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WorleyParsons resources & energy	TANAP TRANS ANATOLIAN NATURAL GAS PIPELINE PROJECT	TANAP

Specification for Reinstatement

Rev	Status	Date	Status Description	Issued by	Checked by	Approved by	TANAP Approval
P3-B	IDC	16-Feb-15	Issued for Inter Discipline Check	PALR / KAMK	WESC	CURM	
P3-C	IFR	10-Mar-15	Issued For Review	PALR / KAMK	WESC	CURM	
P4-0	IAAC	26-Mar-15	Issued As Approved For Construction	CONA	WESC	CURM	
P4-1	IFA	10-Nov-15	Issue For Approval	PALR	WESC	CURM	
P4-2	IAAC	26-Nov-15	Issued as Approved for Construction	MOLP	WESC	CURM	

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REVISION DESCRIPTION SHEET

Rev.	REVISION DESCRIPTION	DATE ISSUED	UPDATE / AMENDMENT DETAILS
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HOLDS

No.	Section	Description	Input From	Planned Date

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1 INTRODUCTION

Reinstatement on pipeline projects historically has not always been adequate, from its environmental sensitivity to visual impact. The TANAP Natural Gas Pipeline Project has a commitment to international standard reinstatement, protecting sensitive environments and minimising the long term visual impact of the works on the landscape.

The reinstatement commitment will be achieved through the planning of soil excavation, storage, and replacement, protection against soil erosion, appropriate replanting, and ongoing monitoring and maintenance of the pipeline.

1.1 Purpose

The objective of this specification is to describe the reinstatement requirements that the Contractor shall adhere to for areas disturbed by work. The specification covers the TANAP ROW and all other project areas that are used to support construction, including (but not limited to) construction camps, pipe lay down areas, maintenance areas, roads and other transport facilities; and waste management and disposal sites. The specification also describes the temporary and permanent erosion control and installation requirements for said features.

The specification describes the methods to be used for removing, storing, and replacing excavated topsoil, subsoil and rock; and for disposing of any of those materials that are surplus to reinstatement requirements. The specification also describes the process for selection of the methods to be used for excavation and blasting. The choice of methods has significant influence on the quantity and character of subsoil/rock to be reinstated or disposed of.

This specification establishes the minimum technical requirements for topographical replacement, stabilization, erosion control and biorestoration of TANAP ROW by Contractor, after the completion of construction works.

1.2 Definitions

Client	TANAP DOĞALGAZ İLETİM A.Ş.
PROJECT	Trans Anatolian Natural Gas Pipeline Project.
EPCM	WorleyParsons Proje Yönetimi ve Mühendislik Limited Sirketi
WORK	Shall mean all and any of the WORKs and / or services and / or materials required to be provided by the Contractor under the Contract with Client.
SHALL AND MUST	Indicates mandatory requirements.
SHOULD	Indicates that a provision is not mandatory, but recommended as good practice.

Contractor	Pipeline of facilities installation Contractor responsible for the work

1.3 Abbreviations

Abbreviation	Definition
BAP	Biodiversity Action Plan
ROW	Right Of Way
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
USEPA	United States Environmental Protection Agency
USLE	Universal Soil Loss Equation
TPO	Third Party Owner

1.4 References

Document Number	Title
WRP-SPC-PPL-PLG-001	Pipeline Construction Specification
CIN-REP-ENV-GEN-017	Biodiversity Action Plan
WRP-DLP-EGG-PLG-002 to 004	Reinstatement of side slopes - typicals
WRP-DLP-EGG-PLG-006	Working Strip - Forest and Environmentally Sensitive Locations
WRP-DGA-PPL-PLG-044	Slope Breaker Arrangement – typical drawing
WRP-DGA-PPL-PLG-045	Slope Breaker Outlet Designs – typical drawing
WRP-DGA-PPL-PLG-046	Slope Breaker Cross Sections – typical drawing
WRP-DGA-PPL-PLG-047	Typical Lined Chute – typical drawing
WRP-DGA-PPL-PLG-048	Typical Drawing – Silt Fence and Straw Bale Barrier
WRP-DGA-PPL-PLG-050	Erosion Control Matting Installation – typical drawing

WRP-DGA-PPL-PLG-051	Sediment Trap/ High Flow Containment Pond – typical drawing
WRP-SPC-PPL-PLG-030	Pipeline River Crossing Civil Protection Works Specification
WRP-DGA-PPL-PLG-034	Typical Drawing - Riverbank Protection - Riprap Revetments Rvx1, 2 & 3
WRP-DGA-PPL-PLG-035	Typical Drawing - River Bank Protection - Gabions Revetments
WRP-DGA-PPL-PLG-035	Typical Drawing - River Bank Protection - Gabion Revetments And Bed Protection
WRP-DGA-PPL-PLG-036	Typical Drawing - River Bank Protection - Bio-Restoration
WRP-DGA-PPL-PLG-037	Typical Drawing - River Scour Protection Sill Rvx1, 2 & 3 Major
WRP-DGA-PPL-PLG-038	Typical Drawing - Riverbed Scour Protection Sill- Rvx3b And Rvx4a
WRP-DGA-PPL-PLG-039	Typical Drawing - River Scour Protection - Flood Protection Bund With Rip Rap Facing
WRP-DGA-PPL-PLG-040	Typical Drawing - River Scour Protection - Groyne With Rip Rap Facing
WRP-LST-PPL-PLG-003	River Crossing Reinstatement and Scour Protection Schedule
CIN-REP-ENV-GEN-010-18	Trans Anatolian Natural Gas Pipeline, Soil Contamination Baseline Study Report
CIN-REP-ENV-GEN-010-16	Trans Anatolian Natural Gas Pipeline, Surface Water Quality Baseline Report
TNP-REP-ENV-GEN-002	Environmental and Social Impact Assessment (ESIA) Report

1.5 Codes and Standards

The design, materials, workmanship, installation and restoration of the pipeline system shall comply with the requirements of the Turkish laws, regulations and any other applicable legislation.

Additionally the following standards shall be complied with:

European Parliament and of the Council

- EU Environmental Liability Directive (2004/35/EC)
- EU Waste Framework Directive (2006/12/EC)
- EU Water Framework Directive (2000/60/EC)
- EU Groundwater Directive (2002/118/EC)
- EU Directive on Nitrates from Agricultural Sources (91/676/EEC)
- EU Integrated Pollution Prevention and Control Directive (2008/1/EC)

Ministry of Housing Netherlands, Spatial Planning and the Environment, Soil Remediation Circular (2009)

Ministry of Environment and Urbanization of The Turkish Republic, 2010, Regulation on Control of Soil Pollution and Contaminated Lands by Point Sources, Ankara.

Ministry of Environment and Urbanization of The Turkish Republic, Regulation on Control of Hazardous Wastes, Ankara.

2 REINSTATEMENT AND CLEAN-UP PRINCIPLES

2.1 Reinstatement Objectives and Deliverables

The project recognises the importance of the reinstatement of the pipeline. Site restoration and reinstatement should take into account natural processes, operational requirements and technical feasibility, to deliver post-construction land conditions as similar as possible to those prior to construction or as agreed with the relevant authorities and/or landowner.

The objective is that the pipeline should be capable of supporting the same kinds and intensities of land use that existed prior to the project. Land use in this sense includes not only agriculture, but extends to other uses such as grazing, forestry, and watershed. Reinstatement begins with the stockpiling of topsoil as one of the first steps of construction, and ends when the topsoil is replaced, seeded (or replanted), and protected against erosion with erosion protection works such as slope breakers, drainage and protection of river banks. Collaboration and cooperation with farmers and land managers is important for the successful reinstatement.

Disturbed areas within the pipeline ROW will be reinstated to pre-construction condition surveys and reinstatement plan to the greatest practical standards, the requirements of the project ESIA, the Contract Documents and to the satisfaction of EPCM.

Specific objectives of site reclamation and restoration are:

- Achieve long-term stabilisation against erosion;
- Restore the hydrological regime and reinstate natural drainage pattern
- Return the land to its original contours and minimise the visual impact of the reinstated land such that it is compatible with the surrounding landscape;
- Avoid import of foreign material where possible (e.g. reuse site won materials);
- Topsoil will be replaced carefully to encourage vegetation growth and revegetate sites with suitable native plant species;
- Restore habitats and ecological processes affected by the construction works to their original status;
- Discourage illegal/increased access to previously inaccessible areas through the removal of temporary construction roads and appropriate use of fencing and other measures to restrict access to the pipeline ROW;
- Remove and dispose of excess excavated material in line with local regulations;
- Ensure that sites are suitable for future use;

The Contractor shall manage reinstatement and restoration in accordance with the ESIA, the Pipeline Construction Specification and appropriate third party requirements.

The Contractor shall prepare site-specific Reinstatement Plans in line with the above purpose and objectives subject to approval by EPCM prior to construction. Additionally the Contractor shall provide plans and method statements for specific activities relevant to the reinstatement including but not limited to:

- Installation of Soil Erosion Protection (including trench and slope breakers and outlets, erosion matting, crushed rock, lined chutes, riprap, gabions and gully remediation measures)
- Topsoil Removal and Storage
- Subsoil Removal ad Storage
- Trench Excavation and Padding
- Reinstatement of Soils
- Reinstatement of Side Slopes and Steep Slopes
- Reinstatement of Narrow Ridges
- Reinstatement of Topsoil
- Erosion and Sediment Control (including silt fences, straw bale barriers, wooden fences any other sediment interception)
- Water disposal
- Biorestoration including detailed scheduling, plant species protection of plant materials, aftercare, monitoring and corrective action
- Reinstatement in karstic areas
- Reinstatement in areas of thin topsoil cover
- Reinstatement of land other than TANAP ROW (including AGIs, construction support facilities, spoil disposal sites, access and existing roads)

These documents shall be prepared in a timely manner and shall be approved by EPCM prior to any construction works.

2.2 Third Party Activities

The Contractor is responsible to reinstate any and all areas disturbed during the project works irrespective of their location or proximity to the ROW.

Contractor shall fully reinstate any land disturbance due to third party assets/activities where that disturbance is:

(1) within the TANAP ROW; or

(2) close to the TANAP ROW or project area where reinstatement is necessary in order secure the effective reinstatement of the project area.

The above principle applies to third party pipelines, railways, roads and buildings but is not limited to these examples.

The reinstatement shall also be based on applicable sections of the ESIA (Document No. TNP-REP-ENV-GEN-002).

2.3 Clean-up of Sites

Contractor shall, after backfilling and before replacement of topsoil, clean-up all areas affected by construction operations. That shall include removal of all plant, equipment and materials not required for replacement of soil and subsequent biorestoration.

In pre-developed areas (either for agriculture or industry) the cleaned condition shall be reinstated in accordance with this specification. The strategy for the remediation of contaminated land identified within the ESIA and the Contract Documents are not covered by this specification and reference should be made to Contract Documents.

Clean-up shall be accomplished to the satisfaction of EPCM and shall as a minimum be to the documented standard and quality of the adjacent and adjoining land, and shall be of suitable materials reused and or replaced in accordance with the land use as defined by the Environmental Standards under the Contract.

2.4 Third Party Properties

The pipeline will encounter numerous third party properties, services and facilities over its length. The Contractor is responsible for identifying properties, services, and facilities, marking and protecting them, and reinstating them to the third party owner's (TPO) requirement as agreed between the TPO and the EPCM. The Contractors' responsibilities for third party properties, services, and facilities, are set out in the Pipeline Construction Specification , Document No. WRP-SPC-PPL-PLG-001.

2.5 Critical Habitats

Critical habitats were identified in the Environmental and Social Impact Assessment (ESIA) (Document No. TNP-REP-ENV-GEN-002) and Biodiversity Action Plan (BAP) (Document No. CIN-REP-ENV-GEN-017). The BAP provides the description of 67 terrestrial and 27 freshwater critical habitats, as well as mitigation and reinstatement measures to be applied in the areas.

In those areas and along water courses and in locations prone to erosion, Contractor shall backfill and re-instate immediately after installation of the pipeline. Also in these areas, Contractor shall fully re-instate in accordance with this specification. This applies to, but is not limited to: new/upgraded roads and tracks, including bridges, helicopter pads, construction camps, maintenance bases and borrow pits / aggregate quarries (if in Contractor's ownership).

2.6 Soil Erosion, Principle and Classification

The loss of soil through the action of natural and manmade processes is termed soil erosion. Soil erosion is both a risk to the pipeline through reduction of cover / support, and a risk to the environment through the relocation of large quantities of sediment causing changes in drainage patterns, soil fertility et cetera. In addition the visual impact of soil erosion on the RoW is a concern.

Erosion during the construction (i.e. from vegetation clearance to completion of reinstatement) shall be managed and mitigated as required by the Contractor. This management will require the separate consideration, using specific and separated handling systems and protocols, for areas of the pipeline corridor which have been identified to be or which are suspected to be contaminated lands, whether by historical use of influence and/or by actions of incidents under the works. The Contractor shall ensure that water courses and ecologically sensitive sites are not affected by soil erosion and the migration of soils. Methods for control of sediment movement during construction and performance criteria are discussed in Section 3.5 of this document. Details of these measures shall be provided by Contractor in the Management Plan subject to approval by EPCM.

Following completion of the reinstatement the Contractor shall monitor the reinstatement. This monitoring period, described in Section 6.10, will depend on the type of reinstatement and mitigation measures employed at each site. The Contractor shall undertake repair and supplementary works as required to ensure the reinstatement is successful. Where ecological restoration is not achieving prescribed rates of establishment the Contractor shall take appropriate measures such as reseed, fertilize, irrigate or change plant type as required.

Table 2.1 below gives the definition of erosion severity classes for overland areas based on historic pipeline projects in similar conditions (i.e. not specific to TANAP). For the temporary as well as permanent case erosion class 2 or better shall be achieved for all slopes where sediment may discharge into a watercourse or ecologically sensitive area, i.e. <5t/ha/year. For other slopes an erosion class of 3 or better (<10 t/ha/year) shall be achieved for reinstatement along the pipeline ROW.

Where there is a risk of sediment contaminating water bodies, sediment control devices and measures shall be installed (see Section 3.5 and 3.6).

As a minimum the following standards shall be achieved:

- very low risk to the pipeline cover; maintain pipeline cover over the design life of the pipeline;
- very low risk of off-site pollution and sedimentation as described in erosion severity class 2 for sensitive sites and severity class 3 for normal sites; and
- low risk of damage to biorestoration by washing-out of seeds and plants as described in erosion severity class 2;

Table 2.1 Erosion Severity Classes

Erosion Class		**Erosion Rate (t/ha/y)**	**Visual Assessment**
1	Very Slight	<2	No evidence of compaction or crusting of the soil. No wash marks or scour features. No splash pedestals or exposed roots or channels.
2	Slight	2-5	Some crusting of soil surface. Localised wash but no or minor scouring. Rills (channels < 25cm deep) every 50-100m. Small splash pedestals where stones or exposed roots protect underlying soil.
3	Moderate	5-10	Wash marks. Discontinuous rills spaced every 20-50m. Splash pedestals and exposed roots mark level of former surface. Slight risk of pollution problems downstream if slope discharge straight into water courses.
4	High	10-50	Connected and continuous network of rills every 5-10m or gullies (channels > 25cm deep or 0.1m^2 in cross-sectional area) spaced every 50-100m. Washing out of seeds and young plants. Danger of pollution and sedimentation problems downstream.
5	Severe	50-100	Continuous network of rills every 2-5m or gullies every 20m. Access to site becomes difficult. Damage to roads by erosion and sedimentation. Siltation of water bodies.
6	Very Severe	100-500	Continuous network of channels with gullies every 5-10m. Surrounding soil heavily crusted. Integrity of the pipeline threatened by exposure. Severe siltation, pollution and eutrophication problems.
7	Catastrophic	>500	Extensive network of rills and gullies; large gullies (> 100m^2 in cross-sectional area) every 20m. Most of original surface washed away exposing pipeline. Severe damage from erosion and sedimentation on-site and downstream.

REF: Use of Terrain Analysis as a Basis for Erosion Risk Assessment Along Pipeline Rights-Of-Way: A Case Study From Georgia – 2004, Morgan, Hann, Shilston, Mirtskhoulava and Nadirashvili, Gasca, Clarke and Sweeney.

3 REINSTATEMENT OF TANAP ROW

3.1 Topsoil Removal and Storage

3.1.1 Objective

Topsoil is defined here as the top, fertile layer of material on the land surface that is capable of supporting plant growth. It contains the seed bank and is therefore an essential component of the revegetation program. Maintenance of topsoil quality, particularly its structure and the integrity of its seed bank, is vital to both biorestoration work and erosion control.

The TANAP ROW shall be reinstated to a sufficient extent in order to allow the affected area to be returned to its pre-project use and productivity. Appropriate maintenance and handling of topsoil is essential to achieving this objective.

Areas of the pipeline corridor identified to be classified as contaminated land is not covered by the specification and reference should be made to the relevant remediation strategy contained in the Contract Documents.

3.1.2 Topsoil Stripping and Storage

Along the TANAP ROW the depth of the topsoil shall be established by Contractor. Procedures shall be developed by Contractor for topsoil stripping in advance of all work fronts. WORK shall not commence until EPCM Approval. Typically, stripping shall be done to a depth of between 100mm and up to a maximum of 300mm. In areas where little or no topsoil is present the Contractor must agree the depth (if any) of topsoil to be stripped with the EPCM's representative.

Topsoil stripping must be undertaken by earthmoving equipment using a toothless cutting edge and no excavator buckets with teeth will be permitted. The Contractor shall use equipment which will minimise the impact on the topsoil structure or has a detrimental effect on the efficiency of the vegetation recovery. The topsoil shall be carefully stripped to its full depth and stored separately from any other soil or materials. Both for stripping and storage, where plant is operating on topsoil it should be preferably low ground pressure equipment. The Contractor shall submit details of plant and procedures for topsoil stripping and storage in a specific method statement to be subject to EPCM approval.

Topsoil shall be stored where it is not compacted by vehicles or contaminated and shall be stored in a manner that minimises its loss and / or degradation. Topsoil shall not be mixed with subsoil, and shall be stored on the opposite side of the TANAP ROW to subsoil; other than in restricted areas where mixing shall be prevented by physical means, e.g. geotextile sheeting. Isolated piles of topsoil shall be clearly signed as 'Topsoil' in Turkish and English.

All soils shall be visually and olfactory inspected prior to stripping and a watching brief will be maintained during all excavation works for potentially contaminated soils / materials. All soils suspected or confirmed to be contaminated will be removed from site and disposed of to a suitably licensed facility. All materials shall be sampled and tested prior to reuse in accordance with the agreed limits of USEPA guidance and Dutch Standards for Soil Contamination.

Contractor shall strip the topsoil over TANAP ROW.

Stripped topsoil shall be kept free from the passage of vehicles and plant following stockpilling. Topsoil and subsoil stacks shall be placed to ensure that they are free draining. Gaps shall be left in the topsoil stack to permit reasonable access across the TANAP ROW.

Topsoil shall be stored in a stockpile not more than 2m high with side slopes <45°, drained with open ditches, and 1 m high in critical habitats (ref: BAP). Topsoil stockpiles must be turned over every 4 months to re-oxygenate and avoid development of anaerobic conditions by turning the soil as required. In areas of very limited working space, topsoil stockpiles of up to 3m high and <45° slope may be permitted with EPCM's approval, but the pile shall be turned every 2 months. The surface of the stockpile shall be lightly compacted (a single pass of light hand compaction equipment) to reduce rainfall penetration but not enough to promote anaerobic conditions. Drainage shall be provided which prevents standing water on or against the stockpile. Where necessary, the stockpile shall be protected from flooding by placing berms/diversions around the perimeter. Under no circumstances shall stockpiled topsoil be used as padding material. In critical habitats topsoil must be replaced within 3 months after the removal (refer to BAP).

During handling, damage to soil structure shall be avoided. Soil handling under wet conditions is to be avoided other than in areas having obviously sandy soils (river banks and possibly locations containing tuff). Construction handling of topsoil is to be delayed 24 hours following a rainfall of 10mm or more during the preceding 24 hour period, after which soil conditions shall be reassessed.

Soil that is plastic when wet should not be worked (i.e. placed, compacted, etc.) until dry. A qualified Geotechnical Engineer or Engineering Geologist should advise of determination of suitability of soil condition for working.

3.2 Subsoil Removal and Storage

3.2.1 Objective

The objective is to manage the subsoil so that it is not subjected to, nor is the cause of, excessive erosion.

The TANAP ROW shall be reinstated to a sufficient extent in order to allow the affected area to be returned to its pre-project use and productivity. Appropriate maintenance and handling of subsoil is essential to achieving this objective.

Any area of subsoil suspected or confirmed through ESIA or on site testing to be contaminated will be stockpiled separately and either removed from site or reused following an appropriate risk assessment of the subsoil to determine the suitability of its reuse in accordance with the agreed limits of USEPA guidance and Dutch Standards for Soil Contamination for the identified land use locally required.

3.2.2 Requirements

The subsoil shall be excavated from the pipe trench and, in some cases, from ridge-top widening or cutting of benches on sides of slopes. In general, subsoil shall be returned to the excavated area. However, in Special Areas (refer to Section 7) subsoil may be required to be removed.

3.2.3 Management of Subsoil

Subsoil that will be reused, (i.e. returned to the trench or corridor TANAP ROW) shall be placed in stockpiles as shown on the typical drawings. In some areas, particularly where there is limited working width, temporary or permanent removal of subsoil from the ROW may be required, to approved locations only. See the Pipeline Construction Specification for details of grading.

Contractor method statements shall prove his stated maximum allowable height and any compaction requirements for temporary stockpiles to ensure safe working. All maximum heights shall conform to the commitment made in the ESIA.

Removed subsoil shall be kept free from the passage of vehicles and plant, and segregated from topsoil stockpiles. Subsoil stockpiles shall be placed to ensure that they are free draining. Gaps shall be left in the stockpile to permit reasonable access across the TANAP ROW and at low areas where surface water may be held against the stack.

The surface of the stockpile shall be lightly compacted (a single pass of light hand compaction plant) to reduce rainfall penetration but not enough to promote anaerobic conditions. Where necessary, the stockpile shall be protected from flooding by placing berms/barriers around the outside.

Contractor shall maintain the integrity of the stockpile during the storage period to the satisfaction of EPCM. Contractor is responsible for the placement of suitable drainage and erosion control measures as necessary.

All subsoils shall be visually and olfactory inspected prior to stripping and a watching brief will be maintained during all excavation works for potentially contaminated soils / materials. All soils suspected or confirmed to be contaminated will be removed from site and disposed of to a suitably licensed facility. All materials shall be sampled and tested proper prior to reuse in accordance with the agreed limits of USEPA guidance and Dutch Standards for Soil Contamination.

3.3 Trench Excavation and Padding

3.3.1 Excavated Material

The creation of surplus excavated material shall be minimized as far as practicable, for example by use of rock-trenching machines. All material that is excavated shall be re-used to the maximum extent practicable. Contractor shall produce a waste minimization statement justifying the extent to which surplus material shall be minimised and reuse maximised.

3.3.2 Blasting

Blasting shall be performed in accordance with WRP-SPC-PPL-PLG-001 Pipeline Construction Specification and BCH-SPC-PPL-PLG-012 Specification for Blasting.

3.3.3 Padding and Backfill

Padding and backfill operations shall be performed in in accordance with WRP-SPC-PPL-PLG-001 Pipeline Construction Specification.

3.3.4 Management of Excess Soil and Rock

Generally, all soil and rock shall be returned to the excavated areas. In some locations, however, there will be surplus subsoil or rock that cannot be returned, and this must be disposed of both safely and in line with the environmental requirements of the Contract and in accordance with the requirements of the project Waste Management Plan.

All surplus materials shall be visually and olfactory inspected, sampled and tested prior to reuse in accordance with the agreed limits of Dutch Standards and USEPA guidance, All soils suspected or confirmed to be contaminated will be removed from site and disposed of to a suitably licensed facility. Contractor retains the same responsibilities for excess soil and rock as for any other waste material as specified in the project documentation and Waste Management Plan.

3.3.5 Priorities for Managing Excess Soil and Rock

In developing a plan to dispose of excess material, Contractor shall follow the priorities for disposal as follows:

1st priority: TANAP ROW Reuse

Where generated spoil is suitable for use as a construction material it shall be first considered for reuse on the TANAP ROW for:

Project infrastructure works materials; stability, erosion control, construction camps, AGIs, etc.

2nd priority: On TANAP ROW Disposal

E.g. simulation of rock streams/glaciers in adjacent areas 1, hillside contour blending. Localized increase in finished surface height of TANAP ROW where approved by EPCM.

Note the special requirements for disposing of material on side-slopes specified in Section 3.4.4

3rd priority: Off TANAP ROW Reuse

Transfer to third Party for re-use purposes as raw or semi-finished materials, e.g. crushed andesite that may be suitable for road construction materials or for rail ballast.

Contractor shall enter into negotiations and agreements with third parties regarding the feasibility, material specifications, terms and conditions for supplying spoil materials off the TANAP ROW as materials acceptable for reuse. Notification of such agreements shall be duly noted and reported to EPCM. The requirements of the project Waste Management Plan regarding waste transfer shall apply.

4th priority: Off TANAP ROW Disposal (permanent soil and rock)

All Off ROW disposal sites are to be agreed prior to use with EPCM, and will be in accordance with the Contractor's approved Project Waste Management Plan.

Spoil shall not be deposited; in valley bottoms, creeks, gully crossings, or sink holes; where they will potentially interrupt concentrated overland flow and where they may form landslides. Earth works management shall be undertaken with consideration for contour restoration.

3.4 Reinstatement of Soils

3.4.1 General

The TANAP ROW shall be reinstated to a sufficient extent in order to allow the affected area to be returned to its pre-project use and productivity. Appropriate maintenance and handling of all soil is essential to achieving this objective.

General reinstatement shall achieve:

- Final surface shall be within +100mm of the level of undisturbed adjacent ground and blended to the existing contours (excluding slope breakers). In certain locations such as side slopes or along narrow ridges site specific reinstatement shall be applied as shown on the AFC drawings or approved by the EPCM representative.
- Planting within pipeline permanent ROW to be approved by EPCM.
- In barren areas, a semi- natural appearance is required: rocks or processed rock may be distributed over the final surface provided the particle size distribution is similar to that of adjacent undisturbed rocks.
- Erosion control measures (if any) may remain visible.
- Water drainage has adequate outfalls and avoids ponding water on the ROW

Upon completion of reinstatement, disturbed areas shall be inspected jointly by Contractor and EPCM for slope stability, relief, topographic diversity, acceptable surface water drainage capabilities, and compaction.

3.4.2 Reinstatement of Subsoil

Two situations are considered: standard reinstatement and special re-instatement.

3.4.3 Standard Reinstatement

On return of the subsoil to the trench the subsoil shall be compacted to a similar density to that in the adjacent undisturbed area, see Pipeline Construction Specification. The depth of subsoil after settlement shall not be above the level of the surrounding ground. After the subsoil has been returned and the land levelled, the subsoil shall be rendered to a loose and workable condition to a depth of 300 – 400mm and contoured in keeping with the adjacent undisturbed ground. Both Contractor and EPCM Environmental Inspectors shall regularly monitor subsoil replacement, compaction and contouring.

Contractor shall provide a detailed method statement for standard reinstatement for approval prior to mobilisation.

3.4.4 Special Reinstatement – Side Slopes

Special reinstatement is applied where it has been necessary to cut a bench into the hillside in order to establish a flat working area from which to lay the pipe. It is the intention where possible to restore the original slope by filling-in the bench, thereby removing any scar in the landscape.

Side-cut topsoil shall be stripped and removed from the area and stockpiled as described in Section 3.1. Both the topsoil and subsoil shall be stored separately. The side slope cut shall be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours (see Section7.2). The subsoil layers shall be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account should subsoil extend beyond the original line of slope or a new slope be created which is steeper than the original slope. Following compaction of the subsoil, the topsoil shall be spread over the site, harrowed and reseeded. The reinstatement of side sloped ROW section shall include drainage measures to avoid erosion taking place across the reinstated ROW. Compaction of the backfilled subsoils shall be sufficient to ensure long term stability of the slope and shall as a minimum match the existing density of the surrounding ground. The reinstatement shall be carried out in accordance with the typical drawings for side slopes unless otherwise approved by the EPCM. In exceptional circumstances where full reinstatement is not possible and the created cut slope will remain, Contractor shall prepare a methodology statement proposing an alternative slope reinstatement solution subject to EPCM approval. This shall set out as a minimum how the long term slope stability, visual impact, and environmental project requirements are met.

3.4.5 Reinstatement of Topsoil

Topsoil shall be segregated and shall not be mixed with spoil material before or during replacement. Topsoil shall be re-spread over the surface of the subsoils. Topsoil shall not be used for bedding material in the trench, and topsoil from unstripped/undisturbed areas shall not be used to cover adjacent disturbances. Topsoil shall not be handled during excessively wet conditions or at times when the ground or topsoil is frozen, unless agreed otherwise with EPCM's representative.

Once the disturbed areas have had subsoils compacted and have been re-contoured, topsoil shall be re-distributed over the entire disturbed areas from which it was stored.

All disturbed areas shall be subject to final grading as specified in Section 3.5; however, measures shall be taken prior to seeding to ensure areas of reinstated topsoil remain rough / tilled, to help protect the stability of topsoil against erosion. On sites where harrowing etc. is not practical (e.g. steep slopes, rocky areas), the sites should be dozer-tracked perpendicular to the slope or otherwise left with adequate roughness following topsoil placement. When the topsoil is replaced over the TANAP ROW, a slightly rough, loosely consolidated texture shall be achieved in order to promote vegetation growth.

Topsoil should be seeded following the seeding regime identified in Table 6.1. In general this will be undertaken using hydroseeding, but for steep slope locations, other techniques and measures will apply, see Section 3.6.

Contractor shall provide a detailed method statement for topsoil reinstatement for approval prior to mobilisation.

3.5 Erosion and Sediment Control during Construction

3.5.1 General

Contractor shall be responsible for employing, to the satisfaction of EPCM, any temporary erosion and sediment control measures in order to protect the TANAP ROW and adjacent areas during construction activities. In the event that the pipeline ditch remains open, Contractor shall ensure trench integrity and employ such measures as temporary ditch breakers, silt fences, straw bales, etc. as necessary.

Temporary ditch breakers are installed in the open trench and are removed before lowering the pipe. Temporary ditch breakers have the purpose of arresting flows inside the trench during construction.

The following temporary erosion control measures shall be incorporated along the TANAP ROW in order to protect the environment and to achieve the performance standards as set out in Section 2.6.

On longitudinal slopes with open trenches, plugs of unexcavated material shall be left in the trench to interrupt surface flow and prevent scouring of the trench bottom.

Tree stumps should be left in place wherever possible to provide soil stabilization.

Drainage channels shall be installed on all longitudinal and transverse slopes as required.

Where slopes require cutting, flumes shall be installed across the TANAP ROW. These shall carry water from drainage sumps on the upslope.

The TANAP ROW shall be monitored and repairs made immediately throughout construction to prevent:

- subsidence of the pipeline trench (below natural grade);
- breaching of diversion berms and slope breakers;
- slope wash from improperly placed berms and slope breakers;
- slumping and soil movements from cut and fill slopes;
- loss of stored topsoil, subsoil or cuttings.
- Pollution of sensitive sites, including watercourses, with displaced sediment as a result of erosion on the ROW.

3.5.2 Sediment Interception

Where the TANAP ROW intersects or is parallel to a watercourse sediment interception shall be provided to prevent sediment entering the water. Sediment interception shall be provided for runoff that may occur during construction and reinstatement activities until the reinstatement has been in place for at least 3 months, and is achieving the requirements of Section 2.6.

Sediment interception devices may take the form of a Silt Fence, Wooden Fence or Straw Bale Barrier. The removal of sediment caught by these measures shall be the responsibility of the Contractor. It should be noted by the Contractor that these forms of construction may be subject to vandalism in some rural areas where the resources used are of value, and as such selection of approach should consider location and access.

3.5.2.1 Silt Fence

Silt fences or other suitable sediment barriers shall be installed in areas of low sheet flow and are installed to intercept runoff on eroding slopes.

The filter cloth is draped over the fence and secured in a 15-cm-deep trench dug one metre uphill. Filter fences installed across the working width should follow a slight gradient towards a natural outlet, waterway, or lined chute, into which they drain.

The following requirements shall be satisfied:

- ponding shall not be allowed behind a silt fence;
- drainage area shall not exceed 0.1 hectares per 30m of fence length;
- for slopes between 2% and 20%, the maximum allowable upstream flow path length shall be 30m;
- for slopes steeper than 20%, the maximum shall be 6m;
- maximum upslope grade perpendicular to the fence line shall not exceed 100%; silt fences shall be used for sheet flow only.

Filter fabric shall meet the following criteria contained in Table 3.1 as a minimum:

Table 3.1 Filter Fabric Criteria

Physical Property	**Minimum Requirements**
Filtering efficiency	75% - 80%
Tensile strength at 20% (maximum) elongation	90kg/ linear metre minimum
Slurry flow rate	0.11 liters/m^3/min

Synthetic fibre shall contain ultraviolet inhibitors and stabilisers and meet the performance criteria for the entire length of installation and the environments encountered.

Filter fabric shall be installed in continuous lengths.

Silt fences shall be inspected daily during periods of prolonged rainfall, immediately after each rain event, and weekly during periods of no rainfall. Any repairs required shall be made immediately.

Sediment shall be removed prior to the sediment reaching 1/3 of the height of the silt fence. Care shall be taken during sediment removal to ensure integrity of the fence is maintained. Sediment collected shall be disposed of in an approved manner.

The silt fence shall not be removed until the upslope area has been permanently stabilised. Any sediment deposits remaining in place after the fence has been removed shall be dressed to conform to the existing grade, prepared and re-vegetated.

3.5.2.2 Straw bale barrier

Straw bale barriers (the term can include hay or other baled vegetative matter) shall be installed in areas where small amounts of temporary sediment interception are required.

Straw bale barriers shall not generally be installed where sediment control is required for periods greater than three months. Where they are installed on the working width, they should follow a slight gradient towards a natural channel, waterway, or lined chute.

The requirement for locations of straw bale barriers along the ROW is to be established during the work jointly between Contractor and EPCM representative. Generally these sediment control areas with slopes >10% shall include:

- areas of protection for longitudinal down slope to water bodies and roads;
- edge of ROW with adjacent down slope water bodies or roads; and
- edge of ROW with adjacent down slope to defined environmentally sensitive areas.

Straw bales shall be bedded into the ground and anchored with reinforcing stakes. Anchors are driven at an angle towards the neighbouring bale so as to tie them firmly together.

The drainage area shall be no greater than 0.1 hectares for each 30m of bale barrier. Straw bale barriers shall not be used in areas of rock or other hard areas, where full and uniform anchoring is prevented.

Straw bale barriers shall be inspected daily during periods of rainfall, immediately after each rain event, and bi-weekly during periods of no rainfall. Any repairs required shall be made immediately. While the life expectancy of bales is not more than 3–6 months, deteriorated bales can be broken up and used as straw mulch or are often left to decompose in place. If non-biodegradable plastic or wire ties are used to bind the bales, these should be removed and disposed of. Straw bales shall not be left in the trench from the point of backfilling.

3.5.2.3 Wooden Fences

Typically subsoil will not be stored in working areas constrained by side slope or narrow ridges, spoil will instead be removed from the working strip and stored in approved temporary stockpiles. The use of wooden fences in areas of side slope and ridge construction to retain cuttings during construction and reinstatement of the TANAP ROW shall be subject to EPCM approval. The requirement for locations of wood fences is to be established during the work jointly between Contractor and EPCM representative.

Contractor shall ensure by calculation that fences are capable of safely supporting the loads imposed. Fences shall be regularly inspected to ensure safe operation and structural integrity. Contractor shall be aware that the use of wooden fences may pose localized problems. In certain areas, firewood is a valuable commodity therefore the fence material may be attractive to locals for firewood.

Fences shall be removed, unless directed otherwise by EPCM, during reinstatement of the TANAP ROW.

3.5.2.4 Water Disposal

Pipeline trenches commonly collect water during construction. Because it may be turbid and sediment laden, trench water shall require filtering before it can be discharged.

Trench water is commonly removed using a pump connected to a 7–10cm diameter flexible hose. Disposal of trench water shall be in accordance with the requirements set out in the Contractor's Environmental and Social Management Plan (ESMP) and the ESIA.

Appropriate measures to prevent erosion and sediments during the disposal of trench water, hydrotest water, or any other water shall be adopted. Such measures are specified in the Contractor's ESMP and all water discharges shall be undertaken in accordance with the requirements of that plan.

3.5.2.5 Crushed Rock

Crushed rock may be required as a temporary measure it serves to reduce muddy conditions and sediment production during construction.

Crushed rock is applicable to locations where vegetation cannot be established and where erosion poses a risk to the pipeline or sediment threatens nearby streams. This also applies to stone dressings outside of the working width: e.g. camps, temporary roads, pipe storage locations, and crew quarters.

As required by local conditions and as agreed with EPCM representative, crushed rock may be used for temporary roadways, turning areas, and other locations from where sediment discharge poses a problem. Particle size to be determined for specific purpose.

Following project completion, temporary areas dressed with crushed rock shall be ripped, fertilized and seeded or planted. These areas shall be subject to the acceptance of EPCM.

3.6 Erosion Control Devices for Reinstated Slopes

3.6.1 General

Careful construction and reinstatement can reduce soil erosion and sedimentation to within manageable limits. Bioremedial and mechanical (hydraulic) methods of controlling soil erosion and sedimentation shall be implemented.

Stabilisation practices are essential on all steeply sloping lands disturbed by construction. Steep sloping ground is considered to be ground inclined at >15% to the horizontal, or shallower ground which through the nature of its topography is expected to be subjected to significant surface water flow.

Mechanical methods of stabilisation include the use of slope breakers, containment ponds, and lined chutes. Slope breakers cross the ROW and serve to contain and remove water runoff from the working width and other disturbed areas. They discharge into soakaway / containment ponds, natural channels, or lined chutes, depending on the situation. Dissipation of the energy anticipated from the flow is necessary. The breakers reduce the length of slope over which water can travel without interruption, but typically require the presence of vegetation to effectively limit the transportation of sediment from the slopes. The bioremedial measures include hydroseeding and hydromulching to revegetate the slopes. For some situations a seed impregnated jute matting will also be utilised to allow the establishment of the specified flora.

3.6.2 Slope Breakers

3.6.2.1 General

Slope breakers are channels constructed across the working width. Their purpose is to remove surface runoff and, acting with vegetation, to protect against soil erosion. Slope breaker details can be seen on Drawing WRP-DGA-PPL-PLG-046, with different types depending on the requirements of the individual slopes. Slope breakers can be temporary or permanent.

Temporary slope breakers are required to be functional for the first 5 years after the pipeline reinstatement takes place, and the construction must allow maintenance to ensure this is the case. Five years is considered sufficient time for the vegetation to be fully established provided suitable reinstatement is undertaken.

Permanent slope breakers (diversion ditches) will be in the form of stone dressed or rock formed slope breakers, Type C or D as shown on drawing WRP-DGA-PPL-PLG-046. These permanent structures and their associated outlets are required to remain functional for the design life of the pipeline (25 years), and the construction must allow maintenance to ensure this is the case.

The shape and dimensions of the slope breakers shall be, where necessary, altered to suit the local topography and runoff situation, following approval from the EPCM's representative. If a spring is intercepted it should be diverted to a lined chute and provision made to drain the slope appropriately.

3.6.2.2 Slope breaker maintenance

Slope breakers shall be inspected and maintained for their design life. Inspection of slope breakers shall be carried out immediately after any significant rainfall event (1 in 2 year return period) within the first month after construction, and at a minimum of every 6 weeks for the first 6 months following construction. After this time inspection shall be as a minimum once every three months until 2 years after the reinstatement is completed. After 2 years slope breaker inspection shall be annual until the breakers are no longer required. Inspection shall identify where slope breakers, or the ground downslope of slope breakers, show signs of rilling and / or the formation of gullies due to failure of the breaker or associated hydraulic control.

Slope breakers may require maintenance over their functional life, as shall be determined during their inspection. This maintenance may include reconstruction, stone lining, deepening, de-silting, or deicing as required, including by shovel in inaccessible areas. Breakers may ice-up and not convey flowing water and care should be taken to inspect and maintain the breakers if necessary (deicing chemicals (e.g., salt) may be used in some circumstances where critical breakers must be made functional, but first check local water discharge regulations).

The shape and dimensions of the slope breakers shall be, where necessary, altered to suit the local topography and runoff situation, following approval from the EPCM's representative. If a spring is intercepted it should be diverted to a lined chute and provision made to drain the slope appropriately.

3.6.2.3 Slope breaker outlets

Slope breaker outlets shall provide disposal of runoff generated along the TANAP ROW. The runoff shall not cause soil erosion or sediment transportation. In areas of predominantly cohesive soils, or any area where permeability is considered likely to be too low for effective soak away, a lined chute will be used in place of slope breaker outlets, see Section 3.6.5.

Outlets shall be installed at the end of each slope breaker, as indicated on drawing WRP-DGA-PPL-PLG-044. Outlets shall dissipate the energy from run off of the TANAP ROW, and allow water to soak away and occasionally over-top the outlet berm without causing excessive erosion of the surrounding slopes.

Two sizes of slope breaker outlets are expected to be required, based on the rainfall catchment feeding into them.

- 2m diameter, 0.5m deep – Standard Outlet;
- 3m diameter, 0.5m deep – Large Outlet.

The shape of the outlets shall be determined on site to suit the local topography, but the volume shall be a minimum of that for the schematic breakers given on the typical drawing.

Lined channels will be required to link the slope breakers to the outlets. The channel lining is to match that of the outlet.

Inspection of the slope breaker integrity, as well as for the condition of the overflow / downslope area for signed of erosion, will be made at the same time as slope breaker inspections, see Section 3.6.2.2. Where required slope breaker outlets will be repaired as necessary, and if significant erosion is observed downslope of the outlet as a result of over topping, the bund height will be increased.

The final installation requirements shall be determined based on the local conditions. Contractor shall provide proposals for all slope breaker outlets to EPCM for approval prior to installation.

3.6.3 Erosion (Jute) Matting

Erosion matting, consisting of jute, shall be installed to provide an immediate protection to the slope against erosion, prevent washing-out of seeds and enhance the micro-climatic conditions in the soil for plant growth.

Erosion matting shall provide temporary protection to the soil surface until sufficient vegetation cover has been established to control erosion and meet the performance criteria as set out in Section 0.

The erosion matting shall be Geojute or similar. The mat shall be biodegradable, open weave 11mm x 18mm mesh size and 2mm thick fibres with a mass/area ratio of 500g/m^2. The mat shall absorb water to 500% of its dry weight on saturation. The mat should rot in approximately two years. For river crossings reinstatement, biodegradable erosion matting shall be Geojute Plus or similar. Contractor shall submit data sheets and samples of the proposed erosion matting for EPCM approval.

Where revegetation is taking place topsoil preparation and grass seeding work shall be undertaken prior to laying erosion matting. The seeding shall match the planting regime described in Section 6.5.

The erosion mat shall be unrolled from the top of the slope, allowing it to lay naturally on the soil surface over all the local undulations. On no account shall the material be taut or stretched so that it forms ‘bridges’ over local soil mounds and stones. Matting shall be fastened to the slope surface as described on typical drawing WRP-DGA-PPL-PLG-050. Unless properly anchored, mats are liable to slip. Uphill ends are to be buried in a 15cm deep slot and stapled per the manufacturer’s recommendation at maximum 30cm centres across the width of the mat. At joints, the downhill end should be overlapped shingle-fashion for 30cm. The uphill end of the new roll is inserted into a 15cm trench and stapled as before. On slopes steeper than 25% check slots should be used every 30m. These are 15cm deep trenches into which a tight fold of matting is inserted. The slot is filled and tamped, and staples are punched.

Following installation, mats should be rolled, if the slope allows, with a smooth hand-roller to bring them into close contact with the soil and to consolidate the seedbed.

Erosion mats, once installed shall be regularly inspected for degradation and installation integrity. Where matting has remained in place for longer than 12 months, Contractor shall be responsible for maintaining and replacing matting as required through the construction and maintenance period.

3.6.4 Crushed Rock

Crushed rock may be required as a permanent erosion control measure at locations where it is impossible to establish vegetation and with prior approval of EPCM. Crushed rock will be used, if necessary, to recreate the surface covering of rock on the adjacent and pre-works slope. If possible the rock used shall be that recovered in the top soil stripping and pipe trench excavation.

3.6.5 Lined Chutes

Lined chutes are channels created to collect and convey runoff to where it can be safely disposed of without erosion. Chutes or waterways serve to receive and concentrate runoff from slope breakers, from small gullies that cross the pipeline right-of-way, and from other areas that require water disposal. Their design is such that channel velocities remain non-erosive, even on steep slopes. The discharge point is to be designed and installed sufficiently to dissipate discharge energy and avoid erosion at the discharge point. See typical drawings WRP-DGA-PPL-PLG-047 and WRP-DGA-PPL-PLG-051 presenting the lined chutes and attenuation pond designs. Lined chutes shall be applied where shown on the alignment sheets or as directed by the EPCM representative.

Commonly, lined chutes are designed to convey water from where springs emerge in the vicinity of the pipeline ROW.

On steep slopes (>25%) lined chutes will contain wicker dams to reduce the potential for high velocity water flow down the slopes.

The chutes, including wicker dams where utilised, shall be inspected and maintained at the same time as the slope breakers, see Section 3.6.2.2.

3.6.6 Geotextile

Geotextile shall be as defined in the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030 (or EPCM-approved equivalent).

Geotextile shall be handled and installed according to the manufacturer’s recommendations, and/ or as shown on the Drawings. Geotextile shall not be stored in direct sunlight. Construction equipment and/ or vehicles shall not be allowed to operate directly on geotextile.

Where geotextile is joined with overlapping joints, a minimum 500 mm overlap shall be allowed at adjoining borders. For geotextile placed on slopes, the geotextile shall be secured at the top of slope by embedding in an anchor trench, as shown on the Project Drawings.

3.7 Proposed Measures

Using slope geometry and assumptions where necessary, mitigation measures have been proposed for each slope using the USLE (see Section 7.4) These measures are presented on the alignment sheets using two codes, one for Bio-remedial measures, and one for the engineered referred to as 'slope breakers'. The codes present predicted measures required to reduce soil erosion to an acceptable level for each slope. The codes are in the following format:

Table 3.2 Bioremediation Code

Code	Description
HM	Hydromulching of slope surface
HS	Hydroseeding of slope surface
BR	BioRemedial scheme, Number identifies which BR from list in Specification for Reinstatement (Table 6.1)

Table 3.3 Slope Breaker Code

Code	Description
TB	Temporary Slope Breaker
PB	Permanent Slope Breaker
- a	Slope Breaker type A
- b	Slope Breaker type B
- c	Slope Breaker type C
- d	Slope Breaker type D
_L	Large breaker dimensions
_S	Standard breaker dimensions
J	Jute Matting

Figure 1 gives an example of the codes provided on the alignment sheets, and some explanatory notes, to be read in conjunction with Table 3.2 and Table 3.3.

Bioremediation Code	Slope Breaker Code
HM+J+BR7a	2TB_S-b10
HM+BR7a	9TB_S-a18+3PB_S-c/d

Size of slope breakers

Spacing between temp slope breakers

Number of temp slope breakers

Bio-remedial scheme number

Number of permanent slope breakers

Slope Breaker type (see typicals drawings WRP-DGA-PPL-PLG-046

Figure 1 - Alignment Sheet Code Example

The first example given in Figure 1 identifies that the slope shall be hydromulched, and have Jute Matting, making use of the seed mix BR7a as described in Table 6.1. It also identifies that 2 temporary slope breakers, of standard dimensions and type ‘b’ shall be constructed at 10m spacing down the slope.

The second example given in Figure 1 has 9 temporary slope breakers of standard size, type ‘a’ at 18m spacing down the slope. It also has 3 permanent slope breakers, type ‘c’ or ‘d’ as appropriate for the slope, and of standard size.

Permanent slope breakers are always used to divide the slopes into equal parts. In the case of the Figure 1 second example this is 3 slope breakers subdividing the slope into 4 sections. Theoretical slope breaker spacing has been presented in Figure 2 for the second example, with Permanent Breakers identified in a schematic with the letter ‘P’ and Temporary Breakers with the letter ‘T’. The temporary slope breakers are spaced between permanent breakers, with an additional breaker included at the crest of the slope (as denoted by T* in Figure 3), which has been included to take account of situations where the surrounding topography may result in discharge onto the steep slope. The requirement for T* temporary breakers shall be judged by the Contractor to the satisfaction of the EPCM’s representative.

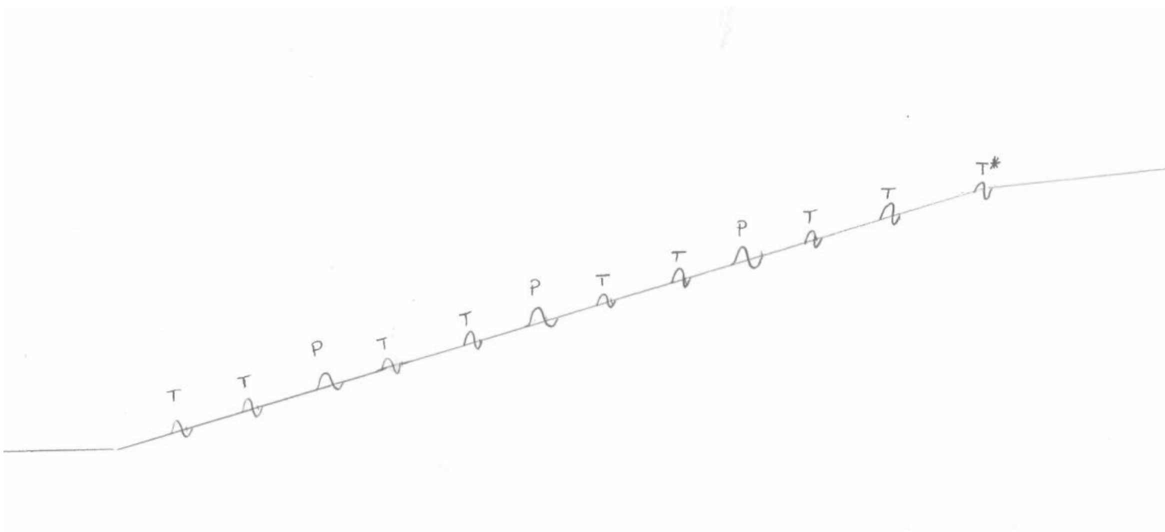

Figure 2 - Example 2 Theoretical Spacing (See Figure 1)

3.8 Assumptions and Site Validation

Where information was not available to undertake the USLE as described in Section 7.42.6, assumptions were made such that the initial proposed soil erosion mitigation measures could be generated for each slope. As not all slopes were visited, these assumptions are significant and relevant to almost all slopes, and must be validated accordingly. The following list of assumptions should be considered for each slope, and the mitigation measures reconsidered if the assumptions are found to be invalidated by the site observations:

- Slope start / endpoint identified using GIS
- Slope angle attributed based on averaging from GIS
- The percentage of slope surface covered by rock-mulch
- Potential for sediment discharge into a watercourse or sensitive site, identified from GIS
- Soil class mix (gravel, sand, silt, clay), currently assumed to be a silt for all sites
- Local topography (is RoW likely to be impacted by flowing groundwater), including requirement for slope creast temporary breaker (Section 3.7)

The assessment of the validity of the assumptions made shall be undertaken by the Contractor, and EPCM representatives on site, and the USLE assessment reworked by the EPCM representative where necessary to modify the mitigation measures to be installed, for the approval of the EPCM.

3.9 Marking of Erosion Control Works

Contractor and EPCM's representative are to walk the pipeline ROW for each steep slope, to validate the design assumptions in the erosion assessment. Following validation, or update of the prescribed erosion mitigation measures, the Contractor and EPCM shall agree the site specific arrangement of mitigation measures, and jointly stake the route with the agreed upon measures immediately prior to clearing and grading of the ROW. Due to the length of the TANAP pipeline and the lot allocation, multiple teams shall be required to perform this function.

3.10 Rip Rap

Rip rap will be required to reinstate specific river crossings. The minimum installation locations are defined in the River Crossing Reinstatement and Scour Protection Schedule Document No. WRP-LST-PPL-PLG-003.

This document shall not limit the location of rip rap installations. Contractor shall identify any additional areas and propose them to EPCM for review and approval.

Rip rap may also be used in areas along the right of way other than at river crossings, Contractor shall install rip rap wherever deemed necessary and suitable to achieve the erosion control requirements or for slope stabilisation.

Rip rap shall be as defined in the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030.

3.11 Rock-filled Gabions

Gabions will be required to reinstate specific river crossings. The minimum installation locations are defined in the River Crossing Reinstatement and Scour Protection Schedule Document No. WRP-LST-PPL-PLG-003.

This document shall not limit the location of gabion installations. Contractor shall identify any additional areas and propose them to EPCM for review and approval.

Gabions may also be used in areas along the right of way other than at river crossings Contractor shall install gabions wherever rip rap is not suitable control measure and deemed necessary to achieve the erosion control requirements or for slope stabilisation.

Rock-filled gabions shall be as defined in the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030.

4 TRENCH BREAKERS

Trench breakers shall be installed within the pipeline ditch at locations along the pipeline route where the natural profile, drainage pattern and backfill materials may cause the trench to act as a drain resulting in the washing out of the bedding material etc. Where the slope is steep trench breakers will assist in the backfilling operation, breaking the trench into shorter sections. Anticipated spacing requirements for slope breakers are identified on typical drawing WRP-DGA-PPL-PLG-041.

Contractor shall install the trench breakers per design. The final installation shall require approval from the EPCM. Allowance for water movement through the trench breaker shall be made by installing pipes through the trench breaker as shown on the typical drawing.

Additionally, impermeable trench breakers are required to control the lateral/horizontal migration of groundwater and/or fluids:

- at bases of slopes adjacent to wetlands and where needed to avoid draining of wetlands,
- to prevent contamination migration, and/or
- reduce suffosion risk in karst terrain

If trench breakers are used for this purpose the drainage pipes shall be omitted.

The materials of construction shall be polyurethane bags filled with sand and cement 10:1 as detailed in the referenced Project Drawings, polyurethane foam (subject to Client approval), or alternative (subject to Client approval).

5 RIVERS

Where required the design of riverbed and riverbank protection shall be in accordance with Project Drawings.

Specific method statements shall be produced by Contractor for all major river crossings, i.e. RVX1, RVX2, RVX3A and RVX8, generic method statements shall be produced by Contractor for each type of minor river crossing i.e. RVX3B, RVX4 to RVX7 for EPCM approval. The method statement shall detail all construction and restoration procedures.

Riparian vegetation (Plant habitats and communities along the river margins and banks) are of high importance to the long term stability of the river. Contractor shall minimise riparian disturbance wherever practicable. Where riparian vegetation consists of shrubs and trees greater than 1m height, Contractor should transplant the plants wherever possible for re-planting during reinstatement works. Where it is not practicable to transplant or translocate the trees then new trees of the same species mix shall be planted. Nursery trees of minimum 2 years old up to 5 year old shall be planted in order to restore the riparian environment, subject to the restrictions of the Planting Proximity Zones.

The Planting Proximity Zones are defined by the following:

- there shall be no trees planted within 6m of the pipeline centreline,

- trees such as Willows (Salix) and Poplar (Salicaceae) or other native species with similarly deep and aggressive root structures shall not be planted within 10m of the pipeline centreline.

- other tree species such as Ash, Alder, Lebanon cedar, larch, beech, elm, sweet chestnut, hornbeam, Turkish Pine, scotts pine, black pine, Kermes oak, Cilician Fir, sycamore, apple, plum, cherry, pear, and also included in this category are most conifers may be planted at a distance of 6m or greater from the pipeline centreline.

Contractor shall plant sufficient density of vegetation to achieve the original plant densities subject to the restrictions of the Planting Proximity Zones. The planting density shall take consideration of die-back rates of each plant.

Where originally present native shrubs shall be re-planted above the pipeline and within the riparian zone, if no shrubs are originally present, Contractor shall introduce shrubs native to the region to provide vegetative stabilisation and erosion protection to the cleared riparian zone 6m either side of the pipeline centreline.

Acceptable plant types, suggestion of planting density and their location relative to the pipeline are outlined in drawings WRP-DGA-PPL-PLG-036-01 – Typical Drawing Riverbank Protection Bio Restoration and WRP-DGA-PPL-PLG-036-02 Typical Drawing River Riparian Restoration.

Bioremediation of river banks shall be undertaken to re-establish vegetation to the equivalence of the adjacent untouched areas. This may include juvenile trees and shrubs the selection of, placement and planting shall be supervised by a competent ecologist and approved by the EPCM. In addition, for erosion protection purposes, the regional planting and seeding regime presented in Section 0 shall also be applied.

Unless stipulated on project documentation river banks shall be restored to their original condition and contours. Where this is not practicable, Contractor shall propose site specific solutions with engineering justification; this shall be included within EPCM approved method statements.

For gravel bed rivers, the armoured bed (the sediment forming the surface layer that is coarser than the underlying sediment) shall be recovered to a minimum depth of 300mm at the start of crossing excavations, stored in a segregated area and replaced as the top layer of bed material during reinstatement.

The backfill over the pipe shall be at least as scour-resistant as the original bed material. Where rock is present the backfill material shall be coherent and with similar properties to the adjacent undisturbed ground, the trench should not create a natural channel for preferential erosion or water run-off nor should it create localised hard areas, with the potential to increase future erosion rates across the watercourse.

The disturbed portion of the river bed shall be returned to pre-construction contours where possible and in compliance with Project Drawings. Any deviations shall be subject to EPCM approval.

Erosion protection and stabilisation measures shall be provided to prevent acceleration of and / or increase in the erosion as a direct or indirect result of the construction activities. Other than sites where civil protection measures are designed e.g. riverbank revetments and riverbed protection, erosion and soil stabilisation measures, when implemented, shall not be intended to permanently alter the pre-construction hydrologic and environmental regimes including natural erosion of the rivers. Trench backfill materials shall meet the requirements of the Pipeline Construction Specification. Any material too wet to be suitable for reinstatement of the banks shall be dried as required to ensure stability during reinstatement.

Erosion and sediment control devices shall be installed and maintained until re-vegetation and/or selected stabilisation measures shown in Project Drawings are sufficiently established and functioning to meet the requirements of "no accelerated" or "increased erosion". Contractor shall detail erosion and sediment control measures to be used in the method statements for EPCM approval and these shall be compliant with the project documentation.

Where erosion matting and/or bio-restoration cannot achieve the project reinstatement performance requirements, or where otherwise indicated on Project Drawings, or as otherwise deemed necessary, erosion protection shall be achieved by the installation of civil protection measures (see Section 3).

Where permanent river bed scour and riverbank protection is required it shall generally be specified on site specific detail drawings and in the River Crossing Reinstatement and Scour Protection Schedule Document No. WRP-LST-PPL-PLG-003. Protection measures shall be implemented as specified. Contractor is required to validate the river crossing reinstatement and scour protection schedule document and where additional protection requirements become apparent during either construction and/ or re-instatement, contractor shall propose additional measures, in accordance with project requirements, for EPCM review and approval prior to implementation.

Requirements for riprap, geotextile, gabions, sills, bunds, groynes etc, including but not limited to material specifications, placement and testing shall be in accordance with Project Drawings, and meet the minimum requirements of the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030.

6 BIORESTORATION

6.1 General

The presence of vegetation reduces the susceptibility to soil erosion, providing canopy cover to the soils and having roots binding the soil. Revegetation in the project area means returning the land to its use prior to construction of the TANAP pipeline. This shall mean planting grasses on highly erodible landscapes, or planting alpine plants and trees if the land is unsuited to grass, to be determined by a competent ecologist on site prior to stripping and grubbing, and to be approved by the EPCM. Privately owned land shall normally be replanted to the pre-existing condition or as agreed with the landowner and EPCM. Trees shall not be planted within an 16 m wide strip centred over the pipe. However, trees may be planted in areas suitable for reforestation, such as the verge of the right-of-way. In addition to the TANAP's working width, its temporary roads and other disturbed areas shall be reinstated by Contractor to the satisfaction of the Landowner and EPCM.

All biorestoration programs shall be approved by EPCM. Landowners shall be consulted by Contractor to assist in developing these programs. Where Landowners requirements cannot be achieved, Contractor shall consult with EPCM to agree final resolution of the issue.

6.2 Objectives

The objectives are: (1) to establish sufficient vegetation cover to reduce erosion to meet the performance requirement of Erosion Class 3 (and in sensitive locations Class 2) or better through restoration of the local plant community, (2) to reinstate with sufficient variety and distribution of appropriate plant species such that over time the local species will re-establish themselves across the ROW.

The long-term cover shall be the native flora with the exception of areas that were planted with crops or other non-native species prior to construction. The biorestoration strategy is based on supplementing the seed bank of local species to remain in the topsoil when it is replaced. These supplementary seeds shall be of fast growing species, sensitive to the local ecology, and that will rapidly provide soil surface cover and limit erosion. All biorestoration materials including seeds and plants are to be supplied by Contractor.

6.3 Requirements

6.3.1 Agricultural/developed areas

In agricultural (defined as arable land) and other developed areas Contractor shall leave the land in the condition specified in the pre-entry agreements. Except where agreed otherwise, Contractor shall assume that the land is to be made ready for re-planting with crops: the land shall be graded and tined to remove compaction. Application of fertilizer and other soil amendments (if needed), and planting on permanent growing areas shall be carried out by the landowner or tenant. Contractor shall, however, seed and maintain all topsoil storage areas as required by Section 3.1, and irrigate all areas to the extent required to suppress dust formation.

6.3.2 Undeveloped areas

A minimum of 70% or the pre-works cover of ground vegetation (based on 100% total without overlapping cover) shall be established within one year of planting. This will minimise surface erosion and provide a sustainable, self-generating plant community under virtually all conditions.

Fertiliser shall be applied where necessary to achieve these target growth rates, as described in Section 6.6.

In areas where third party activities have affected the level of vegetative cover, the original cover shall be determined by reference to adjacent, unaffected areas of similar topography and soil type.

Original percentage cover shall be estimated from Contractor's photographic record of the route, or, in case of doubt, by reference to adjacent undisturbed areas.

The vegetation cover shall be composed of either:

- Species (for example, fast growth types) that are suited to the local environment and indigenous to the region; (The selection of species which do not belong to the same area shall be aligned with sensitivity of the area. For example for critical habitats, there may be certain restriction of importing alien species to the area.), as proposed in Section 6.5
- species originally found in each route section or project area, as determined by competent ecologist on site and approved by the EPCM;
- or an ecologically compatible mixture of those two groups.

Further requirements are given in the following sections.

The biorestoration maintenance, including weeding and grazing control, shall be Contractor's responsibility for a period defined within the Contract.

6.4 Scheduling

Contractor shall carry out biorestoration work in the appropriate growing seasons. Sowing or planting must take place in the appropriate season for the applicable plant types. Contractor shall identify from historical meteorological data suitable weather 'windows' for each area of the route. Biorestoration schedule to be approved by EPCM.

Contractor shall produce a Biorestoration Schedule including pre-construction transplanting or cultivation in addition to post-construction soil preparation, planting and aftercare. Scheduling of the biorestoration shall be aligned with the ESIA requirements and management plans and shall be issued to EPCM for confirmation before being applied.

6.5 Selection of Plant Species

This section refers to the species and form of materials (seed, seed-mix, bulb, or plant etc.) chosen to supplement the seed bank of the topsoil. This section does not apply to agricultural or other developed areas.

The selection of species shall be designed to achieve the objectives defined in Section 6.2. Seed mixes based on localised assessment for all regions along the pipeline are presented in Table 6.1 , but must be verified at each location by a competent ecologist to ensure suitability and compatibility with pre-works and adjacent ecology. This is of particular importance in critical habitat areas.

Contractor shall be responsible for the final choice of species and form of materials for each project area and section of TANAP ROW. Contractor shall refer to specialist advice provided by Specialist Contractor on existing species and their distributions.

Contractor shall produce Site Specific Special Area Reinstatement Plans and Generic Reinstatement Plans describing the quantity of plants/seeds and material forms to be planted for approval by

EPCM. This plan shall include certain mitigations and limitation for critical areas in terms of selection of species and seeds to be used.

Table 6.1 Proposed Seeding Combinations

Biological Restoration Ref. (See alignment sheet codes for allocation to slopes)	Region	Kilometer Point (KP) From (m)	Kilometer Point (KP) To (m)	Elevation (m)	Seeds of the species to be collected	Life Form	Seed collection time	Planting method (see Alignment sheet code)
1a	Ardahan	0	125000	<1500	*Elymus repens*	Herb	July-August	Hydroseed or Hydromulch
					Bromus tectorum	Herb	July-August	
					Bromus racemosus	Herb	July-August	
					Koeleria nitidula	Herb	June-July	
					Phleum phleoides	Herb	July-August	
1b	Ardahan	0	125000	>1500	*Agrostis stolonifera*	Herb	July-August	Hydroseed or Hydromulch
					Bromus tectorum	Herb	July-August	
					Elymus repens	Herb	July-August	
					Hordeum violaceum	Herb	July-August	
					Poa angustifolia	Herb	July-August	
2a	Kars	125000	210000	<2200	*Bromus tectorum*	Herb	July-August	Hydroseed or Hydromulch
					Elymus repens	Herb	July-August	
					Hordeum violaceum	Herb	July-August	
					Koeleria gracilis	Herb	July-August	
					Poa angustifolia	Herb	July-August	
2b	Kars	125000	210000	2200 > slope < 2500	*Bromus tectorum*	Herb	July-August	Hydroseed or Hydromulch
					Hordeum violaceum	Herb	July-August	
					Koeleria gracilis	Herb	July-August	
					Poa bulbosa	Herb	July-August	
					Poa pratensis	Herb	July-August	
2c	Kars	125000	210000	>2500	*Achillea millefolium*	Herb	July-August	Hydroseed or Hydromulch
					Poa pratensis	Herb	July-August	
					Poa araratica	Herb	July-August	
					Poa bulbosa	Herb	July-August	
					Festuca chalcophaea	Herb	July-August	
3a	Erzurum	210000	393000	<1800	*Bromus lanceolatus*	Herb	July-August	Hydroseed or Hydromulch
					Elymus repens	Herb	July-August	
					Hordeum violaceum	Herb	July-August	
					Phleum phleoides	Herb	July-August	
					Poa angustifolia	Herb	July-August	
3b	Erzurum	210000	393000	>1800	*Poa bulbosa* var. *vivipara*	Herb	July-August	Hydroseed or Hydromulch
					Phleum pratense	Herb	July-August	
					Koeleria cristata	Herb	July-August	
					Lolium perenne	Herb	July-August	
					Hordeum violaceum	Herb	July-August	
4a	Erzincan	393000	450000	<1700	*Alopecurus vaginatus*	Herb	July-August	Hydroseed or Hydromulch
					Bromus japonicus	Herb	July-August	
					Fumana procumbens	Herb	July-August	
					Coronilla orientalis	Herb	June-July	
					Trigonella monantha	Herb	June-July	
4b	Erzincan	393000	450000	1700 < slope > 2100	*Phleum montanum*	Herb	July-August	Hydroseed or Hydromulch
					Koeleria macrantha	Herb	July-August	
					Chrysopogon gryllus	Herb	July-August	
					Alopecurus vaginatus	Herb	July-August	
					Scabiosa argentea	Herb	July-August	
4c	Erzincan	393000	450000	>2100	*Bromus cappadocicus*	Herb	July-August	Hydroseed or Hydromulch
					Hordeum violaceum	Herb	July-August	
					Koelaria cristata	Herb	July-August	
					Phleum pratense	Herb	July-August	
					Poa bulbosa	Herb	July-August	

Biological Restoration Ref. (See alignment sheet codes for allocation to slopes)	Region	Kilometer Point (KP) From (m)	Kilometer Point (KP) To (m)	Elevation (m)	Seeds of the species to be collected	Life Form	Seed collection time	Planting method (see Alignment sheet code)
5a	Bayburt & Gumushane	450000	495000	all	*Bromus erectus*	Herb	July-August	Hydroseed or Hydromulch
					Poa nemoralis	Herb	July-August	
					Artemisia chamaemellifolia	Herb	July-August	
					Poa alpina	Herb	July-August	
					Festuca pratensis	Herb	July-August	
5b	Bayburt & Gumushane	495000	580000	all	*Alopecurus myosuroides*	Herb	July-August	Hydroseed or Hydromulch
					Bromus erectus	Herb	July-August	
					Koeleria cristata	Herb	July-August	
					Poa nemoralis	Herb	July-August	
					Artemisia chamaemellifolia	Herb	July-August	
6	Erzincan (2)	580000	605000	all	*Alopecurus vaginatus*	Herb	July-August	Hydroseed or Hydromulch
					Bromus japonicus	Herb	July-August	
					Fumana procumbens	Herb	July-August	
					Coronilla orientalis	Herb	June-July	
					Trigonella monantha	Herb	June-July	
7a	Sivas	605000	840000	<1400	*Artemisia austriaca*	Herb	July-August	Hydroseed or Hydromulch
					Aegilops umbellulata	Herb	July-August	
					Bromus japonicus	Herb	July-August	
					Elymus elongatus	Herb	July-August	
					Poa bulbosa	Herb	July-August	
7b	Sivas	605000	840000	1400 < slope > 1600	*Artemisia austriaca*	Herb	July-August	Hydroseed or Hydromulch
					Aegilops umbellulata	Herb	July-August	
					Bromus inermis	Herb	July-August	
					Poa bulbosa	Herb	July-August	
					Poa trivialis	Herb	July-August	
7c	Sivas	605000	840000	1600 < slope > 1700	*Poa bulbosa*	Herb	July-August	Hydroseed or Hydromulch
					Poa alpina	Herb	July-August	
					Lolium perenne	Herb	July-August	
					Koeleria cristata	Herb	July-August	
					Hordeum murinum	Herb	July-August	
7d	Sivas	605000	840000	1700 < slope > 1900	*Poa bulbosa*	Herb	July-August	Hydroseed or Hydromulch
					Poa alpina	Herb	July-August	
					Lolium perenne	Herb	July-August	
					Koeleria cristata	Herb	July-August	
					Hordeum murinum	Herb	July-August	
7e	Sivas	605000	840000	>1900	*Koeleria cristata*	Herb	July-August	Hydroseed or Hydromulch
					Phleum exaratum	Herb	July-August	
					Poa angustifolia	Herb	July-August	
					Poa bulbosa	Herb	July-August	
					Poa pratensis	Herb	July-August	
8a	Yozgat	840000	1010000	< 900	*Xeranthemum annuum*	Herb	June-July	Hydroseed or Hydromulch
					Bromus japonicus	Herb	June-July	
					Chrysopogon gryllus	Herb	July-August	
					Poa bulbosa	Herb	July-August	
					Poa pratensis	Herb	July-August	
					Lolium perenne	Herb	July-August	
8b	Yozgat	840000	1010000	900 > slope < 1200	*Bromus japonicus*	Herb	June-July	Hydroseed or Hydromulch
					Chrysopogon gryllus	Herb	June-July	
					Poa bulbosa	Herb	July-August	
					Poa pratensis	Herb	July-August	
					Stipa bromoides	Herb	July-August	
					Xeranthemum annuum	Herb	July-August	

Biological Restoration Ref. (See alignment sheet codes for allocation to slopes)	**Region**	**Kilometer Point (KP) From (m)**	**Kilometer Point (KP) To (m)**	**Elevation (m)**	**Seeds of the species to be collected**	**Life Form**	**Seed collection time**	**Planting method (see Alignment sheet code)**
8c	Yozgat	840000	1010000	> 1200	*Xeranthemum cylindraceum*	Herb	June-July	Hydroseed or Hydromulch
					Bromus japonicus	Herb	June-July	
					Chrysopogon gryllus	Herb	July-August	
					Poa bulbosa	Herb	July-August	
					Stipa bromoides	Herb	July-August	
9a	Kirsehir	1010000	1017500	all	*Xeranthemum annuum*	Herb	June-July	Hydroseed or Hydromulch
					Bromus tomentellus	Herb	June-July	
					Poa bulbosa	Herb	June-July	
					Bromus japonicus	Herb	June-July	
					Artemisia santonicum	Herb	July-August	
9b	Kirsehir	1017500	1035000	all	*Aegilops cylindraceus*	Herb	July-August	Hydroseed or Hydromulch
					Bromus sterilis	Herb	June-July	
					Cynodon dactylon	Herb	July-August	
					Elymus hispidus	Herb	July-August	
					Poa pratensis	Herb	July-August	
10a	Kirikkale	1035000	1450000	all	*Aegilops cylindraceus*	Herb	July-August	Hydroseed or Hydromulch
					Bromus sterilis	Herb	June-July	
					Cynodon dactylon	Herb	July-August	
					Elymus hispidus	Herb	July-August	
					Poa pratensis	Herb	July-August	
					Festuca valesiaca	Herb	July-August	
					Phleum montanum	Herb	July-August	
10b	Kirikkale	1450000	1098000	all	*Aegilops cylindraceus*	Herb	July-August	Hydroseed or Hydromulch
					Bromus japonicus	Herb	June-July	
					Elymus hispidus	Herb	July-August	
					Festuca valesiaca	Herb	July-August	
					Poa pratensis	Herb	July-August	
11	Ankara	1098000	1125000	all	*Poa pratensis*	Herb	July-August	Hydroseed or Hydromulch
					Bromus tectorum	Herb	July-August	
					Hordeum bulbosum	Herb	July-August	
					Elymus elongatus	Herb	July-August	
					Trachynia distachya	Herb	June-July	
					Festuca callieri	Herb	July-August	
12	Eskisehir	1125000	1250000	all	*Chrysopogon gryllus*	Herb	July-August	Hydroseed or Hydromulch
					Bromus tectorum	Herb	July-August	
					Phleum pratense	Herb	July-August	
					Lolium perenne	Herb	July-August	
					Poa bulbosa	Herb	July-August	

Biological Restoration Ref. (See alignment sheet codes for allocation to slopes)	Region	Kilometer Point (KP) From (m)	Kilometer Point (KP) To (m)	Elevation (m)	Seeds of the species to be collected	Life Form	Seed collection time	Planting method (see Alignment sheet code)
13	Eskisehir	1250000	1405000	all	*Elymus repens*	Herb	July-August	Hydroseed or Hydromulch
					Bromus tectorum	Herb	July-August	
					Bromus racemosus	Herb	July-August	
					Koeleria nitidula	Herb	June-July	
					Phleum phleoides	Herb	July-August	
14a	Kutayha - Bilecik	1405000	1473000	>1100	*Aegilops umbellulata*	Herb	June-July	Hydroseed or Hydromulch
					Bromus hordeaceus	Herb	June-July	
					Bromus tectorum	Herb	June-July	
					Poa annua	Herb	June-July	
					Poa angustifolia	Herb	June-July	
14b	Kutayha - Bilecik	1405000	1473000	<1100	*Aegilops geniculata*	Herb	June-July	Hydroseed or Hydromulch
					Bromus tectorum	Herb	June-July	
					Chrysopogon gryllus	Herb	June-July	
					Cynodon dactylon	Herb	June-July	
					Poa bulbosa	Herb	June-July	
15a	Bursa-Balikesir	1473000	1670000	<200	*Dactylis glomerata*	Herb	June-July	Hydroseed or Hydromulch
					Cynodon dactylon	Herb	June-July	
					Bromus scoparius	Herb	June-July	
					Bromus tectorum	Herb	June-July	
					Avena barbata	Herb	June-July	
15b	Bursa-Balikesir	1473000	1670000	200 < slope > 450	*Aegilops geniculata*	Herb	June-July	Hydroseed or Hydromulch
					Bromus diandrus	Herb	June-July	
					Bromus tectorum	Herb	June-July	
					Poa bulbosa	Herb	June-July	
					Lolium perenne	Herb	June-July	
15c	Bursa-Balikesir	1473000	1670000	450 < slope > 600	*Dactylis glomerata*	Herb	June-July	Hydroseed or Hydromulch
					Poa pratensis	Herb	June-July	
					Poa bulbosa	Herb	June-July	
					Festuca rubra	Herb	June-July	
					Trisetum flavescens	Herb	July-August	
15d	Bursa-Balikesir	1473000	1670000	>600	*Poa bulbosa*	Herb	June-July	Hydroseed or Hydromulch
					Poa nemoralis	Herb	June-July	
					Poa pratensis	Herb	June-July	
					Festuca rubra	Herb	June-July	
					Trisetum flavescens	Herb	July-August	
16	Canakkale	1670000	1757512	All	*Bromus diandrus*	Herb	June-July	Hydroseed or Hydromulch
					Bromus hordeaceus	Herb	June-July	
					Poa annua	Herb	June-July	
					Poa bulbosa	Herb	June-July	
					Dactylis glomerata	Herb	June-July	
17	Edirne	1757512	End	All	*Bromus diandrus*	Herb	June-July	Hydroseed or Hydromulch
					Bromus hordeaceus	Herb	June-July	
					Poa annua	Herb	June-July	
					Poa bulbosa	Herb	June-July	
					Dactylis glomerata	Herb	June-July	

6.5.1 Rare plants

Rare plants shall be dealt with in accordance with the mitigation measures detailed in the BAP. In addition to flora, there may be certain fauna which make a habitat critical; in this case certain limitations shall be applied to the seed selection.

6.5.2 Species selection

Where rapid growth is necessary for erosion control or other reasons, the species selected for initial planting shall have the following be compatible with the area required to be erosion controlled:

- dense, fibrous horizontal root structure close to the surface;
- dense uniform ground cover, particularly during the season of the most intense rainfalls;
- resistant to damage by high-velocity run-off;
- resistant to damage from trampling by people and animals; not persistant – to allow the original species to re-colonize the area;
- if possible, not clumpy or tussocky as this may lead to concentration of run-off between the plants.
- Not to be invasive, or harmful to grazing farmstock.

The species selected for long-term growth shall reflect the variety and distribution pattern of the pre-construction flora.

6.6 Fertiliser

Fertilizer shall be applied to disturbed surfaces, as necessary, where vegetation is to be seeded or planted.

Fertilization should be applied during hydroseeding and hydromulching process. The fertilizer should contain 4.0% Fe, 3.0% Mn, 0.1% Mo, 2.0% Zn. The amount of fertilizer should be 25 kg per 1000 m^2. The Contractor shall ensure that this fertilizer is appropriate for each location, or vary the fertilizer if necessary following approval from the EPCM. Local advice (universities, agronomists, and landowners) and advice from the Ministries of Agriculture or Forestry should be obtained to confirm or revise the stated fertilizer application rates at specific locations.

Fertilizer varies chemically and physically, with its greatest variability occurring among nitrogen fertilizers. Fertilizers having high solubility and motility are unsuited to highly mobile construction as practiced by the pipeline industry. The project requires fertilizer that can be applied during reinstatement and that remains active during periods of maximum plant requirements, especially during periods of rapid vegetative growth. Fertilizer broadcast as a top dressing during seeding is generally unsuited for the following reasons:

1. Seedlings during their growth establishment period have low soil nutrient requirements.
2. Autumn-sown wheat does not enter rapid vegetative growth until spring following snowmelt, about 100 days following sowing.
3. Urea, an amide-type fertilizer, may volatilize if applied to the surface. (Biuret, an impurity occasionally found in urea, may be toxic to some plants.)

4. Fertilizers not adsorbed by soil colloids may leach. Fertilizer types particular prone to leaching include nitrate types (sodium nitrate, calcium nitrate) and urea. Ammoniacal types (ammonium sulphate and ammonium chloride) adsorb onto soil colloids but have low nitrogen content and high production costs compared to other forms.

The TANAP project is best suited to combination fertilizer types, such as ammonium sulphate nitrate or calcium ammonium nitrate. Market conditions and local advice is crucial to selecting the type of fertilizer to be applied. Landowner requirements must also be taken into consideration. Reinstatement practices may require adjustment if fertilizer application is to be effective.

6.6.1 Placement of fertiliser

Problems can be avoided if fertilizer is mixed into the topsoil. This effect would be similar to injecting fertilizer into the soil, albeit its depth if broadcast would be deeper than injection as it is currently practiced. Indeed, in-depth placement or mixing may be the only practical way of applying urea if that is the only fertilizer available to the project. Advice from the Ministry of Agriculture should be sought.

6.7 Procedures to be Followed by Contractor

Depending on the type of vegetation being reinstated, one or more of the following procedures for re-vegetation can be adopted:

- sowing of grass seeds - procedure ‘G1’;
- planting of shrubs / tree whips at 1m centers - procedure ‘P1’;
- planting shrubs/tree whips at 2m centers in a lunette (micro basin) - procedure ‘P2’.

The procedure for each of the above is described below.

6.7.1 Procedure G1 for grass seeding

For vegetation to protect adequately against soil erosion, it needs to be seeded at adequate densities and using methods that ensure a dense growth. Seeding methods and species to be used shall be specified in the project specific Reinstatement Plans and Procedures and in Special Area Reinstatement Method Statements. Proposed seed mixes and quantities have been presented in Section 6.5, for use on site following site specific validation from competent ecologist.

Contractor is to provide and transport grass seeds from reputable suppliers. If temporary storage is necessary, cool and dry conditions shall be provided. The delivery by the supplier shall include a datasheet identifying the type of seed and the ‘use by’ date. Seed shall be purchased in accordance with the Pure Live Seed specifications (or its Turkish equivalent) for seed mixes and used within 12 months of testing. Legume seed shall be treated with a species-specific inoculant. Other alternative seed mixes specifically requested by the landowner or land managing agency may be used. Data sheet to be provided to EPCM for approval prior to use.

Chisel harrow the topsoil to a depth of not more than 100mm. On slopes up to 20%, harrowing can be carried out mechanically up-and-down slope; the narrow width of the TANAP ROW will prevent contour cultivation. Use hand tillage on steeper slopes.

In general, broadcast grass seeds at a rate of not less than 600 kg/ha. If the supply of any particular species is limited, EPCM may adjust this specification down to a value of 500kg/ha and shall advise Contractor accordingly in advance of biorestoration commencing in the area affected. The seed mix as identified in Table 6.1 shall be applied in equal portions.

Lightly harrow (chain harrow or similar) the soil to a depth of 25-50mm to bury the seed in a loose tilth.

In locations where neither erosion matting nor hydromulching is specified, mulch or windrowed vegetation from clearance operations shall be re-distributed over the seeded ground.

Following seeding the reinstated slopes shall be watered for a minimum of 5 litres per square metre. The application of water should be gradual, in at least two passes not within 10 minutes of each other, and the watering process shall be undertaken in a fashion that will not to bring the seeds to surface.

If seeding is carried out in spring, watering should be repeated every ten days. Watering interval should be shortened to be once a week with the increase of the air temperature (>20 degrees centigrade) and eventually it should be adjusted as to be every 4-5 days in summer. Watering should be continued until the beginning of flowering period.

If seeding is carried out in summer, watering should be every four days. Watering frequency shall be increased if extreme temperatures (>35 degrees centigrade) prevail in summer. Watering should be continued until the beginning of flowering period.

If seeding will be carried out in autumn, watering should be once a week. This should be continued until the beginning of the autumn rains.

In sections where livestock may be present a stock-proof fence shall be erected along the boundaries of the seeded area. Along the TANAP ROW, in long seeded sections, cross fences shall be erected at intervals of approximately 30m, but stopped short of the full width to allow for access.

Seeding should be done either with a seed drill, hydroseeding, or hydromulching. If sowing is seasonally out of phase, then an application of mulch is required on moderately high and highly erodible soils on slopes steeper than 15%, where seed should be applied in combination with mulch, chemical stabilizer (for some types of mulches), fertilizer, and irrigation.

Hydromulching shall be used on slopes >20%, using straw and a suitable tackifier such as bitumen. The seed mix shall be either broadcast prior to mulching, or included within the mulch, as advised by specialist subcontractor, and approved by the EPCM.

6.7.2 Procedure P1 for shrub planting

A requirement of a minimum of 70% of the pre-existing shrub community (based on number of individuals) established within one year of planting shall be set. If below-average rainfall is experienced, or where soil is lacking in nutrient, or where there are slopes of 25% or greater, a minimum of 50% cover (50% of the original cover where original cover <70%) shall be achieved in the first year with 70% occurring after the end of the following year. In r areas where third party activities have affected the level of vegetative cover, the original cover shall be determined by reference to adjacent, unaffected areas of similar topography and soil type.

Contractor shall provide and transport plants and fertilizer from reputable suppliers. The delivery by the supplier shall include a datasheet identifying the type of shrub and the ‘use by’ date. The roots shall be kept moist. Avoid excessive handling of the stems and roots since this will cause damage. Data sheet to be provided to EPCM for approval prior to use.

Plant shrubs on a 1 m x 1 m spacing (or as advised by the Specialist Contractor), arranged en echelon, in the following steps:

- clear the land of any vegetation around each planting position;

- dig a hole large enough to take the roots of the plant when spread out;
- place fertilizer as supplied in the hole;
- place the shrub in the hole and backfill with soil;
- if necessary to keep upright, support the shrub by tying to a stake;
- water the plant.

In locations where erosion mat is not specified, mulch or windrowed vegetation from clearance operations shall be re-distributed around the shrubs.

6.7.3 Procedure P2 for shrub / tree whip planting (Option – EPCM approval required)

In semi-desert areas the shrub spacing shall be 2m x 2m. Excavate the soil around the plant to form a crescentic berm (maximum height of 300mm, diameter approximately 2m) on the down slope side, horns pointing upslope, to create a basin (lunette) in which runoff can be trapped (see Figure 3).

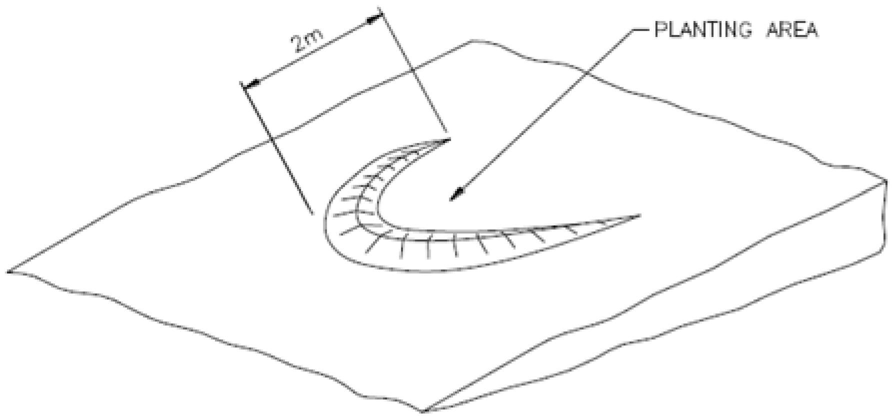

Figure 3 Micro-Basin or Lunette to Trap Runoff Water

6.7.4 Interior plains and plateaus

In general, cereals on slopes less than 15% would not be mulched following hydroseeding. An exception applies to cereals planted out of phase with the agricultural calendar, when a light straw mulch shall be applied.

6.7.5 Mountains and foothills

Slopes steeper than 25% require a heavy mulch, regardless of the situation; slopes less than 25% require a light mulch if they are seeded out of phase with the agricultural calendar. An exception is areas to be reforested in conglomerate-derived soils, where planting basins or terraces following regional forestry practices replace the mulch requirement.

6.7.6 Mulches and Jute Matting

Where detailed on the alignment sheets, both hydromulching and jute matting will be used as part of the reinstatement works. Table 6.2 presents recommended options for jute matting and mulches and application details. Table 6.3 presents anchoring details.

Table 6.2 Types of Mulches and Jute Matting, Application Details

Mulch	Quality standards	Application rate (T ha^{-1})	Application Constraints		Remarks
			Interior Plains & Plateaus	**Mountains & Foothills**	
Light mulch Compost or straw manure	Well shredded, free from excessive coarse material	6–8	Unsuited	Unsuited to slopes steeper than 8%	Excellent moisture conservation. Resistant to wind blow.
Hay or straw	Air dried, shredded into 20–30cm lengths	4	Unsuited to slopes steeper than 16%	Unsuited to slopes steeper than 8%	Effective for more than three months. Requires anchoring (use stapled netting)
Heavy mulch Straw power mulch with emulsion tackifier	Air dried straw Bitumen emulsion	3–7 0.25L/m2	16% < suited < 50%	8% < suited < 50%	Does not withstand traffic. Breaks down in one season or less.
Jute mat	Undyed and unbleached, plain weave jute fabric	See Section 4.6.5	No hillslope limitation. Avoid channels bearing fully turbulent flow (i.e. erosive Reynolds number >70)	No hillslope limitation. Avoid channels bearing fully turbulent flow. (i.e. erosive Reynolds number >70)	Decomposes within 1 yr; bonds with soil

Mulch	Quality standards	Application rate (T ha^{-1})	Application Constraints		Remarks
Excelsior mat	Wood excelsior, 6–12mm thickness Straw, hay, other	Manufacturer's recommendations	In addition to the above, avoid locations subject to fire risk (e.g. near rail lines).	In addition to the above, avoid locations subject to fire risk (e.g. near rail lines)	Requires fire resistance. Mats thicker than 12mm inhibit seedling emergence
Hydro-mulching using mix of seed, fertilizer, and fiber mulch in suspension			No hillslope limitation. Avoid channels bearing fully turbulent flow (ie erosive Reynolds number >70)	No hillslope limitation. Avoid channels bearing fully turbulent flow (i.e. erosive Reynolds number >70)	Apply organic mulches (hay, straw) separately using a blower after hydro-seeding.

Table 6.3 Anchoring Methods for Matting

Anchoring method	Material / technique	Mulch technique	How to apply
Manual	Peg and twine	Hay, straw	After mulching, drive 4–6 stakes per square meter to within 5cm of the ground. Secure criss-cross of twine taking two turns around each peg.
Manual stapler	Mulch netting	Hay, straw	Staple paper, jute, wood fiber, or plastic netting to soil surface using manufacturer's instructions.
Power puncher		Hay, straw	Cut mulch into the surface using a square-edge space in contour ROWs 0.5m apart
Tractor tracks		Hay, straw	Use tracks of tractor run up-and-down the slope to punch-in straw chopped to 20–30 cm lengths.
Specially constructed roller		Hay, straw	Weld steel cleats on section of steel pipe roller. Cleats should not be sharp but have slightly rounded edges. Straw specifications same as above.

6.8 Reforestation

Forests reduce runoff due to the canopy cover to the soils, soil cover through fallen debris, and their beneficial effect on soil infiltration. They reduce erosion by the effects of plant roots binding soil particles together and of humus protecting the surface. Reforestation of the ROW with juvenile trees / saplings may be considered necessary wherever a forest existed before construction of the pipeline. This shall be dependent on the judgement of the ecology specialist and with the EPCM approval, where the proposed planting regime (see Section 6.5 and Section 5) is considered unlikely to result in suitable long term ecological diversity. For the purposes of this specification a forest is defined in accordance with Article 1 of the Forest Law that states 'trees and small trees, naturally or artificially grown, together with their surrounding area are considered as forest areas'. The reforestation strategy shall be to successfully replace every tree felled during ROW clearance. The planting zones along I proximity of the pipeline are given in Section 5. It is noted that the revegetation strategy in all sections of the ROW shall be to reinstate the pre-construction vegetation in terms of both composition and density.

A 24m working width is adopted in forest locations. A strip 8m wide above the pipeline is to remain fallow. Beyond this a 3m strip on either side is to be seeded; the outermost 4m on either side is reforested with trees if deemed necessary. See typical drawing WRP-DGA-PPL-PLG-006.

Two planting methods shall be adopted (including for river bank reinstatement:

1. When trees from the ROW are less than 1m high, they are to be carefully excavated, including roots, by an excavator. The earth and trees are then removed to a storage place where they are supplied with water. During reinstatement the same trees are replanted.
2. When trees on the ROW are higher than one metre and cannot be replanted, 3 year to 5 year old plants from plantations are reforested. Bailed or container plants are to be used and planted in a spacing of 2x2m for softwoods and 1.5 x 1.5m for hardwoods. In poor soils (as on tuff or sandstone) a dressing of fertilizer is to be placed in the planting hole.

Shrubs shall be reforested with tree species as per the pre-works slope and adjacent slopes.

Contractor shall provide a detailed reforestation strategy as part of the Reinstatement Plan and Method Statements as required which specify in detail how the project objectives will be met. These documents shall be submitted to EPCM in a timely manner for approval prior to clearance of the Right of Way. The following information should be included in the reforestation strategy:

- species to be used and where;
- specific planting methods;
- detailed requirements for fertilizer use;
- detailed requirements for aftercare and monitoring;
- and supervision of reforestation activities.

6.9 Protection of Planted Materials

In sections where livestock or wild animals may be present, precautions shall be taken to protect the seeds and plants from damage. Some or all of the following techniques should be employed:

- security patrols and procedures;
- liaison and agreements with livestock managers;
- erection of stock-proof fencing (designed/installed to discourage theft), along the project area boundaries;
- supplement boundary fencing by internal area fencing to give double protection to particular areas;

6.10 Aftercare, Monitoring and Corrective Action

Contractor shall carry out the necessary aftercare (watering, further application of fertilizer, weed control, etc.) during the Contract maintenance period in order to meet the re-vegetation requirements.

Where necessary, Contractor shall provide and maintain appropriate fencing to prevent access by grazing animals and vehicles. Fences shall be fitted with signs in Turkish indicating the purpose, i.e. the enclosure is a TANAP biorestoration project area and fencing is required for protection.

Appropriate levels of irrigation/watering shall be provided for revegetated areas (See Section 6.7). The quantity and timing shall be dependent on local climatic conditions, soil type and species requirements. Although recommendations have been provided in this specification local advice should be sought where possible.

Reinstated slopes shall be monitored for the condition of the engineering measures, such as slope breakers, and shall be monitored for the effectiveness of the biological reinstatement.

- If seeding had been carried out in spring, first biological monitoring study should be conducted in May-June, and then every 3 months subsequently until the target cover is achieved.

- If seeding had been carried out in summer, then the first monitoring study should be conducted in March to April, and then every 3 months subsequently until the target cover is achieved.

- If seeding had been carried out in autumn, first monitoring study should be conducted in April-May which is the flowering period of the next year, and then every 3 months subsequently until the target cover is achieved.

If the percentage of the germination remained less than expected (see Section 6.3), then the seeds shall be replanted in the next year. In this case, the same monitoring procedure is carried out in the next year. If after the first year the required vegetation cover was established monitoring shall be reduced to annually, to take place in July-August until 5 years after the initial reinstatement. During this period reduction to the established cover shall be addressed by further seeding, fertilizer application and watering.

Where shrubs and or trees have been included in the reinstatement these shall be monitored on the same frequency as the rest of the seeded slope (as above). If during this monitoring it is observed that >30% of plants or trees have failed further planting shall be undertaken, along with watering and use of fertilizer.

7 SPECIAL AREAS

7.1 General

The TANAP pipeline project contains topographical, geological and ecological features, which are characterized on the project as Special Areas, these require particular attention throughout construction and reinstatement.

Method statements for these areas shall demonstrate sufficient awareness and intent to minimize construction impact. A high level of importance is attached to the satisfactory reinstatement of these areas, therefore an increased level of EPCM inspection, prior to acceptance, is planned. These Special Areas are as follows:

- side slopes;
- steep slopes;
- narrow ridges and areas prone to landslides
- ecological sensitive areas;
- karstic areas;
- volcanic tuff and marl;
- above ground installation sites.
- Areas of Contaminated Land

In addition to specialized construction techniques and increased levels of inspection, these areas are to be specifically considered by Contractor during planning and project control. Consideration of schedule constraints within these areas (weather, planting seasons, animal breeding periods etc.) shall be clearly identified by Contractor on associated documents. Construction planning shall achieve a 21-day period from the time when a Special Area is entered to the completion of reinstatement (to a level specified in EPCM approved Special Area Reinstatement Method Statement) unless otherwise approved by EPCM.

The general construction philosophy shall address completion of these identified Special Areas with minimum delay. The back-end of the spread shall follow directly behind the lowering-in crew. Contractor shall minimize the exposure of these areas to inclement weather.

Contractor shall provide suitably qualified and experienced specialists to assist in the reinstatement engineering and re-vegetation procedures and method statements for the entire route and with particular consideration of these Special Areas. Such specialists shall include geotechnical engineers (and/or engineering geologists) and ecological specialists in relation to the reinstatement of critical habitats (as specified in the BAP), who work for in-country specialist organizations. EPCM may also provide specialists to oversee and audit these activities.

Contractors shall ensure that specialist subcontractors are appointed to provide both advice and specialist skills for reinstatement planning and execution in Special Areas.

7.2 Side Slopes and Spoils

The contour restoration strategy is to ‘contour blend’. The side slope cut shall be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours through the implementation of engineered spoil management. The subsoil layers shall be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account should subsoil extend beyond the original line of slope or a new slope be created that is steeper than the original slope.

Topsoil shall be stripped from the area and stockpiled at designated spoil storage areas which shall be subject to EPCM approval. Both the topsoil and subsoil shall be stored separately. Both stockpiles shall be consolidated and adequately drained. Drainage from the spoils shall be provided and a safe outlet established. See Section 3.

On completion of all pipe installation, the subsoil shall be replaced in layers. Contractor shall prove that the thickness of the layers, conditions of the soil and number of passes of the compactor shall be sufficient to produce a density of 95%-105% of the highest compaction measured in the adjacent undisturbed area. In-situ and laboratory density testing shall be carried out as required to confirm that the compaction requirements are met. In exceptional cases this may require compaction trials on request of the EPCM. Alternatively Contractor may prove 95% of the maximum dry density at ± 2% optimum moisture content as determined by the standard Proctor test.

Compaction shall be carried out in accordance with the Pipeline Construction Specification WRP-SPC-PPL-PLG-001-P3-. Care shall be taken when compacting above and surrounding any pipework or drainage to ensure the integrity of the pipe and adequate compaction is achieved.

Particular consideration should be given to the adequate drainage solutions and the appropriate ‘keying-in’ of the placed backfill material into the existing temporary cut slope in order to prevent any future slip surfaces along the boundary between newly placed and in-situ material. Final slope measures and reinstatement details shall be subject to EPCM approval.

Following compaction of the subsoil, the topsoil shall be spread over the site, harrowed and reseeded (refer to Section 3.4.5). Erosion mats shall then be laid (refer to Section 3.6.3).

In the event that side cuts are to remain as a permanent restoration feature. Contractor shall prepare a methodology statement on the proposed works including (but not limited to) the degree of reinstatement, proposed drainage measures, process of slope inspections and programme of the works. The method statement shall clearly state how the overall environmental project and stability requirements are adhered to.

Contractor shall carry out site inspections with EPCM in order to define required design measure to ensure long term stability of the slope and that the environmental requirements are met.

Adequate drainage shall be applied to assure stability and controlled water runoff. Final cut slope angles shall be defined based on ground conditions encountered. Final slope angles and stabilisation measures (such as geotechnical slope drainage, scaling, rock netting or catchment benches, crest drains etc.) shall be proposed by Contractor for EPCM pre-approval.

The reinstated condition of side slopes is not expected to have any significant inclination perpendicular to the pipeline, and only have a maximum slope length of the width of the RoW. Additionally drainage measures are typically implemented upslope of any sections of side slope the pipeline encounters. As such the anticipated slope erosion is considered minimal, and the prescribed mitigation measures for these lengths of pipe will be based on their downslope fall.

Where there is a cross-fall oblique to the pipeline resulting in an increase of slope angle (compared to the gradient parallel to the pipeline) the slope erosion measures as defined on the alignment sheets shall be reviewed. For such slopes the Contractor and EPCM representative shall determine any additional mitigation measures on a site specific basis in order to ensure that the slope erosion requirements are met. The reinstatement solution shall be based on the standard reinstatement approach, with breakers across the ROW. The slopes as described above shall be identified in the field and details for soil erosion measures verified by the Contractor subject to EPCM approval.

For the fully reinstated case (i.e. if the slope is reinstated to its original contours) the slope erosion will pose a negligible hazard to the pipeline due to the short distance of exposure of the pipe (main gravitational transport perpendicular to the pipe) and considerable cover depth. Final erosion measures will need to be determined on site during construction based on the slope geometry and materials placed.

7.3 Narrow Ridges and Areas Prone to Landslides

Along certain sections the pipeline route crosses hilly terrain and is routed along narrow ridges in order to avoid pre-existing landslides or potentially unstable ground which is typically on steep side slopes with backscarps reaching in some areas up close to the ridge line.

The construction in these areas shall be carried out in accordance with the Construction Specification WRP – SPC – PPL – PLG - 001 and strategy set out in the Slope Assessment Report WRP-REP-EGG-PLG-010-P3-D. For the works in this area Contractor shall prepare a methodology statement subject to EPCM approval detailing how the project and stability requirements are met.

For certain areas along narrow ridges site specific designs and reinstatement requirements will be developed as set out in the AFC documents. For these cases the Contractor shall ensure that all site specific design requirements are met subject to EPCM approval.

Contractor shall assess and determine any requirements for additional earthworks and excavation. For any deviation from the overall project strategy to reinstate back to 'original contours' Contractor shall detail these proposed changes in a methodology statement subject to EPCM approval.

Contractor shall ensure that the following aspects are complied with:

The stability of the ROW shall be proven following the clearance of the ROW and prior to construction works by geotechnical inspection by the Contractor and EPCM. These stability inspections shall carried out at regular intervals throughout the construction works and will focus on any signs of potential slope movement

In sections where topography, geohazards (such as landslides) and proximity to 3rd party pipelines will require a reduced working width, Contractor shall propose an appropriate working method for these areas.

Contractor shall choose appropriate plant and assess stability of ROW taking into account effects of plant surcharge.

No side casting shall be allowed without the approval of EPCM in order to minimise the width of the construction corridor and avoid surcharge and uncontrolled drainage into potentially unstable ground. Spoil storage areas are to be proposed by Contractor for approval by EPCM to avoid any storage on potentially unstable ground and to prevent triggering ground movements

Temporary and permanent surface water run-off should be carefully managed. Appropriate measures (such as appropriate falls, bunds, selection of outlet points from the ROW etc.) shall be implemented in order to avoid ponding, seepage of water into ROW or uncontrolled run-off into potentially unstable ground.

In case of signs of instability (such as tension cracks, backscarp, seepage on the slope etc.), Contractor shall propose remedial measures (including dewatering, soil nail stabilisation, rock anchoring or preventing ROW from further inundation) subject to approval by EPCM.

7.4 Steep Slopes

Steep slopes are those slopes with inclination >15% and >20m slope length that are predicted to exceed soil loss tolerance rates as defined in this specification. The following factors should be considered when assessing the erosion potential of slopes:

- **Rainfall Intensity**. This parameter is a measure of the erosive force and intensity of the rain in a normal year. The rainfall intensity is based on rainfall records and probability statistics for risk evaluation. For the purpose of erosion assessment, the parameter is determined using a 1 hour 10 year return period storm. .
- **Soil Erodibility**. This parameter is a measure of the susceptibility of a soil particle becoming detached and transported by rainfall runoff. Soil parameters, which control soil erodibility are soil texture, structure soil space, organic content and hydraulic conductivity. Information from a particle size analysis (PSD) is used to estimate the soil erodibility using nomograms and correction factors.
- **Slope Angle and Length**. Erosion potential increases proportionally to increases in the length and angle of slope, simply because runoff flow rates increase with increasing gradient and slope length.
- **Vegetation Cover**. The effect of vegetative cover on soil loss is well researched. Bare soil represents high erodibility potential, whilst native vegetation can give maximum protection. Vegetation cover can be directly related to management options ie mulch, erosion control matting etc.
- **Erosion Control Practice**. Further practices that influence erosion potential are roughening of the soil surface by tractor treads, or by rough grading, raking or disking.
- **Temperature**. Temperature is another climatic factor affecting the potential for erosion to occur. Consolidation by freezing of exposed soils during winter months and accumulation of precipitation (snow) until periods of thaw, result in rapid melting and high levels of runoff. This situation exists in Central and Eastern Anatolia.

The Universal Soil Loss Equation used in the soil loss assessment predicts the long-term average annual rate of erosion on a slope based on rainfall intensity, soil type, topography, vegitation cover and management practices. This erosion model, originally developed to predict soil loss in agriculture, is also applicable to non-agricultural conditions such as construction sites. The USLE can be used to compare soil losses from a particular construction site with a specific management system to ‘tolerable soil loss’ rates. . The equation is written as follows:

$$A = R \times K \times LS \times C \times P \qquad [1]$$

Where, **A** is potential long-term average annual soil loss in tons per ton ha-1 y-1, **R** is rainfall and runoff factor by geographic location, **K** is soil erodibility factor, **LS** is slope length-gradient factor, **C** is vegetation and management factor, and **P** is support practice factor.

- The slope geometry has been considered using GIS assessment of the DEM data. This has been used to extract average slope length and angle data and develop the slope length and steepness input parameter ‘LS’.
- The soil erodibility factor ‘K’ has been assessed from erodibility mapping of Turkey. The mapping considers the possible soil composition and uses published relationships to generate a K value for each slope.

- The rainfall –runoff erosivity factor ‘R’ was assessed based on rainfall mapping for Turkey held by Ankara University.
- The cover management factor ‘C’ was selected for a backfilled trench situation assuming the surface would be rough
- The support practice factor ‘P’ is dependent on deliberate rutting of the slope surface and is more appropriate to maintained agricultural land. As such for this assessment no benefit from this parameter has been taken.

This methodology was used to determine the estimated removal rates and recommend appropriate mitigation measures required to meet the soil loss tolerance rates described in Section 2.6 of this document. The mitigation measures, both bioremedial and engineering, are provided on the alignment sheets (see Section 3.7). These require verification at each location by the Contractor and the EPCM', through validation or updating of the design assumptions.

Contractor shall establish steep slope areas and provide procedures and methodology statements as part of the site-specific Special Area Reinstatement Method Statements for EPCM approval. The procedure shall establish all planned temporary and permanent erosion measures in line with this specification and Project Drawings.

Construction in steep slope areas requires an increased awareness of safety and stability issues. Contractor shall utilise proven construction techniques specific to such areas. Contractor shall demonstrate that increased safety measures are planned and these measures are to be followed on site. An increased level of Safety Engineer presence shall be required at these locations.

The requirement for temporary ROW erosion/stabilization techniques shall be dependent upon the season. However Contractor shall be prepared to provide all resources necessary to avoid incipient soil erosion and stabilization issues, regardless of season, in order to be prepared for unforeseen inclement weather.

7.5 Critical Habitats

The Biodiversity Action Plan (BAP) identified 67 terrestrial and 27 freshwater critical habitats, ecologically sensitive areas with the presence of endangered or threatened species and their habitats, along the pipeline route. Refer to the BAP and KP Table for the BAP (CIN-TDT-ENV-GEN-001) for the following information for each of the critical habitats:

- topsoil depth removal and storage for each critical habitat;
- species identification for seeds collection;
- translocation of plants and animals depending on a season;
- appropriate species for revegetation;
- planting methods;
- removal and replacement of turfs.

Table 7.1 List of Terrestrial and Freshwater Critical Habitats identified in the BAP (Route Rev H)

KP Start	KP End	ID	Type of Critical Habitat
3000	*3735*	*CH1*	*Terrestrial Habitat*

KP Start	KP End	ID	Type of Critical Habitat
3940	*4051*	*CH2*	*Terrestrial Habitat*
20700	*23000*	*CH3*	*Terrestrial Habitat*
23670	*27081*	*CH4*	*Terrestrial Habitat*
62320	*63140*	*CH5*	*Terrestrial Habitat*
71710	*71755*	*FCH1*	*Freshwater Habitat*
84758	*87000*	*CH6*	*Terrestrial Habitat*
115393	*116000*	*CH7*	*Terrestrial Habitat*
116069	*116637*	*CH8*	*Terrestrial Habitat*
164345	*164566*	*CH9*	*Terrestrial Habitat*
166450	*166571*	*FCH2*	*Freshwater Habitat*
167000	*167154*	*CH10*	*Terrestrial Habitat*
169000	*174000*	*CH11*	*Terrestrial Habitat*
174412	*176000*	*CH12*	*Terrestrial Habitat*
187557	*193000*	*CH13*	*Terrestrial Habitat*
202930	*203709*	*CH14*	*Terrestrial Habitat*
214885	*219641*	*CH15*	*Terrestrial Habitat*
220177	*220211*	*FCH3*	*Freshwater Habitat*
232172	*232787*	*CH16*	*Terrestrial Habitat*
269680	*269696*	*FCH4*	*Freshwater Habitat*
280401	*280414*	*FCH5*	*Freshwater Habitat*
306365	*312319*	*CH17*	*Terrestrial Habitat*
332830	*332845*	*FCH6*	*Freshwater Habitat*
353584	*353613*	*FCH7*	*Freshwater Habitat*
369037	*369126*	*CH18*	*Terrestrial Habitat*
372760	*372903*	*FCH8*	*Freshwater Habitat*
385169	*390000*	*CH19*	*Terrestrial Habitat*
393489	*394339*	*CH20*	*Terrestrial Habitat*
432592	*434819*	*CH21*	*Terrestrial Habitat*
451458	*454120*	*CH22*	*Terrestrial Habitat*
504756	*504770*	*FCH9*	*Freshwater Habitat*

KP Start	KP End	ID	Type of Critical Habitat
508498	*508510*	*FCH10*	*Freshwater Habitat*
518154	*521487*	*CH23*	*Terrestrial Habitat*
537806	*543711*	*CH24*	*Terrestrial Habitat*
564425	*565125*	*CH25*	*Terrestrial Habitat*
588880	*590358*	*CH26*	*Terrestrial Habitat*
604940	*608000*	*CH27*	*Terrestrial Habitat*
614648	*626000*	*CH28*	*Terrestrial Habitat*
632635	*634183*	*CH29*	*Terrestrial Habitat*
634285	*634864*	*CH30*	*Terrestrial Habitat*
634906	*634932*	*CH31*	*Terrestrial Habitat*
652000	*654878*	*CH32*	*Terrestrial Habitat*
656000	*656431*	*CH33*	*Terrestrial Habitat*
660353	*660456*	*CH34*	*Terrestrial Habitat*
661206	*661709*	*CH35*	*Terrestrial Habitat*
683613	*683648*	*CH36*	*Terrestrial Habitat*
683924	*683963*	*CH37*	*Terrestrial Habitat*
700549	*701087*	*CH38*	*Terrestrial Habitat*
708677	*708890*	*CH39*	*Terrestrial Habitat*
709815	*709897*	*FCH11*	*Freshwater Habitat*
713855	*713956*	*CH40*	*Terrestrial Habitat*
720035	*720290*	*CH41*	*Terrestrial Habitat*
729485	*729571*	*CH42*	*Terrestrial Habitat*
733201	*733366*	*CH43*	*Terrestrial Habitat*
741301	*741446*	*CH44*	*Terrestrial Habitat*
746599	*749672*	*CH45*	*Terrestrial Habitat*
763361	*763381*	*FCH12*	*Freshwater Habitat*
802361	*802428*	*CH46*	*Terrestrial Habitat*
802454	*802755*	*CH47*	*Terrestrial Habitat*
815368	*815380*	*CH48*	*Terrestrial Habitat*
846021	*846224*	*CH49*	*Terrestrial Habitat*

KP Start	KP End	ID	Type of Critical Habitat
945058	*945445*	*CH50*	*Terrestrial Habitat*
983388	*983432*	*FCH13*	*Freshwater Habitat*
993073	*993795*	*CH51*	*Terrestrial Habitat*
1029605	*1029804*	*CH52*	*Terrestrial Habitat*
1030091	*1030310*	*CH53*	*Terrestrial Habitat*
1035368	*1035377*	*FCH14*	*Freshwater Habitat*
1087890	*1087980*	*FCH15*	*Freshwater Habitat*
1139490	*1140300*	*CH54*	*Terrestrial Habitat*
1149730	*1149900*	*CH55*	*Terrestrial Habitat*
1208945	*1209108*	*CH56*	*Terrestrial Habitat*
1214260	*1214290*	*FCH16*	*Freshwater Habitat*
1223054	*1223506*	*CH57*	*Terrestrial Habitat*
1315643	*1315665*	*FCH17*	*Freshwater Habitat*
1323270	*1323300*	*FCH18*	*Freshwater Habitat*
1362917	*1363753*	*CH58*	*Terrestrial Habitat*
1366493	*1366692*	*CH59*	*Terrestrial Habitat*
1369221	*1369237*	*FCH19*	*Freshwater Habitat*
1372340	*1372683*	*CH60*	*Terrestrial Habitat*
1430920	*1432305*	*CH61*	*Terrestrial Habitat*
1461293	*1461349*	*FCH20*	*Freshwater Habitat*
1477452	*1477833*	*CH62*	*Terrestrial Habitat*
1491767	*1496340*	*CH63*	*Terrestrial Habitat*
1553697	*1553730*	*FCH21*	*Freshwater Habitat*
1565865	*1565885*	*FCH22*	*Freshwater Habitat*
1590290	*1590362*	*FCH23*	*Freshwater Habitat*
1605400	*1605425*	*FCH24*	*Freshwater Habitat*
1613360	*1613419*	*FCH25*	*Freshwater Habitat*
1651548	*1651598*	*FCH26*	*Freshwater Habitat*
1689784	*1689838*	*FCH27*	*Freshwater Habitat*
1736000	*1738300*	*CH64*	*Terrestrial Habitat*

KP Start	KP End	ID	Type of Critical Habitat
1741100	*1741500*	*CH65*	*Terrestrial Habitat*
1788300	*1788500*	*CH66*	*Terrestrial Habitat*
1800600	*1805000*	*CH67*	*Terrestrial Habitat*

Contractors are required to provide site specific Reinstatement Management Plans that will further develop and clearly specify the means by which the measures committed to in the BAP and in this specification shall be implemented in relation to their scope of work, including pre-construction measures, (i.e. seeds collection, plants translocation) topsoil removal and storage and reinstatement measures. See Pipeline Construction Specification.

7.5.1 On-site supervision

In addition to the planning of reinstatement activities, ecological expertise shall be present on site during all relevant activities within critical habitats (e.g. route clearance, re-vegetation) to provide advice and supervision. Contractors shall be expected to provide appropriately qualified personnel to undertake the day-to-day supervision of such activities and EPCM shall also provide specialists to advise and supervise the reinstatement works.

7.6 Karstic Areas

Karst is the topography that develops in soluble rocks in which fissures may be enlarged (ultimately to form caves) by flowing groundwater. This may occur in areas of gypsum and limestone bedrock. Gypsum is more soluble than limestone, therefore karstic areas develop relatively rapidly in areas of gypsum (see Section 5 of the ESIA for further information).

Restoration in the karstic areas shall proceed as follows:

- soils from the dolines shall be stockpiled separately;
- mixing of the doline soil and the ridge material is prohibited, unless agreed with the Client;
- continuous environmental inspection shall follow construction;
- excess rock material from ridges shall be disposed of in accordance with the project Waste Management Plan;
- spreading of rock is prohibited, unless agreed with the Client;
- discovery of subsurface voids (greater than 50mm in plan dimension) during construction shall be reported to EPCM, measures detailed on the IAAC alignment sheets and drawing WRP-DGA-EGG-PLG-001 shall be applied, alternative remediation of voids may be used if agreed with EPCM and Client.

Temporary and permanent erosion measures shall be employed in accordance with the requirements of this specification and Project Drawings. Contractor shall employ trench filtration and drainage control measures as necessary to ensure that suffosion (transport of soil from the trench and from subsoil beneath the trench into karstic voids) does not occur during the design life of the pipeline.

Drainage plans in karstic areas shall be submitted to the EPCM for approval prior to construction. Plans should consider special requirements described in WRP-TNO-EGG-PLG-001 (Technical Note for Design of Pipelines in Karst). At the least, Contractor drainage plans shall consider:

- preventing the pipeline becoming a new drainage conduit.
- preventing loss of pipe backfill into karst fissures.
- control groundwater flow in the trench.
- maximizing the use of existing natural drainage (i.e., sink holes >20m from the pipeline alignment) in a controlled manner.

Contractor shall follow particular requirements for drainage control as noted on AFC alignment drawings and DGA-EGG-PLG-001.

7.7 Erodible Soils, Volcanic Tuff and Marls

Specific care is required for the reinstatement of areas underlain by volcanic tuff or marls in particular to ensure the re-establishment of a natural vegetation following the construction works due their thin topsoil cover.

Similar issues regarding the reinstatement may arise in other areas of highly erodible soils and soils with thin topsoil or other site specific ramifications. The Contractor's Soils Specialist shall identify these areas during the clearance of the ROW and give advice on any additional measures as required. The specific examples of Volcanic Tuff and Marls are outlined below which should be applicable to any other soil reinstatement as deemed necessary by the Contractor's Soils Specialist an as agreed with the EPCM representative.

7.7.1 Volcanic tuff

Topsoil layers are typically thin, <10cm, in areas of volcanic tuff. Special care is necessary in such areas to ensure the preservation of topsoil and successful establishment of a natural vegetative cover. In areas of volcanic tuff, or other thin topsoils, Contractor Method Statements shall clearly state the methods to be adopted to avoid adverse impacts.

Special Area Reinstatement Method Statements shall be drawn up by Contractor for reinstatement in areas underlain by volcanic tuff.

The Special Area Reinstatement Method Statements shall include the provision of a Soils Specialist, in addition to the required Environmental Inspection personnel to provide expert advice and identify any additional measures and supervision in areas of volcanic tuff. The Soils Specialist may also provide input in other vulnerable soil areas. The role of the soils specialist shall include the following tasks in such areas:

- consultation with landowners and local experts to determine the most appropriate construction and reinstatement methods;
- establishing the depth of topsoil to be removed on a site specific basis;
- supervision and advice regarding topsoil and subsoil removal, storage and replacement;
- supervision and advice regarding soil erosion control measures during and after construction;
- and supervision and advice regarding re-vegetation.

The Soils Specialist shall be responsible, in cooperation with the Community Liaison Officers and Ecological Specialist, for ensuring that landowners and local specialists/regulators are fully consulted in determining the most appropriate methods of topsoil removal, storage and replacement, and methods of re-vegetation in areas of volcanic tuff in accordance with local conditions. The following mitigations are to be used:

- Although the topsoil layer in areas of volcanic tuff is thin, it is essential that this topsoil be reserved as the topsoil is the sole reservoir of fertility in tuffaceous soils and is also an important store of seeds. Since the topsoil is thin and variable in depth, it is inappropriate at this stage to specify a prescriptive thickness to be removed during ROW clearance. Consequently, Contractor's Soils Specialist shall establish the topsoil for removal and separate storage at regular intervals prior to topsoil clearance. The distance of such intervals may vary and shall be determined by the Soils Specialist in consultation with EPCM's specialists. The Soils Specialist shall also determine the most appropriate removal technique in consultation with the construction supervisor. Contractor shall provide appropriately skilled and experienced operators to undertake topsoil removal in such areas.
- Contractor Method Statements shall provide for pre-existing shrubs and turfs of coarse grasses to be set aside and replanted on the ROW in areas of tuffaceous soils. If possible, and in order to minimise the time period between site clearance and replanting, they can be removed from one location and replanted at another where reinstatement is nearing its end provided the soil and soil climate are effectively identical to the area from where they were taken. Both the Soils Specialist and Ecological Specialists shall provide input to the planning and implementation of such activities. The Soils and Ecological Specialists shall also provide advice on the use of fertilizer in areas of tuffaceous soils. It is anticipated that the use of additional micro-nutrients shall be required in such areas. Local expert advice, including landowners and the Ministry of Forestry and Agriculture, shall also be sought regarding fertilizer usage appropriate to the local conditions.
- Temporary soil erosion control measures shall be established while constructing the pipeline. These shall include temporary water bars, ditch breakers, and runoff barriers such as filter fences or straw bales.
- The land shall be returned to as close to its natural contours as practicable. The infilled subsoil shall be returned in layers following the same sequences as its removal. A crown no higher than 0.3m high shall be left to allow for eventual settling of the soil. The resulting surface shall then be profiled to conform to slope breaker and other specifications. Slope breakers shall drain into a cuvette sculpted into the soil at each slope breaker outlet. Only then shall the topsoil be replaced. If the growing season is nearing its end, the on-site soils expert may require the topsoil berm to be seeded with a fast growing cover crop, when it shall be stored for spreading the following spring.
- Vegetation shall be replanted accompanied by a basal dose of fertilizer mix. On tuff the usual 10-10-10 application of NPK shall require additional micro-nutrients. Local expert advice shall be sought from the Ministries of Forestry and Agriculture. Plants in addition to those recovered during topsoil stripping are likely be required if reinstatement is to succeed. Again, expert local advice shall be sought in identifying seed or plant sources.
- Of critical importance alongside the above list of essential actions shall be establishing communication links among the project's management, its contractors, authorities responsible for the management of public land, and owners and operators of private land. The wishes of land management authorities and land owners shall determine, in large part, the actions that shall be taken to mitigate environmental impacts of the pipeline. Importantly, these same individuals and institutions shall have a signatory role in determining the adequacy of environmental mitigations enacted by EPCM and its contractors.

Contractor shall give particular attention to erosion control measures in areas of volcanic tuff and shall ensure a high level of inspection during construction, reinstatement and aftercare.

7.7.2 Marl

Marl is calcareous clay containing varying amounts of clays, silt and calcium carbonate (35%-65%) that is typically classified as an unconsolidated sedimentary deposit or extremely weak rock. This section treats marl soils that are too steep to play a role in rain fed agriculture, although they may support grazing. Adverse impacts affecting marls include the following:

- visual impact:
- the marl leaves a whitish trace across the landscape where the subsoil has been exposed;
- soil erosion:
- marl horizons can form the slip plane of deep instabilities;
- loss of soil productivity.

As with tuffaceous lands, an important mitigation shall be to decrease the construction corridor to as narrow a width as possible. This is possible because marl topsoil on sloping lands is typically thin and requires little area when set aside for reinstatement. Existing shrubs shall be set aside for later replanting. Temporary soil erosion control measures (water bars, ditch breakers and runoff barriers) shall be installed. Temporary ditch breakers shall be particularly important as marls typically contain springs that are likely to drain into the trench. When drained, trench water shall be pumped either into a filter bag or constructed barrier made of based hay and filter cloth; in no instance shall it drain onto unprotected soil. In some instances, emerging springs may require lined chutes to convey water from the ROW to a safe disposal location.

The specifications for returning tuff to its natural contour and condition also apply to marl and similar considerations to tuff shall be applied as regards use of a soils expert and tailoring topsoil removal to the actual thickness present rather than a pre-prescribed specification.

The potential for replanting shall be determined by the frequency of natural vegetation prior to construction. If this is low or absent, then replanting is unlikely to succeed – the onsite environmental inspector/soils expert shall set out appropriate mitigation measures as required. If the site is incapable of supporting sown grass or other vegetation, downslope agricultural lands shall be provided with protection from eroded sediment; e.g. through a diversion or sediment settling pond. Again, the onsite environmental inspector/soils expert shall give advice to be fulfilled by the construction contractor. If replanting is to be done, it shall follow project specifications using a grass mix recommended by local agricultural and forestry expertise. If the season is too late for replanting, the topsoil berm shall be protected over winter by seeding it with a fast growing cover crop. It shall then be reinstated during the following spring.

7.8 Areas of Contaminated Land

The remediation of contaminated land is not covered by this specification and reference should be made to Contract Documents.

Any materials encountered during the works, which show unusual colouring, texture, and / or odour, shall be stored separately and labelled as potentially contaminated materials. All suspected or confirmed materials shall not be reused within the works unless contamination testing indicates the materials are suitable for use in accordance with the agreed limits of the USEPA guidance and Dutch Standards for soil contamination for the identified land use locally required.

Temporary stockpiling of potentially contaminated materials shall be within an impermeable bunded and lined area, greater than 750m from any environmentally sensitive receptor.

8 REINSTATEMENT OF LAND OTHER THAN TANAP ROW

8.1 Land at Construction Support Facilities

The following requirements apply to all construction support facilities such as construction camps, pipe yards etc. They do not apply to permanent facilities such as AGIs. The fate of construction support facilities is to be agreed with EPCM before starting any activity connected with reinstatement.

Reinstatement of the land shall commence immediately on removal of each individual facility. The reinstated condition shall be to a condition at least as good as that prevailing before establishment of the facilities, depending on the post construction landuse and Project's access agreement.

Construction support facilities shall be avoided in Special Areas (see Section 7). Should this become unavoidable prior approval of EPCM is required. Contractor shall prepare all necessary procedures and plans to achieve such approval and obtain permits as required by any affected authority.

Contractor shall reinstate the area to the satisfaction of EPCM, the regulatory authority or landowner and shall obtain written approval from EPCM, the appropriate regulatory authority or the landowner of the level of reinstatement. Notwithstanding such approval, all reinstatement shall be to the satisfaction of EPCM. Contractor's photographs of the condition of the area prior to construction may be used for reference.

There shall be no waste remaining after removal of the facility and upon return of the site to the landowner. Except for new roads, facilities shall be removed and the land restored so that it is suitable for its original function. New roads shall be handed over as part of the completed project with shoulders finished in keeping with the local environment. Excess rock or stumps may only be left with the agreement of the landowner. Any new roads, not appreciated by EPCM and/or relevant stake holders, shall be dismantled and the area shall be reinstated to the required conditions.

8.2 Permanent Above-Ground Installations (AGIs)

All permanent aboveground installations are to be reinstated in accordance with the Project Drawings and specifications.

Contractor shall reinstate the area surrounding AGIs to the satisfaction of EPCM and the appropriate authority or landowner and shall obtain written approval from EPCM and the appropriate regulatory authority or the landowner of the level of reinstatement. Notwithstanding other such approvals, all reinstatement shall be to the satisfaction of EPCM. Contractor's photographs of the condition of the area prior to construction may be used for reference.

Measures that shall be adopted to minimize the visual impacts of the permanent buildings and facilities at AGI sites include the following:

- landscape planting within the site boundary where appropriate;
- opportunities to retain existing landform screening shall be maximized, i.e. site levelling shall be avoided, if possible, if existing hollows or mounds may be used to integrate built features within the landform;
- new landform screening (e.g. bunds and mounds) shall be introduced where this might complement the existing landform character;
- the use of appropriate colour schemes to minimise the visual impact of buildings;

- external lighting shall be minimized to that necessary for safety and operational purposes and downward facing lighting and lighting of the same colour shall be used to minimise spill and offsite impacts.

Contractors site-specific Reinstatement Method Statements for AGI sites shall address the following:

- maximising opportunities to retain existing landform screening, i.e. site levelling shall be avoided, if possible, if existing hollows or mounds may be used to integrate built features within the landform;
- new landform screening (e.g. bunds and mounds) shall be introduced where this might complement the existing landform character.

8.3 Spoil and Excess Rock/Stump Disposal Sites

Contractor shall close, cap, and landscape all (except as otherwise agreed with EPCM) excess rock/stump disposal sites by the completion of the Contract. Sites shall be dealt with in accordance with the relevant project requirements. Contractor shall develop site-specific plans that are to be approved by EPCM. Biorestoration, where appropriate shall be carried out in accordance with requirements defined in Section 6 and EPCM approved Special Area Reinstatement Method Statements.

Spoil and excess rock/stump disposal sites shall be avoided in ecologically sensitive areas. Should this become unavoidable, prior approval of EPCM is required. Contractor shall prepare all necessary procedures and plans to achieve such approval and obtain permits as required by any affected authority.

The excess rock/stump material shall be compacted to a minimum of 75% of the Proctor value; the surface shall be landscaped to resemble local conditions and shall not extend more than 2m in height above the natural contour; the slopes of the surface shall not exceed 60°. The site shall be covered with soil and an erosion mat and planted with appropriate species.

8.4 Existing Roads and Access

Contractor shall exercise care when using both public and private roads for travelling to and from the TANAP ROW and shall upgrade and maintain roads during the works as necessary for safe operations. No side casting shall be allowed unless otherwise instructed by EPCM.

The reinstatement of roads shall be to their original upgraded condition or better following completion of construction activities.

Contractor shall provide for such work all hard-core, tarmac, asphalt, and other materials as required.

Details of the requirements for the use and construction of existing roads and access Roads are set out in the Pipeline Construction Specification.

8.5 Quarries

Contractor shall ensure that all borrow material shall only be sourced from (both existing and new) licensed and authorized sites or sources. Where new quarries need to be opened Contractor shall obtain the necessary permits and licenses and conduct any necessary environmental impact assessments.

Reinstatement of the quarries shall be carried out to the satisfaction of the respective landowners and local authorities.

For the general selection and approval process for quarries the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030 should be referred to.

8.6 Areas of Contaminated Land

The remediation of contaminated land is not covered by this specification and reference should be made to the Contract Documents.

Any area of the pipeline corridor in which material excavated is not suitable to be reused shall be reinstated with suitable material in accordance with the agreed limits of the USEPA guidance and Dutch Standards for soil contamination for the identified land use locally required

9 RESTRICTING ACCESS

In order to prevent rutting, subsequent erosion problems, and damage to riparian areas, measures should be taken to prevent unauthorized use of the TANAP ROW as a roadway. Access should be blocked, at locations specified by EPCM representatives, through the construction of barrier berms of sufficient height (minimum 1.5m high) to provide a barrier to vehicles. Where possible, the berms should be tied to vegetation or rocks adjacent to the ROW to prevent traffic from circumventing the barrier. Rocks excavated during construction, 0.3m in diameter or larger, may be used instead of the earthen berms. Timber cleared during the construction may also be staggered across the ROW so as to deter off-road vehicle use.

10 HANDOVER AND POST-CONSTRUCTION MAINTENANCE

Contractor shall obtain sign-off of the pre-entry form from the landowner agreeing on the standard of reinstatement. Contractor shall notify EPCM prior to such meetings and allow for EPCM attendance/monitoring. Contractor shall not attend such meetings without EPCM presence unless agreed in writing by EPCM.

Contractor, upon completion of reinstatement, shall accompany EPCM on an inspection of all project areas, before demobilizing from site. EPCM shall notify Contractor of any insufficiencies in the reinstatement of the TANAP ROW / project areas. Contractor shall carry out any further reinstatement to the satisfaction of EPCM.

During the contract maintenance period, Contractor shall be responsible for maintaining the standard of reinstatement and for ensuring that the Civil Protection Works remain effective and in good condition, and that the stated erosion class and biorestoration requirements are met. As a minimum Contractor shall carry out inspections every three months and immediately after any significant rainfall event (1 in 2year return period) and snow melt and implement corrective measures as required to the satisfaction of EPCM.

TANAP
TRANS ANATOLIAN NATURAL GAS PIPELINE PROJECT

Project Doc. No.	FRN-PLN-ENV-PL1-008	**Rev** / **P4-1**	**Status** / Re-IFR
Document Title	EROSION, REINSTATEMENT AND LANDSCAPING PLAN		
Tag Nos			
Contractor	**FERNAS İNŞAAT A.Ş.**		
Contractor Document No.		**Contract or Rev**	

Tick Box	Descriptions	Signature & Date
□	**C1/APP** – Reviewed & accepted. Construction may Proceed. For documents status IFR\IFA, resubmit as IAA at next revision code. For documents status IAA, no action required.	
□	**C2/AWC** – Reviewed & accepted as marked. Revise and resubmit. Construction may proceed. For documents status IFR\IFA, resubmit as IAA at next revision code. For documents status IAA, resubmit as Re-IAA at next revision code.	
□	**C3/RWC** – Reviewed & returned. Revise and resubmit. Construction shall **NOT** proceed. For documents status IFR\IFA, resubmit for review Re-IFR\IFA at next revision code. For documents status IAA, resubmit as IFA at next revision code.	
□	**C4 –** Review not required. Construction may proceed Resubmit for information as IFI at next Revision Code.	
□	**C5/REJ** – REJECTED. Revise and resubmit. Construction shall **NOT** proceed. Revise document and resubmit for review.	

Remarks:

FERNAS	TANAP TRANS ANATOLIAN NATURAL GAS PIPELINE PROJECT (LOT-1)	TANAP WorleyParsons resources & energy

Erosion, Reinstatement and Landscaping Plan

Rev	Status	Date	Status Description	Issued by	Checked by	Approved by	TANAP APPROVED
P4-A	DIC	04.05.2015	Discipline Internal Check	OZAD	GULA	OZKE	
P4-B	IDC	06.05.2015	Inter-Discipline Check	OZAD	GULA	OZKE	
P4-C	IFR	23.06.2015	Issued for Review	OZAD	GULA	OZKE	
P4-0	IAA	30.06.2015	Issued as Approved	OZAD	GULA	OZKE	
P4-1	Re-IAA	11.12.2015	Re-Issued as Approved	OZAD	GULA	OZKE	

DOCUMENT REVISION HISTORY SHEET

Rev.	REVISION DESCRIPTION	DATE ISSUED	UPDATE / AMENDMENT DETAILS
P4-A	DIC	04.05.2015	Discipline Internal Check
P4-B	IDC	06.05.2015	Inter-Discipline Check
P4-C	IFR	23.06.2015	Issued for Review
P4-0	IAA	30.06.2015	Issued as Approved
P4-1	Re-IAA	11.12.2015	Re-Issued as Approved

HOLDS

No.	Section	Description	Input From	Planned Date
1				

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1. PURPOSE and SCOPE

The aim of Erosion, Reinstatement and Landscaping Plan (ERLP) is to indicate the requirements for the reinstatement of the areas impacted by project and thus to minimize the erosion. Moreover, the plan establishes the minimum requirements for temporary and permanent erosion control and the related measures for revegetation (bio-restoration).

The provisions in this plan are applicable to the temporary used areas such as construction corridor, access roads, pipe lay down areas, construction camp sites, other additional lands utilized during the construction of the project, as well as the permanent facilities such as above ground installations (AGI).

FERNAS will be responsible from the following items, in the scope of this ERLP:

- Management of surplus soil and rocks,
- Preserving seed bank through topsoil,
- Re-laying the topsoil to its original location and the subsoil,
- Temporary measures to minimize erosion and maximize sediment control during construction
- Permanent erosion control berms, drainage for long term stability against erosion,
- Retaining the hydrologic regime as before and reinstatement of the natural drainage of the site,
- Restoration of the land to the original contours or maintaining a landscape visually compliant to the adjacent landscape,
- Restoration of the impacted habitats and ecological processes to their original states where it is technically applicable,
- Re-vegetation of sites with appropriate native plant types; re-seeding,
- Prevention of forbidden or dense access to the areas that cannot be accessed before via removal of the temporary construction roads,
- Utilization of engineering solutions and bioengineering techniques to attain the best environmental outcomes.
- Taking the measures to minimise erosion and maximize sediment control during construction.

1.1 Reference Documents

- English ESIA Report P2-0(TNP-REP-ENV-GEN-002),
- Turkish ESIA Report P2-0 (TNP-REP-ENV-GEN-001),
- Biodiversity Action Plan (CIN-REP-ENV-GEN-017),
- TANAP Environmental and Social Management Plan (TNP-PLN-ENV-GEN-001),
- FERNAS Environmental and Social Monitoring Plan (FRN-PLN-ENV-PL1-011),
- FERNAS Pollution Prevention Plan (FRN-PLN-ENV-PL1-009),
- FERNAS Waste Management Plan (FRN-PLN-ENV-PL1-012),
- FERNAS Construction Impact Management Plan (FRN-PLN-ENV-PL 1-003)
- FERNAS Method Statement for Pre-Construction Activities (FRN-MST-PPL-001)
- FERNAS Method Statement for Clearing & Grading of RoW (FRN-MST-PPL-PL 1-007)
- Typical Drawing Riverbank Protection Bio Restoration (WRP-DGA-PPL-PLG-036-01)
- Typical Drawing River Riparian Restoration (WRP-DGA-PPL-PLG-036-02)
- Typical Drawing Erosion Protection Slope Breaker Cross Sections (WRP-DGA-PPL-PLG-046)
- Typical Drawing Erosion Protection Typical Lined Chute (WRP-DGA-PPL-PLG-047)
- Typical Drawing Erosion Protection Erosion Control Matting Installation (WRP-DGA-PPL-PLG-050)
- Specification for Reinstatement (WRP-SPC-EGG-PLG-001)Regulation on Control of Water Pollution (31.12.2004 – 25687)

1.2 Abbreviations

BAP **:** Biodiversity Action Plan
CLIENT **:** TANAP Doğalgaz İletim A.Ş.
CONTRACTOR **:** FERNAS Insaat A.S.
EPCM **:** Worley Parsons Proje Yönetimi ve Mühendislik Limited Şirketi
ERLP : Erosion, Reinstatement and Landscaping Plan
ESIA **:** Environmental and Social Impact Assessment
Project **:** Trans Anatolian Natural Gas Pipeline Project (TANAP)
RoW **:** Right of Way
USLE **:** Universal Soil Loss Equation

1.3 Definitions

Definitions of the erosion severity classes mentioned in this plan are given Table 1.1 below;

Table 1.1 – Erosion Severity Classes (*)

Erosion Class		**Erosion rate (t/ha/y)**	**Visual assessment**
1	Very slight	<2	No evidence of compaction or crusting of the soil. No wash marks or scour features. No splash pedestals or exposed roots or channels.
2	Slight	2-5	Some crusting of soil surface. Localized wash but no or minor scouring. Rills (channels < $1m^2$ in cross-sectional area and < 30cm deep) every 50-100m. Small splash pedestals where stones or exposed roots protect underlying soil.
3	Moderate	5-10	Wash marks. Discontinuous rills spaced every 20-50m. Splash pedestals and exposed roots mark level of former surface. Slight risk of pollution problems downstream.
4	High	10-50	Connected and continuous network of rills every 5-10m or gullies (> $1m^2$ in cross-sectional area and > 30cm deep) spaced every 50-100m. Washing out of seeds and young plants. Reseeding may be required. Danger of pollution and sedimentation problems downstream.
5	Severe	50-100	Continuous networks of rills every 2-5m or gullies every 20m. Access to site becomes difficult. Re-vegetation work impaired and remedial measures required. Damage to roads by erosion and sedimentation. -
6	Very severe	100-500	Continuous networks of channels with gullies every 5-10m. Surrounding soil heavily crusted. Integrity of the pipeline threatened by exposure. Severe siltation, pollution and eutrophication problems.
7	Catastrophic	> 500	Extensive network of rills and gullies; large gullies (> $10m^2$ in cross-sectional area) every 20m. Most of original surface washed away exposing pipeline. Severe damage from erosion and sedimentation on-site and downstream.

**: Moore, H. M., Fox, H. R., & Elliott, S., (2003)*

2. RESPONSIBILITIES

FERNAS will be responsible for the implementation of all reinstatement works in accordance with the requirements of this ERLP. FERNAS will also be responsible for the training and performance of all sub-contractors with respect to the ERLP and will comply with all relevant project standards, statutory requirements, permit and license conditions and secure all applicable permits and licenses.

FERNAS will prepare site specific method statement for specific activities relevant to the reinstatement issues and submit to EPCM for approval.

FERNAS will conduct pre-construction surveys along the Right of Way (RoW) to facilitate the development of site-specific reinstatement method statements for all special areas, by using specialist sub-contractors and/or advisors, particularly for erosion and sediment control and seeding-planting of indigenous vegetation.

2.1 Project Manager

- Overall responsibility for implementation and of this plan.

2.2 Construction Manager

- Will be responsible for ensuring that all site staff, including Sub-Contractors and activities comply with the FERNAS ERLP,

2.3 Environmental Manager

- Will be responsible for the development and oversight of reinstatement activities
- Will update the Plan in conjunction with EPCM if required,
- Will be responsible for preparing environmental procedures, method statements and work instructions as required and implementing amendments to the system identified by audits,
- Will supervise Environmental Inspectors and Biologist.

- Will provide monthly report to EPCM

2.4 Environmental Inspector(s)

- Will monitor the biologist and soil expert for their performance in the implementation of ERLP and Project ESIA ,
- Will monitor construction activities and their compliance with environmental plans, procedures and instructions,
- Will ensure that all remedial action identified by inspections are closed out,
- Will ensure that Environmental Manager is fully informed on every environmental issues,
- Will implement the environmental management system on site and provide as necessary toolbox talks on impact mitigation method.
- Will give trainings to all FERNAS personnel regarding with environmental issues. The whole personnel of the Subcontractor will also be responsible about this training subject.

2.5 Biologist

- Will carry out site inspections related to the topsoil/ subsoil storage, erosion and stabilization structures,
- Will remove erosion and stabilization structures that are no longer required.
- Will keep and maintain records of the depths stripped by the use of topsoil stripping register

2.6 Soil Expert

- Will be responsible for the supervision of the pre-construction and construction works in line with the erosion control, reinstatement
- Will be responsible for monitoring of topsoil stripping and storage
- Will be responsible for the biorestoration activities; including detailed scheduling, plant species protection of plant materials, aftercare, monitoring and corrective action,

3. REINSTATEMENT and CLEAN UP PRINCIPLES

3.1. Third Party Activities

The FERNAS is responsible to reinstate any and all areas disturbed during the project works irrespective of their location or proximity to the RoW.

FERNAS will fully reinstate any land disturbance due to third party assets/activities where that disturbance is:

- within the TANAP RoW, or
- close to the TANAP RoW or project area where reinstatement is necessary in order secure the effective reinstatement of the project area.

The above principle applies to third party pipelines, railways, roads and buildings but is not limited to these examples.

The reinstatement will also be based on applicable sections of the ESIA (Document No. TNP-REP-ENV-GEN-001 and TNP-REP-ENV-GEN-002).

3.2. Clean-up of Sites

FERNAS will, after backfilling and before replacement of topsoil, clean-up all areas affected by construction operations. That will include removal of all plant, equipment and materials not required for replacement of soil and subsequent bio-restoration. The clean-up of the sites will be managed considering the FERNAS Waste Management Plan (FRN-PLN-ENV-PL1-012).

In pre-developed areas (either for agriculture or industry) the cleaned condition will be reinstated in accordance with the Specification for Reinstatement (WRP-SPC-EGG-PLG-001). The strategy for the remediation of contaminated lands identified within the ESIA and the Contract Documents are not covered by the Specification for Reinstatement and reference should be made to Contract Documents.

Clean-up will be accomplished to the specification of EPCM and will as a minimum be to the documented standard and quality of the adjacent and adjoining land, and will be of suitable materials reused and or replaced in accordance with the land use as defined by the Environmental Standards under the Contract.

3.3. Third Part Properties

The pipeline will encounter numerous third party properties, services and facilities over its length. The FERNAS is responsible for identifying properties, services, and facilities, marking and protecting them, and reinstating them to the third party owner's (TPO) requirement as agreed between the TPO and the EPCM. The FERNAS's responsibilities for third party properties, services, and facilities, are set out in the Pipeline Construction Specification , Document No. WRPSPC-PPL-PLG-001.

Reinstatement of any damaged or relocation of third party properties will be done in accordance with the access to site agreements and be to satisfaction of the appropriate regulatory authority and TANAP.

3.4. Critical Habitats

Critical habitats were identified in the Environmental and Social Impact Assessment (ESIA) (Document No. TNP-REP-ENV-GEN-002) and Biodiversity Action Plan (BAP) (Document No. CINREP-ENV-GEN-017). The BAP provides the description of 18 terrestrial and 8 freshwater critical habitats, as well as mitigation and reinstatement measures to be applied in the areas.

In those areas and along water courses and in locations prone to erosion, FERNAS will backfill and re-instate immediately after installation of the pipeline. Also in these areas, FERNAS will fully re-instate in accordance with this specification. This applies to, but is not limited to: new/upgraded roads and tracks, including bridges, helicopter pads, construction camps, maintenance bases and borrow pits / aggregate quarries (if in FERNAS's ownership).

3.5. Soil Erosion, Principle and Classification

The loss of soil through the action of natural and manmade processes is termed soil erosion. Soil erosion is both a risk to the pipeline through reduction of cover / support, and a risk to the environment through the relocation of large quantities of sediment causing changes in drainage patterns, soil fertility et cetera. In addition the visual impact of soil erosion on the RoW is a concern.

Erosion during the construction (i.e. from vegetation clearance to completion of reinstatement) will be managed and mitigated as required by the FERNAS. This management will require the separate consideration, using specific and separated handling systems and protocols, for areas of the pipeline corridor which have been identified to be or which are suspected to be contaminated lands, whether by historical use of influence and/or by actions of incidents under the works. The FERNAS will ensure that water courses and ecologically sensitive sites are not affected by soil erosion and the migration of soils. Methods for control of sediment movement during construction and performance criteria are discussed in Section 4.5 of this plan. Details of these measures will be provided by FERNAS in the Management Plan subject to approval by EPCM.

Following completion of the reinstatement the FERNAS will monitor the reinstatement. This monitoring period, described in Section 7.9, will depend on the type of reinstatement and mitigation measures employed at each site. The FERNAS will undertake repair and supplementary works as required to ensure the reinstatement is successful. Where ecological restoration is not achieving prescribed rates of establishment the FERNAS will take appropriate measures such as reseed, fertilize, irrigate or change plant type as required.

Table 1.1 gives the definition of erosion severity classes for overland areas based on historic pipeline projects in similar conditions (i.e. not specific to TANAP). For the temporary as well as permanent case erosion class 2 or better will be achieved for all slopes where sediment may discharge into a watercourse or ecologically sensitive area, i.e. <5t/ha/year. For other slopes an erosion class of 3 or better (<10 t/ha/year) will be achieved for reinstatement along the pipeline RoW.

Where there is a risk of sediment contaminating water bodies, sediment control devices and measures will be installed (see Section 4.5 and 4.6).

As a minimum the following standards will be achieved:

- very low risk to the pipeline cover; maintain pipeline cover over the design life of the pipeline;
- very low risk of off-site pollution and sedimentation as described in erosion severity class 2 for sensitive sites and severity class 3 for normal sites; and
- low risk of damage to biorestoration by washing-out of seeds and plants as described in erosion severity class 2.

4. METHOD for REINSTATEMENT

4.1 Topsoil Stripping and Storage

Along the TANAP RoW the depth of the topsoil will be established by FERNAS. Procedures will be developed by FERNAS for topsoil stripping in advance of all work fronts. WORK will not commence until EPCM Approval. Typically, stripping will be done to a depth of between 100mm and up to a maximum of 300mm. In areas where little or no topsoil is present the FERNAS must agree the depth (if any) of topsoil to be stripped with the EPCM's representative.

Topsoil stripping must be undertaken by earthmoving equipment using a toothless cutting edge and no excavator buckets with teeth will be permitted. The FERNAS will use equipment which will minimise the impact on the topsoil structure or has a detrimental effect on the efficiency of the vegetation recovery. The topsoil will be carefully stripped to its full depth and stored separately from any other soil or materials. Both for stripping and storage, where plant is operating on topsoil it should be preferably low ground pressure equipment. The FERNAS will submit details of plant and procedures for topsoil stripping and storage in a specific method statement to be subject to EPCM approval.
Topsoil will be stored where it is not compacted by vehicles or contaminated and will be stored in a manner that minimises its loss and / or degradation. Topsoil will not be mixed with subsoil, and will be stored on the opposite side of the TANAP RoW to subsoil; other than in restricted areas where mixing will be prevented by physical means, e.g. geotextile sheeting. Isolated piles of topsoil will be clearly signed as 'Topsoil' in Turkish and English.

All soils will be visually and olfactory inspected prior to stripping and a watching brief will be maintained during all excavation works for potentially contaminated soils / materials. All soils suspected or confirmed to be contaminated will be removed from site and disposed of to a suitably licensed facility. All materials will be sampled and tested prior to reuse in accordance with the agreed limits of USEPA guidance and Dutch Standards for Soil Contamination.

FERNAS will strip the topsoil over TANAP RoW.

Stripped topsoil will be kept free from the passage of vehicles and plant following stockpilling. Topsoil and subsoil stacks will be placed to ensure that they are free draining. Gaps will be left in the topsoil stack to permit reasonable access across the TANAP ROW.

Topsoil will be stored in a stockpile not more than 2m high with side slopes <45°, drained with open ditches, and 1 m high in critical habitats (ref: BAP). Topsoil piles will be leaved in place until final reinstatement by taking the following mitigations to protect the topsoil until completion of constrution activities;

- Topsoil height will be minimized the to 2m,
- Silt fences will be used and regularly maintained where required,
- Outer surface will be compacted using the back of the excavator bucket to minimize water ingress and provided protection from erosion,
- Geotextile will be placed in exposed locations such as access points through the topsoil to provide protection from erosion,
- A drainage channel on the ROW side of the topsoil will be excavated and maintenanced to prevent surface water erosion,
- Routine monitoring of the topsoil piles and maintenance of protection measures, especially after heavy rains will be done.

In areas of very limited working space, topsoil stockpiles of up to 3m high and <45° slope may be permitted with EPCM's approval. The surface of the stockpile will be lightly compacted (a single pass of light hand compaction equipment) to reduce rainfall penetration but not enough to promote anaerobic conditions. Drainage will be provided which prevents standing water on or against the stockpile. Where necessary, the stockpile will be protected from flooding by placing berms/diversions around the perimeter. Under no circumstances will stockpiled topsoil be used as padding material.

During handling, damage to soil structure will be avoided. Soil handling under wet conditions is to be avoided other than in areas having obviously sandy soils (river banks and possibly locations containing tuff). Construction handling of topsoil is to be delayed 24 hours following a rainfall of 10mm or more during the preceding 24 hour period, after which soil conditions will be reassessed.

4.2 Subsoil Stripping and Storage

4.2.1 Objective

The objective is to manage the subsoil so that it is not subjected to, nor is the cause of, excessive erosion.

The TANAP RoW will be reinstated to a sufficient extent in order to allow the affected area to be returned to its pre-project use and productivity. Appropriate maintenance and handling of subsoil is essential to achieving this objective.

Any area of subsoil suspected or confirmed through ESIA or on site testing to be contaminated will be stockpiled separately and either removed from site or reused following an appropriate risk assessment of the subsoil to determine the suitability of its reuse in accordance with the agreed limits of USEPA guidance and Dutch Standards for Soil Contamination for the identified land use locally required.

4.2.2 Requirements

The subsoil will be excavated from the pipe trench and, in some cases, from ridge-top widening or cutting of benches on sides of slopes. In general, subsoil will be returned to the excavated area. However, in Special Areas (refer to Section 8) subsoil may be required to be removed.

4.2.3 Management of Subsoil

Subsoil that will be reused, (i.e. returned to the trench or corridor TANAP RoW) will be placed in stockpiles as shown on the typical drawings. In some areas, particularly where there is limited working width, temporary or permanent removal of subsoil from the RoW may be required, to approved locations only (see the Pipeline Construction Specification for details of grading).

FERNAS method statements will prove his stated maximum allowable height and any compaction requirements for temporary stockpiles to ensure safe working. All maximum heights will conform to the commitment made in the ESIA.

Removed subsoil will be kept free from the passage of vehicles and plant, and segregated from topsoil stockpiles. Subsoil stockpiles will be placed to ensure that they are free draining. Gaps will be left in the stockpile to permit reasonable access across the TANAP RoW and at low areas where surface water may be held against the stack.

The surface of the stockpile will be lightly compacted (a single pass of light hand compaction plant) to reduce rainfall penetration but not enough to promote anaerobic conditions. Where necessary, the stockpile will be protected from flooding by placing berms/barriers around the outside.

FERNAS will maintain the integrity of the stockpile during the storage period to the satisfaction of EPCM. FERNAS is responsible for the placement of suitable drainage and erosion control measures as necessary.

All subsoils will be visually and olfactory inspected prior to stripping and a watching brief will be maintained during all excavation works for potentially contaminated soils / materials. All soils suspected or confirmed to be contaminated will be removed from site and disposed of to a suitably licensed facility. All materials will be sampled and tested proper prior to reuse in accordance with the agreed limits of USEPA guidance and Dutch Standards for Soil Contamination.

4.3 Trench Excavation and Padding

4.3.1 Excavated Material

The creation of surplus excavated material will be minimized as far as practicable since it is significant in terms of waste management. All material that is excavated will be re-used to the maximum extent practicable. FERNAS will produce a waste minimization statement justifying the extent to which surplus material will be minimized and reuse maximized.

4.3.2 Blasting

Blasting will be performed in accordance with WRP-SPC-PPL-PLG-001 Pipeline Construction Specification and BCH-SPC-PPL-PLG-012 Specification for Blasting.

Blasting will only be used where other excavation methods are considered technically infeasible or uneconomic, and it shall be demonstrated to, and approved by, EPCM, that the blasting will minimize over-break of ground and minimize the generation of spoil material.

4.3.3 Backfilling and bedding

Padding and backfill operations will be performed in in accordance with WRP-SPC-PPL-PLG-001 Pipeline Construction Specification.

Bedding is required in areas where the stones and other materials inside the pipeline trench can damage the coating of the pipe and the surrounding soil is not convenient for bedding. When the surrounding soil is considered unsuitable for bedding, the bedding material will be imported by the FERNAS upon approval of EPCM. Imported material used for bedding will be sand and will be salt free (to be verified by sampling and analysis before selecting the material quarry) and will not contain clay, roots, stones or other material which is likely to cause damage to the pipe coating.

4.3.4 Management of Excess Spoil and Rock

Generally, all soil and rock will be returned to the excavated areas. In some locations, however, there will be surplus subsoil or rock that cannot be returned, and this must be disposed of both safely and in line with the environmental requirements of the Contract and in accordance with the requirements of the project Waste Management Plan.

All surplus materials will be visually and olfactory inspected, sampled and tested prior to reuse in accordance with the agreed limits of Dutch Standards and USEPA guidance, All soils suspected or confirmed to be contaminated will be removed from site and disposed of to a suitably licensed facility. FERNAS retains the same responsibilities for excess soil and rock as for any other waste material as specified in the project documentation and Waste Management Plan.

4.4 Reinstatement of Soils

The TANAP RoW will be reinstated to a sufficient extent in order to allow the affected area to be returned to its pre-project use and productivity. Appropriate maintenance and handling of all soil is essential to achieving this objective.

General reinstatement will achieve:

- Final surface will be within +100mm of the level of undisturbed adjacent ground and blended to the existing contours (excluding slope breakers). In certain locations such as side slopes or along narrow ridges site specific reinstatement will be applied as shown on the AFC drawings or approved by the EPCM representative.
- Planting within pipeline permanent RoW to be approved by EPCM.
- In barren areas, a semi- natural appearance is required: rocks or processed rock may be

distributed over the final surface provided the particle size distribution is similar to that of adjacent undisturbed rocks.

- Erosion control measures (if any) may remain visible.
- Water drainage has adequate outfalls and avoids ponding water on the RoW

Upon completion of reinstatement, disturbed areas shall be inspected jointly by FERNAS and EPCM for slope stability, relief, topographic diversity, acceptable surface water drainage capabilities, and compaction.

4.4.1 Reinstatement of Subsoil

Two situations are considered: standard reinstatement and special re-instatement.

4.4.2 Standard Reinstatement

On return of the subsoil to the trench, the subsoil will be compacted to a similar compaction to that in the adjacent undisturbed area. The depth of subsoil after settlement will not be above the level of the surrounding ground. After the subsoil has been returned and the land levelled, the subsoil will be rendered to a loose and workable condition to a depth of 300 - 400 mm and contoured in keeping with the adjacent undisturbed ground. Both the Environmental Inspectors of EPCM and FERNAS will regularly monitor subsoil replacement and contouring.

FERNAS will provide a detailed method statement for standard reinstatement for approval prior to mobilisation.

4.4.3 Special Reinstatement-Side Slopes

Special reinstatement is applied where it has been necessary to cut a bench into hillside in order to establish a flat working area from which to lay the pipe. It is the intention where possible to restore the original slope by filling-in the bench, thereby removing any scar in the landscape.

Side-cut topsoil will be stripped and removed from the area and stockpiled as described in Section 4.1. Both the topsoil and subsoil will be stored separately. The side slope cut will be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours (see Section 8.1). The subsoil layers will be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account should subsoil extend beyond the original line of slope or a new slope be created which is steeper than the original slope. Following compaction of the subsoil, the topsoil will be spread over the site, harrowed and reseeded. The reinstatement of side sloped RoW section will include drainage measures to avoid erosion taking place across the reinstated RoW. Compaction of the backfilled subsoils will be sufficient to ensure long term stability of the slope and will as a minimum match the existing density of the surrounding ground. The reinstatement will be carried out in accordance with the typical drawings for side slopes unless otherwise approved by the EPCM. In exceptional circumstances where full reinstatement is not possible and the created cut slope will remain, FERNAS will prepare a methodology statement proposing an alternative slope reinstatement solution subject to EPCM approval. This will set out as a minimum how the long term slope stability, visual impact, and environmental project requirements are met.

4.4.4 Reinstatement of topsoil

Topsoil will be segregated and will not be mixed with spoil material before or during replacement. Topsoil will be re-spread over the surface of the subsoils. Topsoil will not be used for bedding material in the trench, and topsoil from unstripped/undisturbed areas will not be used to cover adjacent disturbances. Topsoil will not be handled during excessively wet conditions or at times when the ground or topsoil is frozen, unless agreed otherwise with EPCM's representative.

Once the disturbed areas have had subsoils compacted and have been re-contoured, topsoil will be re-distributed over the entire disturbed areas from which it was stored.

All disturbed areas will be subject to final grading as specified in Section 4.5; however, measures will be taken prior to seeding to ensure areas of reinstated topsoil remain rough / tilled, to help protect the stability of topsoil against erosion. On sites where harrowing etc. is not practical (e.g. steep slopes, rocky areas), the sites should be dozer-tracked perpendicular to the slope or otherwise left with adequate roughness following topsoil placement. When the topsoil is replaced over the TANAP RoW, a slightly rough, loosely consolidated texture will be achieved in order to promote vegetation growth.

Topsoil should be seeded following the seeding regime identified in Table 7.1. In general this will be undertaken using hydroseeding, but for steep slope locations, other techniques and measures will apply, see Section 4.6.

FERNAS will provide a detailed method statement for topsoil reinstatement for approval prior to mobilisation.

4.5 Reinstatement of Soils during construction

FERNAS will be responsible for employing, to the satisfaction of EPCM, any temporary erosion and sediment control measures in order to protect the TANAP RoW and adjacent areas during construction activities. In the event that the pipeline ditch remains open, FERNAS will ensure trench integrity and employ such measures as temporary ditch breakers, silt fences, straw bales, etc. as necessary.

4.5.1 Temporary Erosion Control

The following temporary erosion control measures will be incorporated along the TANAP RoW in order to protect the environment and to achieve the performance standards as set out in Section 3.5.

On longitudinal slopes with open trenches, plugs of unexcavated material will be left in the trench to interrupt surface flow and prevent scouring of the trench bottom.

Tree stumps should be left in place wherever possible to provide soil stabilization.

Drainage channels will be installed on all longitudinal and transverse slopes as required.
Where slopes require cutting, flumes will be installed across the TANAP RoW. These will carry water from drainage sumps on the upslope.

The TANAP RoW will be monitored and repairs made immediately throughout construction to prevent:

- subsidence of the pipeline trench (below natural grade);
- breaching of diversion berms and slope breakers;

- slope wash from improperly placed berms and slope breakers;
- slumping and soil movements from cut and fill slopes;
- loss of stored topsoil, subsoil or cuttings.
- Pollution of sensitive sites, including watercourses, with displaced sediment as a result of erosion on the RoW.

4.5.2 Sediment interception

Where the TANAP RoW intersects or is parallel to a watercourse sediment interception will be provided to prevent sediment entering the water. Sediment interception will be provided for runoff that may occur during construction and reinstatement activities until the reinstatement has been in place and is achieving the requirements of Section 3.5.

Sediment interception devices may take the form of a Silt Fence, Wooden Fence or Straw Bale Barrier. The removal of sediment caught by these measures will be the responsibility of the FERNAS. It should be noted by FERNAS that these forms of construction may be subject to vandalism in some rural areas where the resources used are of value, and as such selection of approach should consider location and access.

4.5.2.1 Silt fence

Silt fences or other suitable sediment barriers will be installed in areas of low sheet flow and are installed to intercept runoff on eroding slopes.
The filter cloth is draped over the fence and secured in a 15-cm-deep trench dug one metre uphill. Filter fences installed across the working width should follow a slight gradient towards a natural outlet, waterway, or lined chute, into which they drain.

The following requirements will be satisfied:

- ponding will not be allowed behind a silt fence;
- drainage area will not exceed 0.1 hectares per 30m of fence length;
- for slopes between 2% and 20%, the maximum allowable upstream flow path length will be 30m;
- for slopes steeper than 20%, the maximum will be 6m;
- maximum upslope grade perpendicular to the fence line will not exceed 100%; silt fences will be used for sheet flow only.

Filter fabric will meet the following criteria contained in Table 4.1 as a minimum:

Table 4.1. Filter Fabric Criteria

Physical Property	Minimum Requirements
Filtering efficiency	75% - 80%
Tensile strength at 20% (maximum) elongation	90kg/ linear metre minimum
Slurry flow rate	0.11 liters/m3/min

Synthetic fibre will contain ultraviolet inhibitors and stabilisers and meet the performance criteria for the entire length of installation and the environments encountered.
Filter fabric will be installed in continuous lengths.

Silt fences will be inspected daily during periods of prolonged rainfall, immediately after each rain event, and weekly during periods of no rainfall. Any repairs required will be made immediately.

Sediment will be removed prior to the sediment reaching 1/3 of the height of the silt fence. Care will be taken during sediment removal to ensure integrity of the fence is maintained. Sediment collected will be disposed of in an approved manner.
The silt fence will not be removed until the upslope area has been permanently stabilised. Any sediment deposits remaining in place after the fence has been removed will be dressed to conform to the existing grade, prepared and re-vegetated.

4.5.2.2 Straw bale barrier

Straw bale barriers (the term can include hay or other baled vegetative matter) will be installed in areas where small amounts of temporary sediment interception are required.

Straw bale barriers will not generally be installed where sediment control is required for periods greater than three months. Where they are installed on the working width, they should follow a slight gradient towards a natural channel, waterway, or lined chute.

The requirement for locations of straw bale barriers along the RoW is to be established during the work jointly between FERNAS and EPCM representative. Generally these sediment control areas with slopes >10% will include:

- areas of protection for longitudinal down slope to water bodies and roads;
- edge of ROW with adjacent down slope water bodies or roads; and
- edge of ROW with adjacent down slope to defined environmentally sensitive areas.

Straw bales will be bedded into the ground and anchored with reinforcing stakes. Anchors are driven at an angle towards the neighbouring bale so as to tie them firmly together.

The drainage area will be no greater than 0.1 hectares for each 30m of bale barrier. Straw bale barriers will not be used in areas of rock or other hard areas, where full and uniform anchoring is prevented.

Straw bale barriers will be inspected daily during periods of rainfall, immediately after each rain event, and bi-weekly during periods of no rainfall. Any repairs required will be made immediately. While the life expectancy of bales is not more than 3–6 months, deteriorated bales can be broken up and used as straw mulch or are often left to decompose in place. If non-biodegradable plastic or wire ties are used to bind the bales, these should be removed and disposed of. Straw bales will not be left in the trench from the point of backfilling.

4.5.2.3 Wooden Fence

Typically subsoil will not be stored in working areas constrained by side slope or narrow ridges, spoil will instead be removed from the working strip and stored in approved temporary stockpiles. The use of wooden fences in areas of side slope and ridge construction to retain cuttings during construction and reinstatement of the TANAP RoW will be subject to EPCM approval. The requirement for locations of wood fences is to be established during the work jointly between FERNAS and EPCM representative.

FERNAS will ensure by calculation that fences are capable of safely supporting the loads imposed. Fences will be regularly inspected to ensure safe operation and structural integrity. FERNAS will be aware that the use of wooden fences may pose localized problems. In certain areas, firewood is a valuable commodity therefore the fence material may be attractive to locals for firewood.

Fences will be removed, unless directed otherwise by EPCM, during reinstatement of the TANAP RoW.

4.5.2.4 Water Disposal

Pipeline trenches commonly collect water during construction. Because it may be turbid and sediment laden, trench water will require filtering before it can be discharged.

Trench water is commonly removed using a pump connected to a 7–10cm diameter flexible hose. Disposal of trench water will be in accordance with the requirements set out in the FERNAS’s Environmental and Social Management Plan (ESMP) and the ESIA.

Appropriate measures to prevent erosion and sediments during the disposal of trench water, hydrotest water, or any other water will be adopted. Such measures are specified in the FERNAS’s ESMP and all water discharges will be undertaken in accordance with the requirements of that plan.

4.5.2.5 Crushed Rocks

Crushed rock may be required as a temporary measure it serves to reduce muddy conditions and sediment production during construction.

Crushed rock is applicable to locations where vegetation cannot be established and where erosion poses a risk to the pipeline or sediment threatens nearby streams. This also applies to stone dressings outside of the working width: e.g. camps, temporary roads, pipe storage locations, and crew quarters.

As required by local conditions and as agreed with EPCM representative, crushed rock may be used for temporary roadways, turning areas, and other locations from where sediment discharge poses a problem. Particle size to be determined for specific purpose.

Following project completion, temporary areas dressed with crushed rock will be ripped, fertilized and seeded or planted. These areas will be subject to the acceptance of EPCM.

4.6. Erosion Control Devices for Reinstated Slopes

Careful construction and reinstatement can reduce soil erosion and sedimentation to within manageable limits. Bioremedial and mechanical (hydraulic) methods of controlling soil erosion and sedimentation will be implemented.

Stabilisation practices are essential on all steeply sloping lands disturbed by construction. Steep sloping ground is considered to be ground inclined at >15% to the horizontal, or shallower ground which through the nature of its topography is expected to be subjected to significant surface water flow.

Mechanical methods of stabilisation include the use of slope breakers, containment ponds, and lined chutes. Slope breakers cross the RoW and serve to contain and remove water runoff from the working width and other disturbed areas. They discharge into soakaway / containment ponds, natural channels, or lined chutes, depending on the situation. Dissipation of the energy anticipated from the flow is necessary. The breakers reduce the length of slope over which water can travel without interruption, but typically require the presence of vegetation to effectively limit the transportation of sediment from the slopes. The bioremedial measures include hydroseeding and hydromulching to revegetate the slopes. For some situations a seed impregnated jute matting will also be utilised to allow the establishment of the specified flora.

4.6.1 Slope Breakers

Slope breakers are channels constructed across the working width. Their purpose is to remove surface runoff and, acting with vegetation, to protect against soil erosion. Slope breakers can be temporary or permanent.

Temporary slope breakers are required to be functional for the first 5 years after the pipeline reinstatement takes place, and the construction must allow maintenance to ensure this is the case. Five years is considered sufficient time for the vegetation to be fully established provided suitable reinstatement is undertaken.

Permanent slope breakers (diversion ditches) will be in the form of stone dressed or rock formed slope breakers. These permanent structures and their associated outlets are required to remain functional for the design life of the pipeline (25 years), and the construction must allow maintenance to ensure this is the case.

The shape and dimensions of the slope breakers will be, where necessary, altered to suit the local topography and runoff situation, following approval from the EPCM's representative. If a spring is intercepted it should be diverted to a lined chute and provision made to drain the slope appropriately.

4.6.2 Erosion (Jute) Matting

Erosion matting, consisting of jute, will be installed to provide an immediate protection to the slope against erosion, prevent washing-out of seeds and enhance the micro-climatic conditions in the soil for plant growth.

Erosion matting will provide temporary protection to the soil surface until sufficient vegetation cover has been established to control erosion and meet the performance criteria. The erosion matting will be Geojute or similar. The mat will be biodegradable, open weave 11mm x 18mm mesh size and 2mm thick fibres with a mass/area ratio of 500g/m2. The mat will absorb water to 500% of its dry weight on saturation. The mat should rot in approximately two years. For river crossings reinstatement, biodegradable erosion matting willl be Geojute Plus or similar. FERNAS will submit data sheets and samples of the proposed erosion matting for EPCM approval.

Where revegetation is taking place topsoil preparation and grass seeding work will be undertaken prior to laying erosion matting. The seeding will match the planting regime described in Section 7.

The erosion mat will be unrolled from the top of the slope, allowing it to lay naturally on the soil surface over all the local undulations. On no account will the material be taut or stretched so that it forms 'bridges' over local soil mounds and stones. Matting will be fastened to the slope surface as described on typical drawing WRP-DGA-PPL-PLG-050. Unless properly anchored, mats are liable to slip. Uphill ends are to be buried in a 15 cm deep slot and stapled per the manufacturer's recommendation at maximum 30 cm centres across the width of the mat. At joints, the downhill end should be overlapped shingle-fashion for 30 cm. The uphill end of the new roll is inserted into a 15 cm trench and stapled as before. On slopes steeper than 25 %

check slots should be used every 30 m. These are 15cm deep trenches into which a tight fold of matting is inserted. The slot is filled and tamped, and staples are punched.

Following installation, mats should be rolled, if the slope allows, with a smooth hand-roller to bring them into close contact with the soil and to consolidate the seedbed.

Erosion mats, once installed will be regularly inspected for degradation and installation integrity. Where matting has remained in place for longer than 12 months, FERNAS will be responsible for maintaining and replacing matting as required through the construction and maintenance period.

4.6.3 Crushed Rock

Crushed rock may be required as a permanent erosion control measure at locations where it is impossible to establish vegetation and with prior approval of EPCM. Crushed rock will be used, if necessary, to recreate the surface covering of rock on the adjacent and pre-works slope. If possible the rock used will be that recovered in the top soil stripping and pipe trench excavation.

4.6.4 Lined Chutes

Lined chutes are channels created to collect and convey runoff to where it can be safely disposed of without erosion. Chutes or waterways serve to receive and concentrate runoff from slope breakers, from small gullies that cross the pipeline right-of-way, and from other areas that require water disposal. Their design is such that channel velocities remain non-erosive, even on steep slopes. The discharge point is to be designed and installed sufficiently to dissipate discharge energy and avoid erosion at the discharge point. Lined chutes will be applied where shown on the alignment sheets or as directed by the EPCM representative.

Commonly, lined chutes are designed to convey water from where springs emerge in the vicinity of the pipeline RoW.

On steep slopes (>25%) lined chutes will contain wicker dams to reduce the potential for high velocity water flow down the slopes.
The chutes, including wicker dams where utilised, will be inspected and maintained at the same time as the slope breakers.

4.6.5 Gully Remediation

The objective of gully remediation is to prevent existing gullies from increasing in size and extent through continued erosion.

The structures described in this specification reduce the velocity of concentrated storm water flows and thus reduces erosion of the swale or ditch. They also trap small amounts of sediment flowing in the gully.

Additional mitigation measures will be applied for gully heads close to the pipeline using a gabion solution as detailed in drawing WRP-DGA-PPL-PLG-047 (Detail 1). Gabions in combination with a geotextile and rock fill will ensure that further erosion will be mitigated and gully head migration and possible exposure of the pipeline prevented.

Gully head remediation will be applied as shown on the alignment sheets or directed by the EPCM representative. Final design of the gully head mitigation measures will be proposed by the FERNAS subject to EPCM approval.

4.6.6 Geotextile

Geotextile will be as defined in the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030 (or EPCM-approved equivalent).

Geotextile will be handled and installed according to the manufacturer’s recommendations, and/ or as shown on the Drawings. Geotextile will not be stored in direct sunlight. Construction equipment and/ or vehicles will not be allowed to operate directly on geotextile.

Where geotextile is joined with overlapping joints, a minimum 500 mm overlap will be allowed at adjoining borders. For geotextile placed on slopes, the geotextile will be secured at the top of slope by embedding in an anchor trench, as shown on the Project Drawings.

4.7. Proposed Measures

Using slope geometry and assumptions where necessary, mitigation measures have been proposed for each slope using the USLE (see Section 8.3) These measures are presented on the alignment sheets using two codes, one for Bio-remedial measures, and one for the engineered referred to as 'slope breakers'. The codes present predicted measures required to reduce soil erosion to an acceptable level for each slope. The codes are in the following format:

Table 4.2: Bioremediation Code

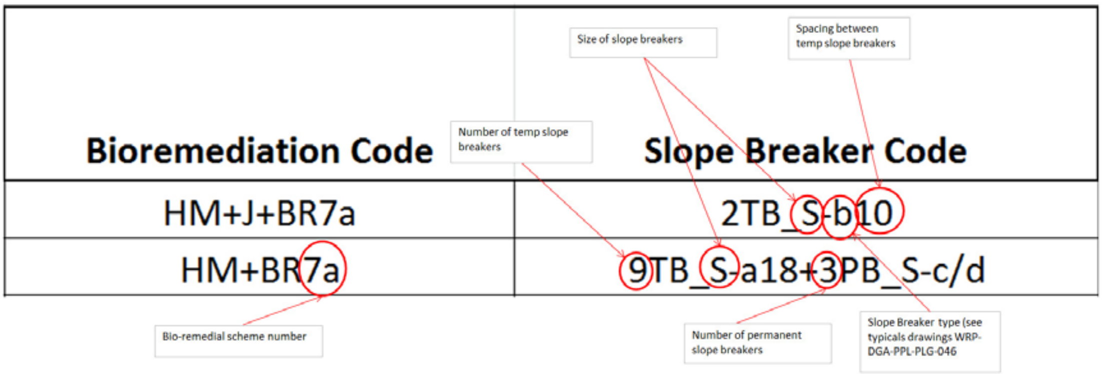
CODE	Description
HM	Hydromulching of slope surface
HS	Hydroseeding of slope surface
BR	BioRemedial scheme, Number identifies which BR from list in Specification for Reinstatement

Table 4.3: Slope Breaker Code

CODE	Description
TB	Temporary Slope Breaker
PB	Permanent Slope Breaker
-a	Slope Breaker type A
-b	Slope Breaker type B
-c	Slope Breaker type C
-d	Slope Breaker type D
-L	Large breaker dimensions
-S	Standard breaker dimensions
J	Jute Matting

Figure 4.1 gives an example of the codes provided on the alignment sheets, and some explanatory notes, to be read in conjunction with Table 4.2 and Table 4.3.

Figure 4.1. Alignment Sheet Code Example



The first example given in Figure 4.1 identifies that the slope will be hydromulched, and have Jute Matting, making use of the seed mix BR7a as described in Table 7.1. It also identifies that 2 temporary slope breakers, of standard dimensions and type ‘b’ will be constructed at 10m spacing down the slope.

The second example given in Figure 4.1 has 9 temporary slope breakers of standard size, type ‘a’ at 18 m spacing down the slope. It also has 3 permanent slope breakers, type ‘c’ or ‘d’ as appropriate for the slope, and of standard size.

Permanent slope breakers are always used to divide the slopes into equal parts. In the case of the Figure 4.1 second example this is 3 slope breakers subdividing the slope into 4 sections. The temporary slope breakers are spaced between permanent breakers, with an additional breaker included at the crest of the slope which has been included to take ccount of situations where the surrounding topography may result in discharge onto the steep slope. The requirement for T* temporary breakers will be judged by the FERNAS to the satisfaction of the EPCM’s representative.

4.8. Assumptions and Site Validation

Where information was not available to undertake the USLE as described in Section 8.3, assumptions were made such that the initial proposed soil erosion mitigation measures could be generated for each slope. As not all slopes were visited, these assumptions are significant and relevant to almost all slopes, and must be validated accordingly. The following list of assumptions should be considered for each slope, and the mitigation measures reconsidered if the assumptions are found to be invalidated by the site observations:

- Slope start / endpoint identified using GIS
- Slope angle attributed based on averaging from GIS
- The percentage of slope surface covered by rock-mulch
- Potential for sediment discharge into a watercourse or sensitive site, identified from GIS
- Soil class mix (gravel, sand, silt, clay), currently assumed to be a silt for all sites
- Local topography (is RoW likely to be impacted by flowing groundwater), including requirement for slope creast temporary breaker (see section 4.7)

The assessment of the validity of the assumptions made will be undertaken by the FERNAS, and EPCM representatives on site, and the USLE assessment reworked by the EPCM representative where necessary to modify the mitigation measures to be installed, for the approval of the EPCM.

4.9. Marking of Erosion Control Works

FERNAS and EPCM's representative are to walk the pipeline RoW for each steep slope, to validate the design assumptions in the erosion assessment. Following validation, or update of the prescribed erosion mitigation measures, the FERNAS and EPCM will agree the site specific arrangement of mitigation measures, and jointly stake the route with the agreed upon measures immediately prior to clearing and grading of the RoW. Due to the length of the TANAP pipeline and the lot allocation, multiple teams will be required to perform this function.

4.10. Rip Rap

Rip rap will be required to reinstate specific river crossings. The minimum installation locations are defined in the River Crossing Reinstatement and Scour Protection Schedule Document No. WRPLST-PPL-PLG-003.

This document will not limit the location of rip rap installations. FERNAS will identify any additional areas and propose them to EPCM for review and approval.

Rip rap may also be used in areas along the right of way other than at river crossings, FERNAS will install rip rap wherever deemed necessary and suitable to achieve the erosion control requirements or for slope stabilisation.

Rip rap will be as defined in the Pipeline River Crossing Civil Protection Works Specification WRPSPC-PPL-PLG-030.

4.11. Rock-filled Gabions

Gabions will be required to reinstate specific river crossings. The minimum installation locations are defined in the River Crossing Reinstatement and Scour Protection Schedule Document No. WRPLST-PPL-PLG-003.

This document will not limit the location of gabion installations. FERNAS will identify any additional areas and propose them to EPCM for review and approval.

Gabions may also be used in areas along the right of way other than at river crossings FERNAS will install gabions wherever rip rap is not suitable control measure and deemed necessary to achieve the erosion control requirements or for slope stabilisation.

Rock-filled gabions will be as defined in the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030.

5. TRENCH BREAKERS

Trench breakers will be installed within the pipeline ditch at locations along the pipeline route where the natural profile, drainage pattern and backfill materials may cause the trench to act as a drain resulting in the washing out of the bedding material etc. Where the slope is steep trench breakers will assist in the backfilling operation, breaking the trench into shorter sections. Anticipated spacing requirements for slope breakers are identified on typical drawing WRP-DGA-PPL-PLG-041.

FERNAS will install the trench breakers per design. The final installation will require approval from the EPCM. Allowance for water movement through the trench breaker will be made by installing pipes through the trench breaker as shown on the typical drawing.

Additionally, impermeable trench breakers are required to control the lateral/horizontal migration of groundwater and/or fluids:

- at bases of slopes adjacent to wetlands and where needed to avoid draining of wetlands,
- to prevent contamination migration, and/or
- reduce suffosion risk in karst terrain

If trench breakers are used for this purpose the drainage pipes will be omitted.

The materials of construction will be polyurethane bags filled with sand and cement 10:1 as detailed in the referenced Project Drawings, polyurethane foam (subject to Client approval), or alternative (subject to Client approval).

6. RIVERS

Where required the design of riverbed and riverbank protection will be in accordance with Project Drawings.

Specific method statements will be produced by FERNAS for all major river crossings, i.e. RVX1, RVX2, RVX3A and RVX8, generic method statements will be produced by FERNAS for each type of minor river crossing i.e. RVX3B, RVX4 to RVX7 for EPCM approval. The method statement will detail all construction and restoration procedures.

Riparian vegetation (Plant habitats and communities along the river margins and banks) are of high importance to the long term stability of the river. FERNAS will minimise riparian disturbance wherever practicable. Where riparian vegetation consists of shrubs and trees greater than 1m height, FERNAS should transplant the plants wherever possible for re-planting during reinstatement works. Where it is not practicable to transplant or translocate the trees then new trees of the same species mix will be planted. Nursery trees of minimum 2 years old up to 5 year old will be planted in order to restore the riparian environment, subject to the restrictions of the Planting Proximity Zones.

The Planting Proximity Zones are defined by the following:

- there will be no trees planted within 6 m of the pipeline centreline,
- trees such as Willows (Salix) and Poplar (Salicaceae) or other native species with similarlydeep and aggressive root structures will not be planted within 10m of the pipeline centreline.
- other tree species such as Ash, Alder, Lebanon cedar, larch, beech, elm, sweet chestnut, hornbeam, Turkish Pine, scotts pine, black pine, Kermes oak, Cilician Fir, sycamore, apple, plum, cherry, pear, and also included in this category are most conifers may be planted at a distance of 6 m or greater from the pipeline centreline.

FERNAS will plant sufficient density of vegetation to achieve the original plant densities subject to the restrictions of the Planting Proximity Zones. The planting density will take consideration of dieback rates of each plant.

Where originally present native shrubs will be re-planted above the pipeline and within the riparian zone, if no shrubs are originally present, FERNAS will introduce shrubs native to the region to provide vegetative stabilisation and erosion protection to the cleared riparian zone 6 m either side of the pipeline centreline.

Acceptable plant types, suggestion of planting density and their location relative to the pipeline are outlined in drawings WRP-DGA-PPL-PLG-036-01 – Typical Drawing Riverbank Protection Bio Restoration and WRP-DGA-PPL-PLG-036-02 Typical Drawing River Riparian Restoration.

Bioremediation of river banks will be undertaken to re-establish vegetation to the equivalence of the adjacent untouched areas. This may include juvenile trees and shrubs the selection of, placement and planting will be supervised by a competent ecologist and approved by the EPCM. Unless stipulated on project documentation river banks will be restored to their original condition and contours. Where this is not practicable, FERNAS will propose site specific solutions with engineering justification; this will be included within EPCM approved method statements.

For gravel bed rivers, the armoured bed (the sediment forming the surface layer that is coarser than the underlying sediment) will be recovered to a minimum depth of 300 mm at the start of crossing excavations, stored in a segregated area and replaced as the top layer of bed material during reinstatement.

The backfill over the pipe will be at least as scour-resistant as the original bed material. Where rock is present the backfill material will be coherent and with similar properties to the adjacent undisturbed ground, the trench should not create a natural channel for preferential erosion or water run-off nor should it create localised hard areas, with the potential to increase future erosion rates across the watercourse.

The disturbed portion of the river bed will be returned to pre-construction contours where possible and in compliance with Project Drawings. Any deviations will be subject to EPCM approval.

Erosion protection and stabilisation measures will be provided to prevent acceleration of and / or increase in the erosion as a direct or indirect result of the construction activities. Other than sites where civil protection measures are designed e.g. riverbank revetments and riverbed protection, erosion and soil stabilisation measures, when implemented, will not be intended to permanently alter the pre-construction hydrologic and environmental regimes including natural erosion of the rivers. Trench backfill materials will meet the requirements of the Pipeline Construction Specification. Any material too wet to be suitable for reinstatement of the banks will be dried as required to ensure stability during reinstatement.

Erosion and sediment control devices will be installed and maintained until re-vegetation and/or selected stabilisation measures shown in Project Drawings are sufficiently established and functioning to meet the requirements of “no accelerated” or “increased erosion”. FERNAS will detail erosion and sediment control measures to be used in the method statements for EPCM approval and these willll be compliant with the project documentation.

Where erosion matting and/or bio-restoration cannot achieve the project reinstatement performance requirements, or where otherwise indicated on Project Drawings, or as otherwise deemed necessary, erosion protection will be achieved by the installation of civil protection measures (see Section 4).

Where permanent river bed scour and riverbank protection is required it will generally be specified on site specific detail drawings and in the River Crossing Reinstatement and Scour Protection Schedule Document No. WRP-LST-PPL-PLG-003. Protection measures will be implemented as specified. FERNAS is required to validate the river crossing reinstatement and scour protection schedule document and where additional protection requirements become apparent during either construction and/ or re-instatement, FERNAS will propose additional measures, in accordance with project requirements, for EPCM review and approval prior to implementation.

Requirements for riprap, geotextile, gabions, sills, bunds, groynes etc, including but not limited to material specifications, placement and testing will be in accordance with Project Drawings, and meet the minimum requirements of the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030.

7. BIORESTORATION

The presence of vegetation reduces the susceptibility to soil erosion, providing canopy cover to the soils and having roots binding the soil. Revegetation in the project area means returning the land to its use prior to construction of the TANAP pipeline. This will mean planting grasses on highly erodible landscapes, or planting alpine plants and trees if the land is unsuited to grass, to be determined by a competent ecologist on site prior to stripping and grubbing, and to be approved by the EPCM. Privately owned land will normally be replanted to the pre-existing condition or as agreed with the landowner and EPCM. Trees will not be planted within an 16 m wide strip centred over the pipe. However, trees may be planted in areas suitable for reforestation, such as the verge of the right-of-way. In addition to the TANAP's working width, its temporary roads and other disturbed areas will be reinstated by FERNAS to the satisfaction of the Landowner and EPCM.
The collected seeds then will be sent to Ministry of Agriculture's seed gene banks in Ankara and vegetative propagules will be used in order to start an ex situ cultivation for the reintroduction of populations in suitable habitats within the species range. Seed transportation and providing the records will be responsibility of FERNAS's biologist.

All biorestoration programs will be approved by EPCM. Landowners will be consulted by FERNAS to assist in developing these programs. Where Landowners requirements cannot be achieved, FERNAS will consult with EPCM to agree final resolution of the issue.

7.1. Objectives

The objectives are: (1) to establish sufficient vegetation cover to reduce erosion to meet the performance requirement of Erosion Class 3 (and in sensitive locations Class 2) or better through restoration of the local plant community, (2) to reinstate with sufficient variety and distribution of appropriate plant species such that over time the local species will re-establish themselves across the RoW.

The long-term cover will be the native flora with the exception of areas that were planted with crops or other non-native species prior to construction. The biorestoration strategy is based on supplementing the seed bank of local species to remain in the topsoil when it is replaced. These supplementary seeds will be of fast growing species, sensitive to the local ecology, and that will rapidly provide soil surface cover and limit erosion. All biorestoration materials including seeds and plants are to be supplied by FERNAS.

7.2. Requirements

7.2.1. Agricultural/developed areas

In agricultural (defined as arable land) and other developed areas FERNAS will leave the land in the condition specified in the pre-entry agreements. Except where agreed otherwise, FERNAS will assume that the land is to be made ready for re-planting with crops: the land will be graded and tined to remove compaction. Application of fertilizer and other soil amendments (if needed), and planting on permanent growing areas will be carried out by the landowner or tenant. FERNAS will, however, seed and maintain all topsoil storage areas as required by Section 3.1, and irrigate all areas to the extent required to suppress dust formation.

7.2.2. Undeveloped areas

A minimum of 70% or the pre-works cover of ground vegetation (based on 100% total without overlapping cover) will be established within one year of planting. This will minimise surface erosion and provide a sustainable, self-generating plant community under virtually all conditions.

Fertiliser will be applied where necessary to achieve these target growth rates, as described in Section 7.5.

In areas where third party activities have affected the level of vegetative cover, the original cover will be determined by reference to adjacent, unaffected areas of similar topography and soil type.

Original percentage cover will be estimated from FERNAS's photographic record of the route, or, in case of doubt, by reference to adjacent undisturbed areas.

The vegetation cover will be composed of either:

- Species (for example, fast growth types) that are suited to the local environment and indigenous to the region; (The selection of species which do not belong to the same area will be aligned with sensitivity of the area. For example for critical habitats, there may be certain restriction of importing alien species to the area.), as proposed in Section 7.5
- species originally found in each route section or project area, as determined by competent ecologist on site and approved by the EPCM;
- or an ecologically compatible mixture of those two groups.

The biorestoration maintenance, including weeding and grazing control, will be FERNAS's responsibility for a period defined within the Contract.

7.3. Scheduling

FERNAS will carry out biorestoration work in the appropriate growing seasons. Sowing or planting must take place in the appropriate season for the applicable plant types. FERNAS will identify from historical meteorological data suitable weather 'windows' for each area of the route. Biorestoration schedule to be approved by EPCM.

FERNAS will produce a Biorestoration Schedule including pre-construction transplanting or cultivation in addition to post-construction soil preparation, planting and aftercare. Scheduling of the biorestoration will be aligned with the ESIA requirements and management plans and will be issued to EPCM for confirmation before being applied.

7.4. Selection of Plant Species

This section refers to the species and form of materials (seed, seed-mix, bulb, or plant etc.) chosen to supplement the seed bank of the topsoil. This section does not apply to agricultural or other developed areas.

The selection of species wiil be designed to achieve the objectives defined in Section 7.1. Seed mixes based on localised assessment for all regions along the pipeline are presented in Table 7.1 , but must be verified at each location by a competent ecologist to ensure suitability and compatibility with pre-works and adjacent ecology. This is of particular importance in critical habitat areas.

FERNAS will be responsible for the final choice of species and form of materials for each project area and section of TANAP ROW. FERNAS will refer to specialist advice provided by Specialist Contractor on existing species and their distributions.

FERNAS will produce Site Specific Special Area Reinstatement Plans and Generic Reinstatement Plans describing the quantity of plants/seeds and material forms to be planted for approval by EPCM. This plan will include certain mitigations and limitation for critical areas in terms of selection of species and seeds to be used.

7.4.1 Rare Plants

Rare plants will be dealt with in accordance with the mitigation measures detailed in the BAP. In addition to flora, there may be certain fauna which make a habitat critical; in this case certain limitations will be applied to the seed selection.

7.4.2 Species selection

Where rapid growth is necessary for erosion control or other reasons, the species selected for initial planting will have the following be compatible with the area required to be erosion controlled:

- dense, fibrous horizontal root structure close to the surface;
- dense uniform ground cover, particularly during the season of the most intense rainfalls;
- resistant to damage by high-velocity run-off;
- resistant to damage from trampling by people and animals; not persistant – to allow the original species to re-colonize the area;
- if possible, not clumpy or tussocky as this may lead to concentration of run-off between the plants.
- Not to be invasive, or harmful to grazing farmstock.

The species selected for long-term growth will reflect the variety and distribution pattern of the preconstruction flora.

Table 7.1. Proposed Seeding Combinations

Biological Restor Ref. (See align sheet codes allocation to slope	Region	Kilometer Point From (m)	Kilometer Point From (m)	Elevation (m)	Seeds of the sp to be collected	Life From	Seed Collection T	Planting method Alignment sheet c
1a	Ardahan	0	125000	<1500	*Elymus repens*	Herb.	July-August	Hydroseed Hydromulch
					Bromus tectorum	Herb.	July-August	
					Bromus racemosus	Herb.	July-August	
					Koeleria nitidula	Herb.	June-July	
					Phleum phleoides	Herb.	July-August	
1b	Ardahan	0	125000	>1500	*Agrostis stolonifera*	Herb.	July-August	Hydroseed or Hydromulch
					Bromus tectorum	Herb.	July-August	
					Elymus repens	Herb.	July-August	
					Hordeum violaceum	Herb.	July-August	
					Poa angustifolia	Herb.	July-August	
2a	Kars	125000	210000	<2200	*Bromus tectorum*	Herb.	July-August	Hydroseed or Hydromulch
					Elymus repens	Herb.	July-August	
					Hordeum violaceum	Herb.	July-August	
					Koeleria gracilis	Herb.	July-August	
					Poa angustifolia	Herb.	July-August	
2b	Kars	125000	210000	2200> Slope< 2500	*Bromus tectorum*	Herb.	July-August	Hydroseed or Hydromulch
					Hordeum violaceum	Herb.	July-August	
					Koeleria gracilis	Herb.	July-August	
					Poa bulbosa	Herb.	July-August	

					Poa pratensis	Herb.	July-August	
2c	Kars	125000	210000	>2500	*Achillea millefolium*	Herb.	July-August	Hydroseed or Hydromulch
					Poa pratensis	Herb.	July-August	
					Poa araratica	Herb.	July-August	
					Poa bulbosa	Herb.	July-August	
					Festuca chalcophaea	Herb.	July-August	
3a	Erzurum	210000	393000	<1800	*Bromus lanceolatus*	Herb.	July-August	Hydroseed or Hydromulch
					Elymus repens	Herb.	July-August	
					Hordeum violaceum	Herb.	July-August	
					Phleum phleoides	Herb.	July-August	
					Poa angustifolia	Herb.	July-August	
3b	Erzurum	210000	393000	>1800	*Poa bulbosa* var. *vivipara*	Herb.	July-August	Hydroseed or Hydromulch
					Phleum pratense	Herb.	July-August	
					Koeleria cristata	Herb.	July-August	
					Lolium perenne	Herb.	July-August	
					Hordeum violaceum	Herb.	July-August	

7.5. Fertiliser

Fertilizer will be applied to disturbed surfaces, as necessary, where vegetation is to be seeded or planted.

Fertilization should be applied during hydroseeding and hydromulching process. The fertilizer should contain 4.0% Fe, 3.0% Mn, 0.1% Mo, 2.0% Zn. The amount of fertilizer should be 25 kg per 1000 m2. The FERNAS will ensure that this fertilizer is appropriate for each location, or vary the fertilizer if necessary following approval from the EPCM. Local advice (universities, agronomists, and landowners) and advice from the Ministries of Agriculture or Forestry should be obtained to confirm or revise the stated fertilizer application rates at specific locations.

Fertilizer varies chemically and physically, with its greatest variability occurring among nitrogen fertilizers. Fertilizers having high solubility and motility are unsuited to highly mobile construction as practiced by the pipeline industry. The project requires fertilizer that can be applied during reinstatement and that remains active during periods of maximum plant requirements, especially during periods of rapid vegetative growth. Fertilizer broadcast as a top dressing during seeding is generally unsuited for the following reasons:

1. Seedlings during their growth establishment period have low soil nutrient requirements.
2. Autumn-sown wheat does not enter rapid vegetative growth until spring following snowmelt,about 100 days following sowing.
3. Urea, an amide-type fertilizer, may volatilize if applied to the surface. (Biuret, an impurity occasionally found in urea, may be toxic to some plants.)
4. Fertilizers not adsorbed by soil colloids may leach. Fertilizer types particular prone to leaching include nitrate types (sodium nitrate, calcium nitrate) and urea. Ammoniacal types (ammonium sulphate and ammonium chloride) adsorb onto soil colloids but have low nitrogen content and high production costs compared to other forms.

The TANAP project is best suited to combination fertilizer types, such as ammonium sulphate nitrate or calcium ammonium nitrate. Market conditions and local advice is crucial to selecting the type of fertilizer to be applied. Landowner requirements must also be taken into consideration. Reinstatement practices may require adjustment if fertilizer application is to be effective.

Placement of Fertilizer

Problems can be avoided if fertilizer is mixed into the topsoil. This effect would be similar to injecting fertilizer into the soil, albeit its depth if broadcast would be deeper than injection as it is currently practiced. Indeed, in-depth placement or mixing may be the only practical way of applying urea if that is the only fertilizer available to the project. Advice from the Ministry of Agriculture should be sought.

7.6. Procedures to be Followed by FERNAS

Depending on the type of vegetation being reinstated, one or more of the following procedures for revegetation can be adopted:

- sowing of grass seeds - procedure ‘G1’;
- planting of shrubs / tree whips at 1m centers - procedure ‘P1’;
- planting shrubs/tree whips at 2m centers in a lunette (micro basin) - procedure ‘P2’.

The procedure for each of the above is described in “Specification for Reinstatement” document (WRP-SPC-EGG-PL6-001)

7.7. Reforestation

Forests reduce runoff due to the canopy cover to the soils, soil cover through fallen debris, and their beneficial effect on soil infiltration. They reduce erosion by the effects of plant roots binding soil particles together and of humus protecting the surface. Reforestation of the RoW with juvenile trees / saplings may be considered necessary wherever a forest existed before construction of the pipeline. This will be dependent on the judgement of the ecology specialist and with the EPCM approval, where the proposed planting regime (see Section 7.4 and Section 6) is considered unlikely to result in suitable long term ecological diversity. For the purposes of this specification a forest is defined in accordance with Article 1 of the Forest Law that states ‘trees and small trees, naturally or artificially grown, together with their surrounding area are considered as forest areas’. The reforestation strategy will be to successfully replace every tree felled during RoW clearance. The planting zones along I proximity of the pipeline are given in Section 6. It is noted that the revegetation strategy in all sections of the ROW will be to reinstate the pre-construction vegetation in terms of both composition and density.

A 24 m working width is adopted in forest locations. A strip 8m wide above the pipeline is to remain fallow. Beyond this a 3m strip on either side is to be seeded; the outermost 4m on either side is reforested with trees if deemed necessary. See typical drawing WRP-DGA-PPL-PLG-006.

Two planting methods will be adopted (including for river bank reinstatement):

1. When trees from the RoW are less than 1 m high, they are to be carefully excavated, including roots, by an excavator. The earth and trees are then removed to a storage place where they are supplied with water. During reinstatement the same trees are replanted.

2. When trees on the RoW are higher than one metre and cannot be replanted, 3 year to 5 year old plants from plantations are reforested. Bailed or container plants are to be used and planted in a spacing of 2x2m for softwoods and 1.5 x 1.5m for hardwoods. In poor soils (as on tuff or sandstone) a dressing of fertilizer is to be placed in the planting hole.

Shrubs will be reforested with tree species as per the pre-works slope and adjacent slopes.

FERNAS will provide a detailed reforestation strategy as part of the Reinstatement Plan and Method Statements as required which specify in detail how the project objectives will be met. These documents will be submitted to EPCM in a timely manner for approval prior to clearance of the Right of Way. The following information should be included in the reforestation strategy:

- species to be used and where;
- specific planting methods;
- detailed requirements for fertilizer use;
- detailed requirements for aftercare and monitoring;
- and supervision of reforestation activities.

7.8. Protection of Planted Materials

In sections where livestock or wild animals may be present, precautions will be taken to protect theseeds and plants from damage. Some or all of the following techniques should be employed:

- security patrols and procedures;
- liaison and agreements with livestock managers;
- erection of stock-proof fencing (designed/installed to discourage theft), along the project area boundaries;
- supplement boundary fencing by internal area fencing to give double protection to particular areas;

7.9. Aftercare, Monitoring and Corrective Action

FERNAS will carry out the necessary aftercare (watering, further application of fertilizer, weed control, etc.) during the Contract maintenance period in order to meet the re-vegetation requirements.

Where necessary, FERNAS will provide and maintain appropriate fencing to prevent access by grazing animals and vehicles. Fences will be fitted with signs in Turkish indicating the purpose, i.e. the enclosure is a TANAP biorestoration project area and fencing is required for protection.

Appropriate levels of irrigation/watering will be provided for revegetated areas (See Section 6.7 of in "Specification for Reinstatement" document (WRP-SPC-EGG-PL6-001)). The quantity and timing will be dependent on local climatic conditions, soil type and species requirements. Although recommendations have been provided in this specification local advice should be sought where possible.

Reinstated slopes will be monitored for the condition of the engineering measures, such as slope breakers, and will be monitored for the effectiveness of the biological reinstatement.

- If seeding had been carried out in spring, first biological monitoring study should be conducted in May-June, and then every 3 months subsequently until the target cover is achieved.

- If seeding had been carried out in summer, then the first monitoring study should be conducted in March to April, and then every 3 months subsequently until the target cover is achieved.
- If seeding had been carried out in autumn, first monitoring study should be conducted inApril-May which is the flowering period of the next year, and then every 3 months subsequently until the target cover is achieved.

If the percentage of the germination remained less than expected (see Section 7.2), then the seeds will be replanted in the next year. In this case, the same monitoring procedure is carried out in the next year. If after the first year the required vegetation cover was established monitoring will be reduced to annually, to take place in July-August until 5 years after the initial reinstatement. During this period reduction to the established cover will be addressed by further seeding, fertilizer application and watering.

Where shrubs and or trees have been included in the reinstatement these will be monitored on the same frequency as the rest of the seeded slope (as above). If during this monitoring it is observed that >30% of plants or trees have failed further planting will be undertaken, along with watering and use of fertilizer.

8. SPECIAL AREAS

The TANAP pipeline project contains topographical, geological and ecological features, which are characterized on the project as Special Areas, these require particular attention throughout construction and reinstatement.

Method statements for these areas will demonstrate sufficient awareness and intent to minimize construction impact. A high level of importance is attached to the satisfactory reinstatement of these areas, therefore an increased level of EPCM inspection, prior to acceptance, is planned. These Special Areas are as follows:

- side slopes;
- steep slopes;
- narrow ridges and areas prone to landslides

- ecological sensitive areas;
- karstic areas;
- volcanic tuff and marl;
- above ground installation sites.
- Areas of Contaminated Land

In addition to specialized construction techniques and increased levels of inspection, these areas are to be specifically considered by FERNAS during planning and project control. Consideration of schedule constraints within these areas (weather, planting seasons, animal breeding periods etc.) will be clearly identified by FERNAS on associated documents. Construction planning will achieve a 21-day period from the time when a Special Area is entered to the completion of reinstatement (to a level specified in EPCM approved Special Area Reinstatement Method Statement) unless otherwise approved by EPCM.

The general construction philosophy will address completion of these identified Special Areas with minimum delay. The back-end of the spread will follow directly behind the lowering-in crew. FERNAS will minimize the exposure of these areas to inclement weather.

FERNAS will provide suitably qualified and experienced specialists to assist in the reinstatement engineering and re-vegetation procedures and method statements for the entire route and with particular consideration of these Special Areas. Such specialists will include geotechnical engineers (and/or engineering geologists) and ecological specialists in relation to the reinstatement of critical habitats (as specified in the BAP), who work for in-country specialist organizations. EPCM may also provide specialists to oversee and audit these activities.

FERNAS will ensure that specialist subcontractors are appointed to provide both advice and specialist skills for reinstatement planning and execution in Special Areas.

8.1. Side Slopes and Spoils

The contour restoration strategy is to 'contour blend'. The side slope cut will be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours through the implementation of engineered spoil management. The subsoil layers will be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account should subsoil extend beyond the original line of slope or a new slope be created that is steeper than the original slope.

Topsoil will be stripped from the area and stockpiled at designated spoil storage areas which will be subject to EPCM approval. Both the topsoil and subsoil will be stored separately. Both stockpiles will be consolidated and adequately drained. Drainage from the spoils will be provided and a safe outlet established. See Section 4.

On completion of all pipe installation, the subsoil will be replaced in layers. FERNAS will prove that the thickness of the layers, conditions of the soil and number of passes of the compactor will be sufficient to produce a density of 95%-105% of the highest compaction measured in the adjacent undisturbed area. In-situ and laboratory density testing will be carried out as required to confirm that the compaction requirements are met. In exceptional cases this may require compaction trials on request of the EPCM. Alternatively FERNAS may prove 95% of the maximum dry density at ± 2% optimum moisture content as determined by the standard Proctor test.

Compaction will be carried out in accordance with the Pipeline Construction Specification WRPSPC-PPL-PLG-001-P3-. Care will be taken when compacting above and surrounding any pipework or drainage to ensure the integrity of the pipe and adequate compaction is achieved.

Particular consideration should be given to the adequate drainage solutions and the appropriate 'keying-in' of the placed backfill material into the existing temporary cut slope in order to prevent any future slip surfaces along the boundary between newly placed and in-situ material. Final slope measures and reinstatement details will be subject to EPCM approval.

Following compaction of the subsoil, the topsoil will be spread over the site, harrowed and reseeded (refer to Section 4.4.4). Erosion mats will then be laid (refer to Section 4.6.2).
In the event that side cuts are to remain as a permanent restoration feature. FERNAS will prepare a methodology statement on the proposed works including (but not limited to) the degree of reinstatement, proposed drainage measures, process of slope inspections and programme of the works. The method statement will clearly state how the overall environmental project and stability requirements are adhered to.

FERNAS will carry out site inspections with EPCM in order to define required design measure to ensure long term stability of the slope and that the environmental requirements are met.

Adequate drainage will be applied to assure stability and controlled water runoff. Final cut slope angles will be defined based on ground conditions encountered. Final slope angles and stabilisation measures (such as geotechnical slope drainage, scaling, rock netting or catchment benches, crest drains etc.) will be proposed by FERNAS for EPCM pre-approval.

The reinstated condition of side slopes is not expected to have any significant inclination perpendicular to the pipeline, and only have a maximum slope length of the width of the RoW. Additionally drainage measures are typically implemented upslope of any sections of side slope the pipeline encounters. As such the anticipated slope erosion is considered minimal, and the prescribed mitigation measures for these lengths of pipe will be based on their downslope fall.

Where there is a cross-fall oblique to the pipeline resulting in an increase of slope angle (compared to the gradient parallel to the pipeline) the slope erosion measures as defined on the alignment sheets will be reviewed. For such slopes the FERNAS and EPCM representative will determine any additional mitigation measures on a site specific basis in order to ensure that the slope erosion requirements are met. The reinstatement solution will be based on the standard reinstatement approach, with breakers across the RoW. The slopes as described above will be identified in the field and details for soil erosion measures verified by the FERNAS subject to EPCM approval.

For the fully reinstated case (i.e. if the slope is reinstated to its original contours) the slope erosion will pose a negligible hazard to the pipeline due to the short distance of exposure of the pipe (main gravitational transport perpendicular to the pipe) and considerable cover depth. Final erosion measures will need to be determined on site during construction based on the slope geometry and materials placed.

8.2. Narrow Ridges and Areas Prone to Landsl ides

Along certain sections the pipeline route crosses hilly terrain and is routed along narrow ridges in order to avoid pre-existing landslides or potentially unstable ground which is typically on steep side slopes with backscarps reaching in some areas up close to the ridge line.

The construction in these areas will be carried out in accordance with the Construction Specification WRP – SPC – PPL – PLG - 001 and strategy set out in the Slope Assessment Report WRP-REP-EGG-PLG-010-P3-D. For the works in this area FERNAS will prepare a methodology statement subject to EPCM approval detailing how the project and stability requirements are met.

For certain areas along narrow ridges site specific designs and reinstatement requirements will be developed as set out in the AFC documents. For these cases the FERNAS will ensure that all site specific design requirements are met subject to EPCM approval.

FERNAS will assess and determine any requirements for additional earthworks and excavation. For any deviation from the overall project strategy to reinstate back to ‘original contours’ FERNAS will detail these proposed changes in a methodology statement subject to EPCM approval.

FERNAS will ensure that the following aspects are complied with:

The stability of the RoW will be proven following the clearance of the RoW and prior to construction works by geotechnical inspection by the FERNAS and EPCM. These stability inspections will carried out at regular intervals throughout the construction works and will focus on any signs of potential slope movement.

In sections where topography, geohazards (such as landslides) and proximity to 3rd party pipelines will require a reduced working width, FERNAS will propose an appropriate working method for these areas.

FERNAS will choose appropriate plant and assess stability of RoW taking into account effects of plant surcharge.

No side casting will be allowed without the approval of EPCM in order to minimise the width of the construction corridor and avoid surcharge and uncontrolled drainage into potentially unstable ground. Spoil storage areas are to be proposed by FERNAS for approval by EPCM to avoid any storage on potentially unstable ground and to prevent triggering ground movements.

Temporary and permanent surface water run-off should be carefully managed. Appropriate measures (such as appropriate falls, bunds, selection of outlet points from the RoW etc.) will be implemented in order to avoid ponding, seepage of water into RoW or uncontrolled run-off into potentially unstable ground.

In case of signs of instability (such as tension cracks, backscarp, seepage on the slope etc.), FERNAS will propose remedial measures (including dewatering, soil nail stabilisation, rock anchoring or preventing RoW from further inundation) subject to approval by EPCM.

8.3. Steep Slopes

Steep slopes are those slopes with inclination >15% and >20m slope length that are predicted to exceed soil loss tolerance rates as defined in this specification. The following factors should be considered when assessing the erosion potential of slopes:

- Rainfall Intensity. This parameter is a measure of the erosive force and intensity of the rain in a normal year. The rainfall intensity is based on rainfall records and probability statistics for risk evaluation. For the purpose of erosion assessment, the parameter is determined using a 1 hour 10 year return period storm.
- Soil Erodibility. This parameter is a measure of the susceptibility of a soil particle becoming detached and transported by rainfall runoff. Soil parameters, which control soil erodibility are soil texture, structure soil space, organic content and

hydraulic conductivity. Information from a particle size analysis (PSD) is used to estimate the soil erodibility using nomograms and correction factors.

- Slope Angle and Length. Erosion potential increases proportionally to increases in the length and angle of slope, simply because runoff flow rates increase with increasing gradient and slope length.
- Vegetation Cover. The effect of vegetative cover on soil loss is well researched. Bare soil represents high erodibility potential, whilst native vegetation can give maximum protection. Vegetation cover can be directly related to management options ie mulch, erosion control matting etc.
- Erosion Control Practice. Further practices that influence erosion potential are roughening of the soil surface by tractor treads, or by rough grading, raking or disking.
- Temperature. Temperature is another climatic factor affecting the potential for erosion to occur.Consolidation by freezing of exposed soils during winter months and accumulation of precipitation (snow) until periods of thaw, result in rapid melting and high levels of runoff. This situation exists in Central and Eastern Anatolia.

The Universal Soil Loss Equation used in the soil loss assessment predicts the long-term average annual rate of erosion on a slope based on rainfall intensity, soil type, topography, vegitation cover and management practices. This erosion model, originally developed to predict soil loss in agriculture, is also applicable to non-agricultural conditions such as construction sites. The USLE can be used to compare soil losses from a particular construction site with a specific management system to ‘tolerable soil loss’ rates.The equation is written as follows:

$$A = R \times K \times LS \times C \times P$$

Where, A is potential long-term average annual soil loss in tons per ton ha-1 y-1, R is rainfall and runoff factor by geographic location, K is soil erodibility factor, LS is slope length-gradient factor, C is vegetation and management factor, and P is support practice factor.

- The slope geometry has been considered using GIS assessment of the DEM data. This has been used to extract average slope length and angle data and develop the slope length and steepness input parameter ‘LS’.

- The soil erodibility factor ‘K’ has been assessed from erodibility mapping of Turkey. The mapping considers the possible soil composition and uses published relationships to generate a K value for each slope.
- The rainfall –runoff erosivity factor ‘R’ was assessed based on rainfall mapping for Turkey held by Ankara University.
- The cover management factor ‘C’ was selected for a backfilled trench situation assuming the surface would be rough
- The support practice factor ‘P’ is dependent on deliberate rutting of the slope surface and is more appropriate to maintained agricultural land. As such for this assessment no benefit from this parameter has been taken.

This methodology was used to determine the estimated removal rates and recommend appropriate mitigation measures required to meet the soil loss tolerance rates described in Section 3.5 of this document. The mitigation measures, both bioremedial and engineering, are provided on the alignment sheets (see Section 4.7). These require verification at each location by the FERNAS and the EPCM', through validation or updating of the design assumptions.

FERNAS will establish steep slope areas and provide procedures and methodology statements as part of the site-specific Special Area Reinstatement Method Statements for EPCM approval. The procedure will establish all planned temporary and permanent erosion measures in line with this specification and Project Drawings.

Construction in steep slope areas requires an increased awareness of safety and stability issues. FERNAS will utilise proven construction techniques specific to such areas. FERNAS will demonstrate that increased safety measures are planned and these measures are to be followed on site. An increased level of Safety Engineer presence will be required at these locations.

The requirement for temporary RoW erosion/stabilization techniques will be dependent upon the season. However FERNAS will be prepared to provide all resources necessary to avoid incipient soil erosion and stabilization issues, regardless of season, in order to be prepared for unforeseen inclement weather.

8.4. Critical Habitats

The Biodiversity Action Plan (BAP) identified 18 terrestrial and 8 freshwater critical habitats, ecologically sensitive areas with the presence of endangered or threatened species and their habitats, along the pipeline route. Refer to the BAP and KP Table for the BAP (CIN-REP-ENV-GEN-017) for the following information for each of the critical habitats:

- topsoil depth removal and storage for each critical habitat;
- species identification for seeds collection;
- translocation of plants and animals depending on a season;
- appropriate species for revegetation;
- planting methods;
- removal and replacement of turfs.

Table 8.1. List of Terrestrial and Freshwater Critical Habitats identified in the BAP (Route Rev H)

KP Start	KP End	ID	Type of Critical Habitat
3000	*3735*	*CH1*	*Terrestrial Habitat*
3940	4051	CH2	*Terrestrial Habitat*
20700	23000	CH3	*Terrestrial Habitat*
23670	27081	CH4	*Terrestrial Habitat*
62320	63140	CH5	*Terrestrial Habitat*
71710	71755	FCH1	*Freshwater Habitat*
84758	87000	CH6	*Terrestrial Habitat*
115393	116000	CH7	*Terrestrial Habitat*
116069	116637	CH8	*Terrestrial Habitat*
164345	164566	CH9	*Terrestrial Habitat*
166450	166571	FCH2	*Freshwater Habitat*
167000	167154	CH10	*Terrestrial Habitat*
169000	174000	CH11	*Terrestrial Habitat*
174412	176000	CH12	*Terrestrial Habitat*
187557	193000	CH13	*Terrestrial Habitat*
202930	203709	CH14	*Terrestrial Habitat*
214885	219641	CH15	*Terrestrial Habitat*

220177	220211	FCH3	*Freshwater Habitat*
232172	232787	CH16	*Terrestrial Habitat*
269680	269696	FCH4	*Freshwater Habitat*
280401	280414	FCH5	*Freshwater Habitat*
306365	312319	CH17	*Terrestrial Habitat*
332830	332845	FCH6	*Freshwater Habitat*
353584	353613	FCH7	*Freshwater Habitat*
369037	369126	CH18	*Terrestrial Habitat*
372760	372903	FCH8	*Freshwater Habitat*

FERNAS will provide site specific Reinstatement Management Plans that will further develop and clearly specify the means by which the measures committed to in the BAP and in this specification will be implemented in relation to their scope of work, including pre-construction measures, (i.e. seeds collection, plants translocation) topsoil removal and storage and reinstatement measures. See Pipeline Construction Specification.

8.5. Karstic Areas

Karst is the topography that develops in soluble rocks in which fissures may be enlarged (ultimately to form caves) by flowing groundwater. This may occur in areas of gypsum and limestone bedrock. Gypsum is more soluble than limestone, therefore karstic areas develop relatively rapidly in areas of gypsum (see Section 5 of the ESIA for further information).

Restoration in the karstic areas will proceed as follows:

- soils from the dolines will be stockpiled separately;
- mixing of the doline soil and the ridge material is prohibited, unless agreed with the Client;
- continuous environmental inspection will follow construction;
- excess rock material from ridges will be disposed of in accordance with the project Waste Management Plan;
- spreading of rock is prohibited, unless agreed with the Client;
- discovery of subsurface voids (greater than 50mm in plan dimension) during construction will be reported to EPCM, measures detailed on the IAAC alignment sheets and drawing WRPDGA-EGG-PLG-001 will be applied,

alternative remediation of voids may be used if agreed with EPCM and Client.

Temporary and permanent erosion measures will be employed in accordance with the requirements of this specification and Project Drawings. FERNAS will employ trench filtration and drainage control measures as necessary to ensure that suffosion (transport of soil from the trench and from subsoil beneath the trench into karstic voids) does not occur during the design life of the pipeline.

Drainage plans in karstic areas will be submitted to the EPCM for approval prior to construction. Plans should consider special requirements described in WRP-TNO-EGG-PLG-001 (Technical Note for Design of Pipelines in Karst). At the least, FERNAS drainage plans will consider:

- preventing the pipeline becoming a new drainage conduit
- preventing loss of pipe backfill into karst fissures
- preventing loss of pipe backfill into karst fissures
- maximizing the use of existing natural drainage (i.e., sink holes >20m from the pipeline alignment) in a controlled manner.

FERNAS will follow particular requirements for drainage control as noted on AFC alignment drawings and DGA-EGG-PLG-001.

8.6. Erodible Soils, Volcanic Tuff and Marls

Specific care is required for the reinstatement of areas underlain by volcanic tuff or marls in particular to ensure the re-establishment of a natural vegetation following the construction works due their thin topsoil cover.

Similar issues regarding the reinstatement may arise in other areas of highly erodible soils and soils with thin topsoil or other site specific ramifications. The FERNAS's Soils Specialist will identify these areas during the clearance of the RoW and give advice on any additional measures as required. The specific examples of Volcanic Tuff and Marls are outlined below which should be applicable to any other soil reinstatement as deemed necessary by the FERNAS's Soils Specialist an as agreed with the EPCM representative.

Details are given in "Specification for Reinstatament" document no. WRP-SPC-EGG-PLG-001.

8.7. Areas of Contaminated Land

The remediation of contaminated land is not covered by this specification and reference should be made to Contract Documents.

Any materials encountered during the works, which show unusual colouring, texture, and / or odour, will be stored separately and labelled as potentially contaminated materials. All suspected or confirmed materials will not be reused within the works unless contamination testing indicates the materials are suitable for use in accordance with the agreed limits of the USEPA guidance and Dutch Standards for soil contamination for the identified land use locally required.

Temporary stockpiling of potentially contaminated materials will be within an impermeable bunded and lined area, greater than 750 m from any environmentally sensitive receptor.

9. REINSTATEMENT OF LAND OTHER THAN TANAP RoW

9.1. Land at Construction Support Facilities

The following requirements apply to all construction support facilities such as construction camps, pipe yards etc. They do not apply to permanent facilities such as AGIs. The fate of construction support facilities is to be agreed with EPCM before starting any activity connected with reinstatement.

Reinstatement of the land will commence immediately on removal of each individual facility. The reinstated condition will be to a condition at least as good as that prevailing before establishment of the facilities, depending on the post construction landuse and Project's access agreement.

Construction support facilities will be avoided in Special Areas (see Section 8). Should this become unavoidable prior approval of EPCM is required. FERNAS will prepare all necessary procedures and plans to achieve such approval and obtain permits as required by any affected authority.

FERNAS will reinstate the area to the satisfaction of EPCM, the regulatory authority or landowner and will obtain written approval from EPCM, the appropriate regulatory authority or the landowner of the level of reinstatement. Notwithstanding such approval, all reinstatement will be to the satisfaction of EPCM. FERNAS's photographs of the condition of the area prior to construction may be used for reference.

There will be no waste remaining after removal of the facility and upon return of the site to the landowner. Except for new roads, facilities will be removed and the land restored so that it is suitable for its original function. New roads will be handed over as part of the completed project with shoulders finished in keeping with the local environment. Excess rock or stumps may only be left with the agreement of the landowner. Any new roads, not appreciated by EPCM and/or relevant stake holders, will be dismantled and the area will be reinstated to the required conditions.

9.2. Permanent Above-Ground Installations (AGIs)

All permanent aboveground installations are to be reinstated in accordance with the Project Drawings and specifications.

FERNAS will reinstate the area surrounding AGIs to the satisfaction of EPCM and the appropriate authority or landowner and will obtain written approval from EPCM and the appropriate regulatory authority or the landowner of the level of reinstatement. Notwithstanding other such approvals, all reinstatement will be to the satisfaction of EPCM. FERNAS's photographs of the condition of the area prior to construction may be used for reference.

Measures that will be adopted to minimize the visual impacts of the permanent buildings and facilities at AGI sites include the following:

- landscape planting within the site boundary where appropriate;
- opportunities to retain existing landform screening will be maximized, i.e. site levelling will be avoided, if possible, if existing hollows or mounds may be used to

integrate built features within the landform;

- new landform screening (e.g. bunds and mounds) will be introduced where this might complement the existing landform character;
- the use of appropriate colour schemes to minimise the visual impact of buildings;
- external lighting will be minimized to that necessary for safety and operational purposes and downward facing lighting and lighting of the same colour will be used to minimise spill and offsite impacts.

FERNAS's site-specific Reinstatement Method Statements for AGI sites will address the following:

- maximising opportunities to retain existing landform screening, i.e. site levelling will be avoided, if possible, if existing hollows or mounds may be used to integrate built features within the landform;
- new landform screening (e.g. bunds and mounds) will be introduced where this might complement the existing landform character.

9.3. Spoil and Excess Rock/Stump Disposal Sites

FERNAS will close, cap, and landscape all (except as otherwise agreed with EPCM) excess rock/stump disposal sites by the completion of the Contract. Sites will be dealt with in accordance with the relevant project requirements. FERNAS will develop site-specific plans that are to be approved by EPCM. Biorestoration, where appropriate will be carried out in accordance with requirements defined in Section 6 and EPCM approved Special Area Reinstatement Method Statements.

Spoil and excess rock/stump disposal sites will be avoided in ecologically sensitive areas. Should this become unavoidable, prior approval of EPCM is required. FERNAS will prepare all necessary procedures and plans to achieve such approval and obtain permits as required by any affected authority.

The excess rock/stump material will be compacted to a minimum of 75% of the Proctor value; the surface will be landscaped to resemble local conditions and will not extend more than 2 m in height above the natural contour; the slopes of the surface will not exceed 60°. The site will be covered with soil and an erosion mat and planted with appropriate species.

9.4. Existing Roads and Access

FERNAS will exercise care when using both public and private roads for travelling to and from the TANAP RoW and will upgrade and maintain roads during the works as necessary for safe operations. No side casting will be allowed unless otherwise instructed by EPCM.

The reinstatement of roads will be to their original upgraded condition or better following completion of construction activities.

FERNAS will provide for such work all hard-core, tarmac, asphalt, and other materials as required.

Details of the requirements for the use and construction of existing roads and access Roads are set out in the Pipeline Construction Specification.

9.5. Quarries

FERNAS will ensure that all borrow material will only be sourced from (both existing and new) licensed and authorized sites or sources. Where new quarries need to be opened FERNAS will obtain the necessary permits and licenses and conduct any necessary environmental impact assessments.

Reinstatement of the quarries will be carried out to the satisfaction of the respective landowners and local authorities.

For the general selection and approval process for quarries the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030 should be referred to.

9.6. Areas of Contaminated Land

The remediation of contaminated land is not covered by this specification and reference should be made to the Contract Documents.

Any area of the pipeline corridor in which material excavated is not suitable to be reused will be reinstated with suitable material in accordance with the agreed limits of the USEPA guidance and Dutch Standards for soil contamination for the identified land use locally required.

10. RESTRICTING ACCESS

In order to prevent rutting, subsequent erosion problems, and damage to riparian areas, measures should be taken to prevent unauthorized use of the TANAP RoW as a roadway. Access should be blocked, at locations specified by EPCM representatives, through the construction of barrier berms of sufficient height (minimum 1.5 m high) to provide a barrier to vehicles. Where possible, the berms should be tied to vegetation or rocks adjacent to the RoW to prevent traffic from circumventing the barrier. Rocks excavated during construction, 0.3 m in diameter or larger, may be used instead of the earthen berms. Timber cleared during the construction may also be staggered across the RoW so as to deter off-road vehicle use.

11. HANDOVER AND POST-CONSTRUCTION MAINTENANCE

FERNAS will obtain sign-off of the pre-entry form from the landowner agreeing on the standard of reinstatement. FERNAS will notify EPCM prior to such meetings and allow for EPCM attendance/monitoring. FERNAS will not attend such meetings without EPCM presence unless agreed in writing by EPCM.

FERNAS, upon completion of reinstatement, will accompany EPCM on an inspection of all project areas, before demobilizing from site. EPCM will notify FERNAS of any insufficiencies in the reinstatement of the TANAP ROW / project areas. FERNAS will carry out any further reinstatement to the satisfaction of EPCM.

During the contract maintenance period, FERNAS will be responsible for maintaining the standard of reinstatement and for ensuring that the Civil Protection Works remain effective and in good condition, and that the stated erosion class and biorestoration requirements are met. As a minimum FERNAS will carry out inspections every three months and immediately after any significant rainfall event (1 in 2year return period) and snow melt and implement corrective measures as required to the satisfaction of EPCM.

12. POST CONSTRUCTION ACTIVITIES

12.1. Restricting Access

In order to prevent rutting, subsequent erosion problems, and damage to riparian areas, unauthorized use of the construction corridor as a roadway will be prevented. Access should be blocked at locations specified by EPCM representatives, through the construction of barrier berms of sufficient height (minimum 1.5m high) to provide a barrier to vehicles. Warning tapes/berms should be tied to vegetation or rocks adjacent to the pipeline corridor to prevent traffic. Rocks excavated during construction, may be used instead of the earthen berms. Timber cleared during the construction can also be staggered across the pipeline corridor so as to deter off-road vehicle use.

12.2. Handover and Post-Construction Maintenance

FERNAS will carry out the required aftercare (watering, further application of fertilizers, etc.) for successful re-vegetation and monitor the progress of bio-restoration and the records will be kept by filling out the Reinstatement Register (see Appendix 3).

FERNAS will obtain sign-off of the pre-entry form from the landowner agreeing on the standard of reinstatement.

FERNAS, upon completion of reinstatement, will accompany EPCM on an inspection of all project areas, before demobilizing from site. EPCM will notify the FERNAS of any insufficiencies in the reinstatement of the construction corridor/ project areas. FERNAS will carry out any further reinstatement to the approval of EPCM.

During the contract maintenance period to be defined by TANAP, FERNAS will be responsible for maintaining the standard of reinstatement and for ensuring that the stated erosion class and bio- restoration requirements are met. As a minimum, FERNAS will carry out inspections every three months and immediately after any significant rainfall and snow melt and implement corrective measures as required to the satisfaction of EPCM.

Before termination of maintenance period, final reinstatement inspection will be carried out and the required corrective measures will be encouraged until the reinstatement measures satisfy the project requirements. Upon the final approval of reinstatement studies, the future management of the reinstatement program and maintenance activities will be under the responsibility of TANAP.

13. TRAINING

All workers to be employed for the erosion control, reinstatement and landscaping related works will receive the compulsory specific environmental trainings and will not start working before completing induction training. The induction training, which is required for all employees working on RoW, will be about performing work activities in a manner consistent with environmental permits, site specific conditions, and best practices for the environmental monitoring, waste management, reinstatement including the erosion control devices, pollution prevention, spill response, cultural heritage. The topics of the specific environmental trainings will be reinstatement, waste management, water and soil management, air quality management; cultural heritage management, traffic management, noise and vibration management, aggregate management and biodiversity action plan (pls. see FERNAS Environmental and Social Training Plan (FRN-PLN-ENV-PL1-017) for further detail). Training will be given by FERNAS Environmental Inspector and Biologist.

14. MONITORING

FERNAS will be responsible for continuous monitoring of all reinstatement related works to be performed by the workers and its sub-contractors throughout all construction works. Monitoring will comply with FERNAS's Environmental and Social Monitoring Plan (FRN-PLN-ENV-PL1-011).

Site activities will be monitored and supervised by Environmental Inspectors of FERNAS and EPCM for their performance in the implementation of this ERLP. EPCM will give the final approval prior to handover of work by FERNAS. Subsequent to the final approval of reinstatement works, the future management of the reinstatement program and maintenance activities will be under the responsibility of TANAP.

FERNAS Environmental Inspector, Soil Expertand Biologist will monitor,

- The implementation of mitigation measures,
- The implementation of corrective actions,
- Erosion control methods,
- The slope stability
- Topsoil stripping, storage and reinstatement applications,
- Subsoil removal, storage and reinstatement applications,
- The success of the Bio-restoration and Reinstatement.

15. REPORTING

Topsoil Stripping Register, Off-Row Aggregate Consumption Register, Reinstatement Register and Tree Cutting Registers will be filled out for each specified activity and kept as records. Special Area Reinstatement Method Statement (SARMS) will be prepared for each special area and will be subject to the approval of EPCM before put into practice. SARMS will give information on the topography, land use, soil characteristics, etc. of the special area and also its ecological characteristic including the species of the site, the related mitigation measures including topsoil management, seed collection, etc., restoration of the habitat, recommendation of a follow-up monitoring program, etc.

The progress of the reinstatement works will be presented by FERNAS in the monthly Report to be prepared in the scope of Environmental and Social Monitoring Plan (FRN-PLN-ENV-PL 1-011), together with the filled-out registers. Moreover, any incident and/or non-conformance, which results in environmental/social impact, will be immediately communicated to the EPCM via verbal notification and the relevant registers will be filled out as soon as practical (not later than 24 hours).

Before termination of maintenance period, final reinstatement inspection will be carried out and the required corrective measures will be encouraged until the reinstatement measures satisfy the project requirements. Upon the final approval of reinstatement studies, the future management of the reinstatement program and maintenance activities will be under the responsibility of TANAP.

16. APPENDICES

16.1. Appendix 1- TOPSOIL STRIPPING REGISTERS

KP Start	KP End	Depth of the Topsoil Stripped	Where Topsoil is Stripped? (riverbank, potential erosion area, etc.)	Labelling of Topsoil Piles (Yes / No)	Implementation of Required Conditions for Topsoil Piles (Yes / No)	Comments	Name of Environment Inspector

16.2. Appendix 2 - SENSITIVE AREAS REGISTER

SENSITIVE AREA REGISTER																										
LOT 1																										
TERRESTRIAL CRITICAL HABITATS																										
KP Start (Rev H)	KP End	ID	Was the no-construction time frame enforced? (if required)	Which seeds where collected?	Date seeds where collected	Amount of seeds collected	Seeds storage location	Date seeds where planted on RoW	Location where seeds were replanted	Which plants/bulbs were collected	Date plants/bulbs were collected	How many plants/bulbs were collected	Plants/bulbs storage location	Date plants/bulbs replanted on RoW During restoration	How many plants/bulbs replanted on RoW Durin	Location where plants/bulbs were replanted	Date Herbaceous planted where on RoW	Storage location of herbaceous plants collected	Date when herbaceous plants were laid on RoW durig restoration	Date topsoil was stripped	Date topsoil was reinstated	Date when rock were collected (30cm or larger)	Rock storage location	Date rocks were relocated on RoW	Invasive flora species control	Terracing during reinstatement to prevent erosion
003+000	003+735	CH1																								
003+940	004+051	CH2																								
20+700	23+000	CH3																								
23+670	27+081	CH4																								
62+320	63+140	CH5																								
84+758	87+000	CH6																								
115+393	116+000	CH7																								
116+069	116+637	CH8																								
164+345	164+566	CH9																								
167+000	167+154	CH10																								
169+000	174+000	CH11																								
174+412	176+000	CH12																								
187+557	193+000	CH13																								
202+930	203+709	CH14																								
214+885	219+64	CH15																								
232+172	232+787	CH16																								
306+365	312+319	CH17																								
369+037	369+12	CH18																								

385+169	390+000	CH19																								

FRESHWATER CRITICAL HABITATS													
KP Start	**KP End**	**ID**	**Was the no-construction time frame enforced? (if required)**	**Started date of crossing (when banks are being topsoiled/graded)**	**End of crossing (when final reinstatement completed)**	**Control of sediment release**	**Minimize erosion, sedimentation and impact to riparian vegetation**	**Avoid impact and removal of gravel**	**Date erosion and sediment controls in place**	**Restoration of channel bottom**	**Restoration of riparian area (contours and vegetation)**	**Water protection zone marked/flagged? (30cm buffer zone on either side of crossing)**	**Water sample taken upstream/downstream? Prior/during/post construction**
71+710	71+755	**FCH1**											
166+450	166+571	**FCH2**											
220+177	220+211	**FCH3**											
269+680	269+696	**FCH4**											
280+401	280+414	**FCH5**											
332+830	332+845	**FCH6**											
353+584	353+613	**FCH7**											
372+760	372+903	**FCH8**											

16.3. Appendix 3 - REINSTATEMENT REGISTER

REINSTATEMENT REGISTER
SPREAD 1

KP Start	KP End	Original Countours restored?	Date topsoil was spread	Date seeding was conducted	Date permanent Erosion controls installed	Date area was signed off

REINSTATEMENT REGISTER
SPREAD 2

KP Start	KP End	Original Countours restored?	Date topsoil was spread	Date seeding was conducted	Date permanent Erosion controls installed	Date area was signed off

16.4. Appendix 4- TREE CUTTING REGISTER

TREE CUTTING REGISTER						
SPREAD 1						
KP	**Number of Trees**	**Tree/Shrub Species (Latin/English)**	**Photo**	**Cutting or Relocation Date (C for cutting RL for relocating)**	**Remarks**	

TREE CUTTING REGISTER						
SPREAD 2						
KP	**Number of Trees**	**Tree/Shrub Species (Latin/English)**	**Photo**	**Cutting or Relocation Date (C for cutting RL for relocating)**	**Remarks**	

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TANAP

TANAP
TRANS ANATOLIAN NATURAL GAS PIPELINE PROJECT

Project Doc.No.	SYA-PLN-ENV-GEN-007	REV	STATUS
		P4-0	IAAC
Document Title :	Erosion Control, Reinstatement & Landscaping Plan		
Tag Nos.			
Contractor :	SYA - Sicim-Yuksel-Akkord JV		
Contractor Document No.		REV	

		Signature	Date
	C1- Reviewed & accepted. Resubmit as final rev P4-0 - IAAC. Work may proceed.		
	C2- Reviewed & accepted as marked. Revise & resubmit as rev P4-0 - IAAC. Work may proceed.		
	C3- Reviewed & returned. Correct & resubmit as P4-D, E etc. RE-IFR. Work shall NOT proceed.		
	C4- Review not required. Resubmit for information only rev P4-0 - IFI. Work may proceed.		

Remarks:

Prepared by: On behalf of: SICIM-YUKSEL-AKKORD JV	TANAP - TRANS ANATOLIAN NATURAL GAS PIPELINE PROJECT – LOT 2	TANAP WorleyParsons resources & energy

EROSION CONTROL, REINSTATEMENT AND LANDSCAPING PLAN

Rev.	Status	Date (dd/mm/aa)	Document status Description	Issued by	Checked by	Approved by	TANAP Approval
P4-A	DIC	14/03/15	Discipline Internal Check	ARAO	KURV	TENP	
P4-B	IDC	16/03/15	Inter Discipline Check	ARAO	KURV	TENP	
P4-C	IFR	15/04/15	Issued for Review	ARAO	KURV	TENP	
P4-D	Re-IFR	08/05/15	Re-Issued for Review	ARAO	KURV	TENP	
P4-0	IAAC	25/05/2015	Issued as Approved for Construction	ARAO	KURV	TENP	

DOCUMENT REVISION HISTORY SHEET

Rev.	REVISION DESCRIPTION	DATE ISSUED	UPDATE / AMENDMENT DETAILS
P4-A	DIC	14/03/15	Discipline Internal Check
P4-B	IDC	16/03/15	Inter Discipline Check
P4-C	IFR	15/04/15	Issued for Review
P4-D	Re-IFR	11/05/15	Re-Issued for Review
P4-0	IAAC	25/05/2015	Issued as Approved for Construction

HOLDS

No.	Section	Description	Input From	Planned Date

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LIST OF ABBREVIATIONS

AGI	Above ground installations
BAP	Biodiversity Action Plan
BVS	Block valve stations
CH	Critical Habitat
CST	Compressor station
e.g.	such as
ERLP	Erosion Control, Reinstatement and Landscaping Plan
ESIA	Environmental and Social Impact Assessment
ESMS	Environmental and Social Management System
etc.	etcetera
IFC	International Finance Corporation
ISO	International Organization for Standardization
KP	Kilometre Point
OHSAS	Occupational Health & Safety Advisory Services
RoW	Right of Way
RVX	River crossings
SYA	Sicim-Yüksel-Akkord JV
WHO	World Health Organization
TANAP	Trans Anatolian Natural Gas Pipeline Project

LIST OF DEFINITIONS

EPCM	Worley Parsons Proje Yönetimi ve Mühendislik Limited Şirketi

1. PURPOSE AND SCOPE

The aim of Erosion Control, Reinstatement and Landscaping Plan (ERLP) is to comprehensively present the requirements for the reinstatement of the areas to be damaged due to the impacts of the land preparation and construction phases of the project. Moreover, the plan establishes the minimum requirements for temporary and permanent erosion control and taking the related measures and revegetation (bio-restoration).

The provisions in this plan are applicable for the temporary used areas such as construction corridor, access roads, pipe lay down areas, construction camp sites, other additional lands utilized during the construction of the project, besides for the permanent facilities such as above ground installations (AGI).

The main objective of the activities presented in ERLP is the return of the site disturbed during the pipeline construction to a land capability equivalent to the pre-used land capability by means of relaying and preparation of the soil material and revegetation of protective vegetation. The targets of these activities that are under the responsibility of SYA are summarized as follows:

- Management of surplus soil and rocks,
- Preserving seed bank through topsoil,
- Re-laying the topsoil to its original location and the subsoil,
- Temporary measures to minimise erosion and maximize sediment control during construction,
- Permanent erosion control berms, drainage for long term stability against erosion,
- Retaining the hydrologic regime as before and reinstatement of the natural drainage of the site,
- Restoration of the land to the original contours or maintaining a landscape visually compliant to the adjacent landscape,
- Restoration of the impacted habitats and ecological processes to their original state where it is technically applicable,
- Re-vegetation of sites with appropriate native plant types; re-seeding,
- Prevention of forbidden or dense access to the areas that cannot be accessed before via removal of the temporary construction roads,
- Utilization of engineering solutions and bioengineering techniques to attain the best environmental outcomes.

2. LEGISLATION FRAMEWORK

All activities in the management and monitoring plans will comply with the Environmental and Social Management System (ESMS) of TANAP Project that aligns with:

- TANAP's environmental and social management policies;
- National statutory and regulatory requirements;
- International Organization for Standardization (ISO) 14001:2004 Environmental Management System Standard;
- ISO 9001: Quality Management Systems;
- OHSAS 18001: Occupational Health and Safety Management System;

All requirements/ mitigations/ commitments stipulated in TANAP Project's Environmental and Social Impact Assessment Report.

2.1. TANAP Environmental and Social Management Policies

Sicim-Yüksel-Akkord JV (SYA) recognises that it has the responsibility to ensure that all the potential adverse impacts on the environment associated with the Project are either avoided or appropriately mitigated through the implementation of good environmental management practices.

Accordingly, all work shall be conducted in compliance with applicable environmental laws and regulations as well as the standards and best-practices, which support the protection, preservation and enhancement of the environment.

All project personnel employed by SYA shall be individually and collectively responsible for adherence to, and effective application of the ESIA.

3. ROLES AND RESPONSIBILITIES

SYA is responsible for the preparation of Erosion Control, Reinstatement and Landscaping Plan (ERLP) that is prepared in compliance with the principles, guidelines and standards included in the following documents and also TANAP procedures and commitments included in Environmental and Social Impact Assessment (ESIA) Report and the registers presented in its appendices for the site specific details and measures.

- WRP-SPC-EGG-PLG-001 P4.0: Specification for Reinstatement
- TNP-TDT-ENV-GEN-001: KP Table for Biodiversity Action Plan

SYA will be responsible for the implementation of all reinstatement works in accordance with the requirements of this ERLP, project specific plans and procedures of their own, commitments stated in the ESIA and to the satisfaction of on-site EPCM Environmental Inspectors.

SYA will also be responsible for the training and performance of all sub-contractors with respect to the ERLP and shall comply with all relevant project standards, statutory requirements, permit and licence conditions and secure all applicable permits and licences.

SYA will prepare site specific method statements for specific activities relevant to the reinstatement including but not limited to the following and submit to EPCM for approval;

- Installation of Soil Erosion Protection (including trench and slope breakers and outlets, erosion matting, crushed rock, lined chutes, riprap, gabions and gully remediation measures),
- Topsoil Removal and Storage,
- Subsoil Removal ad Storage,
- Trench Excavation and Padding,
- Reinstatement of Soils,
- Reinstatement of Side Slopes and Steep Slopes,
- Reinstatement of Narrow Ridges,
- Reinstatement of Topsoil,
- Erosion and Sediment Control (including silt fences, straw bale barriers, wooden fences any other sediment interception),
- Water disposal,
- Biorestoration including detailed scheduling, plant species protection of plant materials, aftercare, monitoring and corrective action,
- Reinstatement in karstic areas,
- Reinstatement in areas of thin topsoil cover,
- Reinstatement of land other than TANAP ROW (including AGIs, construction support facilities, spoil disposal sites, access and existing roads).

SYA will conduct pre-construction surveys along the Right of Way (RoW) to facilitate the development of site-specific reinstatement method statements for all special areas, by using specialist sub-contractors, who are to provide expert advice, particularly for erosion and sediment control and seeding and planting of indigenous vegetation.

SYA's Environmental Manager will be responsible for the development and oversight of reinstatement activities; while SYA's Reinstatement Team to be appointed for each spread will be responsible for the supervision of the pre-construction and construction works in line with the erosion control, landscaping and reinstatement requirements and the technical design of the erosion control measures, reinstatement and landscaping program. The Reinstatement Team will be comprised of Soil Specialist and Biologists. The team will be supported by the SYA's Environmental Inspector, who will monitor the activities performed by the Reinstatement Team on behalf of Environment Manager.

SYA will maintain the integrity of the pipeline route during the reinstatement activities after construction. Moreover, all temporary and permanent erosion measures will be carried out by SYA.

EPCM will investigate the performance of SYA on the reinstatement activities and will give the final approval and consent for the reinstatement works prior to handover of work by SYA.

4. ACTIVITIES ON SITE

The project pipeline route shall be reinstated to a sufficient extent in order to allow the affected area to be returned to its pre-project use and productivity. Appropriate maintenance and handling of soil is essential to achieve this objective.

General reinstatement shall achieve:

- Final surface up to 100 mm above level of undisturbed adjacent ground and blended to the existing contours (excluding trench berm).
- Final re-planting. Planting within pipeline final corridor to be approved by EPCM.
- In barren areas, a semi- natural appearance is required: rocks or processed rock may be distributed over the final surface provided the particle size distribution is similar to that of adjacent undisturbed rocks.
- Erosion control measures (if any) may remain visible.

Upon completion of reinstatement, disturbed areas shall be inspected by EPCM for slope stability, relief, topographic diversity, acceptable surface water drainage capabilities and compaction and shall be approved by EPCM if deemed adequate. The issues stated in “Pipeline Construction Specification (WRP-SPC-PPL-PLG-001)” shall be considered.

4.1. Topsoil Removal and Storage

Topsoil is to be the uppermost layer of the soil profile, where the bulk of the rooting zone is located. Compared to subsoil materials, healthy topsoil has a higher organic matter content and more nutrients. Topsoil also acts as a seed bank, which is often an important source for revegetation with native species. Moreover, it is vital to both bio-restoration work and erosion control.

The depth of the topsoil shall be established by SYA along the TANAP RoW. As per the “Specification for Reinstatement (WRP-SPC-EGG-PLG-001)”, procedures shall be developed by SYA for topsoil stripping in advance of all work fronts. Work shall not commence until EPCM approval. The topsoil shall be carefully stripped to its full depth if it is less than 300 mm thick. The depth of topsoil stripping is between 100 mm and up to a maximum of 300 mm, depending on the existing vegetative soil depth over the full working corridor and extra working areas, except for the area to be used for stacking topsoil. In the areas where little or no topsoil is present, SYA shall agree the depth (if any) of topsoil to be stripped with the EPCM environmental inspector. Topsoil shall be stacked separately. Isolated piles of topsoil shall be clearly signed as Topsoil in Turkish and English. The information on where the topsoil is stripped including the KPs and the environment will be recorded for each spread in Topsoil Stripping Register presented in Appendix-1. SYA’s Reinstatement Team shall also keep and maintain records of the depths stripped by the use of Topsoil Stripping Register.

In line with the on-site observation of SYA’s Reinstatement Team, the amount of flints will be assessed and if it is decided that excessive flints are present within the topsoil, the topsoil shall be stripped in two separate layers and subsequently maintained in separate stacks. This two layer stripping will also be recorded in the Topsoil Stripping Register. Topsoil replacement in this case will be returned in separate layers.

Stripped topsoil shall be stacked on the opposite side of the construction corridor to subsoil and shall not be mixed with the subsoil. Topsoil stacks shall be drained with open ditches. The height of the topsoil stockpile will be 2 m at maximum with side slopes <45º in order to prevent anaerobic conditions. In critical habitats, topsoil pile height will be limited to 1 m. In order for the stripped topsoil to be kept free from the passage of vehicles and plant, gaps shall be left in the topsoil heap and thus, the topsoil shall not be compressed by the vehicles and machinery. The topsoil shall be stored where it will not be compacted by vehicles or contaminated and shall be stored in a manner that will minimise its loss and/or degradation.

Topsoil shall not be stored within 5 m distance of a ditch or watercourse stream crossing.

The surface of the stockpile shall be lightly compacted to reduce rainfall penetration but not enough to promote anaerobic conditions. Topsoil stockpiles shall be turned over every 2 months to re-oxygenate and avoid development of anaerobic conditions. In areas of very limited working space, topsoil stockpiles of up to 3m high and <45º slope may be permitted with EPCM's approval. Where necessary, the stockpile shall be protected from flooding by placing erosion and sediment control devices around the outside. Under no circumstances shall topsoil be used as padding material or other purposes. In critical habitats topsoil must be replaced as soon as possible after the removal (refer to BAP).

A watching brief will be maintained during all excavation works for potentially contaminated soils / materials.

Where the risk of severe damage to soil structure is high due to high moisture content, topsoil stripping operations shall be delayed until the convenient dryness level is maintained.

SYA shall maintain the integrity of the topsoil stack throughout the storage by the application of the above given measures and necessary drainage and erosion control measures will be taken.

4.2. Subsoil Removal and Storage

The subsoil will be excavated from the pipe trench and, in some cases, from ridge-top widening or cutting of benches on sides of slopes and shall be stored as separate stacks. Under no condition shall subsoil be mixed with topsoil. The subsoil shall be stored on the opposite side of the pipeline corridor to topsoil; other than in restricted areas where mixing will be prevented by physical means, e.g. geotextile sheeting.

Removed subsoil shall be kept free from the passage of vehicles and plant. Subsoil stacks shall be placed to ensure that they are free draining. Gaps shall be left in the stack to permit reasonable access across the construction corridor and at low areas where surface water may be held against the stack.

The surface of the stockpile shall be lightly compacted to reduce rainfall penetration but not enough to promote anaerobic conditions. Where necessary, the stockpile shall be protected from flooding by placing berms/barriers around the outside.

SYA shall maintain the integrity of the subsoil stack throughout the storage by the application of the above given measures and necessary drainage and erosion control measures will be taken.

A watching brief will be maintained during all excavation works for potentially contaminated soils / materials.

4.3. Trench Excavation and Pipeline Padding

Excavated Material

The creation of surplus excavated material shall be minimised as far as practicable since it is significant in terms of waste management. All material that is excavated shall be re-used to the maximum extent practicable. SYA shall produce a waste minimization statement justifying the extent to which surplus material shall be minimised and reuse maximised.

Blasting

Blasting will only be used where other excavation methods are considered technically infeasible or uneconomic, and it shall be demonstrated in a way that the blasting will minimise over-break of ground and minimise the generation of spoil material. Special reports related to the sections where blasting will be performed shall be prepared including the information such as blasting methodology on section basis, all blasting related calculations (vibration, dust, noise, etc.), and upon the approval of EPCM, the activity shall be performed in accordance with Pipeline Construction Specification (WRP-SPC-PPL-PLG-001) and Specification for Blasting (BCH-SPC-PPL-PLG-012) following the approval of related Provincial Directorate of Environment and Urbanization and Special Provincial Administration.

Backfill and Bedding

Bedding is required in areas where the stones and other materials inside the pipeline trench can damage the coating of the pipe and the surrounding soil is not convenient for bedding. When the surrounding soil is considered unsuitable for bedding, the bedding material shall be imported by the SYA upon approval of EPCM. Imported material used for bedding shall be sand and shall be salt free (to be verified by sampling and analysis before selecting the material quarry) and shall not contain clay, roots, stones or other material which is likely to cause damage to the pipe coating.

The excavated material shall be graded by crushing as required and returned to the pipeline trench in layers not exceeding 250 mm and compacted. If stored backfill material is excessively wet, it shall not be used until dried out.

In the event that the excavated material cannot be used, the required backfill material shall be imported. The material shall be either granular or cohesive and be free from any material or chemicals which may be detrimental to the integrity of the pipeline or incompatible with the native soil conditions.

The material shall be supplied only from licensed and authorized sites or sources (existing or new) and all imported material from these facilities will be recorded in Off-Row Aggregate Consumption Register (see Appendix-2). The list of quarries along the pipeline corridor is provided in Appendix 5.6 of ESIA Report.

The borrow material shall not be provided from riverbeds.

Beddding and backfill operations shall be performed in in accordance with Pipeline Construction Specification (WRP-SPC-PPL-PLG-001).

The quarry material will be tested as per Pipeline River Crossing Civil Protection Works Specification (WRP-SPC-PPL-PLG-030).

<u>Management of Excess Spoil and Rock</u>

Generally, all soil and rock shall be returned to the excavated areas. However, in some areas, the rocks removed during the clearing and grading activities have to be replaced as per the Biodiversity Action Plan (BAP) requirements.

These materials can be used as follows in the project activities:

- Where it is suitable for use as a construction material, reusing on the construction corridor,
- Using as project infrastructure works materials for providing stability, erosion control, construction camp sites, AGIs, and similar purposes,
- Using for restoration purposes, e.g. hillside and adjacent land contour blending,
- Using for localised increase in finished surface height of the construction corridor where approved by EPCM.

Except for the project activities, the material can be transferred to third party for re-use purposes, e.g. crushed andesite that may be suitable for road construction materials or for rail ballast.

SYA shall enter into negotiations and agreements with third parties regarding the feasibility, material specifications, terms and conditions for supplying spoil materials off the construction corridor as materials acceptable for reuse. The requirements presented in “Waste Disposal Assessment Report (SYA-REP-ENV-GEN-011)” regarding waste transfer shall apply.

The excess spoil and rock shall be disposed at waste disposal sites outside the construction corridor. Spoil shall not be deposited at the following locations:

- in valley bottoms, creeks, gully crossings or sink holes,

- where they will potentially interrupt concentrated overland flow,
- forestry areas,
- areas where spoil may trigger land instability / landslides.

The amount excess spoil soil/rock will be recorded in the waste registers presented as Attachment-1 of Environmental Monitoring Plan (SYA-PLN-ENV-GEN-002).

4.4. Return of Subsoil to the Trench and Reinstatement

On return of the subsoil to the trench, the subsoil shall be compacted to a similar compaction to that in the adjacent undisturbed area (see Pipeline Construction Specification (WRP-SPC-PPL-PLG-001)). The depth of subsoil after settlement shall not be above the level of the surrounding ground. After the subsoil has been returned and the land levelled, the subsoil shall be rendered to a loose and workable condition to a depth of 300 - 400 mm and contoured in keeping with the adjacent undisturbed ground. Both the Environmental Inspectors of EPCM and SYA shall regularly monitor subsoil replacement and contouring.

SYA shall provide a detailed method statement for standard reinstatement for approval prior to mobilisation.

Side cut topsoil shall be stripped and removed from the area and stockpiled. Both the topsoil and subsoil shall be stored separately. The side slope cut shall be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours. The subsoil layers shall be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account should subsoil extend beyond the original line of slope or a new slope be created which is steeper than the original slope. Following compaction of the subsoil, the topsoil shall be spread over the site, harrowed and reseeded.

The reinstatement of side sloped RoW section shall include drainage measures to avoid erosion taking place across the reinstated RoW. Compaction of the backfilled subsoils shall be sufficient to ensure long term stability of the slope and shall as a minimum match the existing density of the surrounding ground. The reinstatement shall be carried out in accordance with the typical drawings for side slopes unless otherwise approved by the EPCM. In exceptional circumstances where full reinstatement is not possible and the created cut slope will remain, SYA shall prepare a methodology statement proposing an alternative slope reinstatement solution subject to EPCM approval. This shall set out as a minimum how the long term slope stability, visual impact, and environmental project requirements are met. The progress of the reinstatement works will be recorded for each spread in Reinstatement Register that will be filled out by SYA's Reinstatement Team (see Appendix-3).

4.5. Clean-up of Sites

SYA shall, after backfilling, clean-up all areas affected by construction operations. That will include removal of all plant, equipment and materials not required for replacement of soil and subsequent bio-restoration. The clean-up of the sites will be managed considering the Waste Management Plan (SYA-PLN-ENV-GEN-003) of SYA.

4.6. Reinstatement of Topsoil

Topsoil shall be segregated and shall not be mixed with spoil material before or during replacement. Only topsoil shall be segregated and re-spread over the surface. Topsoil shall not be used as bedding material in the trench, and topsoil from non-stripped / undisturbed areas shall not be used to cover adjacent disturbances. Topsoil shall not be handled during excessively wet conditions or at times when the ground or topsoil is frozen.

Once the disturbed areas have been re-contoured and compacted, topsoil shall be redistributed over the entire disturbed areas from which it was stored.

All disturbed areas shall be subject to final grading; however, measures shall be taken prior to seeding to ensure disturbed areas remain in rough condition to help protect the stability of topsoil after its re-distribution. On sites where harrowing and similar activities are not practical (e.g. steep slopes, rocky areas etc.), the sites should be dozer-tracked perpendicular to the slope or otherwise left with adequate roughness following topsoil placement.

When the topsoil is replaced over the construction corridor, a slightly rough, loosely consolidated texture shall be achieved in order to promote vegetation growth.

4.7. Third Party Properties

Following completion of backfill and initial reinstatement activities, SYA shall reinstate any damaged or relocated third party properties. This shall be in accordance with the access to site agreements and be to the satisfaction of the appropriate regulatory authority and/or landowners.

4.8. Erosion Control

Insufficient restoration and reinstatement measures can result in soil erosion on the lands that becomes barren owing to the construction.

Erosion stabilisation practices are essential on all sloping lands disturbed by construction. The studies on surface run-off management are performed to divert the direction of the surface run-off and thus, the surface erosion and ground instability shall be prevented. The methods used to control surface runoff comprise of different kinds of channels constructed across and down slopes.

Soil erosion class 3 or better will be achieved as a result of both temporary and permanent reinstatement along the pipeline RoW. Erosion class 2 will be achieved for soil of special areas (see Table 4.1). The erosion classification will be determined by the use of USLE calculation, as explained in Section 5.2 of this report under “Steep Slope” heading.

Table 4.1: Definitions for Soil Erosion Classes 2 and 3 (Moore, H. M., Fox, H. R., & Elliott, S., (2003))

Erosion Class		Erosion rate (t/ha/y-)	Visual assessment
1	Very slight	< 2	No evidence of compaction or crusting of the soil. No wash marks or scour features. No splash pedestals or exposed roots or channels.
2	Slight	2-5	Some crusting of soil surface. Localised wash but no or minor scouring. Rills (channels < 1m2 in cross-sectional area and < 30cm deep) every 50-100m. Small splash pedestals where stones or exposed roots protect underlying soil.
3	Moderate	5-10	Wash marks. Discontinuous rills spaced every 20-50m. Splash pedestals and exposed roots mark level of former surface. Slight risk of pollution problems downstream.
4	High	10-50	Connected and continuous network of rills every 5-10m or gullies (> 1m2 in cross-sectional area and > 30cm deep) spaced every 50-100m. Washing out of seeds and young plants. Reseeding may be required. Danger of pollution and sedimentation problems downstream.
5	Severe	50-100	Continuous network of rills every 2-5m or gullies every 20m. Access to site becomes difficult. Revegetation work impaired and remedial measures required. Damage to roads by erosion and sedimentation. Siltation of water bodies.
6	Very severe	100-500	Continuous network of channels with gullies every 5-10m. Surrounding soil heavily crusted. Integrity of the pipeline threatened by exposure. Severe siltation, pollution and eutrophication problems.
7	Catastrophic	> 500	Extensive network of rills and gullies; large gullies (> 10m2 in cross-sectional area) every 20m. Most of original surface washed away exposing pipeline. Severe damage from erosion and sedimentation on-site and downstream.

The erosion control works will require a Method Statement for EPCM approval. The temporary and permanent erosion control techniques are discussed in the following paragraphs:

<u>Temporary Erosion Control</u>

SYA shall be responsible for employing temporary erosion and sediment control measures in order to protect the construction corridor and adjacent areas during construction activities and they will be installed as soon as the ground disturbance activities are started. Moreover, in the event that the pipeline trench remains open for an extended period, SYA shall ensure trench integrity and employ temporary erosion and sediment control measures as deemed necessary.

The following temporary erosion control measures shall be incorporated along the construction corridor in order to protect the environment:

- On longitudinal slopes with open trenches, plugs of unexcavated material shall be left in the trench to interrupt surface flow and prevent scouring of the trench bottom.
- Stumps should be left in place wherever possible to provide soil stabilisation.

- Drainage channels shall be installed on all longitudinal and transverse slopes as required.
- Where slopes require cutting, flumes shall be installed across the construction corridor. These shall carry water from drainage sumps on the upslope.
- The construction corridor shall be monitored by SYA's Reinstatement Team on-site throughout the entire construction phase to prevent the following:
  - subsidence of the pipeline trench below natural grade;
  - breaching of diversion berms;
  - slope wash from improperly placed berms;
  - slumping and soil movements from cut and fill slopes;
  - loss of stored topsoil, subsoil or cuttings.

Sediment Interception

Where the construction corridor intersects or is parallel to a watercourse, sediment interception shall be provided to prevent sediment entering the water. Sediment interception shall be provided for runoff that may occur during construction and reinstatement activities until the establishment of sufficient vegetation.

Sediment interception devices may take the form of a silt fence or straw bale barrier. Sediment filters and trapping devices are applicable to sites expected to remain bare during the rainy season.

Silt Fence

Silt fences shall be installed in areas of low sheet flow and are installed to intercept runoff on eroding slopes.

The filter cloth is draped over the fence and secured in a 15-cm-deep trench. Filter fences installed across the working width should follow a slight gradient towards a natural outlet, waterway, or lined chute, into which they drain.

The following requirements shall be satisfied:

- ponding shall not be allowed behind a silt fence;
- drainage area shall not exceed 0.1 hectares per 30m of fence length;
- for slopes between 2% and 20%, the maximum allowable upstream flow path length shall be 30m;
- for slopes steeper than 20%, the maximum shall be 6m;
- maximum upslope grade perpendicular to the fence line shall not exceed 100%;
- silt fences shall be used for sheet flow only.

Silt fences shall be inspected daily during periods of prolonged rainfall, immediately after each rain event and weekly during periods of no rainfall. Any repairs required shall be made immediately.

Sediment shall be removed prior to the sediment reaching 1/3 of the height of the silt fence. Care shall be taken during sediment removal to ensure integrity of the fence is maintained. Sediment removed from silt fences will be reintegrated into topsoil.

The silt fence shall not be removed until the upslope area has been permanently stabilised. Any sediment deposits remaining in place after the fence has been removed shall be dressed to conform to the existing grade, prepared and revegetated.

Straw Bale Barrier

Straw bale barriers shall be installed in areas where small amounts of temporary sediment interception are required.

Straw bale barriers shall not generally be installed where sediment control is required for periods greater than three months. Where they are installed on the working width, they should follow a slight gradient towards a natural channel, waterway, or lined chute.

The requirement for locations of straw bale barriers along the ROW is to be established during the work jointly between SYA and EPCM representative. Generally these sediment control areas with slopes >10% will include:

- areas of protection for longitudinal down slope to water bodies and roads;
- edge of construction corridor with adjacent down slope water bodies or roads;
- edge of construction corridor with adjacent down slope to defined environmentally sensitive areas.

Straw bales shall be bedded into the ground and anchored with reinforcing rods. Anchors are driven at an angle towards the neighbouring bale so as to tie them firmly together.

Straw bale barriers shall not be used in areas of rock or other hard areas, where full and uniform anchoring is prevented.

Straw bale barriers shall be inspected daily during periods of rainfall, immediately after each rain event and bi-weekly during periods of no rainfall. Any repairs required shall be made immediately. While the life expectancy of bales is not more than 3-6 months, deteriorated bales can be broken up and used as straw mulch or are often left to decompose in place.

Wooden Fences

Wooden fences shall be installed in areas of side slope and ridge construction and shall be installed to retain cuttings during construction and reinstatement of the construction corridor (see Photograph 4.1). The use of wooden fences will be subject to EPCM approval.

Reference: ESIA Report of TANAP Project

Photograph 4.1: An Example for Wooden Fences

The requirement for locations of wood fences is to be established during the work jointly between SYA and EPCM representative.

SYA's Reinstatement Team shall ensure that fences are capable of safely supporting the loads imposed. Fences shall be regularly inspected to ensure safe operation and structural integrity. SYA shall be aware that the use of wooden fences may pose localised problems. In certain areas, firewood is a valuable commodity; therefore, the fence material will be attractive to locals for firewood.

Fences shall be removed, during reinstatement of the construction corridor unless directed otherwise by EPCM.

<u>Water Disposal</u>

Pipeline trenches commonly collect water during construction. Because it is turbid and often sediment laden, trench water requires filtering before it can be discharged to an unpolluted location.

Trench water is commonly removed using a pump. Disposal of trench water shall be in accordance with the requirements of the "Pollution Prevention Plan (SYA-PLN-ENV-GEN-005)".

Appropriate measures to prevent erosion during the disposal of hydrotest water shall be adopted. Such measures are specified in "Water Pollution Control Regulation" and "Pollution Prevention Plan (SYA-PLN-ENV-GEN-005)".

Moreover, water disposal activities will also comply with "Water Course Impact Management Plan (SYA-PLN-ENV-GEN-010)".

Permanent Erosion Control Devices

Soil erosion can be particularly active on sites laid bare by construction, where it reduces land productivity and damages rural economies. The sediment it creates makes its way to streams, where it reduces water quality and invades infrastructure such as reservoirs and irrigation works.

Careful construction and reinstatement can reduce soil erosion and sedimentation to within manageable limits. Utilising mechanical (hydraulic) methods of controlling soil erosion and sedimentation, planting and fencing further protect the land surface. Both methods, hydraulic and biological through the use of vegetation, complement each other and are essential to controlling soil erosion and sediment from construction areas.

Stabilisation practices are essential on all sloping lands disturbed by construction. The methods used to control runoff comprise of different kinds of graded channels constructed across and down slopes. Graded slope breakers (interceptor cross drains), contain and remove runoff from the construction corridor and other disturbed areas. They discharge into natural channels, vegetated waterways or lined chutes, depending on the situation. Dissipation of the energy anticipated from the flow is necessary.

Slope breakers acting alone are inadequate on all but the shallowest slopes in the absence of complementary vegetation. They are important to the success of the project, because they simplify the task of protecting the vegetation at the disturbed lands and they safely divert the runoff that might otherwise erode pipeline cover and eventually damage the pipeline.

SYA will be responsible for the installation of the permanent erosion control devices under the supervision of EPCM.

Slope Breakers (Interceptor Cross Drains)

Slope breakers (interceptor cross drains or water bars) are graded channels constructed across the working width (see Photograph 4.2). Their purpose is summarized as follows:

- To decrease surface water velocities through disturbed lands by reducing slope lengths,
- To remove water from the disturbed area in a controlled manner and at frequent intervals to reduce its erosive power,
- To direct water into a stabilized location to minimize surface scour,
- To maximize water infiltration along the pipeline construction corridor,
- To slow water flow across the construction corridor to help maintain soil moisture for restoration efforts.

Reference: ESIA Report of TANAP Project

Photograph 4.2: An Example for Slope Breakers

Slope breaker details can be seen on Drawing WRP-DGA-PPL-PLG-046, with different types depending on the requirements of the individual slopes.

Slope breakers can be temporary or permanent. This has been determined taking into consideration factors including slope angle and length, rainfall intensity and soil erosivity.

Temporary slope breakers are required to be functional for the first 5 years after the pipeline reinstatement takes place; whereas, permanent slope breakers (diversion ditches), which will be in the form of stone dressed or rock formed slope breakers, are required to remain functional for the design life of the pipeline (25 years).

The final slope breaker design will be subject to EPCM approval.

Slope breakers discharge runoff into energy dissipaters, vegetated waterways or lined chutes. Slope breakers are typically stabilised by vegetation. Where soil erosion potential is predicted to be high or vegetation cannot be established, erosion control matting or crushed gravel will be applied. Erosion control matting will be fastened to the ground using corrosion resistant wire staples.

Water outlets shall provide disposal of runoff generated along the construction corridor. Thus, the runoff shall not cause soil erosion or sediment transportation. Outlets shall be installed at the end of each slope breaker. Outlets shall effectively dissipate the energy of runoff from the construction corridor and take the water to a disposal point that is safe and avoids environmental impact. The local conditions will dictate the style and location of outlet. At outlet locations where stable vegetation is not present, the outlet will be lined with rock or erosion control matting will be positioned at the slope breaker outlet.

Soakaways shall not be taken beyond the construction corridor uless EPCM approval has been granted.

Gabions

Gabions are cellular structures consisting of parallel piped elements formed by galvanized steel wire filled with suitable sized rock or rip rap. Simply, gabions are free-draining walls constructed by filling large baskets with broken stone (see Photograph 4.3).

Reference: ESIA Report of TANAP Project

Photograph 4.3: An Example for Gabion Wall

Gabion structures are suitable for all kinds of riverbeds, especially wide flood plains, due to their easy application facility. The permeability and flexibility of gabions make them suitable where the retained material is likely to be saturated and where the bearing quality of the soil is poor. At such locations, the gabions shall be used.

Erosion (Jute) Matting

Erosion matting shall be installed to provide an immediate protection to the slope against erosion, prevent washing-out of seeds and enhance the micro-climatic conditions in the soil for plant growth (see Photograph 4.4). Erosion matting shall provide temporary protection to the soil surface until sufficient vegetation cover has been established to control erosion.

Reference: ESIA Report of TANAP Project

Photograph 4.4: An Example for Erosion (Jute) Matting

The erosion matting shall be geojute or similar. The mat shall be biodegradable, open weave 11mm x 18mm mesh size and 2mm thick fibres with a mass/area ratio of 500g/m^2. The mat shall absorb water to 500% of its dry weight on saturation. The mat should rot in approximately two years. For river crossings reinstatement, biodegradable erosion matting shall be Geojute Plus or similar. SYA shall submit data sheets and samples of the proposed erosion matting for EPCM approval.

Where revegetation is taking place topsoil preparation and grass seeding work shall be undertaken prior to laying erosion matting.

The erosion mat shall be unrolled from the top of the slope, allowing it to lay naturally on the soil surface over all the local undulations. On no account shall the material be taught so that it forms ‘bridges’ over local soil mounds and stones. Matting shall be fastened to the slope surface as described on typical drawing WRP-DGA-PPL-PLG-050.

Since the mat is liable to slip, it shall be secured to the slope using wooden or metal pegs as recommended by the manufacturer.

Erosion mats, once installed shall be regularly inspected for degradation and installation integrity. Where matting has remained in place for longer than 12 months, SYA shall be responsible for maintaining and replacing matting as required through the construction and maintenance period.

<u>Crushed Rock</u>

Crushed rock may be required as a permanent erosion control measure at locations where it is impossible to establish vegetation and with prior approval of EPCM. As a temporary measure, it serves to reduce muddy conditions and sediment production during construction.

Crushed rock is applicable to locations where vegetation cannot be established and where erosion poses a risk to the pipeline or sediment threatens nearby streams. This also applies to stone dressings outside of the working width such as construction camp sites, temporary roads, pipe lay down areas and crew quarters.

Following project completion, temporary areas dressed with crushed rock will be ripped, fertilised and seeded or planted. These areas shall be subject to the acceptance of EPCM.

Lined Chutes and Vegetated Waterways

Lined chutes and vegetated waterways are specially designed channels created to collect and convey runoff to where it can be safely disposed of without erosion. Chutes or waterways serve to receive and concentrate runoff from slope breakers, from small gullies that cross the pipeline construction corridor, and from other areas that require water disposal. Their design is such that channel velocities remain non-erosive, even on steep slopes. The discharge point is to be designed and installed sufficiently to dissipate discharge energy and avoid erosion at the discharge point. See typical drawings WRP-DGA-PPL-PLG-047 and WRP-DGA-PPLPLG-051 presenting the lined chutes and attenuation pond designs.

Vegetated waterway serves to collect and dispose of runoff from slope breakers. They rely on their shallow depth and vegetated cover to reduce velocity of runoff water to within non-erosive limits. Where nearby natural channels offer a safe alternative to a vegetated waterway, these are preferred.

Waterways require fertilising and seeding with a grass mixture suited to the specific location. This seeding must be protected by suitable mulch, mats or netting to allow establishment of the seeded area.

Gully Remediation

The objective of gully remediation is to prevent existing gullies from increasing in size and extent through continued erosion.

The structures described in this specification reduce the velocity of concentrated storm water flows and thus reduces erosion of the swale or ditch. They also trap small amounts of sediment flowing in the gully.

Additional mitigation measures shall be applied for gully heads close to the pipeline using a gabion solution as detailed in drawing WRP-DGA-PPL-PLG-047 (Detail 1). Gabions in combination with a geotextile and rockfill will ensure that further erosion will be mitigated and gully head migration and possible exposure of the pipeline prevented.

Gully head remediation shall be applied as shown on the alignment sheets or directed by the EPCM representative. Final design of the gully head mitigation measures shall be proposed by SYA subject to EPCM approval.

Geotextile

Geotextile shall be as defined in the Pipeline River Crossing Civil Protection Works Specification (WRP-SPC-PPL-PLG-030) (or EPCM-approved equivalent).

Geotextile shall be handled and installed according to the manufacturer's recommendations, and/ or as shown on the Drawings. Geotextile shall not be stored in direct sunlight. Construction equipment and/ or vehicles shall not be allowed to operate directly on geotextile.

Where geotextile is joined with overlapping joints, a minimum 500 mm overlap shall be allowed at adjoining borders. For geotextile placed on slopes, the geotextile shall be secured at the top of slope by embedding in an anchor trench, as shown on the Project Drawings.

Marking of Erosion Control Works

SYA's Reinstatement Team are to walk the pipeline RoW along Lot 2 to stake the route immediately prior to clearing and grading of the RoW. Due to the length of the pipeline and the spread allocation, two Reinstatement Teams of SYA will be appointed for Spread 3 and Spread 4.

The erosion control works are to be marked, taking into account the topographical alignment of the right of way, the cutting to be performed, and the type of land. If the amount of material to be removed is considerable, the locations of temporary storage areas shall be marked and agreed with EPCM. The marking of preliminary erosion control works shall be approved by EPCM and recorded by SYA prior to beginning the works.

4.9. Bio-restoration

Vegetation, by intercepting rainfall and binding the soil, reduces soil erosion and sediment. Revegetation in the project area means returning the land to its use prior to construction. The objectives of the bio-restoration studies are to reinstate the variety and distribution pattern of the original plant species with the long term objective of reinstating the local ecology and to establish sufficient vegetation cover to reduce erosion or better through restoration of the local plant community.

The long-term cover shall be the native flora with the exception of areas that were planted with crops or other non-native species prior to construction. The bio-restoration strategy is based on supplementing the seed bank of local species that will remain in the topsoil when it is replaced. All bio-restoration materials including seeds and plants are to be collected by SYA according the BAP.

The critical terrestrial and freshwater habitats and the seed collection periods for the target flora species along the Lot 2 Section of the route are presented in Chapter 10 of Biodiversity Action Plan (CIN-REP-ENV-GEN-017). All reinstatement works to be carried out at critical terrestrial and freshwater habitats will be recorded in Sensitive Areas Register given in Appendix-4.

Depending on the land use, it can be required planting grasses in grazing areas or on highly erodible landscapes, such as those belonging to moderately steep and steeper slopes; or planting alpine plants where the land is unsuited to grass. Trees shall not be planted within a 8 m wide strip over the pipe in compliance to "Specification for Reinstatement (WRP-SPC-EGG-PLG-001)". On the other hand, trees shall be planted in areas appointed by the Regional Directorates of Forestry and suitable for reforestation and the amount of trees to be planted shall be at least equal to the cut trees. The location and number of the trees that are inevitably cut will be recorded for each spread in Tree Cutting Register by SYA's Reinstatement Team (see Appendix-5). In addition, the pipeline construction corridor, its temporary roads and other disturbed areas shall be reinstated by SYA to its original position.

The aim in arable lands is to sustain its pre-project arability potential and agricultural productivity. The main objective of bio-restoration at the forestry lands is re-creating the ecological functionality of the vegetation by planting of native flora species and the related fauna components. To properly design the measures related to the revegetation activities, the pre-project structure, dynamic development and composition of the vegetation should be considered.

When the forest vegetation is degraded in certain level, appropriate vegetation measures shall be taken to enhance the environmental quality through the permits of the landowner and related authorities. Hence, even not found at the area previously, various trees, scrubs and grass/weed types can be used with the stipulation to consider the vegetation on site. This shall enhance the success of the reclamation works and provide the creation of a habitat for self-generation through development.

A target of 70% cover of ground vegetation will minimise surface erosion and provide a sustainable, self-generating plant community under virtually all conditions within one year of planting. Rates of vegetation growth depend on soil, slope and climatic conditions.

SYA's Reinstatement Team shall carry out bio-restoration work in the appropriate growing seasons according to BAP. Sowing or planting must take place in moist ground and be followed by sufficient rainfall to promote germination and establishment.

SYA's Biologist in the Reinstatement Team shall be responsible for the choice of species and form of materials; the choice shall be based on the objectives and pre-construction survey records. Besides for the advice of SYA's Biologist in the Reinstatement Team on existing species and their distributions, the seeding regime identified in Table 4.2 shall be followed (see Specification for Reinstatement (WRP-SPC-EGG-PLG-001)). SYA shall produce "Site Specific Special Area Reinstatement Plans and Generic Reinstatement Plans" describing the species, number and material forms to be planted for approval by EPCM. Moreover, bio-restoration will follow the BAP requirements in sensitive areas.

Table 4.2: Proposed Seeding Combinations

Biological Restoration Reference (See alignment sheet codes for allocation to slopes)	Region	Kilometer Point (KP) From (m)	Kilometer Point (KP) To (m)	Elevation (m)	Seeds of the species to be collected	Life Form	Seed Collection Time	Planting Method (see Alignment sheet code)
4a	Erzincan	393000	450000	<1700	*Alopecurus vaginatus*	Herb	July-August	Hydroseed or Hydromulch
					Bromus japonicus	Herb	July-August	
					Fumana procumbens	Herb	July-August	
					Coronilla orientalis	Herb	June-July	
					Trigonella monantha	Herb	June-July	
4b	Erzincan	393000	450000	1700< slope< 2100	*Phleum montanum*	Herb	July-August	Hydroseed or Hydromulch
					Koeleria macrantha	Herb	July-August	
					Chrysopogon gryllus	Herb	July-August	
					Alopecurus vaginatus	Herb	July-August	
					Scabiosa argentea	Herb	July-August	
4c	Erzincan	393000	450000	>2100	*Bromus cappadocicus*	Herb	July-August	Hydroseed or Hydromulch
					Hordeum violaceum	Herb	July-August	
					Koelaria cristata	Herb	July-August	
					Phleum pratense	Herb	July-August	
					Poa bulbosa	Herb	July-August	
5a	Bayburt& Gumushane	450000	495000	all	*Bromus erectus*	Herb	July-August	Hydroseed or Hydromulch
					Poa nemoralis	Herb	July-August	
					Artemisia chamaemellifolia	Herb	July-August	
					Poa alpina	Herb	July-August	
					Festuca pratensis	Herb	July-August	
5b	Bayburt& Gumushane	495000	580000	all	*Alopecurus myosuroides*	Herb	July-August	Hydroseed or Hydromulch
					Bromus erectus	Herb	July-August	
					Koeleria cristata	Herb	July-August	
					Poa nemoralis	Herb	July-August	
					Artemisia chamaemellifolia	Herb	July-August	
6	Erzincan (2)	580000	605000	all	*Alopecurus vaginatus*	Herb	July-August	Hydroseed or Hydromulch
					Bromus japonicus	Herb	July-August	
					Fumana procumbens	Herb	July-August	
					Coronilla orientalis	Herb	June-July	
					Trigonella monantha	Herb	June-July	
7a	Sivas	605000	840000	<1400	*Artemisia austriaca*	Herb	July-August	Hydroseed or Hydromulch
					Aegilops umbellulata	Herb	July-August	
					Bromus japonicus	Herb	July-August	
					Elymus elongatus	Herb	July-August	
					Poa bulbosa	Herb	July-August	
7b	Sivas	605000	840000	1400< slope< 1600	*Artemisia austriaca*	Herb	July-August	Hydroseed or Hydromulch
					Aegilops umbellulata	Herb	July-August	
					Bromus inermis	Herb	July-August	

Biological Restoration Reference (See alignment sheet codes for allocation to slopes)	Region	Kilometer Point (KP) From (m)	Kilometer Point (KP) To (m)	Elevation (m)	Seeds of the species to be collected	Life Form	Seed Collection Time	Planting Method (see Alignment sheet code)
					Poa bulbosa	Herb	July-August	
					Poa trivialis	Herb	July-August	
7c	Sivas	605000	840000	1600< slope< 1700	*Poa bulbosa*	Herb	July-August	Hydroseed or Hydromulch
					Poa alpina	Herb	July-August	
					Lolium perenne	Herb	July-August	
					Koeleria cristata	Herb	July-August	
					Hordeum murinum	Herb	July-August	
7d	Sivas	605000	840000	1700< slope< 1900	*Poa bulbosa*	Herb	July-August	Hydroseed or Hydromulch
					Poa alpina	Herb	July-August	
					Lolium perenne	Herb	July-August	
					Koeleria cristata	Herb	July-August	
					Hordeum murinum	Herb	July-August	
7e	Sivas	605000	840000	>1900	*Koeleria cristata*	Herb	July-August	Hydroseed or Hydromulch
					Phleum exaratum	Herb	July-August	
					Poa angustifolia	Herb	July-August	
					Poa bulbosa	Herb	July-August	
					Poa pratensis	Herb	July-August	

Furthermore, SYA's Reinstatement Team shall take erosion preventive measures such as fertilizer, jute mat and mulch to contribute to the planting of vegetation.

Fertiliser will be applied to disturbed surfaces, as necessary, where vegetation is to be seeded or planted.

Fertilization shall be applied during hydroseeding and hydromulching process. The fertilizer should contain 4.0% Fe, 3.0% Mn, 0.1% Mo, 2.0% Zn. The amount of fertilizer should be 25 kg per 1000 m². SYA shall ensure that this fertilizer is appropriate for each location, or vary the fertilizer if necessary following approval from the EPCM. The TANAP project is best suited to combination fertilizer types, such as ammonium sulphate nitrate or calcium ammonium nitrate. Local advice from landowners and from the Provincial Directorate of Agriculture shall be obtained to confirm or revise the stated fertiliser application rates at specific locations.

The fertilizer can be placed by mixing into the topsoil or injecting to the soil and among them, mixing with topsoil is preferable.

For vegetation to protect adequately against soil erosion, it needs to be seeded at adequate densities and using methods that ensure a dense growth. Proposed seed mixes and quantities are presented in Table 4.2, for use on site following site specific validation from competent biologist.

SYA is to provide and transport grass seeds from reputable suppliers. If temporary storage is necessary, cool and dry conditions shall be provided. The delivery by the supplier shall include a datasheet identifying the type of seed and the ‘use by’ date. Data sheet to be provided to EPCM for approval prior to use.

Chisel harrow the topsoil to a depth of not more than 100mm. On slopes up to 20%, harrowing can be carried out mechanically up-and-down slope; the narrow width of the TANAP ROW will prevent contour cultivation. Hand tillage will be used on steeper slopes.

Following seeding the reinstated slopes shall be watered for a minimum of 5 litres per square metre. The time intervals for watering to be followed as per the seasons is indicated in Specification for Reinstatement (WRP-SPC-EGG-PLG-001) together with The details on the conditions to be considered in the selection of the seeding method, namely seed drill, hydroseeding, or hydromulching.

A requirement of a minimum of 70% of the pre-existing shrub community (based on number of individuals) established within one year of planting shall be set. If below-average rainfall is experienced, or where soil is lacking in nutrient, or where there are slopes of 25% or greater, a minimum of 50% cover (50% of the original cover where original cover <70%) shall be achieved in the first year with 70% occurring after the end of the following year. In r areas where third party activities have affected the level of vegetative cover, the original cover shall be determined by reference to adjacent, unaffected areas of similar topography and soil type.

SYA shall provide and transport plants and fertilizer from reputable suppliers. The delivery by the supplier shall include a datasheet identifying the type of shrub and the ‘use by’ date and the data sheet will be provided to EPCM for approval prior to use.

The steps to be followed for the plant shrubs to be arranged on a 1 m x 1 m spacing (or as advised by the Specialist) are presented in Specification for Reinstatement (WRP-SPC-EGG-PLG-001).

The jute mats, whose comprehensive information are presented in the preceding paragraphs, shall be placed to prevent the washout of the seeds and improve the micro-climatic conditions in the soil for plant growth.

Mulch is used to insulate the soil surface from evaporation and high temperatures, to protect young seedlings from desiccation, and to lessen soil erosion by intercepting rainfall. Its application varies with site condition, seeding practices, and phase according to the agricultural calendar. Mulch can comprise organic or synthetic materials, and is not to be confused with erosion cloth used to line chutes and interceptor cross drains.

Both hydromulching and jute matting will be used as part of the reinstatement works where detailed on the alignment sheets. The recommended options for jute matting and mulches and application details and also the anchoring details are presented in “Specification for Reinstatement (WRP-SPC-EGG-PLG-001)”.

The reforestation strategy will be to successfully replace every tree felled during RoW clearance. However, not all trees will be replaced in the same location from which they were removed as trees will not be able to be replanted along an 8m wide strip above the pipeline. It is noted that the re-vegetation strategy in all sections of the RoW will be to reinstate the pre-construction vegetation in terms of both composition and density.

Appropriate levels of irrigation/watering shall be provided for revegetated areas. The quantity and timing will be dependent on local climatic conditions, soil type and species requirements. Local advice such as from mukhtars, landowners, elderly, etc. should be sought.

Further detail on bio-restoration is presented in “Specification for Reinstatement (WRP-SPC-EGG-PLG-001).

5. ACTIVITIES AS PER SITE CHARACTERISTICS

5.1. Reinstatement of Land other than RoW

Land at Construction Support Facilities

The construction support facilities such as main and temporary construction camp sites, pipe lay down areas, etc. are temporary facilities and the main camps at Lot 2 section are as follows:

- Main Camp at Kilometre Point (KP) 419 near Çadırkaya District of Erzincan Province for Spread 3 (KP375 - KP585);
- Main Camp at KP710 near Hafik District of Sivas Province for Spread 4 (KP585 - KP825).

The fate of construction support facilities during the operation phase is to be agreed with EPCM before starting any activity connected with reinstatement. Reinstatement of the land shall commence immediately on removal of each individual facility. The reinstated condition shall be to a condition at least as good as that prevailing before establishment of the facilities.

Construction support facilities shall be avoided in Special Areas. Should this become unavoidable prior approval of EPCM is required. SYA shall prepare all necessary procedures and plans to achieve such approval and obtain permits as required by any affected authority.

SYA shall reinstate the area and obtain written approval from the appropriate regulatory authority or the landowner about the level of reinstatement and then report these written approval to EPCM. A photograph album will be prepared by SYA's Reinstatement Team for all these lands before the commencement of construction activities and the condition of land after the reinstatement will be compared with the previous photographs. The photograph album will be kept at the camp site.

There shall be no waste remaining after removal of the facility and upon return of the site to the landowner. Except for new roads, facilities shall be removed and the land restored so that it is suitable for its original function. New roads shall be handed over as part of the completed project with shoulders finished in keeping with local environment. Erosion control and drainage features may remain visible.

Spoil and Waste Disposal Sites

SYA shall close, cap and landscape all temporary waste disposal sites at the temporary and permanent construction camp sites by the completion of the contract. Sites shall be dealt with in accordance with the relevant project requirements in compliance with the site specific plans to be developed by SYA for the special areas and temporary and permanent construction camp sites in accordance with the BAP and EPCM approved special area reinstatement method statements. Bio-restoration shall be carried out, where appropriate.

Spoil and waste disposal sites will be prohibited in ecologically sensitive areas.

The excess rock/stump material shall be compacted to a minimum of 75% of the Proctor value; the surface shall be landscaped to resemble local conditions and shall not extend more than 2m in height above the natural contour; the slopes of the surface shall not exceed 60º. The site shall be covered with soil and an erosion mat and planted with appropriate species.

Existing Roads and Access

SYA shall exercise care when using both public and private roads for travelling to and from the construction corridor and shall upgrade and maintain roads during the works as necessary for safe operations, and reinstate them to their original upgraded condition or better following completion of construction activities. SYA shall provide for such work all hard-core, tarmac, asphalt and other materials as required.

Details of the requirements for the use and construction of existing roads and access Roads are set out in the Pipeline Construction Specification (WRP-SPC-PPL-PLG-001).

Quarries

SYA shall ensure that all borrow material will only be sourced from (both existing and new) licensed and authorised sites or sources and all imported material from these facilities will be recorded in Off-Row Aggregate Consumption Register (see Appendix-2). Where new quarries need to be opened, all necessary permits and licences will be obtained either by SYA or its subcontractors.

Reinstatement of the quarries shall be carried out to the satisfaction of the respective landowners and local authorities.

For the general selection and approval process for quarries the “Pipeline River Crossing Civil Protection Works Specification (WRP-SPC-PPL-PLG-030)” should be referred to.

5.2. Reinstatement of Land along RoW

The reinstatement and reclamation works in the project are also evaluated in accordance to the features of the sites traversed by the pipeline route.

Rivers

The design and bank/river bed restoration shall be in accordance with project drawings.

Method statements shall be produced by SYA for all major river crossings, i.e. RVX1, RVX2, RVX3A and RVX8; whereas, generic method statements shall be produced by SYA for each type of minor river crossing i.e. RVX3B, RVX4 to RVX7 for EPCM approval. The works shall only commence upon the agreement with the Regional Directorate of State Hydraulic Works.

The disturbed portion of the riverbed shall be returned to pre-construction contours. The backfill over the pipe shall be at least as scour-resistant as the original bed material. For rivers with gravel bed, the armoured bed (the sediment forming the surface layer that is coarser than the underlying sediment) shall be recovered during construction and replaced on the bed during reinstatement.

SYA shall minimise riparian disturbance wherever practicable. Bioremediation of river banks shall be undertaken to re-establish vegetation to the equivalence of the adjacent untouched areas.

River banks shall be restored to their original condition and contours. Where this is not possible, SYA shall propose site specific solutions with engineering justification and studies shall be performed in the content of Special Area Reinstatement Methods.

Erosion and sediment control devices, revegetation works shall be installed and maintained until re-vegetation and/or selected stabilization measures shown in Project Drawings are sufficiently established and functioning to meet the requirements of no accelerated or increased erosion. SYA shall detail erosion and sediment control measures in method statements and these shall be compliant with the project Special Crossing Design Drawings.

The classification for the river crossings (RVX) is summarized in Table 5.1.

Table 5.1: River Crossing Classification

Class/Type	
RVX1	Large River, width > 30m
RVX2	River, 10m < width < 30m
RVX3	Stream, 3m < width < 10m
RVX4	Small Stream, width < 3m

The reinstatement and scour protection activities to be applied at the river crossings along the Lot 2 Section of route are presented in Table 5.2.

Table 5.2: Reinstatement and Scour Protection for the River Crossings along Lot 2 (referenced from WRP-LST-PPL-PLG-003)

Class/Type	KP	TM Zone	Construction Method	Riverbed Scour Protection			Bank Protection			Other Civil Works		D50 Rip Rap Class	Site Specific Detail Drawing No.
				Type	Quantity	Typical Drawing No.	Required	Quantity	Typical Drawing No.	Requirements	Typical Drawing No.		
RVX2-0118	378+149	42	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX4-1111	393+458	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX4-0139	393+476	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX4-0143	395+101	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX4-1156	398+844	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX1-007	425+191	39	Open Cut with Civil Works	Type I	1	WRP-DGA-PPL-PLG-037	√	1	WRP-DGA-PPL-PLG-034	Flood Protection Bund	WRP-DGA-PPL-PLG-039	900/750	WRP-DXG-PPL-PLG-329
RVX4-1159	428+602	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX3-0055	428+729	39	Open Cut with Civil Works	-	-	-	√	1	WRP-DGA-PPL-PLG-034	-	-	750	WRP-DXG-PPL-PLG-330
RVX4-0168	480+067	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX2-0010	500+639	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	750	WRP-DXG-PPL-PLG-333
RVX2-0011	500+769	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	750	WRP-DXG-PPL-PLG-334
RVX3-0069	511+698	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX1-0008	571+261	39	Open Cut with Civil Works	Type II	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	750	WRP-DXG-PPL-PLG-338
RVX2-0015	588+004	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-018	√	2	WRP-DGA-PPL-PLG-018	-	-	750	WRP-DXG-PPL-PLG-341
RVX3-0073	628+944	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX3-0074	634+925	39	Open Cut with Civil Works	-	-	-	√	1	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX4-0282	641+618	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX3-0075	643+145	39	Open Cut with Civil Works	-	1	WRP-DGA-PPL-PLG-038	√	2	WRP-DGA-PPL-PLG-038	-	-	600	-
RVX2-0018	644+496	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	750	WRP-DXG-PPL-PLG-343
RVX3-0077	669+104	39	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX4-1066	699+940	36	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX1-0009	709+869	36	Open Cut with Civil Works	-	-	-	√	2	WRP-DGA-PPL-PLG-034	-	-	750	WRP-DXG-PPL-PLG-344
RVX4-1020	735+147	36	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX4-1172	736+152	36	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX4-0307	817+987	36	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX4-1021	818+010	36	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX3-0080	823+522	36	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-
RVX3-0081	837+104	36	Open Cut with Civil Works	Type III	1	WRP-DGA-PPL-PLG-037	√	2	WRP-DGA-PPL-PLG-034	-	-	600	-

Special Areas

Lot 2 Section of pipeline route contains topographical, geological and ecological features, which are characterized as Special Areas and these areas require particular attention throughout construction and reinstatement phases. A Class II erosion category shall apply to these Special Areas, therefore suitable erosion control to meet these criteria is critical. These areas, where mitigation approach for the construction impacts should be adopted, are listed below:

- Side slopes and spoils,
- Narrow ridges and landslide areas,
- Steep slopes,
- Critical Habitats,
- Karstic areas,
- Volcanic tuff and marl,
- Above ground installation (AGI) sites.

Furthermore, archaeological areas will also be considered as per the requirements given in Cultural Heritage Management Plan (SYA-PLN-SOC-GEN-006).

Based upon the information contained in the BAP and this ERLP, the results of pre-construction surveys, a site-specific Special Area Reinstatement Method Statement (SARMS) will be produced for each Critical Habitat, which will clearly specify the measures to be adopted and implemented.

The objectives of the pre-construction surveys are as follows:

- Improve understanding of the ecological resources and dynamics within, and in the vicinity of, the pipeline RoW and all those aspects which have a bearing on the environmental protection and community impacts;
- Improve the quality of existing data on the species and habitats potentially impacted by the construction. This would reduce the level of uncertainty and improve the quality of the mitigation measure, converting it from a generic mitigation measure into a specific mitigation measure;
- Provide a better understanding of the generic and specific environmental issues along the RoW;
- Assess and document the existing condition of the working area;
- Facilitate the preparation of the work method statements and programs like training activities;
- Provide the basis for determining an appropriate course of action;
- Indicate those areas where the seasonal sensitive activities are not occurring within the RoW (under such circumstances no further action would be required in respect to this specific issue); and

- Identify those issues that need further seasonal studies or prior to construction.

Special Areas will be identified uniquely in SARMS together with the clear identification of the consideration of schedule constraints within these areas (weather, planting seasons, animal breeding periods etc.).

The scope of SARMS will include the following:

- Identification of the presence of endangered or threatened species of plants within the RoW at the special area,
- Identification of the presence of endangered or threatened species of plants in the vicinity of the RoW at the special area, which could be impacted by construction activities,
- Determination of the population abundance of these species in these areas,
- Development of mitigation measures to restore the population of these species following construction,
- Restoration of the habitat of these species following construction,
- Recommendation of a follow-up monitoring program to measure the success of reinstatement of these species within the CH and in adjacent areas,
- Identification of construction impact items.

SYA shall provide suitably qualified and experienced Reinstatement Team including Soil Specialists and Biologists to assist in the reinstatement engineering and re-vegetation procedures for each spread and method statements will be prepared for the entire route and with particular consideration of these special areas. The Soil Specialist will be responsible with all topsoil and subsoil preservation related issues while biologists will be related to the stripping of vegetation cover and reinstatement of ecologically sensitive areas (as specified in the BAP).

In the course of the construction and reinstatement activities at these areas, SYA's Reinstatement Team shall continuously inspect and monitor the subcontractor's performance by the support of SYA's Environmental Inspector.

Side Slopes and Spoils

The contour restoration strategy is to 'contour blend'. The side slope cut shall be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours through the implementation of engineered spoil management. The subsoil layers shall be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account should subsoil extend beyond the original line of slope or a new slope be created that is steeper than the original slope.

Topsoil shall be stripped from the area and stockpiled at designated spoil storage areas which shall be subject to EPCM approval. Both the topsoil and subsoil shall be stored separately. Both stockpiles shall be consolidated and adequately drained. Drainage from the spoils shall be provided and a safe outlet established.

On completion of all pipe installation, the subsoil shall be replaced in layers. The thickness of the layers, conditions of the soil and number of passes of the compactor shall be sufficient to produce a density of 95%-105% of the highest compaction measured in the adjacent undisturbed area. Compaction shall be carried out in accordance with the Pipeline Construction Specification WRPSPC-PPL-PLG-001-P3.

Following compaction of the subsoil, the topsoil shall be spread over the site, harrowed and reseeded. Erosion mats shall then be laid.

Final slope measures and reinstatement details shall be subject to EPCM approval. Moreover, SYA shall carry out site inspections with EPCM in order to define required design measure to ensure long term stability of the slope and that the environmental requirements are met.

After scaling of the slopes to remove loose rock, rock netting shall be applied by SYA as required. Adequate drainage shall be applied to assure stability and controlled water runoff. In cases where these requirements apply, EPCM pre-approval of the detailed construction drawings is required.

The side slopes will be identified during the pre-construction surveys to be carried out by SYA. Side slope identification will also be complemented by the geological profile, soil nature, features in the vicinity and the presence of any water bodies nearby. All these will facilitate the preparation of the SARMS.

Narrow Ridges and Landslide Areas

The construction, where pipeline route crosses hilly terrain and is routed along narrow ridges, shall be carried out in accordance with the Construction Specification WRP-SPC-PPL-PLG-001 and strategy set out in the Slope Assessment Report WRP-REP-EGG-PLG-010. For the construction works on narrow ridges and in proximity to landslides in these areas, SYA shall prepare a SARMS subject to EPCM approval as shown on AFC alignment sheets.

The stability of the RoW shall be proven following the clearance of the RoW and prior to construction works by geotechnical inspection by SYA under the supervision of EPCM. These stability inspections shall carried out at regular intervals throughout the construction works and will focus on any signs of potential slope movement. The landslide areas identified on the AFC alignment sheets based on the landslide assessment studies should be verified and considered during construction.

In sections where topography, geohazards (such as landslides) and proximity to 3rd party pipelines will require a reduced working width, SYA shall propose an appropriate working method for these areas. Temporary and permanent reinstatement methods shall be carefully managed.

In case of signs of instability (such as tension cracks, backscarp, seepage on the slope etc.), SYA shall propose remedial measures (including dewatering, soil nail stabilisation, rock anchoring or preventing RoW from further inundation) subject to approval by EPCM.

Steep Slopes

Steeps slopes are those slopes with inclination 0.15% and >20m slope length that are predicted to exceed soil loss tolerance rates as defined in this specification. The following factors should be considered when assessing the erosion potential of slopes:

Rainfall Intensity: This parameter is a measure of the erosive force and intensity of the rain in a normal year. The rainfall intensity is based on rainfall records and probability statistics for risk evaluation. For the purpose of erosion assessment, the parameter is determined using a 1 hour 10 year return period storm.

Soil Erodibility: This parameter is a measure of the susceptibility of a soil particle becoming detached and transported by rainfall runoff. Soil parameters, which control soil erodibility are soil texture, structure soil space, organic content and hydraulic conductivity. Information from a particle size analysis (PSD) is used to estimate the soil erodibility using nomograms and correction factors.

Slope Angle and Length: Erosion potential increases proportionally to increases in the length and angle of slope, simply because runoff flow rates increase with increasing gradient and slope length.

Vegetation Cover: The effect of vegetative cover on soil loss is well researched. Bare soil represents high erodibility potential, whilst native vegetation will give maximum protection. Vegetation cover can be directly related to management options i.e. mulch, erosion control matting etc.

Erosion Control Practice: Further practices that influence erosion potential are roughening of the soil surface by tractor treads, or by rough grading, raking or disking.

Soil Temperature: Temperature is another climatic factor affecting the potential for erosion to occur. Consolidation by freezing of exposed soils during winter months and accumulation of precipitation (snow) until periods of thaw, result in rapid melting and high levels of runoff. This situation exists in Central and Eastern Anatolia.

One such method for calculating potential soil loss from slopes is the Universal Soil Loss Equation (USLE). This predicts the long-term average annual rate of erosion on a field slope based on rainfall pattern, soil type, topography, crop-system and management practices. USLE only predicts the amount of soil loss that results from sheet or rill erosion on a single slope and does not account for additional soil losses that might occur from gully, wind or tillage erosion. This erosion model was created for use in selected cropping and management systems, but is also applicable to non-agricultural conditions such as construction sites. The USLE can be used to compare soil losses from a particular site with a specific management system to 'tolerable soil loss' rates. Alternative management may also be evaluated to determine the adequacy of conservation measures in planning.

Five major factors are used to calculate the soil loss for a given site. Each factor is the numerical estimate of a specific condition that affects the severity of soil erosion at a particular location. The erosion values reflected by these factors can vary considerably due to varying weather conditions. Therefore, the values obtained from the USLE more accurately represent long-term averages. The equation is written as follows:

$$A = R \times K \times LS \times C \times P$$

Where:

A: potential long-term average annual soil loss in tons per acre per year
R: rainfall and runoff factor by geographic location
K: soil erodibility factor
LS: slope length-gradient factor
C: vegetation and management factor
P: support practice factor

This methodology will be used to determine the estimated removal rates and recommend appropriate mitigation measures required to meet the soil loss tolerance rates in the SARMS reports by SYA. In addition, this calculated soil loss rate can be compared with the threshold of 5 t/ha/year applicable for Erosion Class 2 and the threshold of 10t/ha/year applicable for Erosion Class 3 to asses the success of temporary and permanent reinstatement along the pipeline RoW and the special areas.

SYA shall establish steep slope areas by the help of pre-construction surveys and provide procedures and method statements as part of the site-specific SARMS. The procedure shall establish all planned temporary and permanent erosion measures in line with this ERLP and Project Drawings.

Construction in steep slope areas requires an increased awareness of safety and stability issues. SYA shall utilize proven construction techniques specific to such areas. SYA shall demonstrate that increased safety measures are planned and these measures are to be followed on site. An increased level of H&S Representative presence will be required at these locations.

The requirement for temporary RoW erosion/stabilization techniques shall be dependent upon the season. However, SYA shall be prepared to provide all resources necessary to avoid incipient slope erosion and stabilization issues, regardless of season, in order to be prepared for unforeseen inclement weather.

Critical Habitats

The BAP has identified critical habitats and comprehensive information is presented in BAP.

These critical habitats were identified due to the presence of endangered or threatened plants and animals or their habitats. Flora and Fauna Management Plan identify a number of outline site-specific mitigation measures that will be carried out in each of these ecologically sensitive areas. These measures include, but are not limited to, the following types of technique:

- pre-construction surveys to accurately map the location of endangered or threatened species of plants and animals within critical habitats;
- translocation of species (plants and animals) to appropriate habitat outside of the construction area prior to construction as per the BAP;
- removal, nurture and replacement/reinstatement of turfs of endangered or threatened plant species at temporary construction areas;
- care in the use of fertiliser during reinstatement;
- seasonal limitations for particular construction activities;
- minimisation of tree felling and scrub clearance;
- measures to minimise the impacts of heavy machinery, e.g. moveable equipment mats or plates; and
- supervision by ecological advisors throughout construction and reinstatement.

Based upon the information contained in the BAP, this document, specialist advice and the results of pre-construction surveys, a site-specific Special Area Reinstatement Method Statement will be produced for each critical habitat, which will clearly specify the measures to be adopted in each critical habitat and the means by which these measures will be implemented. The planning and implementation of these Special Area Method Statements, might include, the following activities:

- <u>Provision of specialist advice of Reinstatement Team:</u> Specialist advice and input will be required in relation to a number of aspects of the planning and implementation of reinstatement activities including but not limited to pre-construction surveys ,selection of appropriate species for re-vegetation, planting methods, translocation of plants and animal, removal and replacement of turfs, use of fertiliser and species identification;
- <u>Pre-construction surveys:</u> In addition of critical habitats that were identified in BAP Report, detailed mapping of the presence of such species will be required prior to construction to facilitate the reinstatement of a similar plant community to that existing prior to construction and to confirm the presence of animal species that may require translocation prior to construction;
- <u>Development of a reinstatement method statement for each critical habitats:</u> Based upon the information contained in the BAP and this ERLP, specialist advice and the results of pre-construction surveys, a site-specific Special Area Reinstatement Method Statement will be produced for each critical habitat, which will clearly specify the measures to be adopted in each critical habitat and the means by which these measures will be implemented.
- <u>On-site supervision:</u> In addition to specialist input to the planning of reinstatement activities, ecological expertise will be present on site during all relevant activities within critical habitats (e.g. route clearance, revegetation) to provide advice and supervision. SYA

will provide appropriately qualified Reinstatement Team including soil specialists and biologists to undertake the day-to-day supervision of such activities.

Karstic Areas

Karst is the topography that develops in soluble rocks in which fissures may be enlarged (ultimately to form caves) by flowing groundwater. This may occur in areas of gypsum and limestone bedrock. Gypsum is more soluble than limestone; therefore, karstic areas develop relatively rapidly in areas of gypsum.

Lot 2 section of the pipeline route crosses the outcrops of gypsum on Sivas Gypsum Karst between KP651+000 and KP738+000. The gypsum is structurally complex, with strong folding that is locally discordant, and is also extensively faulted.

Restoration in the karstic areas shall proceed as follows:

- *soils from the dolines shall be stockpiled separately;*
- *mixing of the doline soil and the ridge material is prohibited, unless agreed with the EPCM;*
- *continuous environmental inspection will follow construction;*
- *excess rock material from ridges will be disposed off in accordance with the Waste Management Plan (SYA-PLN-ENV-GEN-003);*
- *spreading of rock is prohibited, unless agreed with the EPCM;*
- *discovery of subsurface voids during construction shall be immediately reported to EPCM; measures detailed on the IAAC alignment sheets and drawing WRP-DGA-EGG-PLG-001 shall be applied, alternative remediation of voids may be used if agreed with EPCM and Client.*

Temporary and permanent erosion measures shall be employed in accordance with the requirements of this specification and project drawings. SYA shall employ trench filtration and drainage control measures as necessary to ensure that suffosion (transport of soil from the trench and from subsoil beneath the trench into karstic voids) does not occur during the design life of the pipeline. Drainage plans will maximize the use of existing natural drainage i.e., sink holes and these plans in karstic areas shall be submitted to the EPCM for approval prior to construction. Plans should consider special requirements described in “Technical Note for Design of Pipelines in Karst (WRP-TNO-EGG-PLG-001)”. At the least, SYA drainage plans shall consider:

- preventing the pipeline becoming a new drainage conduit.
- preventing loss of pipe backfill into karst fissures.
- control groundwater flow in the trench.
- maximizing the use of existing natural drainage (i.e., sink holes >20m from the pipeline
- alignment) in a controlled manner.

SYA shall follow particular requirements for drainage control as noted on AFC alignment drawings and DGA-EGG-PLG-001.

A SARMS will be submitted for this Gypsum Karst located at the east of Sivas Province. Special attention will be given to drainage in this method statement that will be subject to EPCM approval.

Volcanic Tuff and Marls

Volcanic Tuff

Topsoil layers are typically thin, <10cm, in areas of volcanic tuff. Special care is necessary in such areas to ensure the preservation of topsoil and successful establishment of a natural vegetative cover.

In areas of volcanic tuff, or other thin topsoil, SARMS will clearly state the methods that will be adopted to avoid adverse impacts.

SARMS shall be drawn up by SYA for reinstatement in areas underlain by volcanic tuff. SARMS shall include the provision of Soil Specialist in SYA’s Reinstatement Team, in addition to the required SYA’s Environmental Inspector, who will provide expert advice and identify any additional measures and supervision in areas of volcanic tuff. The Soil Specialist may also provide input in other vulnerable soil areas. The role of the soil specialist will include the following tasks in such areas:

- consultation with landowners and local experts to determine the most appropriate construction and reinstatement methods;
- establishing the depth of topsoil to be removed on a site specific basis;
- supervision and advice regarding topsoil and subsoil removal, storage and replacement;
- supervision and advice regarding soil erosion control measures during and after construction and
- supervision and advice regarding re-vegetation.

It will be ensured by SYA that landowners and local specialists/regulators are fully consulted in determining the most appropriate methods of topsoil removal, storage and replacement, and methods of re-vegetation in areas of volcanic tuff in accordance with local conditions. Necessary mitigation measures will be developed as necessary in the SARMS reports, a general overview of the mitigation measures that can be implemented are as follows:

- Narrowing the RoW,
- Preservation of topsoil,
- SARMS reports,
- Temporary soil erosion control measures,
- Returning the land to its natural contours as practicable,
- Vegetation by use of fertilizer, and
- Erosion control measures and high level of inspection during construction, reinstatement and aftercare, especially in areas of volcanic tuff.

Marl

Marl is calcareous clay that is classified as a soft rock. Marl occurs as hills, plateaus and plateau scarps, and plains. This section treats marl soils that are too steep to play a role in rain fed agriculture, although they may support grazing. Adverse impacts affecting marls include the following:

- visual impact: the marl leaves a whitish trace across the landscape where the subsoil has been exposed;
- soil erosion: marl erodes easily – in areas near Turkey's coast marl can rotate as deep landslides;
- loss of soil productivity.

As with tuffaceous lands, an important mitigation will be to decrease the construction corridor to as narrow a width as possible. This is possible because marl topsoil on sloping lands is typically thin and requires little area when set aside for reinstatement.

Existing shrubs will be set aside for later replanting. Temporary soil erosion control measures (water bars, ditch breakers and runoff barriers) shall be installed.

Temporary ditch breakers will be particularly important as marls typically contain springs that are likely to drain into the trench from the middle two-thirds of most slopes. When drained, trench water will be pumped either into a filter bag or constructed barrier made of based hay and filter cloth; in no instance shall it drain onto unprotected soil. The pump will be in place in secondary containment at all time. In some instances, emerging springs may require lined chutes to convey water from the RoW to a safe disposal location.

The specifications for returning tuff to its natural contour and condition also apply to marl and similar considerations to tuff shall be applied as regards use of a soils expert and tailoring topsoil removal to the actual thickness present rather than a pre-prescribed specification.

The potential for replanting shall be determined by the frequency of natural vegetation prior to construction. If this is low or absent, then replanting is unlikely to succeed – the onsite environmental inspector/soils expert shall give a judgment. If the site is incapable of supporting sown grass or other vegetation, downslope agricultural lands shall be provided with protection from eroded sediment; e.g. through a diversion or sediment settling pond.

The onsite environmental inspector/soils expert shall give advice to be fulfilled by SYA. If replanting is to be done, it shall follow project specifications using a grass mix recommended by local agricultural and forestry expertise. If the season is too late for replanting, the topsoil berm shall be protected over winter by seeding it with a fast growing cover crop. It shall then be reinstated during the following spring.

<u>Above Ground Installations (AGIs)</u>

All areas on which permanent facilities and above ground installations are present shall be reinstated at the end of operation phase during abandonment phase in accordance with the specifications.

SYA shall reinstate the area surrounding AGIs to the satisfaction of EPCM and the appropriate authority or landowner and shall obtain written approval from EPCM and the appropriate regulatory authority or the landowner of the level of reinstatement. Notwithstanding other such approvals, all reinstatement shall be to the satisfaction of EPCM.

Landscape projects shall be prepared and implemented for these areas to minimise the visual impacts of the permanent buildings and facilities at AGI sites. Issues to be considered in the landscape projects are listed as follows:

- landscape planting within the site boundary where appropriate;
- maximising the opportunities to retain existing landform screening; i.e. site levelling will be avoided, if possible;
- introduction of new landform screening (e.g. bunds and mounds) where this compliant the existing landform character;
- the use of appropriate colour schemes to minimise the visual impact of buildings,
- external lighting will be minimised to that necessary for safety and operational purposes and downward facing lighting and lighting of the same colour will be used to minimise spill and offsite impacts.

There will be one compressor station (CST) and 14 block valve stations (BVS) along Lot 2 Section of route (see Table 5.3). The compressor station is not within the responsibility of SYA.

Table 5.3: AGIs along Lot 2 Section of Route

Type of Station	KPs	Province	District
CST-03	674+300	Sivas	Zara
BVS-12	407+700	Erzincan	Tercan
BVS-13	440+200	Erzincan	Otlukbeli
BVS-14	473+100	Gümüşhane	Kelkit
BVS-15	502+000	Gümüşhane	Kelkit
BVS-16	532+000	Gümüşhane	Kelkit
BVS-17	547+900	Erzincan	Refahiye
BVS-18	580+900	Sivas	Gölova
BVS-19	612+000	Sivas	Akıncılar
BVS-20	646+400	Sivas	İmranlı
BVS-21	706+900	Sivas	Hafik
BVS-22	734+200 - 734+500	Sivas	Merkez
BVS-23	758+300	Sivas	Merkez
BVS-24	790+800	Sivas	Yıldızeli
BVS-25	821+600	Yozgat	Yıldızeli

6. TRAINING, REPORTING AND MONITORING

6.1. Training

All workers to be employed for the erosion control, reinstatement and landscaping related works will receive the compulsory specific environmental trainings and will not start working before completing induction training. The induction training, which is required for all employees working on RoW, will be about performing work activities in a manner consistent with environmental permits, site specific conditions, and best practices for the environmental monitoring, waste management, reinstatement including the erosion control devices, pollution prevention, spill response, cultural heritage. The topics of the specific environmental trainings will be reinstatement, waste management, water and soil management, air quality management, cultural heritage management, traffic management, noise and vibration management, aggregate management and biodiversity action plan (see Environmental Training Plan (SYA-PLN-ENV-GEN-009) for further detail). Training manager will be responsible for implementation and maintenance of the training program and appointment of the relevant experts/instructors, who will perform the training. The training attendance form and training register will be kept by relevant experts/instructors and delivered to training manager (see Appendix-6).

6.2. Reporting

Topsoil Stripping Register, Off-Row Aggregate Consumption Register, Reinstatement Register and Tree Cutting Registers will be filled out for each specified activity and kept as records. Special Area Reinstatement Method Statement (SARMS) will be prepared for each special area and will be subject to the approval of EPCM before put into practice. SARMS will give information on the topography, land use, soil characteristics, etc. of the special area and also its ecological characteristic including the species of the site, the related mitigation measures including topsoil management, seed collection, etc., restoration of the habitat, recommendation of a follow-up monitoring program, etc.

The progress of the reinstatement works will be presented by SYA in the Monthly Report to be prepared in the scope of Environmental Monitoring Plan (SYA-PLN-ENV-GEN-002), together with the filled-out registers. Moreover, any incident and/or non-conformance, which results in environmental/social impact, shall be immediately communicated to the EPCM via verbal notification and the relevant registers will be filled out as soon as practical (not later than 24 hours) (see Appendix-7).

6.3. Monitoring

SYA's Reinstatement Team will be responsible for continous monitoring of all reinstatement related works to be performed by the workers and its sub-contractors throughout all construction works. SYA's Reinstatement Team will be monitored and supervised by Environmental Inspectors of SYA and EPCM for their performance in the implementation of this ERLP and Specification for Reinstatement (WRP–SPC-EGG-PLG-001). EPCM will give the final approval prior to handover of work by SYA. Subsequent to the final approval of reinstatement works, the future management of the reinstatement program and maintenance activities shall be under the responsibility of TANAP.

7. POST-CONSTRUCTION ACTIVITIES

7.1. Restricting Access

In order to prevent rutting, subsequent erosion problems, and damage to riparian areas, unauthorised use of the construction corridor as a roadway shall be prevented. Access should be blocked at locations specified by EPCM representatives, through the construction of barrier berms of sufficient height (minimum 1.5m high) to provide a barrier to vehicles. Warning tapes/berms should be tied to vegetation or rocks adjacent to the pipeline corridor to prevent traffic. Rocks excavated during construction, 0.3m in diameter or larger, may be used instead of the earthen berms. Timber cleared during the construction can also be staggered across the pipeline corridor so as to deter off-road vehicle use.

Such restrictions to access shall also apply after completion of topsoil reinstatement.

7.2. Handover and Post-Construction Maintenance

SYA's Reinstatement Team shall carry out the required aftercare (watering, further application of fertilizers, etc.) for successful re-vegetation and monitor the progress of bio-restoration and the records will be kept by filling out the Reinstatement Register (see Appendix-3).

SYA shall obtain sign-off of the pre-entry form from the landowner agreeing on the standard of reinstatement.

SYA, upon completion of reinstatement, shall accompany EPCM on an inspection of all project areas, before demobilising from site. EPCM will notify the SYA of any insufficiencies in the reinstatement of the construction corridor/ project areas. SYA shall carry out any further reinstatement to the approval of EPCM.

During the contract maintenance period to be defined by TANAP, SYA shall be responsible for maintaining the standard of reinstatement and for ensuring that the stated erosion class and bio-restoration requirements are met. As a minimum, SYA shall carry out inspections every three months and immediately after any significant rainfall event (1 in 2 year return period) and snow melt and implement corrective measures as required to the satisfaction of EPCM.

Before termination of maintenance period, final reinstatement inspection shall be carried out and the required corrective measures shall be encouraged until the reinstatement measures satisfy the project requirements. Upon the final approval of reinstatement studies, the future management of the reinstatement program and maintenance activities shall be under the responsibility of TANAP.

8. REFERENCES

TNP-REP-ENV-GEN-002	Environmental and Social Impact Assessment (ESIA) Report of TANAP Project
WRP-SPC-EGG-PLG-001	Specification for Reinstatement
WRP-SPC-PPL-PLG-001	Pipeline Construction Specification
CIN-REP-ENV-GEN-017	Biodiversity Action Plan
WRP-DGA-PPL-PLG-005	Typical Drawing - Working Strip in Side Slopes (18 - 30 Degrees)
WRP-DLP-EGG-PLG-006	Working Strip - Forest and Environmentally Sensitive Locations
WRP-DGA-PPL-PLG-044	Slope Breaker Arrangement - typical drawing
WRP-DGA-PPL-PLG-045	Slope Breaker Outlet Designs - typical drawing
WRP-DGA-PPL-PLG-046	Slope Breaker Cross Sections - typical drawing
WRP-DGA-PPL-PLG-047	Typical Lined Chute - typical drawing
WRP-DGA-PPL-PLG-048	Typical Drawing - Silt Fence and Straw Bale Barrier
WRP-DGA-PPL-PLG-050	Erosion Control Matting Installation - typical drawing
WRP-DGA-PPL-PLG-051	Sediment Trap/ High Flow Containment Pond - typical drawing
WRP-SPC-PPL-PLG-030	Pipeline River Crossing Civil Protection Works Specification
WRP-DGA-PPL-PLG-034	Typical Drawing - Riverbank Protection - Riprap Revetments Rvx1, 2 & 3
WRP-DGA-PPL-PLG-035	Typical Drawing - River Bank Protection - Gabions Revetments
WRP-DGA-PPL-PLG-035	Typical Drawing - River Bank Protection - Gabion Revetments And Bed Protection
WRP-DGA-PPL-PLG-036	Typical Drawing - River Bank Protection - Bio-Restoration
WRP-DGA-PPL-PLG-037	Typical Drawing - River Scour Protection Sill - RVX1, 2 &3 Major
WRP-DGA-PPL-PLG-038	Typical Drawing - Riverbed Scour Protection Sill - RVX3B And RVX4A
WRP-DGA-PPL-PLG-039	Typical Drawing - River Scour Protection - Flood Protection Bund With Rip Rap Facing
WRP-DGA-PPL-PLG-040	Typical Drawing - River Scour Protection - Groyne With Rip Rap Facing
WRP-LST-PPL-PLG-003	River Crossing Reinstatement and Scour Protection Schedule

APPENDIX-1: *Topsoil Stripping Register*

TOPSOIL STRIPPING REGISTER

SPREAD ..

KP Start	KP End	Depth of topsoil stripped	Environment where topsoil is stripped*	Labelling of Topsoil Piles (Yes / No)	Implementation of Required Conditions for Topsoil Piles (Yes / No)	Name of Environment Inspector

*** Please specify the environment such as riverbank, potential erosion area, etc.**

APPENDIX-2: Off-Row Aggregate Consumption Register

OFF ROW AGGREGATE CONSUMPTION REGISTER - LOT 2

Date	**Source:**	**Volume (m3)**
	Total to date :	

Appendix-3: Reinstatement Register

REINSTATEMENT REGISTER

SPREAD …

KP Start	KP End	# of Photograph taken from the Location*	Original Countours restored?	Date topsoil was spread	Date seeding was conducted	Date Permanent Erosion controls installed	Date area was signed off

*** to be included in the Photograph Album**

Appendix-4: Sensitive Areas Register

TERRESTRIAL CRITICAL HABITATS																										
KP Start REV J	KP End REV J	ID	Was the no-construction time frame enforced? (if required)	Which seeds were collected?	Date seeds were collected	Amount of seed collected	Seed storage location	Date seeds were planted on ROW	Location where seeds were replanted	Which plants/bulbs were collected?	Date plants/bulbs were collected	How many plants/bulbs were collected	Plants/bulbs Storage location	Date plants/bulbs replanted on ROW during restoration	How many plants/bulbs were replanted on ROW during restoration	Location where plants/bulbs were replanted	Date Herbaceous plants were on ROW	Storage location of herbaceous plants collected.	Date when herbaceous plants were laid on ROW during restoration	Date topsoil was stripped	Date topsoil was reinstated	Date when rocks were collected? (30cm or larger)	Rock storage location	Date rocks were relocated on ROW	Invasive flora species control	Terracing during reinstatement to prevent erosion
389+036	392+485	CH19																								
395+974	396+824	CH 20																								
435+077	437+304	CH21																								
453+943	456+605	CH22																								
520+252	523+585	CH23																								
539+798	545+703	CH 24																								
566+417	567+117	CH25																								
590+940	592+418	CH26																								
607+000	610+060	CH27																								
616+751	628+103	CH28																								
634+738	636+286	CH29																								
636+388	636+967	CH30																								
637+009	637+035	CH31																								
654+103	656+981	CH32																								
658+103	658+534	CH33																								
662+456	662+559	CH34																								
663+309	663+812	CH35																								
687+002	687+037	CH36																								
687+313	687+352	CH37																								
703+938	704+476	CH38																								
712+066	712+279	CH39																								
717+244	717+345	CH40																								
723+424	723+679	CH41																								
732+873	732+959	CH42																								
736+589	736+754	CH43																								
744+689	744+834	CH44																								
749+987	753+060	CH45																								
805+749	805+816	CH46																								
805+842	806+143	CH47																								
818+756	818+768	CH48																								

FRESHWATER CRITICAL HABITATS														
KP Start REV J	KP End REV J	ID	Was the no-construction time frame enforced? (if required)	Start date of crossing (when banks are being topsoiled/graded)	End date of crossing (when final reinstatement completed)	Control of sediment release	Minimize erosion, sedimentation and impact to riparian vegetation	Avoid impact and removal of gravel	Date Erosion and sediment controls in place	Restoration of channel bottom	Restoration of riparian area (contours and vegetation)	Water protection zone marked/flagged? (30m buffer zone on either side of crossing)	Water sample taken upstream/down stream? Prior/during/post construction
375+027	375+177	FCH8											
506+877	506+891	FCH9											
510+622	510+634	FCH10											
713+204	713+286	FCH11											
766+754	766+774	FCH12											

Appendix-5: Tree Cutting Register

TREE CUTTING REGISTER
SPREAD …

KP	Number of Trees Cut	Type of Trees Cut*

* Please include a photo

Appendix-6: Training Records

Training Attendance Form

PROJECT NAME	
JOB NO	

NAME OF TRAINING				
TOPIC				
INSTITUTION				
COMMENCEMENT DATE / TIME				
END DATE / TIME				
TRAINEES				
NO.	FAMILY NAME	NAME	DEPARTMENT	SIGNATURE
DEPARTMENT MANAGER			**TRAINER**	

Training Register Table

TRAINING REGISTER - LOT 2						
Reporting Period:						

Date	Subject	Duration (min)	Location	Attendees (who)	Number of attendees	Total Manhours

Appendix-7: Non-Conformance Report Register and Incident Register

Non-Conformance Report Register

NCR REGISTER - LOT 2
Reporting Period:

Total of NCR	
To date	This reporting Period

Total of NCR to date	
Open	Closed

Date	Doc Control Registration Number	Summary	Date Part A completed and form submitted to assignee	Date Part B Completed	Date Part C completed	Date Part D completed	NCR closed out (green/red)	Comments

Incident Register

INCIDENT REGISTER - LOT 2
Reporting Period:

Total of incidents	
To date	**This reporting Period**

Total of incidents to date	
Open	**Closed**

Date Raised	Contractor Registration Number	Location	Incident Summary	Actions		Close Out		Comments
				Corrective Actions	Actionee	To Close By	Actual Close-out Date	

WorleyParsons
resources & energy

TANAP

TANAP
TRANS ANATOLIAN NATURAL GAS PIPELINE
PROJECT

Project Doc.No.	**TKF-PLN-ENV-PL3-007**	**Rev**	**Status**
		P4-0	**IAAC**
Document Title :	**Tekfen Erosion, Reinstatement and Landscaping Plan**		
Tag Nos.			
Contractor:	**Tekfen Construction and Installation Co., Inc.**		
Contractor Document No.		**Rev**	

		Signature	**Date**
	C1- Reviewed & accepted. Resubmit as final rev P4-0 - IAAC. Construction may proceed.		
	C2 - Reviewed & accepted as marked. Revise & resubmit as rev P4-0 - IAAC. Construction may proceed.		
	C3- Reviewed & returned. Correct & resubmit as P4-D, E etc. RE-IFR. Construction shall **NOT** proceed.		
	C4-Review not required. Resubmit for information only rev P4-0 - IFI. Construction may proceed.		

Remarks:-

TEKFEN CONSTRUCTION	TEKFEN EROSION, REINSTATEMENT AND LANDSCAPING PLAN	TANAP

TEKFEN EROSION, REINSTATEMENT AND LANDSCAPING PLAN

Rev	Status	Date	Status Description	Issued by	Checked by	Approved by	EPCM/TA NAP Approval
P3-A	DIC	20.02.2015	Discipline Internal Check	ZDEM	MASL	MKOP	
P3-B	IDC	27.02.2015	Inter-Discipline Check	ZDEM	SBAG	MKOP	
P3-C	IFR	06.03.2015	Issued for Review	ZDEM	ASON	MKOP	
P4-D	Re-IFR	30.05.2015	Re-issued for Review	ITAS	ASON	MKOP	
P4-0	IAAC	30.06.2015	Issued As Approved for Construction	ITAS	ASON	MKOP	

DOCUMENT REVISION HISTORY

REV.	REVISION DESCRIPTION	DATE ISSUED	UPDATE / AMENDMENT DETAILS
P3-A	DIC	20.02.2015	First issue
P3-B	IDC	27.02.2015	Issued for IDC incorporating DIC comments
P3-C	IFR	06.03.2015	Issued for Review
P4-D	Re-IFR	30.05.2015	Re-Issued for Review
P4-0	IAAC	30.06.2015	Issued As Approved for Construction

HOLDS

No.	Section	Description	Input From	Planned Date

TABLE OF CONTENTS

1. INTRODUCTION

TEKFEN has developed this Erosion, Reinstatement and Landscaping Plan to set out requirements to minimize erosion and to provide the framework for temporary and permanent reinstatement activities related with TANAP Project activities.

1.1. PURPOSE

The overall objective of the Erosion and Reinstatement Plan that TEKFEN will be following for TANAP Lot 3 works will be to apply the requirements for the reinstatement and re-establishment of soil and vegetation following construction activities so as to minimize erosion.

The main purpose of this plan is;

- Achieving long-term stabilization against erosion
- Restoring the project affected areas as far as practicable to its pre-construction state.
- Reinstating all the disturbed areas by project activities according to EPCM Specifications for Reinstatement.
- Restoring the complex ecology existing before construction, particularly the variety and distribution pattern of plant species
- Restoring the contours and topography of the construction to pre-existing conditions, to the maximum extent practicable
- Restoring to original condition of any infrastructure, structures, or agricultural land during construction.
- Ensuring that sites are suitable for future use;
- Establishing sufficient vegetative cover to minimize erosion and to meet the performance target of Erosion Class 3 or better through restoration of the native plant community.
- Providing immediate protection against erosion during construction activities and provide permanent stabilization and prevent washing out of seeds after construction.
- Minimizing erosion by applying all necessary temporary and permanent erosion control methods in project activities in accordance with EPCM specifications.
- Restoring the hydrological regime and reinstate natural drainage pattern
- Returning the land to its original contours and minimize the visual impact of the reinstated land such that it is compatible with the surrounding landscape
- Replacing the topsoil carefully to encourage vegetation growth and revegetate sites with suitable native plant species

This Erosion and Reinstatement Plan is applicable to the reinstatement of all areas disturbed by work, including the RoW, facility construction worksite and all other Project areas which are used to support construction, including (but not limited to) pipe dumps, offloading areas, staging and maintenance areas, access roads/tracks and other transport facilities; waste transfer stations; and other facilities associated with the proposed TANAP Project. Moreover, temporary and permanent erosion and sediment control planning and implementation of activities to be performed during the pre-construction and construction phases of the project are included.

Temporary and permanent erosion control measures will be installed by TEKFEN in order to protect the sensitive habitats and achieve the performance standards of Erosion Class-3 or better for both temporary and permanent reinstatement activities.

Erosion class 3 or better represents moderate erosion, <10 t/ha for a 1-hour 10-year return period storm.

As a minimum the following standards will be achieved:

- no risk of the depth of cover above the loading line being reduced;
- very low risk of off-site pollution and sedimentation;
- low risk of damage to biorestoration by washing-out of seeds and plants;
- continuous networks of channels over the slopes prevented, ensuring that the depth of material above the pipe is not reduced.

1.2. SCOPE

The Plan relates specifically to the following Erosion and Reinstatement management issues:

- Overall Reinstatement management
- Soils
- Seeding
- Biorestoration
- Surface water
- Landscape and social
- Special and Sensitive/Priority Areas
- Worksite clean-up and contaminated land
- Ecology
- Materials and waste management
- Temporary and permanent erosion and sediment control planning and implementation of activities.

1.3. RELATIONSHIP TO OTHER PLANS AND DOCUMENTS

This plan should be read in conjunction with the Environmental and Social Management Plan (TKF-PLN-ENV-PL3-001) that specifies general requirements for environmental and social management including training, inspection, monitoring, reporting and review and the following plans:

Document Number	Document Title
TKF-PLN-ENV-PL3-001	E&S Management Plan
TKF-PLN-ENV-PL3-008	Ecological Management Plan
TKF-PLN-ENV-PL3-009	Waste Management Plan
TKF-PLN-ENV-PL3-010	Pollution Prevention Plan

This plan should also be read in conjunction with the referred project specifications, ESIA and the other Project Standards provided below in Section 1.5.

1.4. ABBREVIATIONS

AGI	Above Ground Installation
BAP	Biodiversity Action Plan
EPCM	Engineering, Procurement and Construction Management
ESA	Ecologically sensitive areas
ESIA	Environmental and Social Impact Assessment
RoW	Right of Way
TBD	To Be Determined

1.5. REFERENCES

Document Number	**Document Title**
WRP-SPC-PPL-PLG-001	Pipeline Construction Specification
WRP-SPC-EGG-PLG-001-P4-0	Specification For Reinstatement
WRP-DGA-PPL-PLG-044	Typical Slope Breakers
WRP-DGA-PPL-PLG-045	Typical Outlet Of Slope Breakers
WRP-DGA-PPL-PLG-046	Typical Cross Section Of Slope Breakers
WRP-DGA-PPL-PLG-047	Typical Drawing - Erosion Protection - Typical Lined Chute
ILF-DID-PPL-PLG-005	Typical Silt Fence & Straw Bale Barrier
ILF-DID-PPL-PLG-006	Typical Subsoil Retaining Wooden Fences
WRP-DGA-PPL-PLG-050	Typical Erosion Control Matting Installation
TNP-REP-ENV-GEN-001	ESIA Report – Turkish version (Appendix 5.1- Construction Impacts Management Plan and Appendix 5.9- Erosion, Reinstatement and Landscaping Plan)
TNP-REP-ENV-GEN-002	ESIA Report – English Version
WRP-DGA-PPL-GEN-004-01-P4-0	Typical Working Strip -Standard
WRP-DGA-PPL-GEN-005-01-P4-0	Typical Working Strip -Reduced
BCH-DID-PPL-PLG-033	Typical Working Strip Parallel Pipelines (Regular/Reduced)
WRP-DGA-PPL-PLG-005-01-P4-0	Typical Working Strip Side Slopes (18 °-30°)
WRP-DGA-PPL-PLG-002-01-P4-0	Typical Working Strip-High Groundwater Conditions
WRP-DGA-PPL-PLG-003-01-P4-0	Typical Working Strip Highway/Main Road/Railroad Crossings
WRP-DGA-PPL-PLG-006-01-P4-0	Typical Working Strip Forest & Environmentally Sensitive Sections
WRP-DGA-PPL-PLG-020-01-P4-0	Typical Highway Crossing (Bored with Casing)
WRP-DGA-PPL-PLG-021-01-P4-0	Typical Road Crossing (Open Cut)

WRP-DGA-PPL-PLG-023-01-P4-0	Typical Railroad Crossing (Bored with Casing)
WRP-LST-PPL-PLG-003	Typical River Crossing Reinstatement And Scour Protection Schedule
WRP–SPC-EGG-PLG-001	Specification for Reinstatement
WRP-REP-EGG-GEN-004	Reinstatement and Erosion Control Requirements
WRP-SPC-PPL-PLG-001	Pipeline Construction Specification
CIN-REP-ENV-GEN-017-Rev-P3-1	Biodiversity Action Plan
WRP-SPC-PPL-PLG-030	Pipeline River Crossing Civil Protection Works Specification
WRPLST- PPL-PLG-003.	River Crossing Reinstatement and Scour Protection Schedule
WRP-DGA-PPL-PLG-036-01	Typical Drawing Riverbank Protection Bio Restoration
WRP-DGA-PPL-PLG-036-02	Typical Drawing River Riparian Restoration
WRP – SPC – PPL – PLG - 001	Construction Specification
WRP-REP-EGG-PLG-010-P3-D.	Slope Assessment Report
WRP-TNO-EGG-PLG-001	Technical Note for Design of Pipelines in Karst
DGA-EGG-PLG-001	

1.6. DEFINITIONS

Area of Influence: The Project Area of Influence (AoI) includes the areas likely to be affected by the physical facilities constituting the Pipeline system that will be directly owned, operated or managed by EPCM/TANAP and its contractors.

Backfilling: The technique for covering a completed pipeline so that adequate fill material is provided underneath the pipe as well as above it. Backfilling prevents pipe damage due to loose rock, abrasion, shifting and washouts.

Discharge: Outflow; the flow of a stream, canal, or aquifer.

Drainage: Refers to the collection, conveyance, containment, and/or discharge of surface and trench water runoff**.**

Ecologically Sensitive Areas: The areas that have a national or international conservation status, habitats of high conservation values and river crossings.

Erosion: The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep. Also, detachment and movement of soil or rock fragments by water, wind, ice, or gravity.

Erosion and Sediment Control: Any temporary or permanent measures taken to reduce erosion, control siltation and sedimentation, and ensure that sediment-laden water does not leave a site.

Gabion: A rectangular or cylindrical wire mesh cage filled with rock and used as a protecting agent, revetment, etc., against erosion.

Geotextile: Permeable fabrics which, when used in association with soil, have the ability to separate, filter, reinforce, protect, or drain.

Mulch: Any material used to cover a soil surface to reduce evaporation or prevent erosion

Outlet: Point of water disposal from a stream, river, lake, tidewater, or artificial drain.

Revegetation: Reestablishing vegetative cover on ground that has been disturbed, such as a construction site.

Right-of-Way (RoW): The strip of land above and below the pipeline; where construction, maintenance, test, replacement and operation activities occur.

Rill: A small intermittent watercourse with steep sides, usually only a few inches deep. Often rills are caused by an increase in surface water flow when soil is cleared of vegetation.

Runoff: Water originating from rainfall and other precipitation that is found in drainage facilities, rivers, streams, springs, seeps, ponds, lakes and wetlands as well as shallow ground water.

Scour: The erosive action of flowing water in streams that removes and carries away material from the bed and banks.

Sediment: Fragmented material that originates from weathering and erosion of rocks or unconsolidated deposits, and is transported by, suspended in, or deposited by water.

Subsoil: The layer of soil under the topsoil on the surface of the ground. The material excavated from the pipe trench or is the result of the ridge top, widening and cutting of benches on side slopes.

Tackifier: Material sprayed onto a soil surface to bind soil particles and prevent erosion.

Topsoil: The top, fertile layer of material on the land surface, which is capable of supporting plant growth.

Trench breaker: Temporary or permanently installed barrier at regular intervals in pipe trenches. Trench Breakers are used for preventing erosion caused by the lateral movement of runoff in the open trench; and for allowing the pipeline contractor to backfill up to the breaker.

Silt Fence: Temporary sediment barrier consisting of filter fabric, sometimes backed with wire mesh, attached to supporting posts and partially buried.

Slope breakers: Graded channels constructed across the working width

Soil Stabilization: The use of measures such as rock lining, vegetation or other engineering structures to prevent the movement of soil when loads are applied to the soil.

Straw Bale: Temporary barriers made of straw bales are sometimes installed across a slope or around the perimeter of a construction site to intercept and detain sediment transported by runoff.

Wind Erosion: Removal of soil particles by wind, causing dryness and deterioration of soil structure; occurs most frequently in flat, dry areas covered by sands and loamy soils.

Table 1- Erosion Severity Classes

Erosion Class		**Erosion rate (t/ha/y)**	**Visual assessment**
1	Very slight	< 2	No evidence of compaction or crusting of the soil. No wash marks or scour features. No splash pedestals or exposed roots or channels.
2	Slight	2-5	Some crusting of soil surface. Localized wash but no or minor scouring. Rills (channels < 1m2 in cross-sectional area and < 30cm deep) every 50-100m. Small splash pedestals where stones or exposed roots protect underlying soil.
3	Moderate	5-10	Wash marks. Discontinuous rills spaced every 20-50m. Splash pedestals and exposed roots mark level of former surface. Slight risk of pollution problems downstream.
4	High	10-50	Connected and continuous network of rills every 5-10m or gullies (> 1m2 in cross-sectional area and > 30cm deep) spaced every 50-100m. Washing out of seeds and young plants. Reseeding may be required. Danger of pollution and sedimentation problems downstream.
5	Severe	50-100	Continuous networks of rills every 2-5m or gullies every 20m. Access to site becomes difficult. Re-vegetation work impaired and remedial measures required. Damage to roads by erosion and sedimentation. -
6	Very severe	100-500	Continuous networks of channels with gullies every 5-10m. Surrounding soil heavily crusted. Integrity of the pipeline threatened by exposure. Severe siltation, pollution and eutrophication problems.
7	Catastrophic	> 500	Extensive network of rills and gullies; large gullies (> 10m2 in cross-sectional area) every 20m. Most of original surface washed away exposing pipeline. Severe damage from erosion and sedimentation on-site and downstream.

2. METHOD

2.1. REINSTATEMENT AND CLEAN-UP

Reinstatement begins with the stockpiling of topsoil as one of the first steps of construction, and ends when the topsoil is replaced, seeded and protected against erosion with erosion protection works such as slope breakers, drainage and protection of river banks.

Disturbed areas within the pipeline RoW will be reinstated to pre-construction condition, as far as practical, and reinstatement plan to the greatest practical standards, the requirements of the project ESIA, and to the Contract Documents.

Reinstatement of the soils following the pipeline construction will be undertaken such that the potential for soil erosion is reduced to an acceptable level.

Collaboration and cooperation with farmers and land managers is important for the successful reinstatement.

2.1.1. Third Party Activities and Properties

TEKFEN will fully reinstate any land disturbance due to third party assets/activities where that disturbance is within or so close to project area that reinstatement is necessary in order to secure the effective reinstatement of the project area.

Following completion of backfill and initial reinstatement activities TEKFEN will reinstate any damaged or relocated third party properties. This will be in accordance with the access to site agreements and be in satisfaction of the appropriate regulatory authority.

2.1.2. Clean-up of sites

TEKFEN will, after backfilling and before the replacement of soil, clean up all areas affected by construction operations. That will include removal of all plants, equipment and materials not required for replacement of soil and subsequent bio-restoration.

In pre-developed areas (either for agriculture or industry) the cleaned condition will be reinstated in accordance with this plan. However, the remediation of contaminated land is not covered by this Reinstatement Plan and reference should be made to Contract Documentation.

2.1.3. Ecologically Sensitive Areas

The BAP provides the description of 9 terrestrial and 6 freshwater critical habitats for LOT 3, as well as mitigation and reinstatement measures to be applied in these areas. **According to latest revision (rev J) whereas, LOT 3 covers 8 terrestrial and 6 freshwater critical habitats.** Special protection measures will be applied during construction activities at the environmentally sensitive areas.

TEKFEN will comply with any instructions, including time of year restrictions, issued by the related authorities and the ESIA Report for the protection of any/all environmentally sensitive areas.

The loss of soil through the action of natural and manmade processes is termed “soil erosion”. Soil erosion is both a risk to the pipeline through reduction of cover/support, and a risk to the environment through the relocation of large quantities of sediment causing changes in drainage patterns, soil fertility etc. TEKFEN will ensure that water courses and ecologically sensitive sites are not affected by soil erosion and the migration of soils. In environmentally sensitive areas, and along water courses and in locations prone to erosion, TEKFEN will backfill and re-instate after installation of the pipeline. Also in these areas, TEKFEN will fully re-instate in accordance with the specifications.

For the temporary as well as permanent case erosion Class 2 or better will be achieved for all slopes where sediment may discharge into a watercourse or ecologically sensitive area, i.e. <5t/ha/year. For other slopes an erosion Class of 3 or better (<10 t/ha/year) will be achieved for reinstatement along the pipeline RoW.

2.1.4. Provision of specialist advice

Advice and input of ecologist or flora expert will be required in relation to a number of aspects of the planning and implementation of reinstatement activities. The expert will conduct re-vegetation with selected species by referencing BAP; planting methods; translocation of plants and animal; removal and replacement of turfs; use of fertilizers; and species identification.

2.1.5. Pre-construction plannings

The ESIA has identified ESAs in which particular species of plants and animals have been recorded. Detailed identification of the presence of such species will be required prior to construction to facilitate the reinstatement of a similar plant community to that existing prior to construction. It is also required to confirm the presence of animal species that may require translocation prior to construction. Preconstruction phase is explained in detail in the Ecological Management Plan (TKF-PLN-ENV-PL3-008).

2.1.6. On-site supervision

In addition to the planning of reinstatement activities, ecological expertise will be present on site during all relevant activities within ESAs (e.g. route clearance, re-vegetation) to provide advice and supervision. TEKFEN will provide appropriately qualified personnel to undertake the day-to-day supervision of such activities.

2.2. REINSTATEMENT OF LAND OTHER THAN TANAP-RoW

2.2.1. Land at Construction Support Facilities

Preconstruction planning and ecological surveys will document conditions in order to adequately reinstate the areas to at least as good as that prevailing before establishment of the facility.

The following requirements apply to all construction support facilities such as fly camps, pipe storage yards, etc. They do not apply to permanent facilities such as AGIs. The fate of construction support facilities will be agreed with EPCM before starting any activity connected with reinstatement.

Construction support facilities will be avoided in the Special Areas. Should this become unavoidable, a prior approval of EPCM is required. TEKFEN will prepare all necessary procedures and plans to achieve such approval and obtain permits as required by any affected authority.

There will be no waste remaining after removal of the facility and upon return of the site to the landowner. Except for new roads, facilities will be removed and the land restored so that it is suitable for its original function. New roads will be handed over as part of the completed project with shoulders finished in keeping with the local environment with approval of EPCM. Erosion control and drainage features may remain visible.

2.2.2. Permanent Above-Ground Installations (AGIs)

All permanent installations will be reinstated in accordance with the Project Drawings and specifications.

TEKFEN will permanently reinstate the area surrounding AGIs to the satisfaction of EPCM, the regulatory authority or landowner and will obtain written approval of the level of reinstatement from EPCM, the appropriate regulatory authority or the landowner. TEKFEN's photographs of the condition of the area prior to construction may be referred to.

2.2.3. Spoil and Temporary Waste Storage Sites

TEKFEN will close, cap, and reinstate all (except as otherwise agreed with EPCM) temporary waste storage sites by the completion of the Contract. Sites will be dealt with in accordance with the relevant project requirements. Biorestoration, where appropriate, will be carried out in accordance with the requirements defined in BAP and EPCM approved Special Area Reinstatement Method Statements.

Spoil and temporary waste storage sites are prohibited in ecologically sensitive areas. Should this become unavoidable, prior approval of EPCM is required. TEKFEN will prepare all necessary procedures and plans to achieve such approval and obtain permits as required by any affected authority.

2.2.4. Existing Roads and Access

TEKFEN will exercise care when using both public and private roads for travelling to and from the TANAP-RoW and will upgrade and maintain roads during the works as necessary for safe operations, and reinstate them to their original upgraded condition or better following completion of construction activities.

2.2.5. Quarries

TEKFEN will ensure that all borrow material will only be sourced from (both existing and new) licensed and authorized sites or sources. Where new quarries need to be opened TEKFEN will obtain the necessary permits and licences and conduct any necessary ESIA. Reinstatement of these quarries to be opened will be carried out to the satisfaction of the respective landowners and local authorities (pls refer to TEKFEN's Aggregate Management Plan - TKF-PLN-ENV-PL3-011).

2.3. TOPSOIL REMOVAL AND STORAGE

Topsoil is defined here as the top, fertile layer of material on the land surface that is capable of supporting plant growth. It contains the seed bank and is therefore an essential component of the re-vegetation program. Maintenance of topsoil quality, particularly its structure and the integrity of its seed bank, is vital to both bio-restoration work and erosion control.

The construction areas will be reinstated to a sufficient extent in order to allow the affected area to be returned to its pre-project use and productivity. Appropriate maintenance and handling of topsoil is essential to achieving this objective.

Topsoil and subsoil storage for a standard working area is given in Fig. 2.1 below.

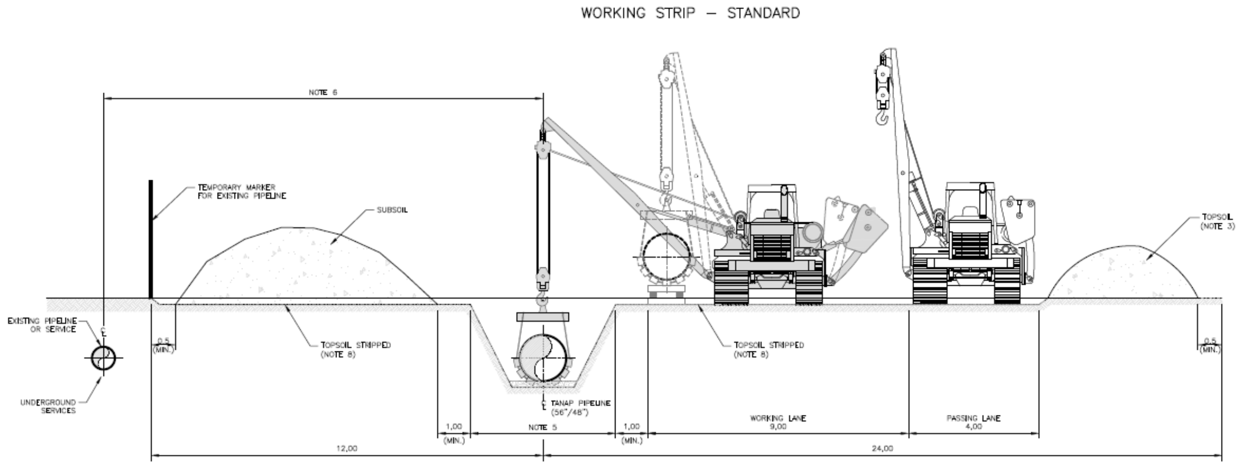


Figure 2–1. Topsoil and subsoil storage in a standard working area

2.3.1. Topsoil Stripping

TEKFEN will determine the depth of topsoil prior to construction. During construction, the determined depth of topsoil will be carefully stripped to its full depth and stored separately.

TEKFEN will develop procedures for topsoil stripping in advance of all work fronts.

The following requirements will apply to topsoil storage:

- Topsoil storage will be in compliance with the ESIA Report, BAP and project drawings.
- Topsoil will be stripped to a depth of between 10 cm and up to a maximum 30 cm. In areas where little or no topsoil is present the TEKFEN will agree the depth (if any) of topsoil to be stripped with the EPCM's representative.
- Topsoil will be stored in a stockpile not more than 3 m high with side slopes < 45º, and drained with open ditches as necessary
- Areas with a topsoil depth less than 10 cm will be identified in the site-specific procedures and method statements.
- Topsoil will not be stripped from areas that will only be used for storing topsoil as long as topsoil is not compacted/affected in any way.
- Topsoil will be stored where it will not be compacted by vehicles or contaminated and will be stored in a manner that will minimize its loss and/or degradation.
- Topsoil will not be mixed with subsoil and will be stored on the opposite side of the TANAP-RoW to subsoil; other than in restricted areas where mixing will be prevented by physical means, e.g. geotextile sheeting.
- Isolated piles of topsoil should be clearly signed as 'Topsoil' in Turkish and English.
- The surface of the stockpile will be lightly compacted, as necessary, to restrict rainfall penetration, maintain aerobic conditions, and will be protected from flooding by placing berms around the outside. Under no circumstances will topsoil be used as padding material.
- Erosion control measures (e.g., temporary seeding) will be installed as necessary to prevent loss of topsoil from the storage area and surface water contamination.
- Topsoil will be stored in a dedicated area where it will not be compacted by vehicles or exposed to contamination
- Topsoil and subsoil piles will be free draining and gaps will be left in linear topsoil piles to permit access and prevent canalization of water that may be held against the stack.

- During handling, damage to soil structure will be avoided. Soil handling under wet conditions is to be avoided other than in areas having obviously sandy soils. Construction is to be delayed 24 hours following a 24-hour rainfall of 10 mm or more during the preceding day, after which soil condition will be reassessed.
- Soils that are plastic when wet will not be worked until their dry consistence, increases to slightly hard or harder or until their moist consistence increases to firm or harder.
- Topsoil stockpiles will be regularly inspected for compliance with storage specifications and the aeration state will be tested and record on a quarterly basis

2.4. SUBSOIL REMOVAL AND STORAGE

Subsoil is material excavated from the pipe trench or is the result of ridge top, widening and cutting of benches on side slopes.

The objective is to manage the subsoil so that it is not subjected to, nor is the cause of excessive erosion.

The construction areas will be reinstated to a sufficient extent in order to allow the affected area to be returned to its pre-project use and productivity. Appropriate maintenance and handling of subsoil is essential to achieving this objective.

2.4.1. Management of Subsoil

Subsoil that will be reused, (i.e. returned to the trench or corridor TANAP-RoW) will be placed in stockpiles as shown on the drawings (See Figure 2-1).

During construction activities, subsoil will be stockpiled so that it is not subject to or the cause of erosion in accordance with construction drawings and project specifications. Topsoil will be stored in a stockpile not more than 2m high with side slopes <45°, drained with open ditches, and 1 m high in critical habitats according to BAP.

Topsoil stockpiles will be turned over every 4 months to re-oxygenate and avoid development of anaerobic conditions. In areas of very limited working space, topsoil stockpiles of up to 3m high and <45° slope may be permitted with EPCM's approval, but the pile will be turned every 2 months. The surface of the stockpile will be lightly compacted (a single pass of light hand compaction equipment) to reduce rainfall penetration but not enough to promote anaerobic conditions.

A drainage corridor will be provided on slopes more than 30° to deal with runoff from the stockpile. Other erosion controls measures (e.g., temporary seeding, silt fence) will be installed as necessary to minimize erosion.

Drainage will be provided which prevents standing water on or against the stockpile. Where necessary, the stockpile will be protected from flooding by placing berms/diversions around the perimeter. Under no circumstances will stockpiled topsoil be used as padding material.

Subsoil stripping and storage will be in compliance with TANAP document.

Removed subsoil will be kept free from passage of vehicles and plant. Subsoil stacks will be placed to ensure that they are free draining. Gaps will be left in the stack to permit reasonable access across the RoW and at low areas where surface water may be held against the stack.

The surface of the stockpile will be lightly compacted to reduce rainfall penetration, but not enough to promote anaerobic conditions.

Subsoil will be reused to bury the pipe and restore pre-construction contours, as appropriate, to the maximum extent possible. The excess subsoil which cannot be used during reinstatement activities or which cannot be reused will be treated as waste and be disposed of in accordance with the Waste Management Plan (TKF-PLN-ENV-PL3-009).

2.5. TRENCH EXCAVATION AND PIPELINE PADDING

2.5.1. Excavated Material

The creation of surplus excavated material will be minimized as far as practicable. All material that is excavated will be re-used to the maximum extent practicable. TEKFEN will ensure activities for the minimization of excess excavation material amount and maximizing its reuse.

2.5.2. Blasting

Grading and trenching in rock areas, which cannot be accomplished by ripping or other mechanical means, require blasting. Blasting will only be used where other excavation methods are considered technically infeasible or uneconomic, and it will be demonstrated to, and approved by, EPCM, that the blasting will minimize over-break of ground and minimize the generation of spoil material.

If blasting is required for the earthworks, TEKFEN will obtain all required permits from related authorities and all necessary measures to protect people, animals and property.

2.5.3. Fill and Padding

Padding and fill materials will not be imported unless demonstrated to, and approved by, EPCM that such fill is technically necessary and/or online processing is technically infeasible or uneconomic and that suitable backfill cannot be provided by excavation techniques (e.g. crushing).

No topsoil will be used for padding or filling.

Padding material placement, quality and quantity will comply with the requirement as defined in the Construction Specification and Project Drawings. TEKFEN will import suitable padding material where the local excavated material does not meet the Specification or as requested by EPCM.

2.5.4. Management of Waste Soil and Rock

Generally, all soil and rock will be returned to the excavated areas. In some locations, however, there will be surplus subsoil or rock that cannot be returned, and this must be disposed of both safely and in line with the environmental requirements of the contract and in accordance with the requirements of the “Waste Management Plan (TKF-PLN-ENV-PL3-009)”.

Any new borrow (e.g. padding material, rock) and disposal (e.g. excess soil, excess rock, tree stumps) sites will be identified and evaluated to support project activities.

All borrow sites will be evaluated to determine if they can be used as disposal sites for waste soil and rock. For those that can be used as disposal sites, method statements will be developed for EPCM approval.

For existing borrow or disposal areas, TEKFEN will evaluate operations to identify corrective actions required for current operations to meet project standards. Only those portions of existing operations that meet or can be adjusted to meet project requirements will be used. TEKFEN will provide information to the facility operators on the actions needed to bring their total facility operations into compliance with project requirements, and will assist them in making necessary changes.

The priorities for managing excess soil and rock are as follows:

1st: Reuse at a project facility or RoW section (e.g., trench backfill material, erosion control)

Where generated spoil is suitable for use as a construction material it will be first considered for reuse on the project facility or RoW for Project infrastructure works materials; stability, erosion control, AGIs, etc.

2nd: On TANAP-RoW Disposal

- For restoration purposes e.g. simulation of rock streams/glaciers in adjacent areas, hillside contour blending.
- Localized increase in finished surface height of TANAP-RoW where approved by EPCM.

3rd: Off TANAP-RoW Reuse

Transfer to third Party for re-use purposes as raw or semi-finished materials, e.g. crushed andesite that may be suitable for road construction materials or for rail ballast.

TEKFEN will enter into negotiations and agreements with third parties regarding the feasibility, material specifications, terms and conditions for supplying spoil materials off the TANAP-RoW as materials acceptable for reuse. Notification of such agreements will be duly noted and reported to EPCM.

4th: Off TANAP-RoW Disposal (permanent soil and rock)

All off RoW disposal sites are to be agreed prior to use with EPCM and are to be in accordance with the project Waste Management Plan.

Spoil will not be deposited:
- in valley bottoms, creeks, gully crossings, or sink holes;
- where they will potentially interrupt concentrated overland flow;

Earth works management will be engineered particularly in contour restoration.

2.6. REINSTATEMENT OF SOILS

The TANAP-RoW will be reinstated to a sufficient extent in order to allow the affected area to be returned to its pre-project use and productivity. Appropriate maintenance and handling of soil is essential to achieving this objective.

Upon completion of reinstatement, disturbed areas will be inspected jointly by TEKFEN and EPCM for slope stability, relief, topographic diversity, acceptable surface water drainage capabilities, and compaction.

2.6.1. Reinstatement of Subsoil

There are two types of reinstatement for subsoil: standard reinstatement and special area reinstatement. Both conditions of subsoil reinstatement will be applied to restore the complex terrain in accordance with TANAP Project documents. In addition to re-contouring the subsoil based on the contours of the undisturbed areas adjacent to, pre-construction survey data will be used in conjunction with the pre-construction photo documentation to reinstate natural contours and conditions.

Prior to backfilling, trench (ditch) breakers will be installed in locations where the natural profile, drainage pattern, and backfill materials may cause the trench to act as a drain (e.g., at the base of a wetland or bank of a stream). Trench breakers will be installed in accordance with TANAP Project documents.

2.6.1.1. Standard Subsoil Reinstatement

On return of the subsoil to the trench, the subsoil will be compacted to a similar compaction to that in the adjacent undisturbed area. The depth of subsoil after settlement will not be above the level of the surrounding ground. After the subsoil has been returned and the land levelled, the subsoil will be rendered to a loose and workable condition to a depth of 300 – 400mm and contoured in keeping with the adjacent undisturbed ground. TEKFEN Environmental Inspectors will regularly monitor subsoil replacement, compaction and contouring.

2.6.1.2. Special Area Subsoil Reinstatement

Special reinstatement is applied where it has been necessary to cut a bench into the hillside in order to lay the pipe and the intention is to restore the original slope by filling-in the bench, thereby removing any scar in the landscape.

Side cut topsoil will be stripped and removed from the area and stockpiled. Both the topsoil and subsoil will be stored separately. The side slope cut will be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours. The subsoil layers will be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account should subsoil extend beyond the original line of slope or a new slope be created which is steeper than the original slope. Following compaction of the subsoil, the topsoil will be spread over the site, harrowed and reseeded.

The reinstatement of side sloped RoW section will include drainage measures to avoid erosion taking place across the reinstated RoW. Compaction of the backfilled subsoils will be sufficient to ensure long term stability of the slope and will as a minimum match the existing density of the surrounding ground. The reinstatement will be carried out in accordance with the typical drawings for side slopes unless otherwise approved by the EPCM. In exceptional circumstances where full reinstatement is not possible and the created cut slope will remain, a methodology proposing an alternative slope reinstatement solution will be prepared. This will set out as a minimum how the long term slope stability, visual impact, and environmental project requirements are met.

<u>Side Slope:</u>

The contour restoration strategy is to 'contour blend'. The side slope cut will be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours through the implementation of engineered spoil management. The subsoil layers will be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account should subsoil extend beyond the original line of slope or a new slope be created which is steeper than the original slope.

Topsoil will be stripped from the area and stockpiled. Both the topsoil and subsoil will be stored separately. Both stockpiles will be consolidated and adequately drained. Drainage from the spoils will be provided and a safe outlet established. Please refer to Project Drawing "Typical Working Strip Side Slopes (18 °-30°) (WRP-DGA-PPL-PLG-005-01-P4-0)".

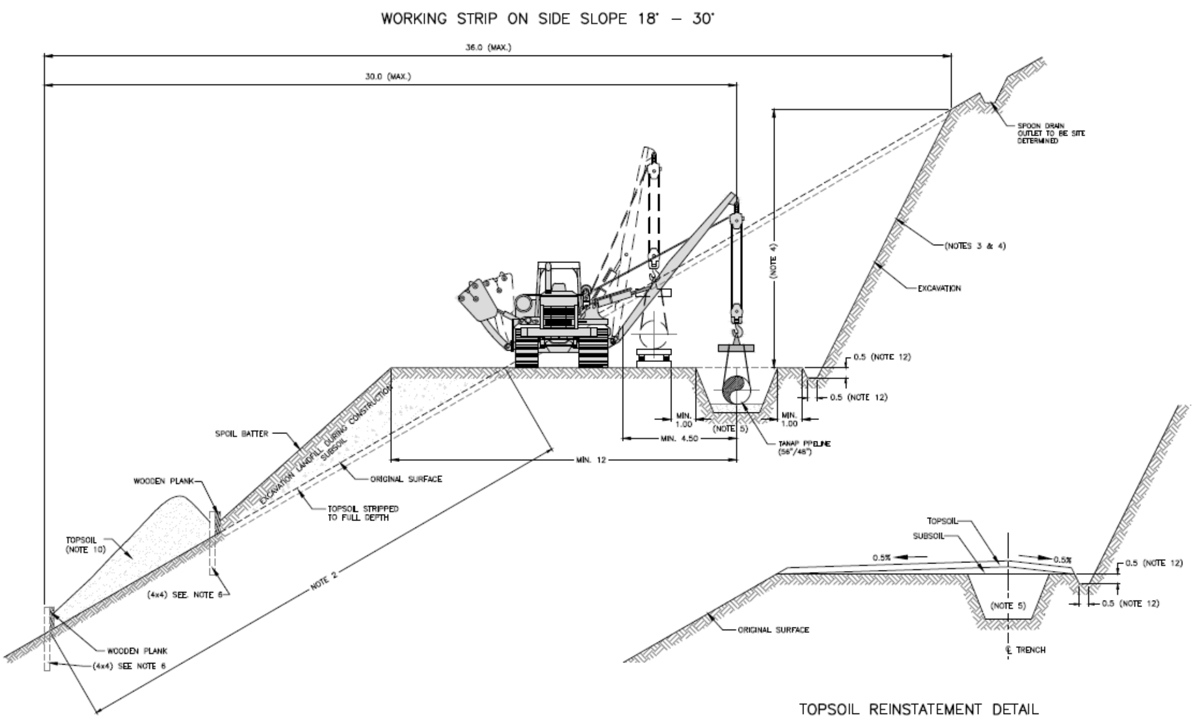


Figure 2–2 Special area reinstatement

On completion of all pipe installations, the subsoil will be replaced in layers. The thickness of the layers, conditions of the soil and number of passes of the compactor will be sufficient to produce a density of 95%-105% of the highest compaction measured in the adjacent undisturbed area.

Following compaction of the subsoil, the topsoil will be spread over the site, harrowed and reseeded. Erosion mats will then be laid.

<u>Special Reinstatement – Side Slopes</u>

Special reinstatement is applied where it has been necessary to cut a bench into the hillside in order to establish a flat working area from which to lay the pipe. It is the intention where possible to restore the original slope by filling-in the bench, thereby removing any scar in the landscape.

Side-cut topsoil will be stripped and removed from the area and stockpiled. Both the topsoil and subsoil will be stored separately. The side slope cut will be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours. The subsoil layers will be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account would subsoil extend beyond the original line of slope or a new slope be created which is steeper than the original slope. Following compaction of the subsoil, the topsoil will be spread over the site, harrowed and reseeded. The reinstatement of side sloped RoW section will include drainage measures to avoid erosion taking place across the reinstated RoW. Compaction of the backfilled subsoils will be sufficient to ensure long term stability of the slope and will as a minimum match the existing density of the surrounding ground. The reinstatement will be carried out in accordance with the typical drawings for side slopes unless otherwise approved by the EPCM.

2.6.2. Reinstatement of Topsoil

Topsoil will be segregated and will not be mixed with spoil material before or during replacement. Only segregated topsoil will be re-spread over the surface. Topsoil will not be used for bedding material in the trench, and topsoil from unstripped/undisturbed areas will not be used to cover adjacent disturbances. Topsoil will not be handled during excessively wet conditions or at times when the ground or topsoil is frozen.

Once the disturbed areas have been re-contoured and compacted, topsoil will be re-distributed over the entire disturbed areas from which it was stored.

All disturbed areas will be subject to final grading; however, measures will be taken prior to seeding to ensure disturbed areas remain in rough condition to help protect the stability of topsoil after its re-distribution. On sites where harrowing etc. is not practical (e.g. steep slopes, rocky areas etc.), the sites should be dozer-tracked perpendicular to the slope or otherwise left with adequate roughness following topsoil placement.

When the topsoil is replaced over the TANAP-RoW, a slightly rough, loosely consolidated texture will be achieved in order to promote vegetation growth.

2.7. RIVERS

Where required the design of riverbed and riverbank protection will be in accordance with Project Drawings.

Specific method statements will be produced by TEKFEN for all major river crossings, i.e. RVX1, RVX2, RVX3A and RVX8, generic method statements will be produced by TEKFEN for each type of minor river crossing i.e. RVX3B, RVX4 to RVX7 for EPCM approval. The method statement will detail all construction and restoration procedures.

Riparian vegetation (Plant habitats and communities along the river margins and banks) are of high importance to the long term stability of the river. TEKFEN will minimize riparian disturbance wherever practicable. Where riparian vegetation consists of shrubs and trees greater than 1m height, TEKFEN will transplant the plants wherever possible for re-planting during reinstatement works. Where it is not practicable to transplant or translocate the trees then new trees of the same species mix will be planted. Nursery trees of minimum 2 years old up to 5 year old will be planted in order to restore the riparian environment, subject to the restrictions of the Planting Proximity Zones.

The *Planting Proximity Zones* are defined by the following:

- there will be no trees planted within 6m of the pipeline centerline,
- trees such as Willows (Salix) and Poplar (Salicaceae) or other native species with similarly deep and aggressive root structures will not be planted within 10m of the pipeline centerline.
- other tree species such as Ash, Alder, Lebanon cedar, larch, beech, elm, sweet chestnut, hornbeam, Turkish Pine, scotts pine, black pine, Kermes oak, Cilician Fir, sycamore, apple, plum, cherry, pear, and also included in this category are most conifers may be planted at a distance of 6m or greater from the pipeline centerline.

TEKFEN will plant sufficient density of vegetation to achieve the original plant densities subject to the restrictions of the Planting Proximity Zones. The planting density will take consideration of dieback rates of each plant.

Where originally present native shrubs will be re-planted above the pipeline and within the riparian zone: if no shrubs are originally present, TEKFEN will introduce shrubs native to the region to provide vegetative stabilization and erosion protection to the cleared riparian zone 6m either side of the pipeline centerline.

Acceptable plant types, suggestion of planting density and their location relative to the pipeline are outlined in drawings WRP-DGA-PPL-PLG-036-01 – Typical Drawing Riverbank Protection Bio Restoration and WRP-DGA-PPL-PLG-036-02 Typical Drawing River Riparian Restoration.

Bioremediation of river banks will be undertaken to re-establish vegetation to the equivalence of the adjacent untouched areas. This may include juvenile trees and shrubs the selection of, placement and planting will be supervised by a competent ecologist and approved by the EPCM. In addition, for erosion protection purposes, the regional planting and seeding regime will also be applied.

Unless stipulated on project documentation, river banks will be restored to their original condition and contours. Where this is not practicable, TEKFEN will propose site specific solutions with engineering justification; this will be included within EPCM approved method statements.

For gravel bed rivers, the armored bed (the sediment forming the surface layer that is coarser than the underlying sediment) will be recovered to a minimum depth of 30cm at the start of crossing excavations, stored in a segregated area and replaced as the top layer of bed material during reinstatement.

The backfill over the pipe will be at least as scour-resistant as the original bed material. Where rock is present the backfill material will be coherent and with similar properties to the adjacent undisturbed ground, the trench should not create a natural channel for preferential erosion or water run-off nor should it create localized hard areas, with the potential to increase future erosion rates across the watercourse.

The disturbed portion of the river bed will be returned to pre-construction contours where possible and in compliance with Project Drawings. Any deviations will be subject to EPCM approval.

Erosion protection and stabilization measures will be provided to prevent acceleration of and / or increase in the erosion as a direct or indirect result of the construction activities. Other than sites where civil protection measures are designed e.g. riverbank revetments and riverbed protection, erosion and soil stabilization measures, when implemented, will not be intended to permanently alter the pre-construction hydrologic and environmental regimes including natural erosion of the rivers. Trench backfill materials will meet the requirements of the Pipeline Construction Specification. Any material too wet to be suitable for reinstatement of the banks will be dried as required to ensure stability during reinstatement.

Erosion and sediment control devices will be installed and maintained until re-vegetation and/or selected stabilization measures shown in Project Drawings are sufficiently established and functioning to meet the requirements of “no accelerated” or “increased erosion”.

Where erosion matting and/or bio-restoration cannot achieve the project reinstatement performance requirements, or where otherwise indicated on Project Drawings, or as otherwise deemed necessary, erosion protection will be achieved by the installation of civil protection measures.

Where permanent river bed scour and riverbank protection is required it will generally be specified on site specific detail drawings and in the River Crossing Reinstatement and Scour Protection Schedule Document No. WRP-LST-PPL-PLG-003. Protection measures will be implemented as specified. TEKFEN is required to validate the river crossing reinstatement and scour protection schedule document and where additional protection requirements become apparent during either construction and/ or re-instatement, TEKFEN will propose additional measures, in accordance with project requirements, for EPCM review and approval prior to implementation.

Requirements for riprap, geotextile, gabions, sills, bunds, groynes etc, including but not limited to material specifications, placement and testing will be in accordance with Project Drawings, and meet the minimum requirements of the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030.

2.8. BIO-RESTORATION

Vegetation, by intercepting rainfall and binding the soil, reduces soil erosion and sediment. Re-vegetation in the project area means returning the land to its use prior to the construction. This means planting grasses in grazing areas or on highly erodible landscapes, such as those belonging to moderately steep and steeper slopes; or planting alpine plants where the land is unsuited to grass. Privately owned land will normally be replanted in accordance with the wishes of the landowner and EPCM.

Trees will not be planted within an 8 m wide strip over the pipe. However, trees will be planted in areas suitable for reforestation, such as the verge of the right-of-way. In addition to the TANAP’s working width, its temporary roads and other disturbed areas will be reinstated by TEKFEN.

All bio-restoration programs will be approved by EPCM. Landowners will be consulted by TEKFEN to assist in developing these programs. Where Landowners requirements cannot be achieved, TEKFEN will consult with EPCM to agree a final resolution of the issue.

2.8.1. Objectives

The objectives are:

- To reinstate the variety and distribution pattern of the original plant species with the long term objective of reinstating the local ecology; and
- To establish sufficient vegetation cover to reduce erosion to meet the performance requirement of Erosion Class 3 or better through restoration of the local plant community.

The long-term cover will be the native flora with the exception of areas that were planted with crops or other non-native species prior to construction. The bio restoration strategy is based on supplementing the seed bank of local species that will remain in the topsoil when it is replaced. All bio restoration materials including seeds and plants will be supplied by TEKFEN.

2.8.2. Requirements in Agricultural/Developed Areas

In agricultural (defined as arable land) and other developed areas TEKFEN will leave the land in the condition specified in the pre-entry agreements. Except where agreed otherwise, TEKFEN will assume that the land is to be made ready for re-planting with crops: the land will be graded and tined to remove compaction. Application of fertilizer and planting of seeds etc. on permanent growing areas will be carried out by the landowner or tenant.

2.8.3. Requirements in Undeveloped Areas

Original percentage cover will be estimated from TEKFEN’s photographic record of the route, or, in case of doubt, by reference to adjacent undisturbed areas.

The vegetation cover will be composed of either:

- The species originally found in each section or project area; or
- Other species (for example, fast growth types) which are suited to the local environment and indigenous to the region; or
- An ecologically compatible mixture of those two groups.

2.8.4. Scheduling

TEKFEN will carry out biorestoration work in the appropriate growing seasons (blooming time for most of the plant species is spring, yet seeding time of each restored species will be considered). Sowing or planting must take place in moist ground and be followed by sufficient rainfall to promote germination and establishment. TEKFEN will identify from historical meteorological data suitable weather ‘windows’ for each area of the route. Bio-restoration schedule will be approved by EPCM.

TEKFEN will produce a Bio-restoration Schedule including pre-construction transplanting or cultivation in addition to post-construction soil preparation, planting and aftercare.

2.8.5. Selection of Plant Species

This section refers to the species and form of materials (seed, seed-mix, bulb, or plant etc.) chosen to supplement the seed bank of the topsoil. This section does not apply to agricultural or other developed areas.

- The selection of species will be designed to achieve the objectives.
- TEKFEN will be responsible for the choice of species and form of materials. The choice will be based on the objectives and ecological survey records. TEKFEN will refer to BAP for existing species and their distributions.

2.8.5.1. Species Selection

Where rapid growth is necessary for erosion control or other reasons, the species selected for initial planting will have the following properties:

- dense, fibrous horizontal root structure close to the surface;
- dense uniform ground cover, particularly during the season of the most intense rainfalls;
- resistant to damage by high-velocity run-off;
- resistant to damage from trampling by people and animals;
- not persistent – will allow the original species to re-colonise the area;
- if possible, not clumpy or tussocky as this may lead to concentration of run-off between the plants.

The species selected for long-term growth will reflect the variety and distribution pattern of the pre-construction flora.

2.8.5.2. Fertilizer

Fertilizer will be applied to disturbed surfaces, as necessary, where vegetation is to be seeded or planted. If topsoil has been restored, the rate of application will generally be 1.1 T ha^{-1} of 10-10-10 (N-P-K); if topsoil has not been restored, the application rate will generally be 2.0 T ha^{-1} of 10-10-10. In some circumstances, basal doses may be substituted. Local advice (universities, agronomists, and landowners) will be obtained to confirm or revise the stated fertilizer application rates at specific locations. Banned materials will not be used.

<u>Timing of Fertilizer:</u>

Fertilizer is generally not required during seedling establishment or during plant post-vegetative phases.

- For spring-sown plants, this would follow about 10–20 days after germination and end about 40 days later.
- For autumn-sown wheat, this would follow snowmelt and last about 50 days.

Local advice (universities, agronomists, and landowners) will be sought by TEKFEN.

<u>Placement of Fertilizer:</u>

Problems can be avoided if fertilizer is broadcast before topsoil replacement or is mixed into the topsoil. This effect would be similar to injecting fertilizer into the soil, albeit its depth if broadcast would be deeper than injection as it is currently practiced. Indeed, in-depth placement or mixing may be the only practical way of applying area if that is the only fertilizer available to the project.

Local advice (universities, agronomists, and landowners) will be sought.

2.8.6. Procedures to be followed by TEKFEN

Depending on local soils, slope and climate and the nature of the local plant communities, one or more of the following procedures for re-vegetation can be adopted:

- sowing of grass seeds;
- planting of shrubs / tree whips at 1m centers;

The procedure for each of the above is described below.

<u>Procedure for Grass Seeding:</u>

For vegetation to protect adequately against soil erosion, it needs to be seeded at adequate densities and using methods that insure a dense gRoWth. Seeding methods and species to be used will be specified in Special Area Reinstatement Method Statements. Species utilised for re-seeding and the seed-mix will be in sympathy with the pre-existing vegetative cover.

TEKFEN will provide and transport grass seeds from reputable suppliers. If temporary storage is necessary, cool and dry conditions will be provided. The delivery by the supplier will include a data sheet identifying the type of seed and the ‘use by’ date. Seed will be purchased in accordance with the manufacturers’ seed specifications for seed mixes and used within 12 months of testing. Other alternative seed mixes specifically requested by the landowner or land managing agency may be used. Seed data sheet to be provided to EPCM for approval prior to use.

Chisel harRoW the topsoil to a depth of not more than 10 cm. On slopes up to 20%, harRoWing can be carried out mechanically up-and-down slope. Hand tillage will be used on steeper slopes.

In general, broadcast grass seeds at a rate of not less than 70 kg/ha. Certain species/mixtures of seed may require different densities.

Lightly harRoW (chain harRoW or similar) the soil to a depth of 25-50mm to bury the seed in a loose tilth.

In locations where erosion mat is not specified, mulch or windRoWed vegetation from clearance operations will be re-distributed over the seeded ground.

In sections where livestock may be present a stock-proof fence will be erected along the boundaries of the seeded area.

Seeding will be done either with a seed drill, hydroseeding or by broadcasting. If broadcast, seeding will be done within 10 days of topsoil replacement. Broadcast seed will be lightly harRoWed or disked. If sowing is seasonally out of phase, then an application of mulch is required on moderately high and highly erodible soils on slopes steeper than 16%, where seed will be applied in combination with mulch, chemical stabilizer (for some types of mulches), and fertiliser.

On extreme slopes, such as cut faces of right-of-ways and roads, and excluding slopes steeper than 1/4:1 (h:v), seed and fertiliser are to be broadcast followed by power mulching using straw and a suitable tackifier such as bitumen.

Vegetated waterways will be planted with species that offer good channel roughness such as alfalfa or a grass-legume mixture incorporating Italian rye grass and common lespedeza; low-gRoWing grasses such as Bermuda are unsuited to waterways above 3% slope.

<u>Procedure for Shrub Planting:</u>

A requirement of a minimum of 70% of the pre-existing shrub cover (based on number of individuals) established within one year of planting will be set. If below-average rainfall is experienced, or where soil is lacking in nutrient, or where there are slopes of 25% or greater, a minimum of 50% cover (50% of the original cover where original cover <70%) will be achieved in the first year with 70% occurring after the end of the following year. In other areas where third party activities have affected the level of vegetative cover, the original cover will be determined by reference to adjacent, unaffected areas of similar topography and soil type.

TEKFEN will provide and transport plants and fertilizer from reputable suppliers. The delivery by the supplier will include a datasheet identifying the type of shrub and the ‘use by’ date. The roots will be kept moist. Avoid excessive handling of the stems and roots since this will cause damage. Data sheet to be provided to EPCM for approval prior to use.

Plant shrubs on a 1m x 1m spacing (or as advised by the Specialist), arranged in echelon, in the following steps:

- clear the land of any vegetation around each planting position;
- dig a hole large enough to take the roots of the plant when spread out;
- place fertiliser as supplied in the hole;
- place the shrub in the hole and backfill with soil;
- if necessary to keep upright, support the shrub by tying to a stake;
- water the plant.

In locations where erosion mat is not specified, mulch or windRoWed vegetation from clearance operations will be re-distributed around the shrubs.

Arrangement will be done for repeated watering of plants during summer and other dry periods during the first year of planting.

2.8.7. Jute Matting and Mulch

Mulch is used to insulate the soil surface from evaporation and high temperatures, to protect young seedlings from desiccation, and to lessen soil erosion by intercepting rainfall. Its application varies with site condition, seeding practices, and phase, according to the agricultural calendar. Mulch can comprise organic or synthetic materials. The type of mulch will vary with the time of seeding, the slope, and the amount of relief. In interior plains and plateaux, temporary mulches using straw fiber or its equivalent are to be applied on undulating and rolling lands seeded in advance of the rainy season; mulch mesh or mats are to be applied on hilly and steeper lands. In the mountains and foothills, mulch mesh or mats are to be applied on rolling and steeper landscape classes that have been seeded to grass. Planted areas are to be temporarily fenced until such time as their vegetation reaches a condition appropriate to the zone. In most cases this will be judged by its ability to resist soil erosion.

2.8.8. Interior plains and plateaus

In general, cereals on slopes less than 16% would not be mulched following seeding. An exception applies to cereals planted out of phase with the agricultural calendar, when a light straw mulch is to be applied.

Slopes steeper than 16% and vegetated waterways require a heavy mulch when seeded to grass, regardless of the situation.

2.8.9. Mountains and Foothills

Vegetated waterways and slopes steeper than 8% require a heavy mulch, slopes less than 8% require a light mulch if they are seeded out of phase with the agricultural calendar. An exception is areas to be reforested in conglomerate-derived soils, where planting basins or terraces following regional forestry practices replace the mulch requirement.

2.8.10. Reforestation

Reforestation of the RoW will occur wherever a forest existed before the construction. For the purposes of this Plan a forest is defined as “trees and small trees, naturally or artificially gRoWn, together with their surrounding area are considered as forest areas”. The reforestation strategy will be applied to every tree felled during RoW clearance. This must be performed in coordination with the Forestry Directorates.

A 24m working width is adopted in forest locations. A strip 8m wide above the pipeline is to remain fallow. Beyond this a 3m strip on either side is to be seeded; the outermost 4m on either side is reforested with trees if deemed necessary.

The number of felled trees and the tree species will be recorded. In reforestation, the composition of tree species will be considered and after care of re-planted trees will be done.

However, not all trees will be able to be replaced in the same location from which they were removed, as trees will not be able to be replanted along an 8m wide strip above the pipeline.

2.8.11. Protection of Planted Materials

In sections where livestock or wild animals may be present, precautions will be taken to protect the seeds and plants from damage. Some or all of the following techniques will be employed:

- Security patrols ;
- Erection of stock-proof fencing (designed/installed to discourage theft), along the project area boundaries;
- Supplement boundary fencing by internal area fencing to give double protection to particular areas;

2.8.12. Aftercare, Monitoring and Corrective Action

TEKFEN will carry out the necessary aftercare (watering, further application of fertilizer etc.) during the contract maintenance period in order to meet the revegetation requirements.

Where necessary, TEKFEN will provide appropriate fencing to prevent access by grazing animals and vehicles. Fences will be fitted with signs in Turkish indicating the purpose, i.e. the enclosure is a TANAP biorestoration project area and fencing is required for protection.

Appropriate levels of irrigation/watering will be provided for revegetated areas. The quantity and timing will be dependent on local climatic conditions, soil type and species requirements. Local advice will be sought where possible.

TEKFEN will examine the biorestoration process of each section every three months after planting against the performance criteria specified below. Where the criteria are not met, or it appears that they will not be met within the specified time, TEKFEN will take corrective action as specified in the Table 1.

Table 1- Bio-restoration Performance Criteria Guide

Plant type	Performance criteria and corrective actions
Grasses	The performance of the new gRoWth will be compared with the requirement described earlier in this section. GRoWth from both the existing seed bank and reseeding will be combined when determining the percentage cover. Corrective action will include over seeding and/or watering.
Shrubs & trees	Failures of planted trees must not exceed 30% of the total numbers planted. TEKFEN will replace failed trees and take further corrective action (watering, application of fertilizer etc.) if needed.

2.9. SPECIAL AREAS

The TANAP pipeline project contains topographical, geological and ecological features, which are characterized on the project as Special Areas, these require particular attention throughout construction and reinstatement.

Method statements of TEKFEN for these areas LOT-3 will demonstrate sufficient awareness and intent to minimize construction impact.

These Special Areas are as follows:

- side slopes;
- steep slopes;
- narrow ridges and areas prone to landslides
- ecological sensitive areas;
- karstic areas;
- volcanic tuff and marl;
- above ground installation sites.
- Areas of Contaminated Land

In addition to specialized construction techniques and increased levels of inspection, these areas will be specifically considered by TEKFEN during planning and project control. Consideration of schedule constraints within these areas (weather, planting seasons, animal breeding periods etc.) will be clearly identified by TEKFEN's environmental personnel on associated documents. Construction planning will achieve a 21-day period from the time when a Special Area is entered to the completion of reinstatement (to a level specified in EPCM approved Special Area Reinstatement Method Statement) unless otherwise approved by EPCM.

The general construction philosophy will address completion of these identified Special Areas with minimum delay. The back-end of the spread will follow directly behind the lowering-in crew. TEKFEN will minimize the exposure of these areas to inclement weather.
TEKFEN will provide suitably qualified and experienced specialists to assist in the reinstatement engineering and re-vegetation procedures and method statements for the entire LOT 3 and with particular consideration of these Special Areas. Such specialists will include geotechnical engineers (and/or engineering geologists) and ecological specialists in relation to the reinstatement of critical habitats (as specified in the BAP), who work for in-country specialist organizations. EPCM may also provide specialists to oversee and audit these activities.

TEKFEN will ensure that specialist subcontractors are appointed to provide both advice and specialist skills for reinstatement planning and execution in Special Areas if required.

2.9.1. Side Slopes and Spoils

The contour restoration strategy is to 'contour blend'. The side slope cut will be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours through the implementation of engineered spoil management. The subsoil layers will be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account will subsoil extend beyond the original line of slope or a new slope be created that is steeper than the original slope.

Topsoil will be stripped from the area and stockpiled at designated spoil storage areas which will be subject to EPCM approval. Both the topsoil and subsoil will be stored separately. Both stockpiles will be consolidated and adequately drained. Drainage from the spoils will be provided and a safe outlet established.

On completion of all pipe installation, the subsoil will be replaced in layers. TEKFEN will prove that the thickness of the layers, conditions of the soil and number of passes of the compactor will be sufficient to produce a density of 95%-105% of the highest compaction measured in the adjacent undisturbed area. *In-situ* and laboratory density testing will be carried out as required to confirm that the compaction requirements are met. In exceptional cases this may require compaction trials on request of the EPCM. Alternatively TEKFEN may prove 95% of the maximum dry density at ± 2% optimum moisture content as determined by the standard Proctor test.

Compaction will be carried out in accordance with the Pipeline Construction Specification WRPSPC-PPL-PLG-001-P3. Care will be taken when compacting above and surrounding any pipework or drainage to ensure the integrity of the pipe and adequate compaction is achieved.

Particular consideration will be given to the adequate drainage solutions and the appropriate ‘keying-in’ of the placed backfill material into the existing temporary cut slope in order to prevent any future slip surfaces along the boundary between newly placed and in-situ material. Final slope measures and reinstatement details will be subject to EPCM approval.

Following compaction of the subsoil, the topsoil will be spread over the site, harRoWed and reseeded. Erosion mats will then be laid.

In the event that side cuts are to remain as a permanent restoration feature. TEKFEN will prepare a methodology statement on the proposed works including (but not limited to) the degree of reinstatement, proposed drainage measures, process of slope inspections and programme of the works. The method statement will clearly state how the overall environmental project and stability requirements are adhered to.
TEKFEN will carry out site inspections with EPCM in order to define required design measure to ensure long term stability of the slope and that the environmental requirements are met.

Adequate drainage will be applied to assure stability and controlled water runoff. Final cut slope angles will be defined based on ground conditions encountered. Final slope angles and stabilisation measures (such as geotechnical slope drainage, scaling, rock netting or catchment benches, crest drains etc.) will be proposed by TEKFEN for EPCM pre-approval.

The reinstated condition of side slopes is not expected to have any significant inclination perpendicular to the pipeline, and only have a maximum slope length of the width of the RoW. Additionally drainage measures are typically implemented upslope of any sections of side slope the pipeline encounters. As such the anticipated slope erosion is considered minimal, and the prescribed mitigation measures for these lengths of pipe will be based on their downslope fall.

Where there is a cross-fall oblique to the pipeline resulting in an increase of slope angle (compared to the gradient parallel to the pipeline) the slope erosion measures as defined on the alignment sheets will be reviewed. For such slopes the TEKFEN and EPCM representative will determine any additional mitigation measures on a site specific basis in order to ensure that the slope erosion requirements are met. The reinstatement solution will be based on the standard reinstatement approach, with breakers across the RoW. The slopes as described above will be identified in the field and details for soil erosion measures verified by the TEKFEN subject to EPCM approval.

For the fully reinstated case (*i.e.* if the slope is reinstated to its original contours) the slope erosion will pose a negligible hazard to the pipeline due to the short distance of exposure of the pipe (main gravitational transport perpendicular to the pipe) and considerable cover depth. Final erosion measures will need to be determined on site during construction based on the slope geometry and materials placed.

2.9.2. Narrow Ridges and Areas Prone to Landsl ides

Along certain sections the pipeline route crosses hilly terrain and is routed along narrow ridges in order to avoid pre-existing landslides or potentially unstable ground which is typically on steep side slopes with backscarps reaching in some areas up close to the ridge line.

The construction in these areas will be carried out in accordance with the Construction Specification WRP – SPC – PPL – PLG - 001 and strategy set out in the Slope Assessment Report WRP-REP-EGG-PLG-010-P3-D. For the works in this area TEKFEN will prepare a methodology statement subject to EPCM approval detailing how the project and stability requirements are met.

For certain areas along narrow ridges site specific designs and reinstatement requirements will be developed as set out in the AFC documents. For these cases TEKFEN will ensure that all site specific design requirements are met subject to EPCM approval.

TEKFEN will assess and determine any requirements for additional earthworks and excavation. For any deviation from the overall project strategy to reinstate back to 'original contours' TEKFEN will detail these proposed changes in a methodology statement subject to EPCM approval.

TEKFEN will ensure that the following aspects are complied with:

The stability of the RoW will be proven following the clearance of the RoW and prior to construction works by geotechnical inspection by the TEKFEN and EPCM. These stability inspections will carried out at regular intervals throughout the construction works and will focus on any signs of potential slope movement.

In sections where topography, geohazards (such as landslides) and proximity to 3rd party pipelines will require a reduced working width, TEKFEN will propose an appropriate working method for these areas.

TEKFEN will choose appropriate plant and assess stability of RoW taking into account effects of plant surcharge.

No side casting will be allowed without the approval of EPCM in order to minimise the width of the construction corridor and avoid surcharge and uncontrolled drainage into potentially unstable ground. Spoil storage areas will be proposed by TEKFEN for approval by EPCM to avoid any storage on potentially unstable ground and to prevent triggering ground movements

Temporary and permanent surface water run-off will be carefully managed. Appropriate measures (such as appropriate falls, bunds, selection of outlet points from the RoW etc.) will be implemented in order to avoid ponding, seepage of water into RoW or uncontrolled run-off into potentially unstable ground.

In case of signs of instability (such as tension cracks, backscarp, seepage on the slope etc.), TEKFEN will propose remedial measures (including dewatering, soil nail stabilisation, rock anchoring or preventing RoW from further inundation) subject to approval by EPCM.

2.9.3. Steep Slopes

Steep slopes are those slopes with inclination >15% and >20m slope length that are predicted to exceed soil loss tolerance rates as defined in this specification. The following factors will be considered when assessing the erosion potential of slopes:

Rainfall Intensity. This parameter is a measure of the erosive force and intensity of the rain in a normal year. The rainfall intensity is based on rainfall records and probability statistics for risk evaluation. For the purpose of erosion assessment, the parameter is determined using a 1 hour 10 year return period storm. .

Soil Erodibility. This parameter is a measure of the susceptibility of a soil particle becoming detached and transported by rainfall runoff. Soil parameters, which control soil erodibility are soil texture, structure soil space, organic content and hydraulic conductivity. Information from a particle size analysis (PSD) is used to estimate the soil erodibility using nomograms and correction factors.

Slope Angle and Length. Erosion potential increases proportionally to increases in the length and angle of slope, simply because runoff flow rates increase with increasing gradient and slope length.

Vegetation Cover. The effect of vegetative cover on soil loss is well researched. Bare soil represents high erodibility potential, whilst native vegetation can give maximum protection. Vegetation cover can be directly related to management options ie mulch, erosion control matting etc.

Erosion Control Practice. Further practices that influence erosion potential are roughening of the soil surface by tractor treads, or by rough grading, raking or disking.

Temperature. Temperature is another climatic factor affecting the potential for erosion to occur. Consolidation by freezing of exposed soils during winter months and accumulation of precipitation (snow) until periods of thaw, result in rapid melting and high levels of runoff. This situation exists in Central and Eastern Anatolia.

The Universal Soil Loss Equation used in the soil loss assessment predicts the long-term average annual rate of erosion on a slope based on rainfall intensity, soil type, topography, vegitation cover and management practices. This erosion model, originally developed to predict soil loss in agriculture, is also applicable to non-agricultural conditions such as construction sites. The USLE can be used to compare soil losses from a particular construction site with a specific management system to 'tolerable soil loss' rates. . The equation is written as follows:

$$A = R \times K \times LS \times C \times P \quad [1]$$

Where, A is potential long-term average annual soil loss in tons per ton ha-1 y-1, R is rainfall and runoff factor by geographic location, K is soil erodibility factor, LS is slope length-gradient factor, C is vegetation and management factor, and P is support practice factor.

- The slope geometry has been considered using GIS assessment of the DEM data. This has been used to extract average slope length and angle data and develop the slope length and steepness input parameter 'LS'.
- The soil erodibility factor 'K' has been assessed from erodibility mapping of Turkey. The mapping considers the possible soil composition and uses published relationships to generate a K value for each slope.
- The rainfall –runoff erosivity factor 'R' was assessed based on rainfall mapping for Turkey held by Ankara University.
- The cover management factor 'C' was selected for a backfilled trench situation assuming the surface would be rough

- The support practice factor 'P' is dependent on deliberate rutting of the slope surface and is more appropriate to maintained agricultural land. As such for this assessment no benefit from this parameter has been taken.

This methodology was used to determine the estimated removal rates and recommend appropriate mitigation measures required to meet the soil loss tolerance rates. The mitigation measures, both bioremedial and engineering, are provided on the alignment sheets. These require verification at each location by TEKFEN and the EPCM', through validation or updating of the design assumptions.

TEKFEN will establish steep slope areas and provide procedures and methodology statements as part of the site-specific Special Area Reinstatement Method Statements for EPCM approval. The procedure will establish all planned temporary and permanent erosion measures in line with Reinstatement specification and Project Drawings.

Construction in steep slope areas requires an increased awareness of safety and stability issues. TEKFEN will utilise proven construction techniques specific to such areas. TEKFEN will demonstrate that increased safety measures are planned and these measures are to be followed on site. An increased level of Safety Engineer presence will be required at these locations.

The requirement for temporary ROW erosion/stabilization techniques will be dependent upon the season. However TEKFEN will be prepared to provide all resources necessary to avoid incipient soil erosion and stabilization issues, regardless of season, in order to be prepared for unforeseen inclement weather.

2.9.4. Critical Habitats

The Biodiversity Action Plan (BAP) identified 9 terrestrial and 6 freshwater critical habitats, ecologically sensitive areas with the presence of endangered or threatened species and their habitats, along LOT 3.

BAP and KP Table for the BAP will be referrred for the following information for each of the critical habitats:

- topsoil depth removal and storage for each critical habitat;
- species identification for seeds collection;
- translocation of plants and animals depending on a season;
- appropriate species for revegetation;
- planting methods;
- removal and replacement of turfs.

TEKFEN will provide site specific Reinstatement Management Plans that will further develop and clearly specify the means by which the measures committed to in the BAP and in Reinstatement specification will be implemented in relation to their scope of work, including pre-construction measures, (i.e. seeds collection, plants translocation) topsoil removal and storage and reinstatement measures.

2.9.5. On-site supervision

In addition to the planning of reinstatement activities, ecological expertise will be present on site during all relevant activities within critical habitats (e.g. route clearance, re-vegetation) to provide advice and supervision. TEKFEN will be expected to provide appropriately qualified personnel to undertake the day-to-day supervision of such activities and EPCM will also provide specialists to advise and supervise the reinstatement works.

2.9.6. Karstic Areas

Karst is the topography that develops in soluble rocks in which fissures may be enlarged (ultimately to form caves) by flowing groundwater. This may occur in areas of gypsum and limestone bedrock. Gypsum is more soluble than limestone, therefore karstic areas develop relatively rapidly in areas of gypsum.

Restoration in the karstic areas will proceed as follows:

- soils from the dolines will be stockpiled separately;
- mixing of the doline soil and the ridge material is prohibited, unless agreed with the TANAP;
- continuous environmental inspection will follow construction;
- excess rock material from ridges will be disposed of in accordance with the project Waste Management Plan;
- spreading of rock is prohibited, unless agreed with the TANAP;
- discovery of subsurface voids (greater than 50 mm in plan dimension) during construction will be reported to EPCM, measures detailed on the IAAC alignment sheets and drawing WRP-DGA-EGG-PLG-001 will be applied, alternative remediation of voids may be used if agreed with EPCM and TANAP.

Temporary and permanent erosion measures will be employed in accordance with the requirements of this specification and Project Drawings. TEKFEN will employ trench filtration and drainage control measures as necessary to ensure that suffosion (transport of soil from the trench and from subsoil beneath the trench into karstic voids) does not occur during the design life of the pipeline.

Drainage plans in karstic areas will be submitted to the EPCM for approval prior to construction. Plans will consider special requirements described in WRP-TNO-EGG-PLG-001 (Technical Note for Design of Pipelines in Karst).

TEKFEN drainage plans will consider:

- preventing the pipeline becoming a new drainage conduit.
- preventing loss of pipe backfill into karst fissures.
- control groundwater flow in the trench.
- maximizing the use of existing natural drainage (i.e., sink holes >20m from the pipeline alignment) in a controlled manner.

TEKFEN will follow particular requirements for drainage control as noted on AFC alignment drawings and DGA-EGG-PLG-001.

2.9.7. Erodible Soils, Volcanic Tuff and Marls

Specific care is required for the reinstatement of areas underlain by volcanic tuff or marls in particular to ensure the re-establishment of a natural vegetation following the construction works due their thin topsoil cover.

Similar issues regarding the reinstatement may arise in other areas of highly erodible soils and soils with thin topsoil or other site specific ramifications. TEKFEN's Soils Specialist will identify these areas during the clearance of the ROW and give advice on any additional measures as required. The specific examples of Volcanic Tuff and Marls are outlined below which will be applicable to any other soil reinstatement as deemed necessary by the TEKFEN's Soils Specialist as agreed with the EPCM representative.

2.9.7.1.Volcanic tuff

Topsoil layers are typically thin, <10cm, in areas of volcanic tuff. Special care is necessary in such areas to ensure the preservation of topsoil and successful establishment of a natural vegetative cover.

In areas of volcanic tuff, or other thin topsoils, Method Statements will clearly state the methods to be adopted to avoid adverse impacts.

Special Area Reinstatement Method Statements will be drawn up by TEKFEN for reinstatement in areas underlain by volcanic tuff.

The Special Area Reinstatement Method Statements will include the provision of a Soils Specialist, in addition to the required Environmental Inspection personnel to provide expert advice and identify any additional measures and supervision in areas of volcanic tuff. The Soils Specialist may also provide input in other vulnerable soil areas. The role of the soils specialist will include the following tasks in such areas:

- consultation with landowners and local experts to determine the most appropriate construction and reinstatement methods;
- establishing the depth of topsoil to be removed on a site specific basis;
- supervision and advice regarding topsoil and subsoil removal, storage and replacement;
- supervision and advice regarding soil erosion control measures during and after construction; and
- supervision and advice regarding re-vegetation.

The Soils Specialist will be responsible, in cooperation with the Community Liaison Officers and Ecological Specialist, for ensuring that landowners and local specialists/regulators are fully consulted in determining the most appropriate methods of topsoil removal, storage and replacement, and methods of re-vegetation in areas of volcanic tuff in accordance with local conditions.

The following mitigations are to be used:

- Although the topsoil layer in areas of volcanic tuff is thin, it is essential that this topsoil be reserved as the topsoil is the sole reservoir of fertility in tuffaceous soils and is also an important store of seeds. Since the topsoil is thin and variable in depth, it is inappropriate at this stage to specify a prescriptive thickness to be removed during ROW clearance.

Consequently, TEKFEN's Soils Specialist will establish the topsoil for removal and separate storage at regular intervals prior to topsoil clearance. The distance of such intervals may vary and will be determined by the Soils Specialist in consultation with EPCM's specialists. The Soils Specialist will also determine the most appropriate removal technique in consultation with the construction supervisor. Contractor will provide appropriately skilled and experienced operators to undertake topsoil removal in such areas.

- Method Statements will provide for pre-existing shrubs and turfs of coarse grasses to be set aside and replanted on the ROW in areas of tuffaceous soils. If possible, and in order to minimise the time period between site clearance and replanting, they can be removed from one location and replanted at another where reinstatement is nearing its end provided the soil and soil climate are effectively identical to the area from where they were taken. Both the Soils Specialist and Ecological Specialists will provide input to the planning and implementation of such activities.

The Soils and Ecological Specialists will also provide advice on the use of fertilizer in areas of tuffaceous soils. It is anticipated that the use of additional micro-nutrients will be required in such areas. Local expert advice, including landowners and the Ministry of Forestry and Agriculture, will also be sought regarding fertilizer usage appropriate to the local conditions.

• Temporary soil erosion control measures will be established while constructing the pipeline. These will include temporary water bars, ditch breakers, and runoff barriers such as filter fences or straw bales.

• The land will be returned to as close to its natural contours as practicable. The infilled subsoil will be returned in layers following the same sequences as its removal. A crown no higher than 0.3m high will be left to allow for eventual settling of the soil. The resulting surface will then be profiled to conform to slope breaker and other specifications. Slope breakers will drain into a cuvette sculpted into the soil at each slope breaker outlet. Only then will the topsoil be replaced. If the growing season is nearing its end, the on-site soils expert may require the topsoil berm to be seeded with a fast growing cover crop, when it will be stored for spreading the following spring.

• Vegetation will be replanted accompanied by a basal dose of fertilizer mix. On tuff the usual 10-10-10 application of NPK will require additional micro-nutrients. Local expert advice will be sought from the Ministries of Forestry and Agriculture. Plants in addition to those recovered during topsoil stripping are likely be required if reinstatement is to succeed. Again, expert local advice will be sought in identifying seed or plant sources.

• Of critical importance alongside the above list of essential actions will be establishing communication links among the project’s management, its contractors, authorities responsible for the management of public land, and owners and operators of private land. The wishes of land management authorities and land owners will determine, in large part, the actions that will be taken to mitigate environmental impacts of the pipeline. Importantly, these same individuals and institutions will have a signatory role in determining the adequacy of environmental mitigations enacted by EPCM and its contractors.

TEKFEN will give particular attention to erosion control measures in areas of volcanic tuff and will ensure a high level of inspection during construction, reinstatement and aftercare.

2.9.7.2.Marl

Marl is calcareous clay containing varying amounts of clays, silt and calcium carbonate (35%-65%) that is typically classified as an unconsolidated sedimentary deposit or extremely weak rock. This section treats marl soils that are too steep to play a role in rain fed agriculture, although they may support grazing. Adverse impacts affecting marls include the following:

• visual impact:
• the marl leaves a whitish trace across the landscape where the subsoil has been exposed;
• soil erosion:
• marl horizons can form the slip plane of deep instabilities;
• loss of soil productivity.

As with tuffaceous lands, an important mitigation will be to decrease the construction corridor to as narrow a width as possible. This is possible because marl topsoil on sloping lands is typically thin and requires little area when set aside for reinstatement.

Existing shrubs will be set aside for later replanting. Temporary soil erosion control measures (water bars, ditch breakers and runoff barriers) will be installed. Temporary ditch breakers will be particularly important as marls typically contain springs that are likely to drain into the trench. When drained, trench water will be pumped either into a filter bag or constructed barrier made of based hay and filter cloth; in no instance will it drain onto unprotected soil. In some instances, emerging springs may require lined chutes to convey water from the RoW to a safe disposal location.

The specifications for returning tuff to its natural contour and condition also apply to marl and similar considerations to tuff will be applied as regards use of a soils expert and tailoring topsoil removal to the actual thickness present rather than a pre-prescribed specification.

The potential for replanting will be determined by the frequency of natural vegetation prior to construction. If this is low or absent, then replanting is unlikely to succeed – the onsite environmental inspector/soils expert will set out appropriate mitigation measures as required. If the site is incapable of supporting sown grass or other vegetation, downslope agricultural lands will be provided with protection from eroded sediment; e.g. through a diversion or sediment settling pond. Again, the onsite environmental inspector/soils expert will give advice to be fulfilled by the TEKFEN.

If replanting is to be done, it will follow project specifications using a grass mix recommended by local agricultural and forestry expertise. If the season is too late for replanting, the topsoil berm will be protected over winter by seeding it with a fast growing cover crop. It will then be reinstated during the following spring.

2.9.7.3.Areas of Contaminated Land

Any materials encountered during the works, which show unusual colouring, texture, and / or odour will be stored separately and labelled as potentially contaminated materials. All suspected or confirmed materials will not be reused within the works unless contamination testing indicates the materials are suitable for use in accordance with the Turkish regulatory limits for soil quality.

Temporary stockpiling of potentially contaminated materials will be within an impermeable bunded and lined area, greater than 750m from any environmentally sensitive receptor.

2.10. RESTRICTING ACCESS

In order to prevent rutting, subsequent erosion problems, and damage to riparian areas, measures will be taken to prevent unauthorised use of the RoW as a roadway.

Access will be blocked, at locations specified by TEKFEN and/or EPCM, through the construction of barrier berms of sufficient height (minimum 1.5m high) to provide a barrier to vehicles. Where possible, the berms will be tied to vegetation or rocks adjacent to the RoW to prevent traffic from circumventing the barrier. Rocks excavated during construction, 0.3m in diameter or larger, may be used instead of the earthen berms. Timber cleared during the construction may also be staggered across the RoW so as to deter off-road vehicle use.

The trees felled from Forest Land will not be used by TEKFEN.

2.11. HANDOVER, POST-CONSTRUCTION INSPECTION, AND MAINTENANCE

TEKFEN will obtain sign-off of the pre-entry form from the landowner agreeing on the standard of reinstatement. TEKFEN will notify EPCM prior to such meetings and allow for EPCM attendance/monitoring.

TEKFEN, upon completion of reinstatement, will accompany EPCM on an inspection of all project areas, before demobilizing from site. EPCM will notify TEKFEN of any insufficiencies in the reinstatement of the RoW / project areas. TEKFEN will carry out any further reinstatement to the approval of EPCM.

During the contract maintenance period, TEKFEN will be responsible for maintaining the standard of reinstatement and for ensuring that the stated erosion class and biorestoration requirements are met.

2.12. EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

Temporary and permanent erosion control measures will be installed by TEKFEN in order to protect the sensitive habitats and achieve the performance standards of Erosion Class-3 or better. Particular attention will be paid to controlling erosion on the instable highland slopes.

The method statement and drawings will define both temporary and permanent erosion control measures to be implemented prior to, during, and following construction activity.

All the control measures will be constructed and installed in accordance with construction drawings and project specifications.

The main goals are to provide immediate protection against erosion during construction activities and provide permanent stabilization and prevent washing out of seeds after construction.

TEKFEN will be responsible for employing, to the satisfaction of EPCM, any temporary erosion and sediment control measures in order to protect the RoW and adjacent areas during construction activities. This plan will apply to all temporary and permanent areas affected by construction. In the event that the pipeline ditch remains open for extended period, TEKFEN will ensure trench integrity and employ such measures as temporary ditch breakers, silt fences, straw bales when deemed necessary.

Temporary ditch breakers are installed in the open trench and are removed before lowering the pipe. Temporary ditch breakers have the purpose of arresting flows inside the trench during construction.

The following temporary erosion control measures will be incorporated along the RoW in order to protect the environment and to achieve the performance standards.

- On longitudinal slopes with open trenches, plugs of unexcavated material will be left in the trench to interrupt surface flow and prevent scouring of the trench bottom.
- Stumps will be left in place wherever possible to provide soil stabilisation.
- Drainage channels will be installed on all longitudinal and transverse slopes as required.
- Where slopes require cutting, flumes will be installed across the RoW. These will carry water from drainage sumps on the upslope.
- Final grading of all cut or filled soil slopes will be restricted to a maximum gradient in accordance with EPCM/TANAP approved site specific designs.
- The RoW will be monitored to prevent:
  - subsidence of the pipeline trench (below natural grade);
  - breaching of diversion berms;
  - slope wash from improperly placed berms;
  - slumping and soil movements from cut and fill slopes;
  - loss of stored topsoil, subsoil or cuttings.

2.12.1. Silt Fences

Silt fences or other suitable sediment barriers will be installed in areas of low sheet flow and will be installed to intercept runoff on eroding slopes.

The filter cloth is draped over the fence and secured in a 15-cm-deep trench dug one metre uphill. Filter fences installed across the working width will follow a slight gradient towards a natural outlet, waterway, or lined chute, into which they drain.

TEKFEN will satisfy the following requirements:

• ponding will not be allowed behind a silt fence;

• drainage area will not exceed 0.1 hectares per 30m of fence length;

• for slopes between 2% and 20%, the maximum allowable upstream flow path length will be 30m;

• for slopes steeper than 20%, the maximum shall be 6m;

• maximum upslope grade perpendicular to the fence line will not exceed 100%; silt fences will be used for sheet flow only.

The minimum requirement for Filtering Efficiency of the filter fabric is 75% - 80%. While the minimum reuirement for the Tensile strength at 20% (maximum) elongation is 90 kg/ linear metre; the slurry flow rate is 11 liters/m^3/min

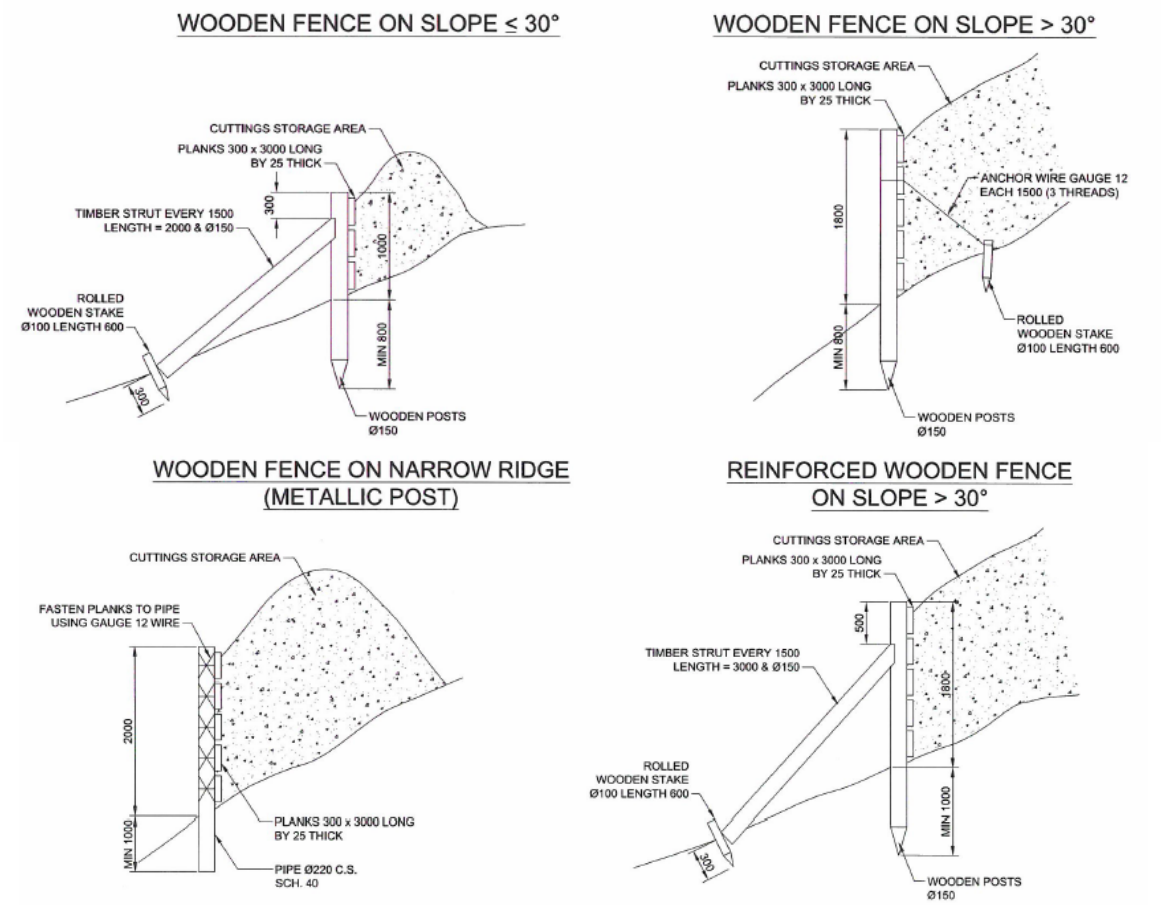
Synthetic fibre will contain ultraviolet inhibitors and stabilisers and meet the performance criteria for the entire length of installation and the environments encountered. Filter fabric will be installed in continuous lengths.

Silt fences will be inspected daily during periods of prolonged rainfall, immediately after each rain event, and weekly during periods of no rainfall. Any repairs required will be made immediately. Sediment will be removed prior to the sediment reaching 1/3 of the height of the silt fence. Care will be taken during sediment removal to ensure integrity of the fence is maintained. Collected sediment will be disposed of after the approved of EPCM.
The silt fence will not be removed until the upslope area has been permanently stabilised. Any sediment deposits remaining in place after the fence has been removed will be dressed to conform to the existing grade, prepared and re-vegetated.

2.12.2. Wooden Fences

Wooden fences will be installed in areas of side slope and ridge construction and will be installed to retain cuttings during construction and reinstatement. The requirement for locations of wood fences will be established during the work jointly between TEKFEN and EPCM/TANAP representative.

For typical details, see Project Drawing “ILF-DID-PPL-PLG-006 Typical Subsoil Retaining Wooden Fences”.



TEKFEN will ensure fences are capable of safely supporting the loads imposed. Fences will be monthly inspected to ensure safe operation and structural integrity. Moreover, fences will be inspected after each rain event. TEKFEN will be aware that the use of wooden fences may pose localised problems. In certain areas, firewood is a valuable commodity, therefore; the fence material will be attractive to locals for firewood. TEKFEN will put warning signs on fences and inform local people and authorities about the importance of the structures.

2.12.3. Water Disposal

Pipeline trenches commonly collect water during construction. Because it is turbid and often sediment laden, trench water requires filtering before it can be discharged to an unpolluted location. Trench water is commonly removed using a pump connected to a 7–10 cm diameter flexible hose.

Appropriate measures will be adopted to prevent erosion during the disposal of hydro test water. Such measures are specified in the project "Pollution Prevention Plan (TKF-PLN-ENV-PL3-010)" and all water discharges will be undertaken in accordance with the requirements of that plan.

2.12.4. Slope Breakers (Interceptor Cross Drains)

Slope breakers (interceptor cross drains or water bars) are graded channels constructed across the working width. Their purpose is to remove surface runoff and, acting with vegetation, to protect against soil erosion. Slope breakers can be temporary or permanent.

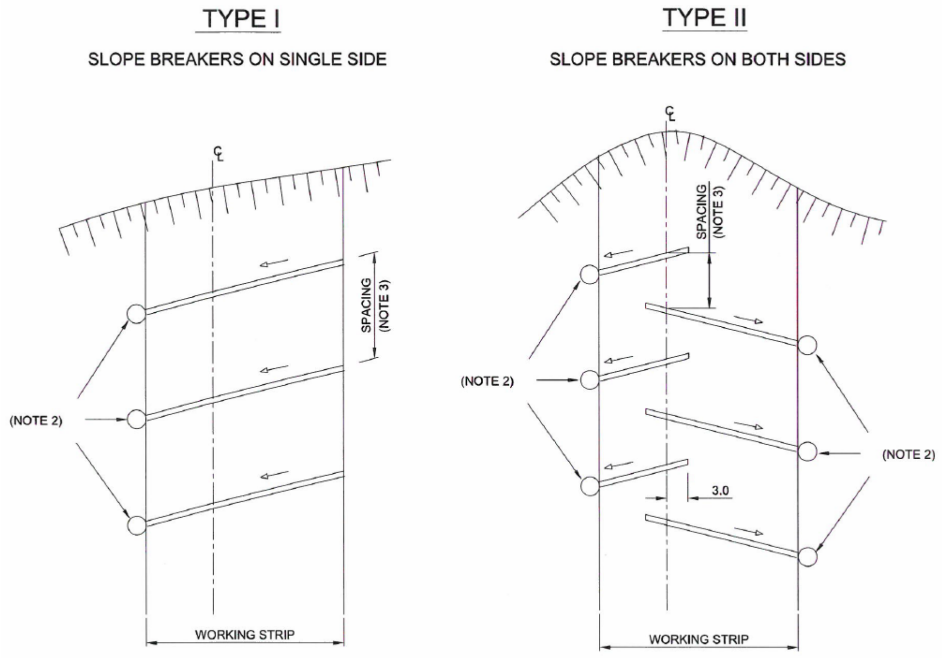
Slope breakers discharge runoff into energy dissipaters, vegetated waterways or lined chutes. They have a longitudinal gradient towards their outlet (not to be in excess of 2%). Slope breakers are typically stabilised by vegetation. Where soil erosion potential is predicted to be high or vegetation cannot be established, erosion control matting or crushed gravel will be applied. Erosion control matting will be fastened to the ground using corrosion resistant wire staples, having a length of at least 15cm on 50cm centres. The up-slope and down-slope ends of erosion cloth will be anchored into 15cm deep trenches cut 0.5m upslope and down slope of the cut portion of the channel.

Slope breakers acting alone are inadequate on all but the shallowest slopes in the absence of complementary vegetation. They are important for the success of the project, in part because they simplify the task of introducing vegetation to disturbed lands and, in large part, because they safely dispose of runoff that might otherwise erode pipeline cover and eventually damage the loading line.

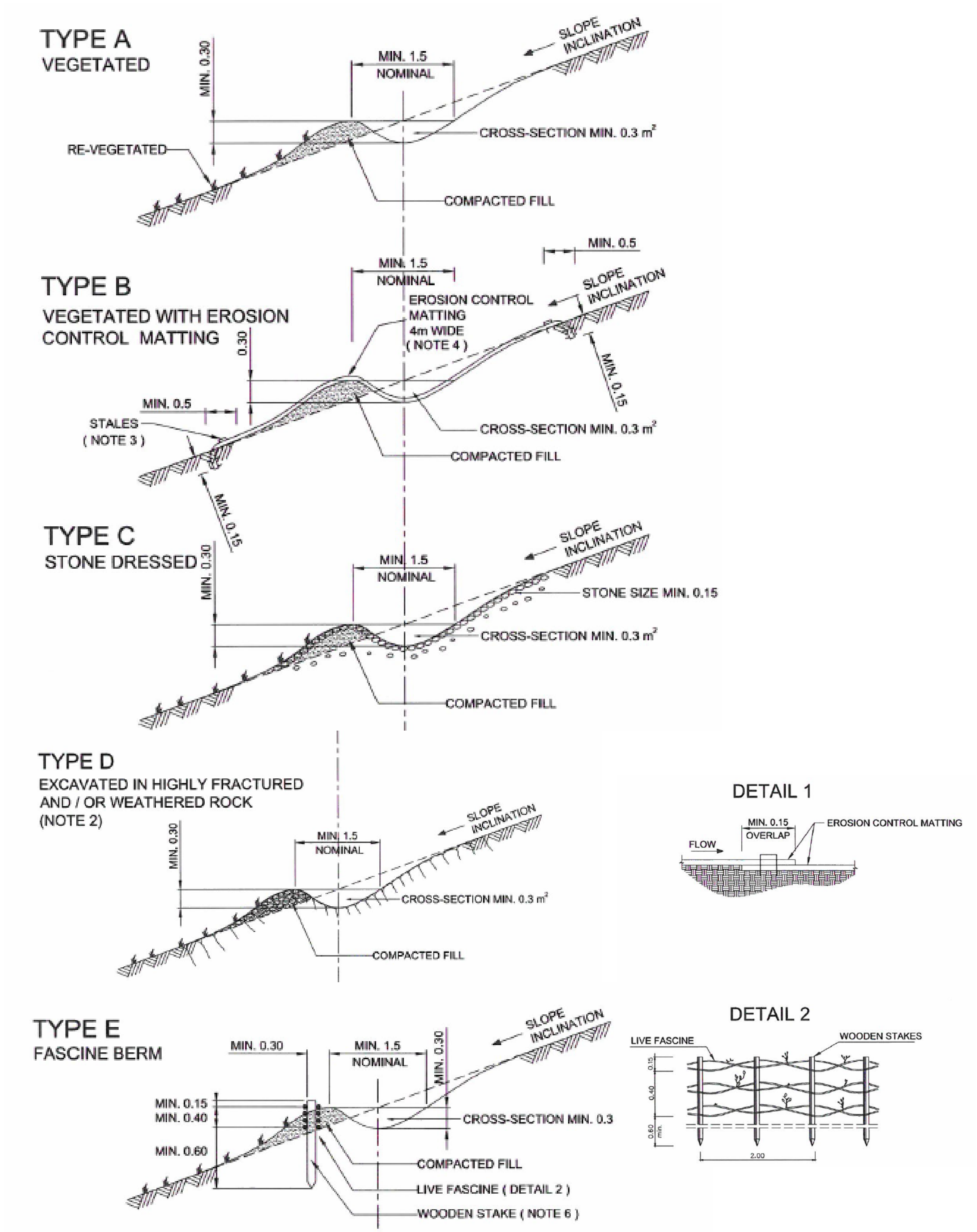
Monitoring to erosion control measures during construction will be regular, and directly after rain events. Repairs will be done in 48 hours maximum.

For typical details, see Project Drawing "WRP-DGA-PPL-PLG-044'' Typical Slope Breakers", "WRP-DGA-PPL-PLG-045 Typical Outlet of Slope Breakers" and "WRP-DGA-PPL-PLG-046 Typical Cross Section of Slope Breakers".

<u>Typical Slope Breakers:</u>



<u>Typical Cross Section of Slope Breakers:</u>



Slope Breaker outlets

Outlets will be installed at the end of each slope breaker. Outlets will effectively dissipate the energy of run off and take the water to a disposal point that is safe and avoids environmental impact. The local conditions will dictate the style and location of outlet and will be approved by EPCM/TANAP.

At outlet locations where stable vegetation is not present, the outlet will be lined with rock or erosion control matting will be positioned at the slope breaker outlet.

At these types of outlets the slope breakers will be extended into the surrounding land by:

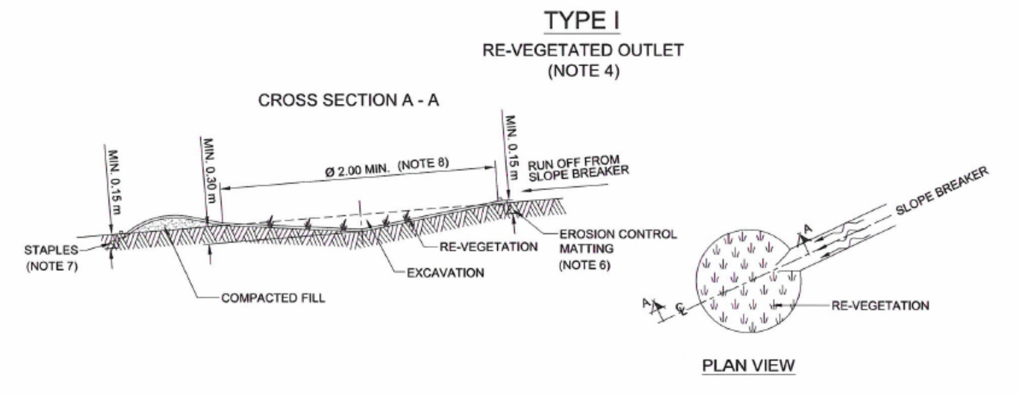
- 2m in low erodable conditions (cohesive soils) – Type I outlet;
- 6m in erodable conditions (non-cohesive soils) – Type II outlet.

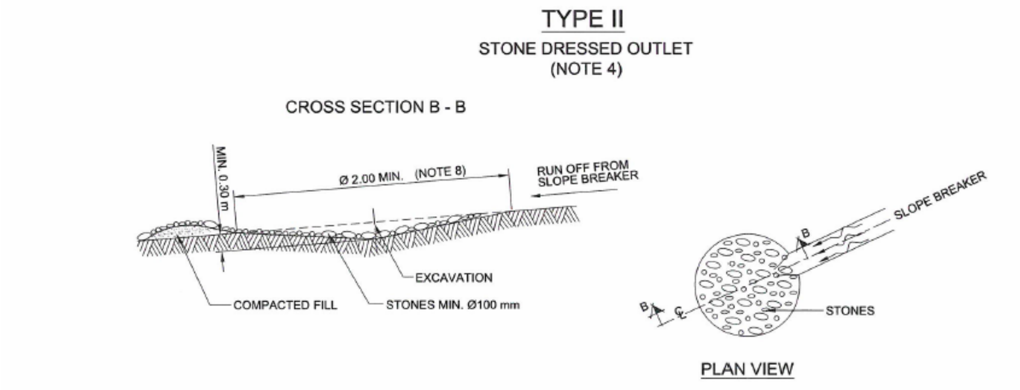
Lined channels may be placed on the loading line RoW to take runoff at a safe velocity down slope to a suitable disposal point. Outlets from the channel will run along the inside of the loading line RoW slope.

For the duration of the RoW maintenance period, TEKFEN will monitor the condition of the outlets at two week intervals and any breaches or damage reported to EPCM/TANAP. Repair work will be carried out within 14 days or less, depending on the severity of the breach.

The local conditions will dictate final installation requirements. TEKFEN will provide proposals for all slope breaker outlets to the EPCM/TANAP for approval prior to installation.

Typical Outlet of Slope Breakers:



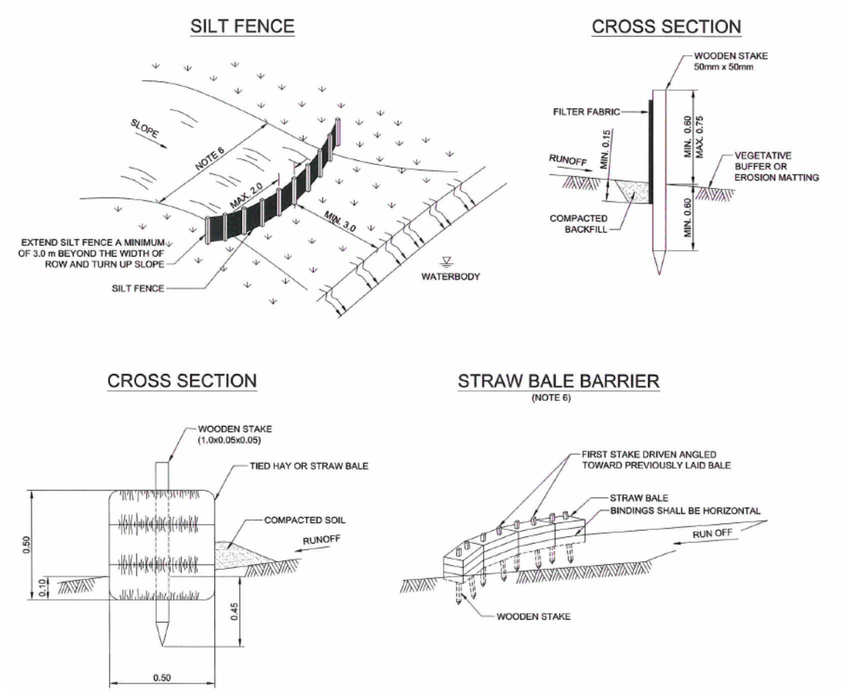


2.12.5. Sediment Interception

Where the RoW intersects or is parallel to a watercourse, sediment interception will be provided to prevent sediment entering the water. Sediment interception will be provided for runoff that may occur during construction and reinstatement activities until the establishment of sufficient vegetation to meet the requirements.

Sediment interception devices may take the form of a Silt Fence or Straw Bale Barrier. Sediment filters and trapping devices are applicable to sites expected to remain bare during the rainy season.

For typical details, see Project Drawing “ILF-DID-PPL-PLG-005 Typical Silt Fence & Straw Bale Barrier”.



2.12.6. Silt Fence

Silt fences or other suitable sediment barriers will be installed in areas of low sheet flow and are installed to intercept runoff on eroding slopes.

The filter cloth is draped over the fence and secured in a 15-cm-deep trench dug one metre uphill. Filter fences installed across the working width will follow a slight gradient towards a natural outlet, waterway, or lined chute, into which they drain.

The following requirements will be satisfied:

- ponding will not be allowed behind a silt fence;
- drainage area will not exceed 0.1 hectares per 30m of fence length;
- for slopes between 2% and 20%, the maximum allowable upstream flow path length will be 30m;
- for slopes steeper than 20%, the maximum will be 6m;
- maximum upslope grade perpendicular to the fence line will not exceed 100%; silt fences will be used for sheet flow only.

The minimum requirements for filter fabric criteria are below:

- Filtering efficiency 75% - 80%
- Tensile strength at 20% (maximum) elongation 90kg/ linear metre minimum
- Slurry flow rate 0.11 liters/m^3/min

Synthetic fibre will contain ultraviolet inhibitors and stabilisers and meet the performance criteria for the entire length of installation and the environments encountered.

Filter fabric will be installed in continuous lengths.

Silt fences will be inspected daily during periods of prolonged rainfall, immediately after each rain event, and weekly during periods of no rainfall. Any repairs required will be made immediately.

Sediment will be removed prior to the sediment reaching 1/3 of the height of the silt fence. Care will be taken during sediment removal to ensure integrity of the fence is maintained. Sediment collected will be disposed of in an approved manner.

The silt fence will not be removed until the upslope area has been permanently stabilised. Any sediment deposits remaining in place after the fence has been removed will be dressed to conform to the existing grade, prepared and re-vegetated.

2.12.7. Straw bale barrier

Straw bale barriers (the term can include hay or other baled vegetative matter) will be installed in areas where small amounts of temporary sediment interception are required.

Straw bale barriers will not generally be installed where sediment control is required for periods greater than three months. Where they are installed on the working width, they will follow a slight gradient towards a natural channel, waterway, or lined chute.

The requirement for locations of straw bale barriers along the RoW is to be established during the work jointly between TEKFEN's earth works lead engineer and EPCM representative. Generally these sediment control areas with slopes >10% will include:

- areas of protection for longitudinal down slope to water bodies and roads;
- edge of RoW with adjacent down slope water bodies or roads; and
- edge of RoW with adjacent down slope to defined environmentally sensitive areas.

Straw bales will be bedded into the ground and anchored with reinforcing stakes. Anchors are driven at an angle towards the neighbouring bale so as to tie them firmly together.

The drainage area will be no greater than 0.1 hectares for each 30m of bale barrier. Straw bale barriers will not be used in areas of rock or other hard areas, where full and uniform anchoring is prevented.

Straw bale barriers will be inspected daily by inspectors during periods of rainfall, immediately after each rain event, and bi-weekly during periods of no rainfall. Any repairs required will be made immediately.

While the life expectancy of bales is not more than 3–6 months, deteriorated bales can be broken up and used as straw mulch or are often left to decompose in place. If non-biodegradable plastic or wire ties are used to bind the bales, these will be removed and disposed of. Straw bales will not be left in the trench from the point of backfilling.

2.12.8. Crushed Rock

Crushed rock may be required as a temporary measure it serves to reduce muddy conditions and sediment production during construction.

Crushed rock is applicable to locations where vegetation cannot be established and where erosion poses a risk to the pipeline or sediment threatens nearby streams. This also applies to stone dressings outside of the working width: e.g. camps, temporary roads, pipe storage locations, and crew quarters.

As required by local conditions and as agreed with EPCM representative, crushed rock may be used for temporary roadways, turning areas, and other locations from where sediment discharge poses a problem. Particle size will be determined for specific purpose.

Following project completion, temporary areas dressed with crushed rock will be ripped, fertilized and seeded or planted. These areas will be subject to the acceptance of EPCM.

2.13. PERMANENT EROSION CONTROL MEASURES

Soil erosion can be particularly active on sites laid bare by construction, where it reduces land productivity and damages rural economies. The sediment it creates makes its way to streams, where it reduces water quality and invades infrastructure such as reservoirs and irrigation works.

Careful construction and reinstatement can reduce soil erosion and sedimentation within manageable limits. Utilising mechanical (hydraulic) methods of controlling soil erosion and sedimentation, planting and fencing further, protect the land surface. Both methods, hydraulic and biological through the use of vegetation, complement each other and are essential to controlling soil erosion and sediment from construction areas.

Stabilisation practices are essential on all sloping lands disturbed by construction. The methods used to control runoff comprise of different kinds of graded channels constructed across and down slopes. Graded slope breakers (interceptor cross drains) contain and remove runoff from the working width and other disturbed areas. They discharge into natural channels, vegetated waterways or lined chutes, depending on the situation. Dissipation of the energy anticipated from the flow is necessary.

Little damage to the landscape occurs when soil erosion is in balance with the rate of soil formation. Due to its moderate rainfall and generally mesic soil climate, the annual rate of soil formation in the project area is about seven tonnes per hectare (T ha^{-1} y^{-1}); soil erosion from soil laid bare by construction, on the other hand, can easily approach several hundred tonnes per hectare. By the use of graded channels and vegetation to segment the working strip, soil erosion becomes equal to or less than the rate of soil formation.

2.13.1. Gabions

Gabions and gabion mattresses will be used where necessary to form flexible, permeable, monolithic structures such as retaining walls, revetments and weirs for earth retention.

Gabion walls will be constructed and utilised for permanent recovery of the right of way and prevention or stabilization of landslides that endanger stability of the land. Gabions structures will be designed and constructed in accordance with the manufacturer's specifications and EPCM/TANAP approved TEKFEN method statements.

2.13.2. Trench Breakers

Trench breakers will be installed within the pipeline ditch at locations along the pipeline route where the natural profile, drainage pattern and backfill materials may cause the trench to act as a drain.

TEKFEN will install the ditch breakers per design. The final installation will require approval of the EPCM/TANAP representative. Allowance for water movement through the ditch breaker will be made by installing pipes through the ditch breaker or a perforated pipe along side the pipeline along the entire section of steep slope.

Additionally, trench breakers are required at the bases of slopes adjacent to wetlands and where needed to avoid draining of wetlands. The materials of construction will be polyurethane bags filled with sand and cement 10:1 as detailed in the referenced Project Drawings, or polyurethane foam (subject to EPCM/TANAP approval).

Trench breakers are generally installed slightly upslope of slope breakers. This causes flow along the line of the trench to emerge onto the surface, where it is intercepted and removed by the slope breaker a short distance down slope. As with slope breakers, ditch breakers can be temporary or permanent.

2.13.3. Erosion (Jute) Matting

Erosion matting will be installed to provide an immediate protection to the slope against erosion, prevent washing-out of seeds and enhance the micro-climatic conditions in the soil for plant gRoWth.

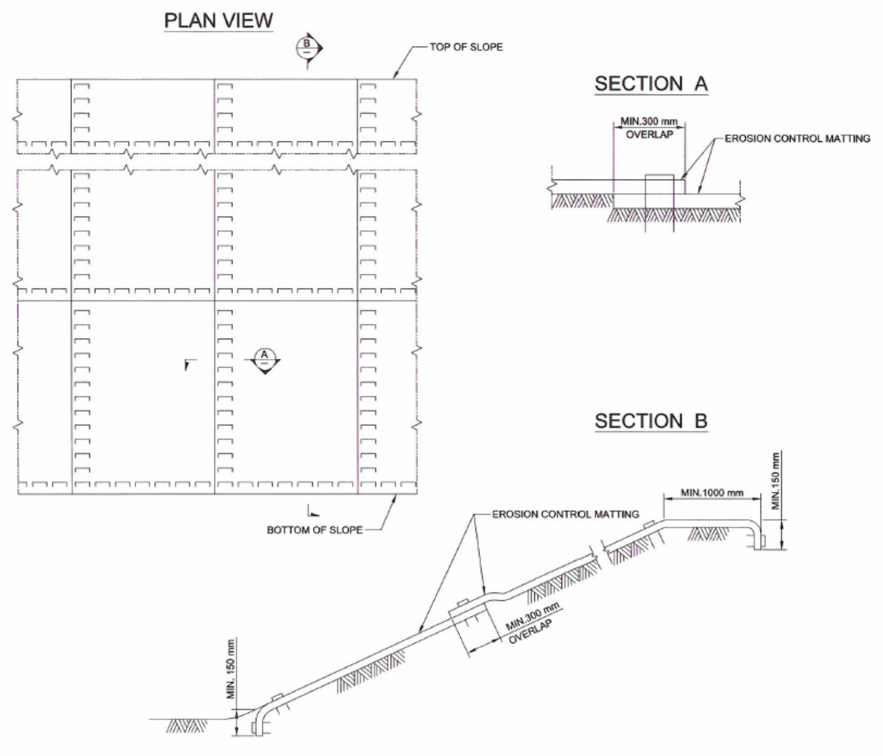
Erosion matting will provide temporary protection to the soil surface until sufficient vegetation cover has been established to control erosion and meet the performance criteria.

The erosion matting will be Geojute or similar. TEKFEN will submit data sheets and samples of the proposed erosion matting for EPCM/TANAP approval.

Where re-vegetation is taking place topsoil preparation and grass seeding work will be undertaken prior to laying erosion matting.

The erosion mat will be unrolled from the top of the slope, allowing it to lay naturally on the soil surface over all the local undulations. On no account will the material be taught so that it forms 'bridges' over local soil mounds and stones.

Typical Erosion Control Matting Installation:



For typical details and spacing requirements, see Project Drawing “WRP-DGA-PPL-PLG-050-Typical Erosion Control Matting Installation”.

Where shrub planting is required, holes will be made in the mat at each planting point.

Erosion mats, once installed will be regularly inspected for degradation and installation integrity. Where matting has remained in place for longer than 12 months, TEKFEN will be responsible for maintaining and replacing matting as required through the construction and maintenance period.

2.13.4. Crushed Rock

Crushed rock may be required as a permanent erosion control measure at locations where it is impossible to establish vegetation and with prior approval of EPCM/TANAP. As a temporary measure it serves to reduce muddy conditions and sediment production during construction.

Crushed rock is applicable to locations where vegetation cannot be established and where erosion poses a risk to the pipeline or sediment threatens nearby streams. This also applies to stone dressings outside of the working width: e.g. camps, temporary roads, pipe storage locations, and crew quarters.

As required by local conditions and as agreed with the EPCM/TANAP representative, two cases apply: (1) for temporary roadways, turning areas, and other locations from where sediment discharge poses a problem, and (2) for slopes where soil erosion and sediment can be controlled only by means of a stone mulch.

Following project completion, temporary areas dressed with crushed rock will be ripped, fertilised and seeded or planted. These areas will be subject to the acceptance of EPCM/TANAP.

2.13.5. Lined Chutes and Vegetated Waterways

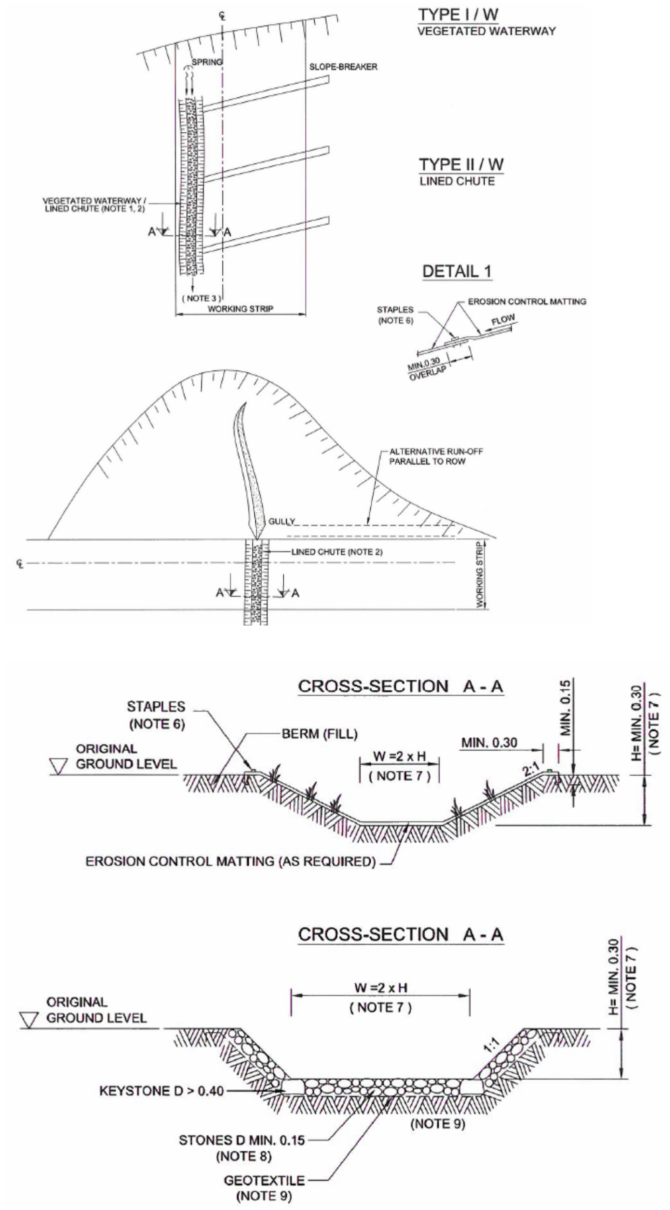
Lined chutes and vegetated waterways are specially designed channels created to collect and convey runoff to where it can be safely disposed of without erosion. Chutes or waterways serve to receive and concentrate runoff from slope breakers, from small gullies that cross the pipeline right-of-way, and from other areas that require water disposal. Their design is such that channel velocities remain non-erosive, even on steep slopes. The discharge point will be designed and installed sufficiently to dissipate discharge energy and avoid erosion at the discharge point. For typical details and spacing requirements, see Project Drawing “WRP-DGA-PPL-PLG-047-Typical Drawing - Erosion Protection - Typical Lined Chute”.

Commonly, lined chutes are designed to convey water from where springs emerge in the vicinity of the loading line RoW. They are inappropriate on most agricultural landscapes, where natural channels or grass-lined waterways may offer a preferred alternative.

Vegetated waterway serves to collect and dispose of runoff from slope breakers. They rely on their shallow depth and vegetated cover to reduce the velocity of runoff water to within non-erosive limits. Where nearby natural channels offer a safe alternative to a vegetated waterway – these are preferred.

Waterways require fertilising and seeding with a grass mixture suited to the specific location. This seeding will be protected by suitable mulch, mats or netting to allow establishment of the seeded area.

Typical Vegetated Waterway/ Lined Chute:



2.13.6. Gully Remediation

The objective of gully remediation is to prevent existing gullies from increasing in size and extent through continued erosion.

The structures described in this plan reduce the velocity of concentrated storm water flows and thus reduces erosion of the swale or ditch. They also trap small amounts of sediment flowing in the gully.

Additional mitigation measures will be applied for gully heads close to the pipeline using a gabion solution as detailed in drawing WRP-DGA-PPL-PLG-047 (Detail 1). Gabions in combination with a geotextile and rockfill will ensure that further erosion will be mitigated and gully head migration and possible exposure of the pipeline prevented.

Gully head remediation will be applied as shown on the alignment sheets or directed by the EPCM representative. Final design of the gully head mitigation measures will be proposed by the TEKFEN subject to EPCM approval.

2.13.7. Geotextile

Geotextile will be as defined in the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030 (or EPCM-approved equivalent).

Geotextile will be handled and installed according to the manufacturer's recommendations, and/ or as shown on the Drawings. Geotextile will not be stored in direct sunlight. Construction equipment and/ or vehicles will not be allowed to operate directly on geotextile.

Where geotextile is joined with overlapping joints, a minimum 500 mm overlap will be allowed at adjoining borders. For geotextile placed on slopes, the geotextile will be secured at the top of slope by embedding in an anchor trench, as shown on the Project Drawings.

2.13.8. Rip Rap

Rip rap will be required to reinstate specific river crossings. The minimum installation locations are defined in the River Crossing Reinstatement and Scour Protection Schedule Document No. WRPLST- PPL-PLG-003.

TEKFEN will identify any additional areas and propose them to EPCM for review and approval.

Rip rap may also be used in areas along the right of way other than at river crossings, TEKFEN will install rip rap wherever deemed necessary and suitable to achieve the erosion control requirements or for slope stabilization.

Rip rap will be as defined in the Pipeline River Crossing Civil Protection Works Specification WRPSPC- PPL-PLG-030.

3. TRAINING

Course Title	Erosion & Sediment Control and Reinstatement
Duration	TBD
Key Objective(s)	To make attendees aware of the work practices required to prevent and/or minimize erosion and sedimentation, reduce the extent of reinstatement needed.
Issues to be covered	General and site specific methods for erosion and sediment control methods. Reinstatement requirements Special Crossings (e.g., rivers) Construction phases (construction – maintenance) Working on steep slopes and side slopes
Tools / Method of Delivery	Presentation(s) Group discussions
Target Audience	All staff directly involved in managing or engaging in construction activities

4. MONITORING AND REPORTING

All EPCM/TANAP, TEKFEN verification and monitoring activity related to the provisions of this plan will be in accordance with the requirements of the Environmental and Social Management and Monitoring Plan and mitigation measures for soil impact management during construction that are defined in ESIA and BAP. If TEKFEN will use subcontractors, they will comply with this plan.

The items below provide a guide to the Reinstatement, Erosion control and Stabilization issues that need to be monitored regularly by site environmental staff:

- Damage to seeding/Biorestoration by washing out of seeds and plants
- Continuous networks of channels over the slopes prevented, ensuring that the depth of material above the pipe is not reduced
- Number of sediment control measure or device failures that repair work has not started on within 24 hours of inspection or notification
- Number of non-compliances with top soil management requirements in Reinstatement Plan
- Stripping of Topsoil to the required depth, and over the required area of land
- Appropriate storage and handling of Topsoil
- Provision and maintenance of suitable sediment interception devices
- Success of seeding establishment
- At river crossing locations, return of the river bed and banks to their pre-construction condition and contours
- Minimal landscape impacts after Reinstatement
- Temporary erosion control methods (e.g. temporary ditch breakers, stumps, drainage channels, flumes, wooden fences, slope breakers).
- Sediment control methods (silt fence, straw bale barrier).
- Permanent erosion control methods (Diversion Channels, Jute Matting, Hydro-seeding, Gabion wall applications, Trench breaker, crushed rock, line chutes and vegetated waterways)
- Trench dewatering efforts (energy dissipation works at pump outlet).
- Surface water drainage patterns using appropriately designed, installed and maintained drainage structures (e.g., culverts, ditches)
- Recontouring the trench and graded areas to match natural contours, and replacement of topsoil evenly over disturbed areas
- Biorestoration procedures
- Revegetatetion of disturbed areas and/or using and maintaining surface treatments (e.g., erosion and sediment control structures)
- Re-use of excess soil and materials along the RoW/minimize material/aggregate resourcing from quarries/borRoW pits (e.g. by using padding machines)

5. RESPONSIBILITIES

Project Manager

- To provide necessary resources for the Erosion Control and Reinstatement activities.
- To ensure the application of all the commitments of this Plan.

Project HS&ES Manager

- To satisfy the need for all biorestoration, seeding, reinstatement activities.
- To ensure that appropriate permitted/licensed subcontractors are selected for erosion control and reinstatement consultancy

Environmental Manager:

- Supervision of Environmental team.
- Determining appropriate corrective action for non-compliance;
- To ensure that the actions stated in this Plan are carried out
- To send monthly progress reports to EPCM
- To monitor Reinstatement and Erosion control measures to achieve the erosion control and stabilization targets until the end of the Contract Warranty Period
- To interface with EPCM to facilitate successful biorestoration of the RoW and other temporary areas
- To consult with local experts, specialist organisations and government authorities in order to ensure the Reinstatement, Erosion control and stabilization works are appropriate to the local, worksite-specific conditions
- Keep the environmental records
- Analyse the reinstatement complaints to avoid recurrence of the concern or issues.
- Forward the grievance to the relevant department/ parties to take the necessary and timely actions as required.

Environmental Advisor:

- To advise on on-site erosion control measures and reinstatement actions.To implement seeding using an approved seed mix.
- To document pre-construction condition of the RoW via photos and/or video to compare for future reinstatement.
- Monitor the implementation of this Plan.
- Stop the work if it is an environmental inappropriate condition.
- Inspect inappropriate conditions and acts for ecology.
- Place the necessary and proper warning signs at certain locations of the workplace.
- To comply with land entry and exit in accordance with the Land Management Plan.
- To perform all required pre-entry surveys

Environmental Inspector:

- To monitor site applications related to the Erosion control and stabilization
- To carry out site inspections related to the environmental precautions
- To report all steps related to Erosion control and stabilization practices in RoW and temporary areas
- Conduct daily environmental inspections
- Warn people who do not comply with the environmental instructions

Construction Manager

- To follow-up actions associated with the implementation of this Plan each in his work area.

Geotechnical Engineer/Engineering geologist

- For site specific inspections and assessments for construction in side slope, steep slopes an on narrow ridges/landslides prone area.
- To deal with geological hazards like landslides, soil erosion and, in some extreme conditions.

6. RECORDS

- Comprehensive photographic record including key habitats and topographical features (e.g. river crossings, wetlands, woodlands, forests, meadows, gullies, slopes, outcrops, eroded terrain) prior to vegetation clearance, Topsoil stripping, grading, cutting and other major earthworks.
- Documentation of RoW pre-construction conditions
- Cut-tree register
- Terrestrial critical habitat registers including seed, plant bulb and herbaceous plant collection, storage and repantation
- Records of translocated plants
- Records of revegetated areas
- Records of biorestoration results during the construction period.
- Records of excessive slope instability or soil erosion
- Recorded sediment loading due to project related activities
- Non compliance records

ANNEX 1 –REGISTERS

SENSITIVE AREAS REGISTER																										
LOT 3																										
TERRESTRIAL CRITICAL HABITATS																										
KP Start REV J	KP End REV J	ID	Was the no-construction time frame enforced? (if required)	Which seeds were collected?	Dates seeds were collected	Amount of seed collected	Seed storage location	Dates seeds were planted on ROW	Location where seeds were replanted	Which plants/bulbs were collected?	Date plants/bulbs were collected	How many plants/bulbs were collected	Plants/bulbs Storage location	Date plants/bulbs replanted on ROW during restoration	How many plants/bulbs were replanted on ROW during restoration	Location where plants/bulbs were replanted	Date Herbaceous plants were on ROW	Storage location of herbaceous plants collected.	Date when herbaceous plants were laid on ROW during restoration	Date topsoil was stripped	Date topsoil was reinstated	Date when rocks were collected? (30cm or larger)	Rock storage location	Date rocks were relocated on ROW	Invasive flora species control	Terracing during reinstatement to prevent erosion
849+409	849+612	CH49																								
948+615	949+002	CH50																								
996+630	997+352	CH51																								
1034+862	1035+061	CH52																								
1035+348	1035+567	CH53																								
1144+988	1145+800	CH54																								
1155+228	1155+398	CH55																								
		CH56																								
1229+052	1229+504	CH57																								

FRESHWATER CRITICAL HABITATS														
KP Start REV J	KP End REV J	ID	Was the no-construction time frame enforced? (if required)	Start date of crossing (when banks are being topsoiled/ graded)	End date of crossing (when final reinstatement completed)	Control of sediment release	Minimize erosion, sedimentation and impact to riparian vegetation	Avoid impact and removal of gravel	Date Erosion and sediment controls in place	Restoration of channel bottom	Restoration of riparian area (contours and vegetation)	Water protection zone marked/ flagged? (30m buffer zone on either side of crossing)	Water sample taken upstream/down stream? Prior/during/post construction
986+945	986+432	FCH13											
1040+654	1040+663	FCH14											
1093+394	1093+484	FCH15											
1222+948	1222+983	FCH16											
1321+758	1321+780	FCH17											
1329+399	1329+429	FCH18											

WATERCOURSE CROSSINGS REGISTER							
SPREAD 5							
KP Location of watercourse	Name	Crossing Start Date	Crossing Finish date	Reinstatement Start Date	Reinstatement Finish date	Date erosion and sediment control devices were installed	Comments

WATERCOURSE CROSSINGS REGISTER							
SPREAD 6							
KP Location of watercourse	Name	Crossing Start Date	Crossing Finish date	Reinstatement Start Date	Reinstatement Finish date	Date erosion and sediment control devices were installed	Comments

REINSTATEMENT REGISTER						
SPREAD 5						
KP Start	KP End	Original Countours restored?	Date topsoil was spread	Date seeding was conducted	Date permanent Erosion controls installed	Date area was signed off

REINSTATEMENT REGISTER						
SPREAD 6						
KP Start	KP End	Original Countours restored?	Date topsoil was spread	Date seeding was conducted	Date permanent Erosion controls installed	Date area was signed off

Trees that were Relocated or Cut during Construction **SPREAD 5**								
Description of Site	**Tree/Shrub Species (Latin/English)**	**Number of Trees**	**Height of Trees**	**Photo Reference**	**Cutting or Relocation Date (C for cutting RL for relocating)**	**Reforestation Place**	**Reforestation or Relocation Date (C for cutting RL for relocating)**	**Verifier Name**

Trees that were Relocated or Cut during Construction **SPREAD 6**								
Description of Site	**Tree/Shrub Species (Latin/English)**	**Number of Trees**	**Height of Trees**	**Photo Reference**	**Cutting or Relocation Date (C for cutting RL for relocating)**	**Reforestation Place**	**Reforestation or Relocation Date (C for cutting RL for relocating)**	**Verifier Name**

<table>
<tr><td colspan="4">TANAP
TRANS ANATOLIAN NATURAL GAS PIPELINE PROJECT</td></tr>
<tr><td rowspan="2">Project Document No.</td><td rowspan="2">PLK-PLN-ENV-PL4-002</td><td>Rev</td><td>Status</td></tr>
<tr><td>P4-2</td><td>Re-IAA</td></tr>
<tr><td>Document Title</td><td colspan="3">EROSION, REINSTATEMENT AND LANDSCAPING PLAN</td></tr>
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<tr><td>Contractor</td><td colspan="3">PUNJ LLOYD – LİMAK - KALYON JV</td></tr>
<tr><td>Contractor Document No.</td><td>PLK-PLN-ENV-PL4-002</td><td>Contractor Rev.</td><td>P4-2</td></tr>
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Tick Box	Descriptions	Signature & Date
☐	**C1/APP** – Reviewed & accepted. Construction may Proceed. For documents status IFR\IFA, resubmit as IAA at next revision code. For documents status IAA, no action required.	
☐	**C2/AWC** – Reviewed & accepted as marked. Revise and resubmit. Construction may proceed. For documents status IFR\IFA, resubmit as IAA at next revision code. For documents status IAA, resubmit as Re-IAA at next revision code.	
☐	**C3/RWC** – Reviewed & returned. Revise and resubmit. Construction shall **NOT** proceed. For documents status IFR\IFA, resubmit for review Re-IFR\IFA at next revision code. For documents status IAA, resubmit as IFA at next revision code.	
☐	**C4 –** Review not required. Construction may proceed Resubmit for information as IFI at next Revision Code.	
☐	**C5/REJ** – REJECTED. Revise and resubmit. Construction shall **NOT** proceed. Revise document and resubmit for review.	

Remarks:

TANAP - TRANS ANATOLIAN NATURAL GAS PIPELINE PROJECT
Comment Reponse Sheet

Document Title EROSION, REINSTATEMENT AND LANDSCAPING PLAN
Document Number PLK-PLN-ENV-PL4-002

Originator PLL JV
Rev P4-1

Except for the following identified comments, all other comments on this document have been resolved or incorporated.

* O - Open, C - Closed

No.	Section/ Page	Comment	By	Response	By	Date	O/C *	Remarks
1	1.2	Please reword as follows 'This Erosion, Reinstatement and Landscaping Plan (ERLP) intends to outline the required measures proposed by Punj Lloyd-Limak Joint Venture (CONTRACTOR) CONTRACTOR for reinstatement of the RoW and AGI's and other associated campsite facilities to stabilize terrain and to re-establish the vegetative cover and blend it with the surrounding environment and to minimize and to prevent erosion and more importantly to restore the lands to the original contours and states. Moreover, the plan establishes the minimum requirements for temporary and permanent erosion control and the related measures for revegetation (bio-restoration). Establishing a vegetative cover is the most effective means to combat erosion. This ERLP highlights the various engineering and bio-engineering methods to achieve the said purposesrequirements.	TANAP	Revised	YOGD	01.07.2016		
2	1.4	Please add: ESA(s) Ecologically Sensitive Area(s)	TANAP	Revised	YOGD	01.07.2016		
3	1.5	Please add Specification for Restoration and Reinstatement (BCH-SPC-PPL-PLG-014) as commented before.	TANAP	Revised	YOGD	01.07.2016		
4	2.0	CLIENT/EPCM	TANAP	Revised	YOGD	01.07.2016		
5	2.5	Please reword: To be responsible for conducting ecological surveys, determine the needs for protecting critical habitats, wildlife and sensitive habitats,	TANAP	Revised	YOGD	01.07.2016		
6	7.0	Please add: In case of failure to store seed at Gene Bank, Contractor will fulfill all thre requirements to arrange appropriate and required storage areas considering temperature, humidity and other requirements of inside conditions to store seed to comply with Project requirements.	TANAP	Revised	YOGD	01.07.2016		
7	8.0	• side slopes; • steep slopes; • side cuts; • narrow ridges and areas prone to landslides; • ecological sensitive areas, critical habitats; • karstic areas; • volcanic tuff and marl; • above ground installation sites; • Areas of Contaminated Land, • Side cuts and critical habitats	TANAP	Revised	YOGD	01.07.2016		

Additional Notes (if any)

Distribution

TANAP

TRANS ANATOLIAN NATURAL GAS PIPELINE PROJECT

48" ONSHORE PIPELINE CONSTRUCTION LOT 4

EROSION, LANDSCAPING AND REINSTATEMENT PLAN

Rev.	Status	Date	Status Description	Issued by	Checked by	Approved by
P4-A	DIC	23/4/2016	Discipline Internal Check	YOGD	ASOV	DHAG
P4-B	IDC	25/4/2016	Inter-Discipline Check	YOGD	BHAG	DHAG
P4-C	IFR	26/4/2016	Issued for Review	YOGD	SDUT	KKSA
P4-0	IAA	11/5/2016	Issued as Approved	YOGD	KALF	MALB
P4-1	Re-IAA	6/6/2016	Re-Issued as Approved	YOGD	KALF	MALB
P4-2	Re-IAA	1/7/2016	Re-Issued for Approval	YOGD	KALF	MALB

DOCUMENT REVISION HISTORY SHEET

Rev.	**Revision Description**	**Date Issued**	**Update / Amendment Details**
P4-A	DIC	23/4/2016	Discipline Internal Check
P4-B	IDC	25/4/2016	Inter-Discipline Check
P4-C	IFR	26/4/2016	Issued for Review
P4-0	IAA	11/5/2016	Issued as Approved
P4-1	Re-IAA	6/6/2016	Re-Issued as Approved
P4-2	Re-IAA	1/7/2016	Re-Issued for Approval

HOLDS

No	Section	Description	Input from	Planned Date

Table of Contents

1 INTRODUCTION

1.1 Background

The Trans Anatolian Natural Gas Pipeline will be built to transport natural gas emanating from the South Caucasus Pipeline Company Pipeline in Georgia to the Trans-Adriatic Pipeline in Greece. In addition to the mainline termination, dedicated off-takes will be provided to BOTAŞ at strategic points in the Republic of Turkey. Contract of Lot 4 of this project is awarded to PUNJ LLOYD – LİMAK Joint Venture and consists mainly of a 48” Onshore Pipeline Construction and also other Above Ground Installations.

1.2 Scope

The provisions in this plan are applicable to the temporary used areas such as construction corridor, access roads, pipe lay down areas, construction camp sites, other additional lands utilized during the construction of the Project, as well as the permanent facilities such as above ground installations (AGI).

CONTRACTOR will be responsible for the following items, in the scope of this ERLP:

- Management of surplus soil and rocks,
- Preserving seed bank through topsoil,
- Re-laying the topsoil to its original location and the subsoil,
- Temporary measures to minimize erosion and maximize sediment control during construction
- Permanent erosion control berms, drainage for long term stability against erosion,
- Retaining the hydrologic regime as before and reinstatement of the natural drainage of the site,
- Restoration of the land to the original contours or maintaining a landscape visually compliant to the adjacent landscape,
- Restoration of the impacted habitats and ecological processes to their original states where it is technically applicable,
- Re-vegetation of sites with appropriate native plant types; re-seeding,
- Prevention of forbidden or dense access to the areas that cannot be accessed before via removal of the temporary construction roads,
- Utilization of engineering solutions and bioengineering techniques to attain the best environmental outcomes,
- Taking the measures to minimise erosion and maximize sediment control during construction

1.3 Purpose

This Erosion, Reinstatement and Landscaping Plan (ERLP) intends to outline the required measures proposed by Punj Lloyd-Limak Joint Venture (CONTRACTOR) CONTRACTOR for reinstatement of the RoW and AGI’s and other associated campsite facilities to stabilize terrain and to re-establish the vegetative cover and blend it with the surrounding environment and to minimize and to prevent erosion and more importantly to restore the lands to the orginal contours ans states Moreover, the plan establishes the minimum requirements for temporary and permanent erosion control and the related measures for revegetation (bio-restoration).

Establishing a vegetative cover is the most effective means to combat erosion. This ERLP highlights the various engineering and bio-engineering methods to achieve the said purposes and requriements.

1.4 Definitions

CLIENT	TANAP DOĞALGAZ İLETİM A.Ş.
PROJECT	Trans Anatolian Natural Gas Pipeline Project (TANAP)
EPCM	WorleyParsons Proje Yönetimi ve Mühendislik Limited Şirketi
CONTRACTOR	PUNJ LLOYD – LİMAK Joint Venture
CONTRACT	48” Onshore Pipeline Construction Contract for Trans-Anatolian Natural Gas Pipeline Lot 4
Biorestoration	Reinstatement of the biotic, or living, component of the environment, achieved through habitat recreation. In this report biorestoration is the third phase of the 3-phased reinstatement process.
Erosion	Action of surface processes (such as water flow or wind) that remove soil, rock, or dissolved material from one location on the Earth's crust, then transport it away to another location
Flora	All the plant species that make up the vegetation of a given area from a particular geological time
Fauna	All the animal species of a region or geological period
Habitat	Terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the nonliving environment
Reinstatement	To bring back into previous condition or position
Topsoil	The top, fertile layer of material on the land surface, which is capable of supporting plant growth
Vegetation	Disregarding the regions in the classification of the plants, the plant cover of a region
Wetlands	Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

1.5 Abbreviations

TANAP	Trans Anatolian Gas Pipeline Project
EPCM	Engineering, Procurement and Construction Management
ROW	Right of Way
H&S	Health and Safety
E&S	Environment and Social
QA/QC	Quality Assurance / Quality Control
CLIENT	TANAP Doğalgaz İletim A.Ş.
BAP	Biodiversity Action Plan
CONTRACTOR	Punj Lloyd-Limak JV responsible for the procurement, construction, installation, pre-commissioning, testing and commissioning assistance of the Lot 4 section of TANAP Project
ERLP	Erosion, Reinstatement and Landscaping Plan

ESIA	Environmental and Social Impact Assessment that was prepared by TANAP
Project	procurement, construction, installation, pre-commissioning, testing and commissioning assistance Lot 4 section of TANAP Project
USLE	Universal Soil Loss Equation
ESA(s)	Ecologiacally Sensitive Area(s)

1.6 References

	Document Number	Document Title
1.	TNP-REP-ENV-GEN-001– Turkish and TNP-REP-ENV-GEN-002 – English	ESIA Report
2.	TNP-PLN-ENV-GEN-001	TANAP Environmental and Social Management Plan
3.	PLK-PLN-ENV-PL4-010-P4-C	CONTRACTOR's Environmental and Social Monitoring Plan
4.	PLK-PLN-ENV-PL4-005-P4-C	CONTRACTOR's Pollution Prevention Plan
5.	PLK-PLN-ENV-PL4-006-P4-C	CONTRACTOR's Waste Management Plan
6.	PLK-PLN-ENV-PL4-003-P4-C	CONTRACTOR's Construction Impact Management Plan
7.	WRP-SPG-EGG-PLG-001-PL4	Specification for Reinstatement
8.	WRP-DGA-PPL-PLG-044	Typical Slope Breakers
9.	WRP-DGA-PPL-PLG-045	Typical Outlet Of Slope Breakers
10.	WRP-DGA-PPL-PLG-046	Typical Cross Section Of Slope Breakers
11.	WRP-DGA-PPL-PLG-047	Typical Drawing - Erosion Protection - Typical Lined Chute
12.	WRP-DGA-PPL-PLG-050	Typical Erosion Control Matting Installation
13.	WRP-DGA-PPL-GEN-004-01-P4-0	Typical Working Strip -Standard
14.	WRP-DGA-PPL-GEN-005-01-P4-0	Typical Working Strip -Reduced
15.	WRP-DGA-PPL-PLG-005-01-P4-0	Typical Working Strip Side Slopes (18 °-30°)
16.	WRP-DGA-PPL-PLG-002-01-P4-0	Typical Working Strip-High Groundwater Conditions
17.	WRP-DGA-PPL-PLG-003-01-P4-0	Typical Working Strip Highway/Main Road/Railroad Crossings
18.	WRP-DGA-PPL-PLG-006-01-P4-0	Typical Working Strip Forest & Environmentally Sensitive Sections
19.	WRP-DGA-PPL-PLG-020-01-P4-0	Typical Highway Crossing (Bored with Casing)
20.	WRP-DGA-PPL-PLG-021-01-P4-0	Typical Road Crossing (Open Cut)
21.	WRP-DGA-PPL-PLG-023-01-P4-0	Typical Railroad Crossing (Bored with Casing)
22.	WRP-LST-PPL-PLG-003	Typical River Crossing Reinstatement and Scour Protection Schedule
23.	WRP–SPC-EGG-PLG-001	Specification for Reinstatement
24.	WRP-REP-EGG-GEN-004	Reinstatement and Erosion Control Requirements
25.	WRP-SPC-PPL-PLG-001	Pipeline Construction Specification
26.	WRP-SPC-PPL-PLG-030	Pipeline River Crossing Civil Protection Works Specification

27.	WRPLST- PPL-PLG-003	River Crossing Reinstatement and Scour Protection Schedule
28.	WRP-DGA-PPL-PLG-036-01	Typical Drawing Riverbank Protection Bio Restoration
29.	WRP-DGA-PPL-PLG-036-02	Typical Drawing River Riparian Restoration
30.	WRP-SPC-PPL-PLG-001	Construction Specification
31.	WRP-REP-EGG-PLG-010-P3-D	Slope Assessment Report
32.	WRP-TNO-EGG-PLG-00	Technical Note for Design of Pipelines in Karst
33.	BCH-SCH-PPL-PLG-014	Restoration and Reinstatment

2 RESPONSIBILITIES

CONTRACTOR will be responsible for the implementation of all erosion and reinstatement works in accordance with the requirements of this ERLP. CONTRACTOR will also be responsible for the training and performance of all sub-CONTRACTORs with respect to the ERLP and will comply with all relevant project standards, statutory requirements, permit and license conditions and secure all applicable permits and licenses.

CONTRACTOR will prepare site specific method statement for specific activities relevant to the erosion and reinstatement issues and submit to Client/EPCM for approval.

CONTRACTOR will conduct pre-construction surveys along the Right of Way (RoW) to facilitate the development of site-specific reinstatement method statements for all special areas particularly for erosion and sediment control and seeding-planting of indigenous vegetation.

2.1 Project Manager

- Overall responsibility for implementation and of this plan,
- To provide necessary resources for the Erosion Control and Reinstatement activities.

2.2 Construction Manager

- Will be responsible for ensuring that all site staff, including Sub-CONTRACTORs and activities comply with the this ERLP,
- Will ensure that ERLP is executed during pre, on and after construction activities effectively
- Will ensure that all related personnel are aware of the ERLP

2.3 Environmental Manager

- Will be responsible for the development and oversight of erosion control and reinstatement activities,
- Will update the Plan in conjunction with EPCM if required,
- Will be responsible for preparing environmental procedures, method statements and work instructions as required and implementing amendments to the system identified by audits,
- Will supervise Soil Experts, Environmental Inspectors and Biologist/Ecologist
- Will provide monthly report to EPCM.
- To monitor Reinstatement and Erosion control measures to achieve the erosion control and stabilization targets until the end of the Contract Warranty Period,
- Will ensure that all remedial action identified by inspections and non-conformities are closed out,
- Will ensure related trainings are given to personnel
- Will coordinate inspections, audits
- To consult with local experts, specialist organisations and government authorities in order to ensure the Reinstatement, Erosion control and stabilization works are appropriate to the local, worksite-specific conditions,

2.4 Environmental Inspector(s)

- Will monitor the biologist/ecologist for their performance in the implementation of ERLP and ESIA,
- Will monitor site applications related to the Erosion control and stabilization and their compliance with environmental plans, procedures and instructions,
- Will ensure that all remedial action identified by inspections and non-conformities are closed out,
- Will ensure that Environmental Manager is fully informed on every environmental issues,
- Will implement the environmental management system on site and provide as necessary toolbox talks on impact mitigation method,
- Will give trainings to all CONTRACTOR's personnel regarding with environmental issues,
- To report all steps related to Erosion control and stabilization practices in RoW and temporary areas

2.5 Biologist / Ecologist

- Will carry out site inspections related to the topsoil/ subsoil storage, erosion and stabilization structures,
- Will remove erosion and stabilization structures that are no longer required,
- Will keep and maintain records of the depths stripped by the use of topsoil stripping register,
- Will be responsible for seed and bulb collection, collection, storage and replantation,
- To be responsible for conducting ecological surveys, determine the needs for protecting critical habitats, wildlife and sensitive habitats,
- To conduct all the ecological monitoring including reinstatement (biorestoration and seeding), species translocations, erosion control, pollution prevention and waste management,
- Planning of reinstatement activities, giving ecological expertise on site during all relevant activities within ESAs (e.g. route clearance, re-vegetation) to provide advice and supervision to implement the environmental monitoring program,
- Will be responsible for the biorestoration activities; including detailed scheduling, plant species protection of plant materials, aftercare, monitoring and corrective action.

2.6 Soil Expert

- Will define the depth of top soil to be stripped,
- Will be responsible for monitoring of topsoil, subsoil stripping and storage
- Will give trainings regarding with soil management
- Will define the ground conditions
- Will be responsible for right application of slope breakers, drainage channels, and other related project requirements
- Will be responsible for excavated materials' managements like storage, disposal, and etc.
- Wİll ensure that soil management will comply with project requirements

3 REINSTATEMENT AND CLEAN UP PRINCIPLES

3.1 Construction Support Facilities (Camp sites, pipe stockyards etc.)

The selection of any proposed construction support facility will depend on the following factors, though not necessarily in the order presented

- Ease of construction; easy access to the RoW;
- Permit requirements and ease of land acquisition;
- Transport conditions and related transport safety; and
- Environmental considerations;
- Social considerations.

The strategy to be followed by CONTRACTOR and the sequence of events that lead to the ultimate selection of any construction support facility from the environmental point of view are as follows:

A baseline assessment will be made on the proposed location and will form the basis for the go-ahead. Any kind of construction support facility will be avoided in the special areas as mentioned in section 8.0 of this document.

An environmental assessment will be undertaken to assess the suitability of any construction facility proposed by CONTRACTOR, before commencing the activity. The area will be well photo-documented and video recorded for the sensitive areas to document the existing condition, as it were before the commencement of the project activity.

As soon as the site is de-commissioned, reinstatement will be undertaken, to achieve a condition, which is as good as or better than the condition it was in before construction or will be reinstated as per the owners wishes as much as practicable. CONTRACTOR will also verify that all environmental impacts are mitigated to meet projects requirements.

3.2 Third Party Activities

CONTRACTOR is responsible to reinstate any and all areas disturbed during the project works irrespective of their location or proximity to the RoW.

CONTRACTOR will fully reinstate any land disturbance due to third party assets/activities where that disturbance is:

- within the TANAP RoW in the scope of Lot 4, or
- close to the TANAP RoW in the scope of Lot 4 or project area where reinstatement is necessary in order secure the effective reinstatement of the project area.

The above principle applies to third party pipelines, railways, roads and buildings but is not limited to these examples.

The reinstatement will also be based on applicable sections of the ESIA (Document No. TNP-REP-ENV-GEN-001 and TNP-REP-ENV-GEN-002).

3.3 Clean-up of Sites

CONTRACTOR will, after backfilling and before replacement of topsoil, clean-up all areas affected by construction operations. That will include removal of all plant, equipment and materials not required for replacement of soil and subsequent bio-restoration. The clean-up of the sites will be managed considering the CONTRACTOR's Waste Management Plan and project requirements.

In pre-developed areas (either for agriculture or industry) the cleaned condition will be reinstated in accordance with the Specification for Reinstatement (WRP-SPC-EGG-PLG001). The strategy for the remediation of contaminated lands identified within the ESIA and the Contract Documents are not covered by the Specification for Reinstatement and reference should be made to Contract Documents.

Clean-up will be accomplished to the specification of EPCM and will as a minimum be to the documented standard and quality of the adjacent and adjoining land, and will be of suitable materials reused and or replaced in accordance with the land use.

3.4 Third Party Properties

The pipeline will encounter numerous third party properties, services and facilities over its length. The CONTRACTOR is responsible for identifying properties, services, and facilities, marking and protecting them, and reinstating them to the third party owner's (TPO) requirement as agreed between the TPO and the EPCM. The CONTRACTOR's responsibilities for third party properties, services, and facilities are set out in the Pipeline Construction Specification, Document No. WRP-SPC-PPL-PLG-001.

Reinstatement of any damaged or relocation of third party properties will be done in accordance with the access to site agreements and be to satisfaction of the appropriate regulatory authority.

3.5 Critical Habitats

Critical habitats were identified in the Environmental and Social Impact Assessment (ESIA) (TNP-REP-ENV-GEN-002) and Biodiversity Action Plan (BAP) (Document No. CIN-REP-ENV-GEN-017). The BAP provides the description of 10 terrestrial and 9 freshwater critical habitats in Lot 4 boundary, as well as mitigation and reinstatement measures to be applied in the areas.

In those areas and along water courses and in locations prone to erosion, CONTRACTOR will backfill and re-instate immediately after installation of the pipeline. Also in these areas, CONTRACTOR will fully re-instate in accordance with this plan. This applies to, but is not limited to: new/upgraded roads and tracks, including bridges, helicopter pads, construction camps, maintenance bases and borrow pits / aggregate quarries.

CONTRACTOR will obey the measures committed to in the BAP in relation to scope of work, including pre-construction measures, (i.e. seeds collection, plants translocation, time period specified), topsoil stripping and storage, and reinstatement measures. There will be no construction activities of stripping or etc. during closed construction period. CONTRACTOR will also obey the construction constraints (closed construction periods) specified in BAP. Additionally, pre-construction survey shall be executed on period specified in the BAP.

3.6 Soil Erosion, Principle and Classification

The loss of soil through the action of natural and manmade processes is termed soil erosion. Soil erosion is both a risk to the pipeline through reduction of cover / support, and a risk to the environment through the relocation of large quantities of sediment causing changes in drainage patterns, soil fertility et cetera. Inaddition the visual impact of soil erosion on the RoW is a concern.

Erosion during the construction (i.e. from vegetation clearance to completion of reinstatement) will be managed and mitigated as required by the CONTRACTOR. This management will require the separate consideration, using specific and separated handling systems and protocols, for areas of the pipeline corridor which have been identified to be or which are suspected to be contaminated lands, whether by historical use of influence and/or by actions of incidents under the works. The CONTRACTOR will ensure that water courses and ecologically sensitive sites are not affected by soil erosion and the migration of soils. Methods for control of sediment movement during construction and performance criteria are discussed in Section 4.5 of this plan.

Following completion of the reinstatement the CONTRACTOR will start the monitoring of the reinstated areas. This monitoring period, described in Section 7.9, will depend on the type of reinstatement and mitigation measures employed at each site. The CONTRACTOR will undertake repair and supplementary works as required to ensure the reinstatement is successful. Where ecological restoration is not achieving prescribed rates of establishment the CONTRACTOR will take appropriate measures such as reseed, fertilize, irrigate or change plant type as required.

Table 1.1 below gives the definition of erosion severity classes for overland areas based on historic pipeline projects in similar conditions (i.e. not specific to TANAP). For the temporary as well as permanent case erosion class 2 or better will be achieved for all slopes where sediment may discharge into a watercourse or ecologically sensitive area, i.e. <5t/ha/year. For other slopes an erosion class of 3 or better (<10 t/ha/year) will be achieved for reinstatement along the pipeline RoW.

Table 1.1. Erosion Severity Classes (*)

Erosion Class		**Erosionrate (t/ha/y-)**	**Visual assessment**
1	Very slight	<2	No evidence of compaction or crusting of the soil. No wash marks or scour features. No splash pedestals or exposed roots or channels.
2	Slight	2 -5	Some crusting of soil surface. Localized wash but no or minor scouring. Rills (channels < 1m2 in cross-sectional area and < 30cm deep) every 50100m. Small splash pedestals where stones or exposed roots protect underlying soil.
3	Moderate	5 -10	Wash marks. Discontinuous rills spaced every 20-50m. Splash pedestals and exposed roots mark level of former surface. Slight risk of pollution problems downstream.
4	High	10 -50	Connected and continuous network of rills every 5-10m or gullies (> 1m2 in cross-sectional area and > 30cm deep) spaced every 50-100m. Washing out of seeds and young plants. Reseeding may be required. Danger of pollution and sedimentation problems downstream.

5	Severe	50 -100	Continuous networks of rills every 2-5m or gullies every 20m. Access to site becomes difficult. Re-vegetation work impaired and remedial measures required. Damage to roads by erosion and sedimentation.
6	Very severe	100 -500	Continuous networks of channels with gullies every 5-10m. Surrounding soil heavily crusted. Integrity of the pipeline threatened by exposure. Severe siltation, pollution and eutrophication problems.
7	Catastrophic	> 500	Extensive network of rills and gullies; large gullies (> 10m2 in cross-sectional area) every 20m. Most of original surface washed away exposing pipeline. Severe damage from erosion and sedimentation on-site and downstream.

Where there is a risk of sediment contaminating water bodies, sediment control devices and measures will be installed (see Section 4.5 and 4.6).

As a minimum the following standards will be achieved:

- very low risk to the pipeline cover; maintain pipeline cover over the design life of the pipeline;
- very low risk of off-site pollution and sedimentation as described in erosion severity class 2 for sensitive sites and severity class 3 for normal sites; and
- low risk of damage to biorestoration by washing-out of seeds and plants as described in erosion severity class 2.

4 METHOD FOR REINSTATEMENT

4.1 Topsoil Stripping and Storage

Topsoil is the top, fertile layer of material on the land surface, which is capable of supporting plant growth. Along the TANAP RoW the depth of the topsoil will be established by soil expert of CONTRACTOR and decision of EPCM's soil expert will be sought. Procedures will be developed by soil expert of CONTRACTOR for topsoil stripping in advance of all work fronts. Typically, stripping will be done to a depth of between 100 mm and up to a maximum of 300mm according to the type of soils. If topsoil depth is more than 30 cm, topsoil will be stripped up to 30 cm. If topsoil depth is less than 30 cm., topsoil will be stripped to its full depth. In areas where little or no topsoil is present the CONTRACTOR must agree the depth (if any) of topsoil to be stripped with the EPCM's soil expert.

Topsoil stripping must be undertaken by earthmoving equipment using a toothless cutting edge and no excavator buckets with teeth will be permitted. The CONTRACTOR will use equipment which will minimise the impact on the topsoil structure or has a detrimental effect on the efficiency of the vegetation recovery. The topsoil will be carefully stripped to its full depth and stored separately from any other soil or materials. Both for stripping and storage, where plant is operating on topsoil it should be preferably low ground pressure equipment. Topsoil will be stored where it is not compacted by vehicles or contaminated and will be stored in a manner that minimises its loss and / or degradation. Topsoil will not be mixed with subsoil, and will be stored on the opposite side of the RoW to subsoil; other than in restricted areas where mixing will be prevented by physical means, e.g. geotextile sheeting. Isolated piles of topsoil will be clearly signed as 'Topsoil' in Turkish and English. Labeled stripped topsoil will indicate originally stripped location including KP's.

Topsoil and subsoil will be stored away from surface waters in line with ESIA requirements and related legislations.

All soils will be visually and olfactory inspected prior to stripping and a watching brief will be maintained during all excavation works for potentially contaminated soils / materials by soil expert of Contractor. All soils suspected or confirmed to be contaminated will be removed from site and disposed of to a suitably licensed facility by fulfilling Project requirements. All materials will be sampled and tested prior to reuse in accordance with the agreed limits of USEPA guidance and Dutch Standards for Soil Contamination."

Stripped topsoil will be kept free from the passage of vehicles and plant following stockpilling. Topsoil and subsoil stacks will be placed to ensure that they are free draining. Gaps will be left in the topsoil stack to permit reasonable access across the Project ROW.

Topsoil will be stored in a stockpile not more than 2.5 m high with side slopes <45°, drained with open ditches, and 1 m high in critical habitats (ref: BAP). In areas of very limited working space, extra lands and camp sites topsoil stockpiles of up to 3m high and <45° slope may be permitted with EPCM's soil expert approval. The surface of the stockpile will be lightly compacted (a single pass of light hand compaction equipment) to reduce rainfall penetration but not enough to promote anaerobic conditions. Drainage will be provided which prevents standing water on or against the stockpile. Where necessary, the stockpile will be protected from flooding by placing berms/diversions around the perimeter and other sediment control devices. Under no circumstances will stockpiled topsoil be used as padding material or other purposes except reinstatement of original locations.

During handling, damage to soil structure will be avoided. Soil handling under wet conditions is to be avoided other than in areas having obviously sandy soils (river banks and possibly locations containing tuff). Construction handling of topsoil is to be delayed 24 hours following a rainfall of 10mm or more during the preceding 24 hour period, after which soil conditions will be reassessed. Topsoil will not be handled during very wet conditions or at the t'mes when the ground or topsoil is frozen unless approved by soil expert of EPCM. The CONTRACTOR will ensure integrity, fertility and quality of topsoil throughout the stripping, storage and reinstatement. If there are degredations in topsoil's quality, CONTRACTOR will bring quality to original situation.

4.2 Subsoil Removal or Management and Storage

4.2.1 Objective

The objective is to manage the subsoil so that it is not subjected to, nor is the cause of, excessive erosion.

The RoW will be reinstated to a sufficient extent in order to allow the affected area to be returned to its pre-project use and productivity. Appropriate maintenance and handling of subsoil is essential to achieving this objective.

Any area of subsoil suspected or confirmed through ESIA or on site testing to be contaminated will be stockpiled separately and either removed from site or reused following an appropriate risk assessment of the subsoil to determine the suitability of its reuse in accordance with the agreed limits of USEPA guidance and Dutch Standards for Soil Contamination for the identified land use locally required.

4.2.2 Requirements

The subsoil will be excavated from the pipe trench and, in some cases, from ridge-top widening or cutting of benches on sides of slopes and stockpiled separately. Topsoil and subsoil will not be mixed and stored on over another under any circumstances. In general, subsoil will be returned to the excavated area. However, in Special Areas (refer to Section 8) subsoil may be required to be removed.

4.2.3 Management of Subsoil

Subsoil that will be reused, (i.e. returned to the trench or corridor RoW) will be placed in stockpiles as shown on the typical drawings. In some areas, particularly where there is limited working width, temporary or permanent removal of subsoil from the RoW may be required, to approved locations only (see the Pipeline Construction Specification for details of grading).

CONTRACTOR method statements will prove his stated maximum allowable height and any compaction requirements for temporary stockpiles to ensure safe working. All maximum heights will conform to the commitment made in the ESIA." with "Height of the subsoil stockpile or any excavated materials will not be higher than 3m.

Removed subsoil will be kept free from the passage of vehicles and plant, and segregated from topsoil stockpiles. Subsoil stockpiles will be placed to ensure that they are free draining. Gaps will be left in the stockpile to permit reasonable access across the RoW and at low areas where surface water may be held against the stack.

The surface of the stockpile will be lightly compacted (a single pass of light hand compaction plant) to reduce rainfall penetration but not enough to promote anaerobic conditions. Where necessary, the stockpile will be protected from flooding by placing berms/barriers around the outside.

CONTRACTOR will maintain the integrity of the stockpile during the storage period to the satisfaction of project requirements. CONTRACTOR is responsible for the placement of suitable drainage and erosion control measures as necessary.

All subsoil will be visually and olfactory inspected prior to stripping and a watching brief will be maintained during all excavation works for potentially contaminated soils / materials. All soils suspected or confirmed to be contaminated will be removed from site and disposed of to a suitably licensed facility. All materials will be sampled and tested proper prior to reuse in accordance with the agreed limits of USEPA guidance and Dutch Standards for Soil Contamination.

4.3 Trench Excavation and Padding

4.3.1 Excavated Material

The creation of surplus excavated material will be minimized as far as practicable since it is significant in terms of waste management. All material that is excavated will be re-used to the maximum extent practicable. CONTRACTOR will produce a waste minimization statement justifying the extent to which surplus material will be minimized and reuse maximized. In case of left over excavated material exists, related legislation will be complied to dispose.

4.3.2 Blasting

Blasting will be performed in accordance with WRP-SPC-PPL-PLG-001 Pipeline Construction Specification and BCH-SPC-PPL-PLG-012 Specification for Blasting.

Blasting will only be used where other excavation methods are considered technically infeasible or uneconomic, and it shall be demonstrated to, and approved by, EPCM, that the blasting will minimize over-break of ground and minimize the generation of spoil material.

Special reports will be generated related to sections where balsting will be executed including information of blasting methodology and related calculations and etc. Blasting can be performed after EPCM's approval.

4.3.3 Backfilling and bedding

Padding and backfill operations will be performed in accordance with WRP-SPC-PPLPLG-001 Pipeline Construction Specification.

Bedding is required in areas where the stones and other materials inside the pipeline trench can damage the coating of the pipe and the surrounding soil is not convenient for bedding. When the surrounding soil is considered unsuitable for bedding, the bedding material will be imported by the CONTRACTOR upon approval of EPCM. Imported material used for bedding will be sand and will be salt free (to be verified by sampling and analysis before selecting the material quarry) and will not contain clay, roots, stones or other material which is likely to cause damage to the pipe coating.

Backfilling and bedding materials must be approved by EPCM before backfilling and bedding and have to be in accordance with project requirements and shall not cause any damage to pipes.

4.3.4 Management of Excess Soil and Rock

Generally, all soil and rock will be returned to the excavated areas. In some locations, however, there will be surplus subsoil or rock that cannot be returned, and this must be disposed of both safely and in line with the environmental requirements of the contract and in accordance with the requirements of the "Waste Management Plan (PLK-PLN-ENV-PL4-006).

Any new borrow (e.g. padding material, rock) and disposal (e.g. excess soil, excess rock, tree stumps) sites will be identified and evaluated to support project activities.

All borrow sites will be evaluated to determine if they can be used as disposal sites for waste soil and rock. For those that can be used as disposal sites, method statements will be developed for EPCM approval.

For existing borrow or disposal areas, CONTRACTOR will evaluate operations to identify corrective actions required for current operations to meet project standards. Only those portions of existing operations that meet or can be adjusted to meet project requirements will be used. CONTRACTOR will provide information to the facility operators on the actions needed to bring their total facility operations into compliance with project requirements, and will assist them in making necessary changes.

All surplus materials will be visually and olfactory inspected, sampled and tested prior to reuse in accordance with the agreed limits of Dutch Standards and USEPA guidance, All soils suspected or confirmed to be contaminated will be removed from site and disposed of to a suitably licensed facility. CONTRACTOR retains the same responsibilities for excess soil and rock as for any other waste material as specified in the project documentation and Waste Management Plan.

The priorities for managing excess soil and rock are as follows:

1st: Reuse at a project facility or RoW section (e.g., trench backfill material, erosion control)

Where generated spoil is suitable for use as a construction material it will be first considered for reuse on the project facility or RoW for Project infrastructure works materials; stability, erosion control, AGIs, etc.

2nd: On TANAP-RoW Disposal

- For restoration purposes e.g. simulation of rock streams/glaciers in adjacent areas, hillside contour blending.
- Localized increase in finished surface height of TANAP-RoW where approved by EPCM.

3rd: Off TANAP-RoW Reuse

Transfer to third Party for re-use purposes as raw or semi-finished materials, e.g. crushed andesite that may be suitable for road construction materials or for rail ballast.

CONTRACTOR will enter into negotiations and agreements with third parties regarding the feasibility, material specifications, terms and conditions for supplying spoil materials off the TANAP-RoW as materials acceptable for reuse. Notification of such agreements will be duly noted and reported to EPCM.

4th: Off TANAP-RoW Disposal (permanent soil and rock)

All off RoW disposal sites are to be agreed prior to use with EPCM and are to be in accordance with the project Waste Management Plan (PLK-PLN-ENC-PL4-006).

Spoil will not be deposited:

- in valley bottoms, creeks, gully crossings, or sink holes;
- where they will potentially interrupt concentrated overland flow;

Earth works management will be engineered particularly in contour restoration.

4.4 Reinstatement of Soils

The RoW will be reinstated to a sufficient extent in order to allow the affected area to be returned to its pre-project use and productivity. Appropriate maintenance and handling of all soil is essential to achieving this objective.

General reinstatement will achieve:

- Final surface will be within +100mm of the level of undisturbed adjacent ground and blended to the existing contours (excluding slope breakers). In certain locations such as side slopes or along narrow ridges site specific reinstatement will be applied as shown on the AFC drawings or approved by the EPCM representative.
- Planting within pipeline permanent RoW to be approved by EPCM.
- In barren areas, a semi- natural appearance is required: rocks or processed rock may be distributed over the final surface provided the particle size distribution is similar to that of adjacent undisturbed rocks.
- Erosion control measures (if any) may remain visible.

- Water drainage has adequate outfalls and avoids ponding water on the RoW.

Upon completion of reinstatement, disturbed areas shall be inspected jointly by CONTRACTOR and EPCM for slope stability, relief, topographic diversity, acceptable surface water drainage capabilities, and compaction.

4.4.1 Reinstatement of Subsoil

Two situations are considered: standard reinstatement and special re-instatement.

4.4.1.1 Standard Reinstatement

On return of the subsoil to the trench, the subsoil will be compacted to a similar compaction to that in the adjacent undisturbed area. The depth of subsoil after settlement will not be above the level of the surrounding ground. After the subsoil has been returned and the land levelled, the subsoil will be rendered to a loose and workable condition to a depth of 300 - 400 mm and contoured in keeping with the adjacent undisturbed ground. Both the Environmental Inspectors of EPCM and CONTRACTOR will regularly monitor subsoil replacement and contouring.

CONTRACTOR will provide a detailed method statement for standard reinstatement for approval prior to mobilisation.

4.4.1.2 Special Reinstatement – Side Slopes

Special reinstatement is applied where it has been necessary to cut a bench into hillside in order to establish a flat working area from which to lay the pipe. It is the intention where possible to restore the original slope by filling-in the bench, thereby removing any scar in the landscape.

Side-cut topsoil will be stripped and removed from the area and stockpiled as described in Section 4.1. Both the topsoil and subsoil will be stored separately. The side slope cut will be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours (see Section 8.1). The subsoil layers will be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account should subsoil extend beyond the original line of slope or a new slope be created which is steeper than the original slope. Following compaction of the subsoil, the topsoil will be spread over the site, harrowed and reseeded. The reinstatement of side sloped RoW section will include drainage measures to avoid erosion taking place across the reinstated RoW. Compaction of the backfilled subsoil will be sufficient to ensure long term stability of the slope and will as a minimum match the existing density of the surrounding ground. The reinstatement will be carried out in accordance with the typical drawings for side slopes unless otherwise approved by the EPCM. In exceptional circumstances where full reinstatement is not possible and the created cut slope will remain, CONTRACTOR will prepare a methodology statement proposing an alternative slope reinstatement solution subject to EPCM approval. This will set out as a minimum how the long term slope stability, visual impact, and environmental project requirements are met.

4.4.1.3 Reinstatement of Topsoil

Topsoil will be segregated and will not be mixed with spoil material before or during replacement. Topsoil will be re-spread over the surface of the subsoil. Topsoil will not be used for bedding material in the trench, and topsoil from unstrapped / undisturbed areas will not be used to cover adjacent disturbances. Topsoil will not be handled during excessively wet conditions or at times when the ground or topsoil is frozen, unless agreed otherwise with EPCM's representative.

Once the disturbed areas have had subsoil compacted and have been re-contoured, topsoil will be re-distributed over the entire disturbed areas from which it was stored.

All disturbed areas will be subject to final grading as specified in Section 4.5; however, measures will be taken prior to seeding to ensure areas of reinstated topsoil remain rough / tilled, to help protect the stability of topsoil against erosion. On sites where harrowing etc. is not practical (e.g. steep slopes, rocky areas), the sites should be dozer-tracked perpendicular to the slope or otherwise left with adequate roughness following topsoil placement. When the topsoil is replaced over the RoW, a slightly rough, loosely consolidated texture will be achieved in order to promote vegetation growth.

Topsoil should be seeded following the seeding regime identified in Table 7.1. In general, this will be undertaken using hydroseeding and/or any other applicable method, but for steep slope locations, other techniques and measures will apply, see Section 4.6.

All slopes which in the post construction state would be above the soil loss threshold willl be hydroseeded or hydromulched as appropriate.

CONTRACTOR will provide a detailed method statement for topsoil reinstatement for approval prior to mobilisation.

4.5 Protection of Soils During Construction

CONTRACTOR will be responsible for employing any temporary erosion and sediment control measures in order to protect the RoW and adjacent areas during construction activities. In the event that the pipeline ditch remains open, CONTRACTOR will ensure trench integrity and employ such measures as temporary ditch breakers, silt fences, straw bales, etc. as necessary.

4.5.1 Temporary Erosion Control

The following temporary erosion control measures will be incorporated along the RoW in order to protect the environment and to achieve the performance standards as set out in Section 3.5.

On longitudinal slopes with open trenches, plugs of unexcavated material will be left in the trench to interrupt surface flow and prevent scouring of the trench bottom.

Tree stumps should be left in place wherever possible to provide soil stabilization.

Drainage channels will be installed on all longitudinal and transverse slopes as required. Where slopes require cutting, flumes will be installed across the RoW. These will carry water from drainage sumps on the upslope.

The RoW will be monitored and repairs made immediately throughout construction to prevent:

- subsidence of the pipeline trench (below natural grade);
- breaching of diversion berms and slope breakers;
- slope wash from improperly placed berms and slope breakers;
- slumping and soil movements from cut and fill slopes;
- loss of stored topsoil, subsoil or cuttings;
- Pollution of sensitive sites, including watercourses, with displaced sediment as a result of erosion on the RoW.

4.5.2 Sediment Interception

Where the RoW intersects or is parallel to a watercourse sediment interception will be provided to prevent sediment entering the water. Sediment interception will be provided for runoff that may occur during construction and reinstatement activities until the reinstatement has been in place and is achieving the requirements of Section 3.5.

Sediment interception devices may take the form of a Silt Fence, Wooden Fence or Straw Bale Barrier. The removal of sediment caught by these measures will be the responsibility of the CONTRACTOR. It should be noted by CONTRACTOR that these forms of construction may be subject to vandalism in some rural areas where the resources used are of value, and as such selection of approach should consider location and access.

4.5.2.1 Silt Fence

Silt fences or other suitable sediment barriers will be installed in areas of low sheet flow and are installed to intercept runoff on eroding slopes.

The filter cloth is draped over the fence and secured in a 15-cm-deep trench dug one metre uphill. Filter fences installed across the working width should follow a slight gradient towards a natural outlet, waterway, or lined chute, into which they drain.

The following requirements will be satisfied:

- ponding will not be allowed behind a silt fence;
- drainage area will not exceed 0.1 hectares per 30m of fence length;
- for slopes between 2% and 20%, the maximum allowable upstream flow path length will be 30m;
- for slopes steeper than 20%, the maximum will be 6m;
- maximum upslope grade perpendicular to the fence line will not exceed 100%; silt fences will be used for sheet flow only.

Filter fabric will meet the following criteria contained in Table 4.1 as a minimum:

Table 4.1 Filter Fabric Criteria

Physical Property	Minimum Requirements
Filtering efficiency	%75 - %80
Tensile strength at 20% (maximum) elongation	90kg/ linear metre minimum
Slurry flow rate	0.11 liters/m3/min

Synthetic fibre will contain ultraviolet inhibitors and stabilisers and meet the performance criteria for the entire length of installation and the environments encountered. Filter fabric will be installed in continuous lengths.

Silt fences will be inspected daily during periods of prolonged rainfall, immediately after each rain event, and weekly during periods of no rainfall. Any repairs required will be made immediately.

Sediment will be removed prior to the sediment reaching 1/3 of the height of the silt fence. Care will be taken during sediment removal to ensure integrity of the fence is maintained. Sediment collected will be disposed of in an approved manner.

The silt fence will not be removed until the upslope area has been permanently stabilised. Any sediment deposits remaining in place after the fence has been removed will be dressed to conform to the existing grade, prepared and re-vegetated.

4.5.2.2 Straw bale barrier

Straw bale barriers (the term can include hay or other baled vegetative matter) will be installed in areas where small amounts of temporary sediment interception are required.

The requirement for locations of straw bale barriers along the RoW is to be established during the work jointly between CONTRACTOR and EPCM representative. Generally, these sediment control areas with slopes >10% will include:

- areas of protection for longitudinal down slope to water bodies and roads;
- edge of ROW with adjacent down slope water bodies or roads; and
- edge of ROW with adjacent down slope to defined environmentally sensitive areas.

Straw bales will be bedded into the ground and anchored with reinforcing stakes. Anchors are driven at an angle towards the neighbouring bale so as to tie them firmly together.

The drainage area will be no greater than 0.1 hectares for each 30m of bale barrier. Straw bale barriers will not be used in areas of rock or other hard areas, where full and uniform anchoring is prevented.

Straw bale barriers will be inspected daily during periods of rainfall, immediately after each rain event and bi-weekly during periods of no rainfall. Any repairs required will be made immediately. While the life expectancy of bales is not more than 3–6 months, deteriorated bales can be broken up and used as straw mulch or are often left to decompose in place. If non-biodegradable plastic or wire ties are used to bind the bales, these should be removed and disposed of. Straw bales will not be left in the trench from the point of backfilling.

4.5.2.3 Wooden Fence

Typically, subsoil will not be stored in working areas constrained by side slope or narrow ridges, spoil will instead be removed from the working strip and stored in approved temporary stockpiles. The use of wooden fences in areas of side slope and ridge construction to retain cuttings during construction and reinstatement of the TANAP RoW will be considered and used in communication with EPCM.

CONTRACTOR will ensure by calculation that fences are capable of safely supporting the loads imposed. Fences will be regularly inspected to ensure safe operation and structural integrity. CONTRACTOR will be aware that the use of wooden fences may pose localized problems. In certain areas, firewood is a valuable commodity therefore the fence material may be attractive to locals for firewood.

4.5.2.4 Water Disposal

Pipeline trenches commonly collect water during construction. Because it may be turbid and sediment laden, trench water will require filtering before it can be discharged.

Trench water is commonly removed using a pump connected to a 7–10cm diameter flexible hose. Disposal of trench water will be in accordance with the requirements set out in the CONTRACTOR's), CONTRACTOR'S Waste Management Plan (PLK-PLN-ENV-PL4-006), Pollution Prevention Plan (PLK-PLN-ENV-PL4-005) and the ESIA.

Appropriate measures to prevent erosion and sediments during the disposal of trench water, hydrotest water, or any other water will be adopted. Such measures are specified in the CONTRACTOR's ESMP and all water discharges will be undertaken in accordance with the requirements of that plan.

4.5.2.5 Crushed Rocks

Crushed rock may be required as a temporary measure it serves to reduce muddy conditions and sediment production during construction. In case of crushed rocks usage, there will be barrier like geotextile or else in order to prevent laying crushed rocks on the bare soil and grounds.

Crushed rock is applicable to locations where vegetation cannot be established and where erosion poses a risk to the pipeline or sediment threatens nearby streams. This also applies to stone dressings outside of the working width: e.g. camps, temporary roads, pipe storage locations, and crew quarters.

As required by local conditions, crushed rock may be used for temporary roadways, turning areas, and other locations from where sediment discharge poses a problem.

Following project completion, temporary areas dressed with crushed rock will be ripped, fertilized and seeded or planted. Before the fertilizing and biorestoration, crushed rock collection process will be made in following three steps;

- First, the surface rock will be collected,
- Second, ripping will be done,
- Finally, rocks rised after the ripping will be collected.

Erosion Control Devices for Reinstated Slopes

Careful construction and reinstatement can reduce soil erosion and sedimentation to within manageable limits. Bioremedial and mechanical (hydraulic) methods of controlling soil erosion and sedimentation will be implemented.

Stabilisation practices are essential on all steeply sloping lands disturbed by construction. Steep sloping ground is considered to be ground inclined at >15% to the horizontal, or shallower ground which through the nature of its topography is expected to be subjected to significant surface water flow.

Mechanical methods of stabilisation include the use of slope breakers, containment ponds, and lined chutes. Slope breakers cross the RoW and serve to contain and remove water runoff from the working width and other disturbed areas. They discharge into soakaway / containment ponds, natural channels, or lined chutes, depending on the situation. Dissipation of the energy anticipated from the flow is necessary. The breakers reduce the length of slope over which water can travel without interruption, but typically require the presence of vegetation to effectively limit the transportation of sediment from the slopes. The bioremedial measures include hydroseeding and hydromulching to revegetate the slopes. For some situations a seed impregnated jute matting will also be utilised to allow the establishment of the specified flora.

4.6.2 Slope Breakers

Slope breakers are channels constructed across the working width. Their purpose is to remove surface runoff and, acting with vegetation, to protect against soil erosion. Slope breakers can be temporary or permanent.

Temporary slope breakers are required to be functional for the first 5 years after the pipeline reinstatement takes place, and the construction must allow maintenance to ensure this is the case. Five years is considered sufficient time for the vegetation to be fully established provided suitable reinstatement is undertaken.

Permanent slope breakers (diversion ditches) will be in the form of stone dressed or rock formed slope breakers. These permanent structures and their associated outlets are required to remain functional for the design life of the pipeline (25 years), and the construction must allow maintenance to ensure this is the case. The shape and dimensions of the slope breakers will be, where necessary, altered to suit the local topography and runoff situation, following approval from the EPCM's representative. If a spring is intercepted, it should be diverted to a lined chute and provision made to drain the slope appropriately.

4.6.3 Erosion (Jute) Matting

Erosion matting, consisting of jute, will be installed to provide an immediate protection to the slope against erosion, prevent washing-out of seeds and enhance the micro-climatic conditions in the soil for plant growth.

Erosion matting will provide temporary protection to the soil surface until sufficient vegetation cover has been established to control erosion and meet the performance criteria. The erosion matting will be Geojute or similar. The mat will be biodegradable, open weave 11 mm x 18 mm mesh size and 2 mm thick fibres with a mass/area ratio of 500 g/m2. The mat will absorb water to 500% of its dry weight on saturation. The mat should rot in approximately two years. For river crossings reinstatement, rip-rap application will be done. CONTRACTOR will submit data sheets and samples of the proposed erosion matting for EPCM approval.

Where revegetation is taking place topsoil preparation and grass seeding work will be undertaken prior to laying erosion matting. The seeding will match the planting regime described in Section 7.

The erosion mat will be unrolled from the top of the slope, allowing it to lay naturally on the soil surface over all the local undulations. On no account will the material be taut or stretched so that it forms 'bridges' over local soil mounds and stones. Matting will be fastened to the slope surface as described on typical drawing WRP-DGA-PPL-PLG-050. Unless properly anchored, mats are liable to slip. Uphill ends are to be buried in a 15 cm deep slot and stapled per the manufacturer's recommendation at maximum 30 cm centres across the width of the mat. At joints, the downhill end should be overlapped shinglefashion for 30 cm. The uphill end of the new roll is inserted into a 15 cm trench and stapled as before. On slopes steeper than 25 % check slots should be used every 30 m. These are 15cm deep trenches into which a tight fold of matting is inserted. The slot is filled and tamped, and staples are punched.

Following installation, mats should be rolled, if the slope allows, with a smooth hand-roller to bring them into close contact with the soil and to consolidate the seedbed.

Erosion mats, once installed will be regularly inspected for degradation and installation integrity. Where matting has remained in place for longer than 12 months, CONTRACTOR will be responsible for maintaining and replacing matting as required through the construction and maintenance period.

4.6.4 Crushed Rock

Crushed rock may be required as a permanent erosion control measure at locations where it is impossible to establish vegetation and with prior approval of EPCM. Crushed rock will be used, if necessary, to recreate the surface covering of rock on the adjacent and pre works slope. If possible the rock used will be that recovered in the top soil stripping and pipe trench excavation.

4.6.5 Lined Chutes

Lined chutes are channels created to collect and convey runoff to where it can be safely disposed of without erosion. Chutes or waterways serve to receive and concentrate runoff from slope breakers, from small gullies that cross the pipeline right-of-way, and from other areas that require water disposal. Their design is such that channel velocities remain nonerosive, even on steep slopes. The discharge point is to be designed and installed sufficiently to dissipate discharge energy and avoid erosion at the discharge point. Lined chutes will be applied where shown on the alignment sheets or as directed by the EPCM representative.

Commonly, lined chutes are designed to convey water from where springs emerge in the vicinity of the pipeline RoW.

On steep slopes (>25%) lined chutes will contain wicker dams to reduce the potential for high velocity water flow down the slopes. The chutes, including wicker dams where utilised, will be inspected and maintained at the same time as the slope breakers

4.6.6 Gully Remediation

The objective of gully remediation is to prevent existing gullies from increasing in size and extent through continued erosion.

The structures described in this specification reduce the velocity of concentrated storm water flows and thus reduces erosion of the swale or ditch. They also trap small amounts of sediment flowing in the gully.

Gabions in combination with a geotextile and rock fill will ensure that further erosion will be mitigated and gully head migration and

Gully head remediation will be applied as shown on the alignment sheets or directed by the EPCM representative. Final design of the gully head mitigation measures will be proposed by the CONTRACTOR subject to EPCM approval.

4.6.7 Geotextile

Geotextile will be as defined in the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030 (or EPCM-approved equivalent).

Geotextile will be handled and installed according to the manufacturer's recommendations, and/ or as shown on the Drawings. Geotextile will not be stored in direct sunlight. Construction equipment and/ or vehicles will not be allowed to operate directly on geotextile.

Where geotextile is joined with overlapping joints, a minimum 500 mm overlap will be allowed at adjoining borders. For geotextile placed on slopes, the geotextile will be secured at the top of slope by embedding in an anchor trench, as shown on the Project Drawings.

Proposed Measures

Using slope geometry and assumptions where necessary, mitigation measures have been proposed for each slope using the USLE (see Section 8.3) These measures are presented on the alignment sheets using two codes, one for Bio-remedial measures, and one for the engineered referred to as 'slope breakers'. The codes present predicted measures required to reduce soil erosion to an acceptable level for each slope. The codes are in the following format:

Table 4.2 Bioremediation Code

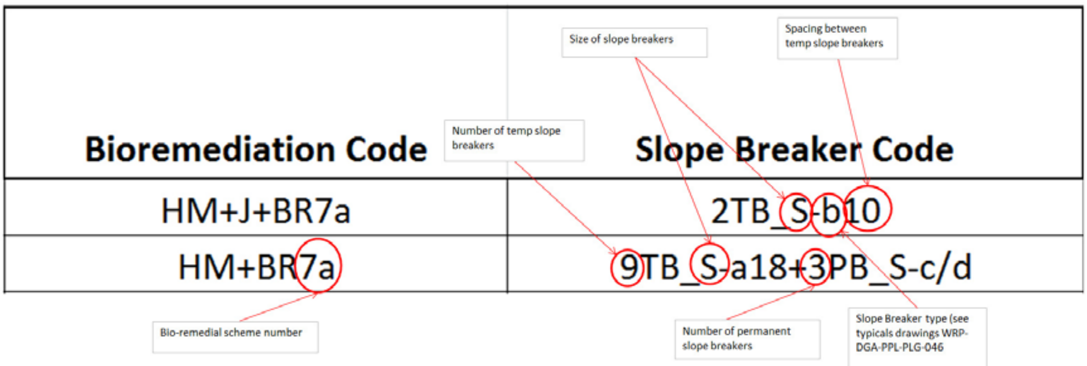
CODE	Description
HM	Hydromulching of slope surface
HS	Hydroseeding of slope surface
BR	BioRemedial scheme, Number identifies which BR from list in Specification for Reinstatement

Table 4.3 Slope Breaker Code

CODE	Description
TB	Temporary Slope Breaker
PB	Permanent Slope Breaker
-a	Slope Breaker type A
-b	Slope Breaker type B
-c	Slope Breaker type C
-d	Slope Breaker type D
-L	Large breaker dimensions
-S	Standard breaker dimensions
J	Jute Matting

Figure 4.1 gives an example of the codes provided on the alignment sheets, and some explanatory notes, to be read in conjunction with Table 4.2 and Table 4.3.

Figure 4.1 Alignment Sheet Code Example



The first example given in Figure 4.1 identifies that the slope will be hydromulched, and have Jute Matting, making use of the seed mix BR7a as described in Table 7.1. It also identifies that 2 temporary slope breakers, of standard dimensions and type 'b' will be constructed at 10m spacing down the slope.

The second example given in Figure 4.1 has 9 temporary slope breakers of standard size, type 'a' at 18 m spacing down the slope. It also has 3 permanent slope breakers, type 'c' or 'd' as appropriate for the slope, and of standard size.

Permanent slope breakers are always used to divide the slopes into equal parts. In the case of the Figure 4.1 second example this is 3 slope breakers subdividing the slope into 4 sections. The temporary slope breakers are spaced between permanent breakers, with an additional breaker included at the crest of the slope which has been included to take count of situations where the surrounding topography may result in discharge onto the steep slope. The requirement for T* temporary breakers will be judged by the CONTRACTOR to the satisfaction of the contract requirements.

The mitigation measures, both bioremedial and engineering, are provided on the IAAC alignment sheets and drawing WRP-DGA-EGG-PLG-001. These require verification at each location by CONTRACTOR and the

EPCM', through validation or updating of the design assumptions.

CONTRACTOR will establish steep slope areas and provide procedures and methodology statements as part of the site-specific Special Area Reinstatement Method Statements for EPCM approval. The procedure will establish all planned temporary and permanent erosion measures in line with Reinstatement specification and Project Drawings.

Construction in steep slope areas requires an increased awareness of safety and stability issues. CONTRACTOR will utilise proven construction techniques specific to such areas. CONTRACTOR will demonstrate that increased safety measures are planned and these measures are to be followed on site.

CONTRACTOR will follow particular requirements for drainage control as noted on AFC alignment drawings and DGA-EGG-PLG-001.

Assumptions and Site Validation

Where information was not available to undertake the USLE as described in Section 8.3, assumptions were made such that the initial proposed soil erosion mitigation measures could be generated for each slope. As not all slopes were visited, these assumptions are significant and relevant to almost all slopes, and must be validated accordingly by site observations. The following list of assumptions should be considered for each slope, and the mitigation measures reconsidered if the assumptions are found to be invalidated by the site observations:

- Slope start / endpoint identified using GIS
- Slope angle attributed based on averaging from GIS
- The percentage of slope surface covered by rock-mulch
- Potential for sediment discharge into a watercourse or sensitive site, identified from GIS
- Soil class mix (gravel, sand, silt, clay), currently assumed to be a silt for all sites
- Local topography (is RoW likely to be impacted by flowing groundwater), including requirement for slope creast temporary breaker (see section 4.7)

The assessment of the validity of the assumptions made will be undertaken by the CONTRACTOR, and EPCM representatives on site, and the USLE assessment reworked by the EPCM representative where necessary to modify the mitigation measures to be installed, for the approval of the EPCM.

Marking of Erosion Control Works

CONTRACTOR and EPCM's representative are to walk the pipeline RoW for each steep slope, to validate the design assumptions in the erosion assessment. Following validation, or update of the prescribed erosion mitigation measures, the CONTRACTOR and EPCM will agree the site specific arrangement of mitigation measures, and jointly stake the route with the agreed upon measures immediately prior to clearing and grading of the RoW. Due to the length of the TANAP pipeline and the lot allocation, multiple teams will be required to perform this function.

Rip Rap

Rip rap will be required to reinstate specific river crossings. The minimum installation locations are defined in the River Crossing Reinstatement and Scour Protection Schedule Document No. WRP-LST-PPL-PLG-003.

This document will not limit the location of rip rap installations. CONTRACTOR will identify any additional areas and propose them to EPCM for review and approval.

Rip rap may also be used in areas along the right of way other than at river crossings, CONTRACTOR will install rip rap wherever deemed necessary and suitable to achieve the erosion control requirements or for slope stabilisation.

Rip rap will be as defined in the Pipeline River Crossing Civil Protection Works Specification WRPSPC-PPL-PLG-030.

Rock filled Gabions

Gabions will be required to reinstate specific river crossings. The minimum installation locations are defined in the River Crossing Reinstatement and Scour Protection Schedule Document No. WRP-LST-PPL-PLG-003.

This document will not limit the location of gabion installations. CONTRACTOR will identify any additional areas and propose them to EPCM for review and approval.

Gabions may also be used in areas along the right of way other than at river crossings CONTRACTOR will install gabions wherever rip rap is not suitable control measure and deemed necessary to achieve the erosion control requirements or for slope stabilisation.

Rock-filled gabions will be as defined in the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030.

5 TRENCH BREAKERS

Trench breakers will be installed within the pipeline ditch at locations along the pipeline route where the natural profile, drainage pattern and backfill materials may cause the trench to act as a drain resulting in the washing out of the bedding material etc. Where the slope is steep trench breakers will assist in the backfilling operation, breaking the trench into shorter sections. Anticipated spacing requirements for slope breakers are identified on typical drawing WRP-DGA-PPL-PLG-041.

CONTRACTOR will install the trench breakers per design. The final installation will require approval from the EPCM. Allowance for water movement through the trench breaker will be made by installing pipes through the trench breaker as shown on the typical drawing.

Additionally, impermeable trench breakers are required to control the lateral/horizontal migration of groundwater and/or fluids:

- at bases of slopes adjacent to wetlands and where needed to avoid draining of wetlands,
- to prevent contamination migration, and/or
- reduce suffosion risk in karst terrain

If trench breakers are used for this purpose the drainage pipes will be omitted.

The materials of construction will be polyurethane bags filled with sand and cement 10:1 as detailed in the referenced Project Drawings, polyurethane foam (subject to Client approval), or alternative (subject to Client approval).

6 RIVERS

Where required the design of riverbed and riverbank protection will be in accordance with Project Drawings.

Specific method statements will be produced by CONTRACTOR for all river crossings, i.e. RVX1, RVX2, RVX3A and RVX8, generic method statements will be produced by CONTRACTOR for each type of minor river crossing i.e. RVX3B, RVX4 to RVX7 for TANAP approval, as per Appendix 5.9, Section 1.3.11 of the ESIA Report. The method statement will detail all construction and restoration procedures.

Riparian vegetation (Plant habitats and communities along the river margins and banks) are of high importance to the long term stability of the river. CONTRACTOR will minimise riparian disturbance wherever practicable. Where riparian vegetation consists of shrubs and trees greater than 1m height, CONTRACTOR should transplant the plants wherever possible for replanting during reinstatement works. Where it is not practicable to transplant or translocate the trees then new trees of the same species mix will be planted. Nursery trees of minimum 2 years old up to 5-year-old will be planted in order to restore the riparian environment, subject to the restrictions of the Planting Proximity Zones.

The Planting Proximity Zones are defined by the following:

- there will be no trees planted within 6 m of the pipeline centreline,
- trees such as Willows (Salix) and Poplar (Salicaceae) or other native species with similarlydeep and aggressive root structures will not be planted within 10m of the pipeline centreline.
- other tree species such as Ash/ *Crataeagus monogyna* , Alder/ Alnus, Lebanon cedar/ *Cedrus libanii*, larch/ *Larix* sp., beech/ *Fagus orietalis*, elm/*Ulmus minor*, sweet chestnut/*Castanea* sp., hornbeam/*Carpinus betulus*, Pinus brutia, scotts pine/*Pinus slyvestris*, black pine/*Pinus nigra*, Kermes oak/*Quercus coccifera*, Cilician Fir/*Abies cilicica*, sycamore/*Platanus orientalis*, apple/*Malus* sp., plum/*Prunus* sp., cherry/*Cerasus* sp., pear/*Pyrus* sp., and also included in this category are most conifers may be planted at a distance of 6 m or greater from the pipeline centreline.

CONTRACTOR will plant sufficient density of vegetation to achieve the original plant densities subject to the restrictions of the Planting Proximity Zones. The planting density will take consideration of dieback rates of each plant. Besides, cultivated plants will not prevent the flow of water.

Where originally present native shrubs will be re-planted above the pipeline and within the riparian zone, if no shrubs are originally present, CONTRACTOR will introduce shrubs native to the region to provide vegetative stabilisation and erosion protection to the cleared riparian zone 6 m either side of the pipeline centreline.

Acceptable plant types, suggestion of planting density and their location relative to the pipeline are outlined in drawings WRP-DGA-PPL-PLG-036-01 – Typical Drawing Riverbank Protection Bio Restoration and WRP-DGA-PPL-PLG-036-02 Typical Drawing River Riparian Restoration.

Bioremediation of river banks will be undertaken to re-establish vegetation to the equivalence of the adjacent untouched areas. This may include juvenile trees and shrubs the selection of, placement and planting will be supervised by an ecologist.

Unless stipulated on project documentation river banks will be restored to their original condition and contours. Where this is not practicable, CONTRACTOR will propose site specific solutions with engineering justification; this will be included within EPCM approved method statements.

For gravel bed rivers, the armoured bed (the sediment forming the surface layer that is coarser than the underlying sediment) will be recovered to a minimum depth of 300 mm at the start of crossing excavations, stored in a segregated area and replaced as the top layer of bed material during reinstatement.

The backfill over the pipe will be at least as scour-resistant as the original bed material. Where rock is present the backfill material will be coherent and with similar properties to the adjacent undisturbed ground, the trench should not create a natural channel for preferential erosion or water run-off nor should it create localised hard areas, with the potential to increase future erosion rates across the watercourse.

The disturbed portion of the river bed will be returned to pre-construction contours where possible and in compliance with Project Drawings. Any deviations will be subject to EPCM approval.

Erosion protection and stabilisation measures will be provided to prevent acceleration of and / or increase in the erosion as a direct or indirect result of the construction activities. Other than sites where civil protection measures are designed e.g. riverbank revetments and riverbed protection, erosion and soil stabilisation measures, when implemented, will not be intended to permanently alter the pre-construction hydrologic and environmental regimes including natural erosion of the rivers. Trench backfill materials will meet the requirements of the Pipeline Construction Specification. Any material too wet to be suitable for reinstatement of the banks will be dried as required to ensure stability during reinstatement.

Erosion and sediment control devices will be installed and maintained until re-vegetation and/or selected stabilisation measures shown in Project Drawings are sufficiently established and functioning to meet the requirements of “no accelerated” or “increased erosion”. CONTRACTOR will detail erosion and sediment control measures to be used in the method statements for EPCM approval and these will be compliant with the project documentation. Where erosion matting and/or bio-restoration cannot achieve the project reinstatement performance requirements, or where otherwise indicated on Project Drawings, or as otherwise deemed necessary, erosion protection will be achieved by the installation of civil protection measures (see Section 4).

Where permanent river bed scour and riverbank protection is required it will generally be specified on site specific detail drawings and in the River Crossing Reinstatement and Scour Protection Schedule Document No. WRP-LST-PPL-PLG-003. Protection measures will be implemented as specified. CONTRACTOR is required to validate the river crossing reinstatement and scour protection schedule document and where additional protection requirements become apparent during either construction and/ or re-instatement, CONTRACTOR will propose additional measures, in accordance with project requirements.

Requirements for riprap, geotextile, gabions, sills, bunds, groynes etc, including but not limited to material specifications, placement and testing will be in accordance with Project Drawings, and meet the minimum requirements of the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030.

7 BIORESTORATION

The presence of vegetation reduces the susceptibility to soil erosion, providing canopy cover to the soils and having roots binding the soil. Revegetation in the project area means returning the land to its use prior to construction of the TANAP pipeline. This will mean planting grasses on highly erodible landscapes, or planting alpine plants and trees if the land is unsuited to grass, to be determined by an ecologist on site prior to stripping and grubbing, and to be approved by the EPCM. Privately owned land will normally be replanted to the pre-existing condition or as agreed with the landowner and EPCM.

Trees will not be planted within a 16 m wide strip centred over the pipe. However, trees may be planted in areas suitable for reforestation, such as the verge of the right-ofway. In addition to the TANAP’s working width, its temporary roads and other disturbed areas will be reinstated by CONTRACTOR to the satisfaction of the Landowner and EPCM. The collected seeds then will be sent to Ministry of Agriculture's seed gene banks in Ankara and vegetative propagules will be used in order to start an ex situ cultivation for the reintroduction of populations in suitable habitats within the species range. In case failure to seed at Gene Bank, Contractor will fulfill all the requirements to arrange the appropriate and required storage areas considering temperature, humidity and other requirements of inside conditions to store seed to comply with project requirements. Seed transportation and providing the records will be responsibility of CONTRACTOR's biologist/ecologist.

All biorestoration programs will be approved by EPCM. Landowners will be consulted by CONTRACTOR to assist in developing these programs. Where Landowners requirements cannot be achieved, CONTRACTOR will consult with EPCM to agree final resolution of the issue.

7.1 Objectives

The objectives are: (1) to establish sufficient vegetation cover to reduce erosion to meet the performance requirement of Erosion Class 3 (and in sensitive locations Class 2) or better through restoration of the local plant community, (2) to reinstate with sufficient variety and distribution of appropriate plant species such that over time the local species will re-establish themselves across the RoW.

The long-term cover will be the native flora with the exception of areas that were planted with crops or other non-native species prior to construction. The biorestoration strategy is based on supplementing the seed bank of local species to remain in the topsoil when it is replaced. These supplementary seeds will be of fast growing species, sensitive to the local ecology, and that will rapidly provide soil surface cover and limit erosion. All biorestoration materials including seeds and plants are to be supplied by CONTRACTOR.

7.2 Requirements

7.2.1 Agricultural / developed areas

In agricultural (defined as arable land) and other developed areas CONTRACTOR will leave the land in the condition specified in the pre-entry agreements. Except where agreed otherwise, CONTRACTOR will assume that the land is to be made ready for re-planting with crops: the land will be graded and tined to remove compaction. Application of fertilizer and other soil amendments (if needed), and planting on permanent growing areas will be carried out by the landowner or tenant. CONTRACTOR will, however, seed and maintain all topsoil storage areas as required by Section 3.1, and irrigate all areas to the extent required to suppress dust formation.

7.2.2 Undeveloped areas

A minimum of 70% or the pre-works cover of ground vegetation (based on 100% total without overlapping cover) will be established within one year of planting. This will minimise surface erosion and provide a sustainable, self-generating plant community under virtually all conditions.

Fertiliser will be applied where necessary to achieve these target growth rates, as described in Section 7.5.

In areas where third party activities have affected the level of vegetative cover, the original cover will be determined by reference to adjacent, unaffected areas of similar topography and soil type.

Original percentage cover will be estimated from CONTRACTOR's photographic record of the route, or, in case of doubt, by reference to adjacent undisturbed areas.

The vegetation cover will be composed of either:

- Species (for example, fast growth types) that are suited to the local environment and indigenous to the region; (The selection of species which do not belong to the same area will be aligned with sensitivity of the area. For example, for critical habitats, there may be certain restriction of importing alien species to the area.), as proposed in Section 7.5
- species originally found in each route section or project area, as determined by ecologist on site;
- or an ecologically compatible mixture of those two groups.

The biorestoration maintenance, including weeding and grazing control, will be CONTRACTOR's responsibility for a period defined within the Contract.

7.3 Scheduling

CONTRACTOR will carry out biorestoration work in the appropriate growing seasons. Sowing or planting must take place in the appropriate season for the applicable plant types. CONTRACTOR will identify from historical meteorological data suitable weather 'windows' for each area of the route. Biorestoration schedule will be provided before starting biorestoration works and be approved by EPCM.

CONTRACTOR will produce a Biorestoration Schedule including pre-construction transplanting or cultivation in addition to post-construction soil preparation, planting and aftercare. Scheduling of the biorestoration will be aligned with the ESIA requirements and management plans and will be issued to EPCM for confirmation before being applied.

7.4 Selection of Plant Species

This section refers to the species and form of materials (seed, seed-mix, bulb, or plant etc.) chosen to supplement the seed bank of the topsoil. This section does not apply to agricultural or other developed areas. The selection of species will be designed to achieve the objectives defined in Section 7.1. Seed mixes based on localised assessment for all regions along the pipeline are presented in Table 7.1, but must be verified at each location by a competent ecologist to ensure suitability and compatibility with pre-works and adjacent ecology. This is of particular importance in critical habitat areas.

CONTRACTOR will be responsible for the final choice of species and form of materials for each project area and section of TANAP ROW. CONTRACTOR will refer to specialist advice provided by Specialist CONTRACTOR on existing species and their distributions.

CONTRACTOR will produce Site Specific Special Area Reinstatement Plans and Generic Reinstatement Plans describing the quantity of plants/seeds and material forms to be planted for approval by EPCM. This plan will include certain mitigations and limitation for critical areas in terms of selection of species and seeds to be used.

7.4.1 Rare Plants

Rare plants will be dealt with in accordance with the mitigation measures detailed in the BAP. In addition to flora, there may be certain fauna which make a habitat critical; in this case certain limitations will be applied to the seed selection.

7.4.2 Species Selection

Where rapid growth is necessary for erosion control or other reasons, the species selected for initial planting will have the following be compatible with the area required to be erosion controlled:

- dense, fibrous horizontal root structure close to the surface;
- dense uniform ground cover, particularly during the season of the most intense rainfalls;
- resistant to damage by high-velocity run-off;
- resistant to damage from trampling by people and animals; not persistant – to allow the original species to re-colonize the area;
- if possible, not clumpy or tussocky as this may lead to concentration of run-off between the plants.
- Not to be invasive, or harmful to grazing farmstock.

The species selected for long-term growth will reflect the variety and distribution pattern of the preconstruction flora.

Table 7.1 Proposed Seeding Combinations

Seeds of the species to be collected	Kilometer Point From (m)	Kilometer Point From (m)	Region	Seed Collection Time
Thymus leucostomus	1362+917	1363+753	Eskişehir	15 June-15 July
Salvia tchihatcheffii	1366+493	1366+692	Eskişehir	1 June-1 July
Cephalaria aytachii, Gypsophila osmangaziensis, Scabiosa hololeuca	1372+340	1372+683	Eskişehir	1 July-August (Cephalaria aytachii, Gypsophila osmangaziensis, Scabiosa hololeuca) and 15 July-15 August (Alyssum niveum and Salvia tchihatcheffii)
Erodium sibthorpianum ssp. sibthorpianum and Astragalus densifolius ssp. ayashensis	1430+920	1432+305	Kütahya	1 June-1 July
Onosma briquetii	1477+452	1477+83	Bursa	1 June-1 July
Alyssum dudleyi, Verbascum n.sp., Dianthus goekayi	1491+767	1496+340	Bursa	1 June-1 July (Alyssum dudleyi) and 15 June-15 July (Verbascum n.sp. and Dianthus goekayi)

7.5 Fertiliser

Fertilizer will be applied to disturbed surfaces, as necessary, where vegetation is to be seeded or planted.

Fertilization should be applied during hydroseeding and hydromulching process. The fertilizer should contain 4.0 % Fe, 3.0 % Mn, 0.1% Mo, 2.0 % Zn. The amount of fertilizer should be 25 kg per 1000 m 2. The CONTRACTOR will ensure that this fertilizer is appropriate for each location, or vary the fertilizer if necessary following approval from the EPCM. Local advice (universities, agronomists, and landowners) and advice from the Ministries of Agriculture or Forestry should be obtained to confirm or revise the stated fertilizer application rates at specific locations.

Fertilizer varies chemically and physically, with its greatest variability occurring among nitrogen fertilizers. Fertilizers having high solubility and motility are unsuited to highly mobile construction as practiced by the pipeline industry. The project requires fertilizer that can be applied during reinstatement and that remains active during periods of maximum plant requirements, especially during periods of rapid vegetative growth. Fertilizer broadcast as a top dressing during seeding is generally unsuited for the following reasons:

1. Seedlings during their growth establishment period have low soil nutrient requirements.
2. Autumn-sown wheat does not enter rapid vegetative growth until spring following snowmelt, about 100 days following sowing.
3. Urea, an amide-type fertilizer, may volatilize if applied to the surface. (Biuret, an impurity occasionally found in urea, may be toxic to some plants.)
4. Fertilizers not adsorbed by soil colloids may leach. Fertilizer types particular prone to leaching include nitrate types (sodium nitrate, calcium nitrate) and urea. Ammoniacal types (ammonium sulphate and ammonium chloride) adsorb onto soil colloids but have low nitrogen content and high production costs compared to other forms.

The TANAP project is best suited to combination fertilizer types, such as ammonium sulphate nitrate or calcium ammonium nitrate. Market conditions and local advice is crucial to selecting the type of fertilizer to be applied. Landowner requirements must also be taken into consideration. Reinstatement practices may require adjustment if fertilizer application is to be effective.

Placement of Fertilizer

Problems can be avoided if fertilizer is mixed into the topsoil. This effect would be similar to injecting fertilizer into the soil, albeit its depth if broadcast would be deeper than injection as it is currently practiced. Indeed, in-depth placement or mixing may be the only practical way of applying urea if that is the only fertilizer available to the project.

7.6 Procedures to be followed by CONTRACTOR

Depending on the type of vegetation being reinstated, one or more of the following procedures for revegetation can be adopted:

- sowing of grass seeds - procedure ‘G1’;
- planting of shrubs / tree whips at 1m centers - procedure ‘P1’;
- planting shrubs/tree whips at 2 m centers in a lunette (micro basin) - procedure ‘P2’.

The procedure for each of the above is described in "Specification for Reinstatement" document (WRP-SPC-EGG-PL6-001).

7.7 Reforestation

Forests reduce runoff due to the canopy cover to the soils, soil cover through fallen debris, and their beneficial effect on soil infiltration. They reduce erosion by the effects of plant roots binding soil particles together and of humus protecting the surface. Reforestation of the RoW with juvenile trees / saplings may be considered necessary wherever a forest existed before construction of the pipeline. This will be dependent on the judgement of the ecology specialist and with the EPCM approval, where the proposed planting regime (see Section 7.4 and Section 6) is considered unlikely to result in suitable long term ecological diversity. For the purposes of this specification a forest is defined in accordance with Article 1 of the Forest Law that states 'trees and small trees, naturally or artificially grown, together with their surrounding area are considered as forest areas'. The reforestation strategy will be to successfully replace every tree felled during RoW clearance. The planting zones along I proximity of the pipeline are given in Section 6. It is noted that the revegetation strategy in all sections of the ROW will be to reinstate the pre-construction vegetation in terms of both composition and density.

A 24 m working width is adopted in forest locations. A strip 8m wide above the pipeline is to remain fallow. Beyond this a 3m strip on either side is to be seeded; the outermost 4m on either side is reforested with trees if deemed necessary. See typical drawing WRP-DGAPPL-PLG-006.

Two planting methods will be adopted (including for river bank reinstatement):

1. When trees from the RoW are less than 1 m high, they are to be carefully excavated, including roots, by an excavator. The earth and trees are then removed to a storage place where they are supplied with water. During reinstatement the same types of trees are replanted.
2. When trees on the RoW are higher than one metre and cannot be replanted, 3 years to 5-year-old plants from plantations are reforested. Bailed or container plants are to be used and planted in a spacing of 2x2 m for softwoods and 1.5 x 1.5 m for hardwoods. In poor soils (as on tuff or sandstone) a dressing of fertilizer is to be placed in the planting hole.

Shrubs will be reforested with tree species as per the pre-works slope and adjacent slopes.

CONTRACTOR will provide a detailed reforestation strategy as part of the Reinstatement Plan and Method Statements as required which specify in detail how the project objectives will be met. Reforestation strategy will be provided and approved by TANAP 12 weeks prior to clearance of RoW. The following information should be included in the reforestation strategy:

- species to be used and where;
- specific planting methods;
- detailed requirements for fertilizer use;
- detailed requirements for aftercare and monitoring;
- and supervision of reforestation activities.

Reforestration activities will be performed by Contractor's biologist/ecologist and soil expert. If conducting these studies with the supervision of a forest engineer is required by the relevant authority, Contractor will provide supervision services from a forest engineer.

7.8 Protection of Planted Materials

In sections where livestock or wild animals may be present, precautions will be taken to protect theseeds and plants from damage. Some or all of the following techniques should be employed:

- security patrols and procedures;
- liaison and agreements with livestock managers;
- erection of stock-proof fencing (designed/installed to discourage theft), along the project area boundaries;
- supplement boundary fencing by internal area fencing to give double protection to particular areas;

7.9 Aftercare, Monitoring and Corrective Action

CONTRACTOR will carry out the necessary aftercare (watering, further application of fertilizer, weed control, etc.) during the Contract maintenance period in order to meet the revegetation requirements.

Where necessary, CONTRACTOR will provide and maintain appropriate fencing to prevent access by grazing animals and vehicles. Fences will be fitted with signs in Turkish indicating the purpose, i.e. the enclosure is a TANAP biorestoration project area and fencing is required for protection.

Appropriate levels of irrigation/watering will be provided for revegetated areas (See Section 6.7 of in "Specification for Reinstatement" document (WRP-SPC-EGG-PL6-001)). The quantity and timing will be dependent on local climatic conditions, soil type and species requirements. Although recommendations have been provided in this specification local advice should be sought where possible.

Reinstated slopes will be monitored for the condition of the engineering measures, such as slope breakers, and will be monitored for the effectiveness of the biological reinstatement.

- If seeding had been carried out in spring, first biological monitoring study should be conducted in May-June, and then every 3 months subsequently until the target cover is achieved.
- If seeding had been carried out in summer, then the first monitoring study should be conducted in March to April.
- If seeding had been carried out in autumn, first monitoring study should be conducted in April-May which is the flowering period of the next year.

If the percentage of the germination remained less than expected (see Section 7.2), then the seeds will be replanted in the next year. In this case, the same monitoring procedure is carried out in the next year. If after the first year the required vegetation cover was established monitoring will be reduced to annually, to take place in July-August until 5 years after the initial reinstatement. During this period reduction to the established cover will be addressed by further seeding, fertilizer application and watering.

Where shrubs and or trees have been included in the reinstatement these will be monitored on the same frequency as the rest of the seeded slope (as above). If during this monitoring it is observed that >30% of plants or trees have failed further planting will be undertaken, along with watering and use of fertilizer.

8 SPECIAL AREAS

The TANAP pipeline project contains topographical, geological and ecological features, which are characterized on the project as Special Areas; these require particular attention throughout construction and reinstatement.

Method statements for these areas will demonstrate sufficient awareness and intent to minimize construction impact. A high level of importance is attached to the satisfactory reinstatement of these areas, therefore an increased level of EPCM inspection, prior to acceptance, is planned. These Special Areas are as follows:

- side slopes;
- steep slopes;
- site cuts
- narrow ridges and areas prone to landslides;
- ecological sensitive areas;
- karstic areas;
- volcanic tuff and marl;
- above ground installation sites;
- Areas of Contaminated Land,
- Side cuts and critical habitats

In addition to specialized construction techniques and increased levels of inspection, these areas are to be specifically considered by CONTRACTOR during planning and project control. Consideration of schedule constraints within these areas (weather, planting seasons, animal breeding periods etc.) will be clearly identified by CONTRACTOR on associated documents. Construction planning will achieve a 21-day period from the time when a Special Area is entered to the completion of reinstatement (to a level specified in EPCM approved Special Area Reinstatement Method Statement) unless otherwise approved by EPCM.

The general construction philosophy will address completion of these identified Special Areas with minimum delay. The back-end of the spread will follow directly behind the lowering-in crew. CONTRACTOR will minimize the exposure of these areas to inclement weather.

CONTRACTOR will provide suitably qualified and experienced specialists to assist in the reinstatement engineering and re-vegetation procedures and method statements for the entire route and with particular consideration of these Special Areas. Such specialists will include geotechnical engineers (and/or engineering geologists) and ecological specialists in relation to the reinstatement of critical habitats (as specified in the BAP), who work for incountry specialist organizations. EPCM may also provide specialists to oversee and audit these activities.

CONTRACTOR will ensure that specialist subCONTRACTORs are appointed to provide both advice and specialist skills for reinstatement planning and execution in Special Areas.

8.1 Side Slopes and Spoils

The contour restoration strategy is to ‘contour blend’. The side slope cut will be restored, as far as practicable, to the original contours, so that the cut surface blends with the original contours through the implementation of engineered spoil management. The subsoil layers will be arranged so that the outer edges effectively restore the slope to its original (ground) level; on no account should subsoil extend beyond the original line of slope or a new slope be created that is steeper than the original slope.

Topsoil will be stripped from the area and stockpiled at designated spoil storage areas which will be subject to EPCM approval. Both the topsoil and subsoil will be stored separately. Both stockpiles will be consolidated and adequately drained. Drainage from the spoils will be provided and a safe outlet established. See Section 4.

On completion of all pipe installation, the subsoil will be replaced in layers. CONTRACTOR will prove that the thickness of the layers, conditions of the soil and number of passes of the compactor will be sufficient to produce a density of 95%-105% of the highest compaction measured in the adjacent undisturbed area. In-situ and laboratory density testing will be carried out as required to confirm that the compaction requirements are met. In exceptional cases this may require compaction trials on request of the EPCM. Alternatively, CONTRACTOR may prove 95% of the maximum dry density at ± 2% optimum moisture content as determined by the standard Proctor test.

Compaction will be carried out in accordance with the Pipeline Construction Specification WRPSPC-PPL-PLG-001-P3-. Care will be taken when compacting above and surrounding any pipework or drainage to ensure the integrity of the pipe and adequate compaction is achieved.

Particular consideration should be given to the adequate drainage solutions and the appropriate ‘keying-in’ of the placed backfill material into the existing temporary cut slope in order to prevent any future slip surfaces along the boundary between newly placed and insitu material. Final slope measures and reinstatement details will be subject to EPCM approval.

Following compaction of the subsoil, the topsoil will be spread over the site, harrowed and reseeded (refer to Section 4.4.4). Erosion mats will then be laid (refer to Section 4.6.2). In the event that side cuts are to remain as a permanent restoration feature. CONTRACTOR will prepare a methodology statement on the proposed works including (but not limited to) the degree of reinstatement, proposed drainage measures, process of slope inspections and programme of the works. The method statement will clearly state how the overall environmental project and stability requirements are adhered to.

CONTRACTOR will carry out site inspections with EPCM in order to define required design measure to ensure long term stability of the slope and that the environmental requirements are met.

Adequate drainage will be applied to assure stability and controlled water runoff. Final cut slope angles will be defined based on ground conditions encountered. Final slope angles and stabilisation measures (such as geotechnical slope drainage, scaling, rock netting or catchment benches, crest drains etc.) will be proposed by CONTRACTOR for EPCM preapproval.

The reinstated condition of side slopes is not expected to have any significant inclination perpendicular to the pipeline, and only have a maximum slope length of the width of the RoW. Additionally, drainage measures are typically implemented upslope of any sections of side slope the pipeline encounters. As such the anticipated slope erosion is considered minimal, and the prescribed mitigation measures for these lengths of pipe will be based on their downslope fall.

Where there is a cross-fall oblique to the pipeline resulting in an increase of slope angle (compared to the gradient parallel to the pipeline) the slope erosion measures as defined on the alignment sheets will be reviewed. For such slopes the CONTRACTOR and EPCM representative will determine any additional mitigation measures on a site specific basis in order to ensure that the slope erosion requirements are met. The reinstatement solution will be based on the standard reinstatement approach, with breakers across the RoW. The slopes as described above will be identified in the field and details for soil erosion measures verified by the CONTRACTOR subject to EPCM approval.

For the fully reinstated case (i.e. if the slope is reinstated to its original contours) the slope erosion will pose a negligible hazard to the pipeline due to the short distance of exposure of the pipe (main gravitational transport perpendicular to the pipe) and considerable cover depth. Final erosion measures will need to be determined on site during construction based on the slope geometry and materials placed.

8.2 Narrow Ridges and Areas Prone to Landslides

Along certain sections the pipeline route crosses hilly terrain and is routed along narrow ridges in order to avoid pre-existing landslides or potentially unstable ground which is typically on steep side slopes with backscarps reaching in some areas up close to the ridge line.

The construction in these areas will be carried out in accordance with the Construction Specification WRP – SPC – PPL – PLG - 001 and strategy set out in the Slope Assessment Report WRP-REP-EGG-PLG-010-P3-D. For the works in this area CONTRACTOR will prepare a methodology statement subject to EPCM approval detailing how the project and stability requirements are met.

For certain areas along narrow ridges site specific designs and reinstatement requirements will be developed as set out in the AFC documents. For these cases the CONTRACTOR will ensure that all site specific design requirements are met subject to EPCM approval.

CONTRACTOR will assess and determine any requirements for additional earthworks and excavation. For any deviation from the overall project strategy to reinstate back to 'original contours' CONTRACTOR will detail these proposed changes in a methodology statement subject to EPCM approval.

CONTRACTOR will ensure that the following aspects are complied with:

The stability of the RoW will be proven following the clearance of the RoW and prior to construction works by geotechnical inspection by the CONTRACTOR and EPCM. These stability inspections will be carried out at regular intervals throughout the construction works and will focus on any signs of potential slope movement.

In sections where topography, geohazards (such as landslides) and proximity to 3rd party pipelines will require a reduced working width, CONTRACTOR will propose an appropriate working method for these areas.

CONTRACTOR will choose appropriate plant and assess stability of RoW taking into account effects of plant surcharge.

No side casting will be allowed without the approval of EPCM in order to minimise the width of the construction corridor and avoid surcharge and uncontrolled drainage into potentially unstable ground. Spoil storage areas are to be proposed by CONTRACTOR for approval by EPCM to avoid any storage on potentially unstable ground and to prevent triggering ground movements.

Temporary and permanent surface water run-off should be carefully managed. Appropriate measures (such as appropriate falls, bunds, selection of outlet points from the RoW etc.) will be implemented in order to avoid ponding, seepage of water into RoW or uncontrolled run-off into potentially unstable ground.

In case of signs of instability (such as tension cracks, backscarp, seepage on the slope etc.), CONTRACTOR will propose remedial measures (including dewatering, soil nail stabilisation, rock anchoring or preventing RoW from further inundation) subject to approval by EPCM.

8.3 Steep Slopes

Steep slopes are those slopes with inclination >15% and >20m slope length that are predicted to exceed soil loss tolerance rates as defined in this specification. The following factors should be considered when assessing the erosion potential of slopes:

- Rainfall Intensity. This parameter is a measure of the erosive force and intensity of the rain in a normal year. The rainfall intensity is based on rainfall records and probability statistics for risk evaluation. For the purpose of erosion assessment, the parameter is determined using a 1 hour 10 year return period storm.
- Soil Erodibility. This parameter is a measure of the susceptibility of a soil particle becoming detached and transported by rainfall runoff. Soil parameters, which control soil erodibility are soil texture, structure soil space, organic content and hydraulic conductivity. Information from a particle size analysis (PSD) is used to estimate the soil erodibility using nomograms and correction factors.
- Slope Angle and Length. Erosion potential increases proportionally to increases in the length and angle of slope, simply because runoff flow rates increase with increasing gradient and slope length.
- Vegetation Cover. The effect of vegetative cover on soil loss is well researched. Bare soil represents high erodibility potential, whilst native vegetation can give maximum protection. Vegetation cover can be directly related to management options ie mulch, erosion control matting etc.
- Erosion Control Practice. Further practices that influence erosion potential are roughening of the soil surface by tractor treads, or by rough grading, raking or disking.
- Temperature. Temperature is another climatic factor affecting the potential for erosion to occur. Consolidation by freezing of exposed soils during winter months and accumulation of precipitation (snow) until periods of thaw, result in rapid melting and high levels of runoff. This situation exists in Central and Eastern Anatolia.

The Universal Soil Loss Equation used in the soil loss assessment predicts the long-term average annual rate of erosion on a slope based on rainfall intensity, soil type, topography, vegetation cover and management practices. This erosion model, originally developed to predict soil loss in agriculture, is also applicable to non-agricultural conditions such as construction sites. The USLE can be used to compare soil losses from a particular construction site with a specific management system to ‘tolerable soil loss’ rates. The equation is written as follows:

$$A = R \times K \times LS \times C \times P$$

Where, A is potential long-term average annual soil loss in tons per ton ha-1 y-1, R is rainfall and runoff factor by geographic location, K is soil erodibility factor, LS is slope length-gradient factor, C is vegetation and management factor, and P is support practice factor.

- The slope geometry has been considered using GIS assessment of the DEM data. This has been used to extract average slope length and angle data and develop the slope length and steepness input parameter ‘LS’.

- The soil erodibility factor ‘K’ has been assessed from erodibility mapping of Turkey. The mapping considers the possible soil composition and uses published relationships to generate a K value for each slope.
- The rainfall –runoff erosivity factor ‘R’ was assessed based on rainfall mapping for Turkey held by Ankara University.
- The cover management factor ‘C’ was selected for a backfilled trench situation assuming the surface would be rough
- The support practice factor ‘P’ is dependent on deliberate rutting of the slope surface and is more appropriate to maintained agricultural land. As such for this assessment no benefit from this parameter has been taken.

This methodology was used to determine the estimated removal rates and recommend appropriate mitigation measures required to meet the soil loss tolerance rates described in Section 3.5 of this document. The mitigation measures, both bioremedial and engineering, are provided on the alignment sheets (see Section 4.7). These require verification at each location by the CONTRACTOR and the EPCM', through validation or updating of the design assumptions.

CONTRACTOR will establish steep slope areas and provide procedures and methodology statements as part of the site-specific Special Area Reinstatement Method Statements for EPCM approval. The procedure will establish all planned temporary and permanent erosion measures in line with this specification and Project Drawings.

Construction in steep slope areas requires an increased awareness of safety and stability issues. CONTRACTOR will utilise proven construction techniques specific to such areas. CONTRACTOR will demonstrate that increased safety measures are planned and these measures are to be followed on site. An increased level of Safety Engineer presence will be required at these locations.

The requirement for temporary RoW erosion/stabilization techniques will be dependent upon the season. However, CONTRACTOR will be prepared to provide all resources necessary to avoid incipient soil erosion and stabilization issues, regardless of season, in order to be prepared for unforeseen inclement weather.

8.4 Critical Habitats

The Biodiversity Action Plan (BAP) identified 10 terrestrials and 9 freshwater critical habitats, ecologically sensitive areas with the presence of endangered or threatened species and their habitats, along the pipeline route. Refer to the BAP and KP Table for the BAP (CINREP-ENV-GEN-017) for the following information for each of the critical habitats:

- topsoil depth removal and storage for each critical habitat;
- species identification for seeds collection;
- translocation of plants and animals depending on a season;
- appropriate species for revegetation;
- planting methods;
- removal and replacement of turfs.

Table 8.1. List of Terrestrial and Freshwater Critical Habitats identified in the BAP

KP Start	KP End	ID	Type of Critical Habitat
1362+917	1363+753	*CH58*	*Terrestrial Habitat*
1366+493	1366+692	*CH59*	*Terrestrial Habitat*
1372+340	1372+683	*CH60*	*Terrestrial Habitat*
1430+920	1432+305	*CH61*	*Terrestrial Habitat*
1477+452	1477+833	*CH62*	*Terrestrial Habitat*
1491+767	1496+340	*CH63*	*Terrestrial Habitat*
1736+000	1738+300	*CH64*	*Terrestrial Habitat*
1741+100	1741+500	*CH65*	*Terrestrial Habitat*
1788+300	1788+500	*CH66*	*Terrestrial Habitat*
1800+600	1805+000	*CH67*	*Terrestrial Habitat*
1396+221	1396+237	*FCH 19*	*Freshwater Habitat*
1461+293	1461+349	*FCH 20*	*Freshwater Habitat*
1553+697	1553+730	*FCH 21*	*Freshwater Habitat*
1565+865	1565+885	*FCH 22*	*Freshwater Habitat*
1590+290	1590+362	*FCH 23*	*Freshwater Habitat*
1605+400	1605+425	*FCH 24*	*Freshwater Habitat*
1613+360	1613+419	*FCH 25*	*Freshwater Habitat*
1651+548	1651+598	*FCH 26*	*Freshwater Habitat*
1689+784	1689+838	*FCH 27*	*Freshwater Habitat*

CONTRACTOR will provide site specific Reinstatement Management Plans that will further develop and clearly specify the means by which the measures committed to in the BAP and in this specification will be implemented in relation to their scope of work, including preconstruction measures, (i.e. seeds collection, plants translocation) topsoil removal and storage and reinstatement measures. See Pipeline Construction Specification.

8.5 Karstic Areas

Karst is the topography that develops in soluble rocks in which fissures may be enlarged (ultimately to form caves) by flowing groundwater. This may occur in areas of gypsum and limestone bedrock. Gypsum is more soluble than limestone, therefore karstic areas develop relatively rapidly in areas of gypsum (see Section 5 of the ESIA for further information).

Restoration in the karstic areas will proceed as follows:

- soils from the dolines will be stockpiled separately;
- mixing of the doline soil and the ridge material is prohibited, unless agreed with the Client;
- continuous environmental inspection will follow construction;
- excess rock material from ridges will be disposed of in accordance with the project Waste Management Plan;

- spreading of rock is prohibited, unless agreed with the Client;
- discovery of subsurface voids (greater than 50 mm in plan dimension) during construction will be reported to EPCM, measures detailed on the IAAC alignment sheets and drawing WRPDGA-EGG-PLG-001 will be applied, alternative remediation of voids may be used if agreed with EPCM and Client.

Temporary and permanent erosion measures will be employed in accordance with the requirements of this specification and Project Drawings.CONTRACTOR will employ trench filtration and drainage control measures as necessary to ensure that suffosion (transport of soil from the trench and from subsoil beneath the trench into karstic voids) does not occur during the design life of the pipeline.

Drainage plans in karstic areas will be submitted to the EPCM for approval prior to construction. Plans should consider special requirements described in WRP-TNO-EGGPLG-001 (Technical Note for Design of Pipelines in Karst). At the least, CONTRACTOR drainage plans will consider:

- preventing the pipeline becoming a new drainage conduit,
- preventing loss of pipe backfill into karst fissures,
- maximizing the use of existing natural drainage (i.e., sink holes >20m from the pipeline alignment) in a controlled manner.

CONTRACTOR will follow particular requirements for drainage control as noted on AFC alignment drawings and DGA-EGG-PLG-001.

8.6 Erodible Soils, Volcanic Tuff and Marns

Specific care is required for the reinstatement of areas underlain by volcanic tuff or marls in particular to ensure the re-establishment of a natural vegetation following the construction works due their thin topsoil cover.

Similar issues regarding the reinstatement may arise in other areas of highly erodible soils and soils with thin topsoil or other site specific ramifications. The CONTRACTOR's Soils Specialist will identify these areas during the clearance of the RoW and give advice on any additional measures as required. The specific examples of Volcanic Tuff and Marls are outlined below which should be applicable to any other soil reinstatement as deemed necessary by the CONTRACTOR's Soils Specialist an as agreed with the EPCM representative.

Details are given in "Specification for Reinstatement" document no. WRP-SPC-EGG-PLG001.

9 REINSTATEMENT OF LAND OTHER THAN ROW

9.1 Land at Construction Support Facilities

The following requirements apply to all construction support facilities such as construction camps, pipe yards etc. They do not apply to permanent facilities such as AGIs. The fate of construction support facilities is to be agreed with EPCM before starting any activity connected with reinstatement.

Reinstatement of the land will commence immediately on removal of each individual facility. The reinstated condition will be to a condition at least as good as that prevailing before establishment of the facilities, depending on the post construction landuse and Project's access agreement.

Construction support facilities will be avoided in Special Areas (see Section 8). Should this become unavoidable prior approval of EPCM is required. CONTRACTOR will prepare all necessary procedures and plans to achieve such approval and obtain permits as required by any affected authority.

CONTRACTOR will reinstate the area to the satisfaction of EPCM, the regulatory authority or landowner and will obtain written approval from EPCM, the appropriate regulatory authority or the landowner of the level of reinstatement. Notwithstanding such approval, all reinstatement will be to the satisfaction of EPCM. CONTRACTOR's photographs of the condition of the area prior to construction may be used for reference.

There will be no waste remaining after removal of the facility and upon return of the site to the landowner. Except for new roads, facilities will be removed and the land restored so that it is suitable for its original function. New roads will be handed over as part of the completed project with shoulders finished in keeping with the local environment. Excess rock or stumps may only be left with the agreement of the landowner. Any new roads, not appreciated by EPCM and/or relevant stake holders, will be dismantled and the area will be reinstated to the required conditions.

9.2 Permanent Above-Ground Installations (AGIs)

All permanent aboveground installations are to be reinstated in accordance with the Project Drawings and specifications.

CONTRACTOR will reinstate the area surrounding AGIs to the satisfaction of EPCM and the appropriate authority or landowner and will obtain written approval from EPCM and the appropriate regulatory authority or the landowner of the level of reinstatement. Notwithstanding other such approvals, all reinstatement will be to the satisfaction of contract requirements. CONTRACTOR's photographs of the condition of the area prior to construction may be used for reference.

Measures that will be adopted to minimize the visual impacts of the permanent buildings and facilities at AGI sites include the following:

- landscape planting within the site boundary where appropriate;
- opportunities to retain existing landform screening will be maximized, i.e. site levelling will be avoided, if possible, if existing hollows or mounds may be used to integrate built features within the landform;
- new landform screening (e.g. bunds and mounds) will be introduced where this might complement the existing landform character;
- the use of appropriate colour schemes to minimise the visual impact of buildings;
- external lighting will be minimized to that necessary for safety and operational purposes and downward facing lighting and lighting of the same colour will be used to minimise spill and offsite impacts.

CONTRACTOR's site-specific Reinstatement Method Statements for AGI sites will address the following:

- maximising opportunities to retain existing landform screening, i.e. site levelling will be avoided, if possible, if existing hollows or mounds may be used to integrate built features within the landform;
- new landform screening (e.g. bunds and mounds) will be introduced where this might complement the existing landform character.

9.3 Spoil and Excess Rock / Stump Disposal Sites

CONTRACTOR will close, cap, and landscape all (except as otherwise agreed with EPCM) excess rock/stump disposal sites by the completion of the Contract. Sites will be dealt with in accordance with the relevant project requirements. CONTRACTOR will develop site-specific plans that are to be approved by EPCM. Biorestoration, where appropriate will be carried out in accordance with requirements defined in Section 6 and EPCM approved Special Area Reinstatement Method Statements.

Spoil and excess rock/stump disposal sites will be avoided in ecologically sensitive areas. Should this become unavoidable, prior approval of EPCM is required. CONTRACTOR will prepare all necessary procedures and plans to achieve such approval and obtain permits as required by any affected authority.

The excess rock/stump material will be compacted to a minimum of 75% of the Proctor value; the surface will be landscaped to resemble local conditions and will not extend more than 2 m in height above the natural contour; the slopes of the surface will not exceed 60°. The site will be covered with soil and an erosion mat and planted with appropriate species.

9.4 Existing Roads and Access

CONTRACTOR will exercise care when using both public and private roads for travelling to and from the TANAP RoW and will upgrade and maintain roads during the works as necessary for safe operations. No side casting will be allowed unless otherwise instructed by EPCM.

The reinstatement of roads will be to their original upgraded condition or better following completion of construction activities.

CONTRACTOR will provide for such work all hard-core, tarmac, asphalt, and other materials as required.

Details of the requirements for the use and construction of existing roads and access Roads are set out in the Pipeline Construction Specification.

9.5 Quarries

CONTRACTOR will ensure that all borrow material will only be sourced from (both existing and new) licensed and authorized sites or sources. Where new quarries need to be opened CONTRACTOR will obtain the necessary permits and licenses and conduct any necessary environmental impact assessments.

Reinstatement of the quarries will be carried out to the satisfaction of the respective landowners and local authorities.

For the general selection and approval process for quarries the Pipeline River Crossing Civil Protection Works Specification WRP-SPC-PPL-PLG-030 should be referred to.

9.6 Areas of Contaminated Land

The remediation of contaminated land is not covered by this specification and reference should be made to the Contract Documents.

Any area of the pipeline corridor in which material excavated is not suitable to be reused will be reinstated with suitable material in accordance with the agreed limits of the USEPA guidance and Dutch Standards for soil contamination for the identified land use locally required.

10 RESTRICTING ACCESS

In order to prevent rutting, subsequent erosion problems, and damage to riparian areas, measures should be taken to prevent unauthorized use of the TANAP RoW as a roadway. Access should be blocked, at locations specified by EPCM representatives, through the construction of barrier berms of sufficient height (minimum 1.5 m high) to provide a barrier to vehicles. Where possible, the berms should be tied to vegetation or rocks adjacent to the RoW to prevent traffic from circumventing the barrier. Rocks excavated during construction, 0.3 m in diameter or larger, may be used instead of the earthen berms. Timber cleared during the construction may also be staggered across the RoW so as to deter off-road vehicle use.

11 HANDOVER AND POST – CONSTRUCTION MAINTENANCE

CONTRACTOR will obtain sign-off of the pre-entry form from the landowner agreeing on the standard of reinstatement. CONTRACTOR will notify EPCM prior to such meetings and allow for EPCM attendance/monitoring. CONTRACTOR will not attend such meetings without EPCM presence unless agreed in writing by EPCM.

CONTRACTOR, upon completion of reinstatement, will accompany EPCM on an inspection of all project areas, before demobilizing from site. EPCM will notify CONTRACTOR of any insufficiencies in the reinstatement of the TANAP ROW / project areas. CONTRACTOR will carry out any further reinstatement to the satisfaction of EPCM.

During the contract maintenance period, CONTRACTOR will be responsible for maintaining the standard of reinstatement and for ensuring that the Civil Protection Works remain effective and in good condition, and that the stated erosion class and biorestoration requirements are met. As a minimum CONTRACTOR will carry out inspections every three months and immediately after any significant rainfall event (1 in 2 year return period) and snow melt and implement corrective measures as required to the satisfaction of EPCM.

12 POST – CONSTRUCTION ACTIVITIES

12.1 Restricting Access

In order to prevent rutting, subsequent erosion problems, and damage to riparian areas, unauthorized use of the construction corridor as a roadway will be prevented. Access should be blocked at locations specified by EPCM representatives, through the construction of barrier berms of sufficient height (minimum 1.5 m high) to provide a barrier to vehicles. Warning tapes/berms should be tied to vegetation or rocks adjacent to the pipeline corridor to prevent traffic. Rocks excavated during construction, may be used instead of the earthen berms. Timber cleared during the construction can also be staggered across the pipeline corridor so as to deter off-road vehicle use.

12.2 Handover and Post – Construction Maintenance

CONTRACTOR will carry out the required aftercare (watering, further application of fertilizers, etc.) for successful re-vegetation and monitor the progress of bio-restoration and the records will be kept by filling out the Reinstatement Register (see Appendix 3).

CONTRACTOR will obtain sign-off of the pre-entry form from the landowner agreeing on the standard of reinstatement.

CONTRACTOR, upon completion of reinstatement, will accompany EPCM on an inspection of all project areas, before demobilizing from site. EPCM will notify the CONTRACTOR of any insufficiencies in the reinstatement of the construction corridor/ project areas. CONTRACTOR will carry out any further reinstatement to the approval of EPCM.

During the contract maintenance period to be defined by TANAP, CONTRACTOR will be responsible for maintaining the standard of reinstatement and for ensuring that the stated erosion class and bio- restoration requirements are met. As a minimum, CONTRACTOR will carry out inspections every three months and immediately after any significant rainfall and snow melt and implement corrective measures as required to the satisfaction of EPCM.

Before termination of maintenance period, final reinstatement inspection will be carried out and the required corrective measures will be encouraged until the reinstatement measures satisfy the project requirements. Upon the final approval of reinstatement studies, the future management of the reinstatement program and maintenance activities will be under the responsibility of TANAP.

13 TRAINING

All workers to be employed for the erosion control, reinstatement and landscaping related works will receive the compulsory specific environmental trainings and will not start working before completing induction training. The induction training, which is required for all employees working on RoW, will be about performing work activities in a manner consistent with environmental permits, site specific conditions, and best practices for the environmental monitoring, waste management, reinstatement including the erosion control devices, pollution prevention, spill response, cultural heritage. The topics of the specific environmental trainings will be reinstatement, waste management, water and soil management, air quality management; cultural heritage management, traffic management, noise and vibration management, aggregate management and biodiversity action plan (pls. see CONTRACTOR Environmental and Social Training Plan for further detail). Training will be given by CONTRACTOR Environmental Inspector and/or Biologist/Ecologist.

14 MONITORİNG

CONTRACTOR will be responsible for continuous monitoring of all reinstatement related works to be performed by the workers and its sub-CONTRACTORs throughout all construction works. Monitoring will comply with CONTRACTOR's Environmental and Social Monitoring Plan.

Site activities will be monitored and supervised by Environmental Inspectors of CONTRACTOR and EPCM for their performance in the implementation of this ERLP. EPCM will give the final approval prior to handover of work by CONTRACTOR. Subsequent to the final approval of reinstatement works, the future management of the reinstatement program and maintenance activities will be under the responsibility of TANAP.

CONTRACTOR Environmental Inspector, Biologist/Ecologist will monitor,

The implementation of mitigation measures,

- The implementation of corrective actions,
- Erosion control methods,
- The slope stability,
- Topsoil stripping, storage and reinstatement applications,
- Subsoil removal, storage and reinstatement applications,
- The success of the Bio-restoration and Reinstatement.

15 REPORTING

Topsoil Stripping Register, Off-Row Aggregate Consumption Register, Reinstatement Register and Tree Cutting Registers will be filled out for each specified activity and kept as records. Special Area Reinstatement Method Statement (SARMS) will be prepared for each special area and will be subject to the approval of EPCM before put into practice. SARMS will give information on the topography, land use, soil characteristics, etc. of the special area and also its ecological characteristic including the species of the site, the related mitigation measures including topsoil management, seed collection, etc., restoration of the habitat, recommendation of a follow-up monitoring program, etc.

The progress of the reinstatement works will be presented by CONTRACTOR in the monthly Report to be prepared in the scope of Environmental and Social Monitoring Plan, together with the filled-out registers. Moreover, any incident and/or non-conformance, which results in environmental/social impact, will be immediately communicated to the EPCM via verbal notification and the relevant registers will be filled out as soon as practical (not later than 24 hours).

Before termination of maintenance period, final reinstatement inspection will be carried out and the required corrective measures will be encouraged until the reinstatement measures satisfy the project requirements. Upon the final approval of reinstatement studies, the future management of the reinstatement program and maintenance activities will be under the responsibility of TANAP.

16 KEY PERFORMANCE INDICATORS

CONTRACTOR will monitor the implementation of the Erosion, Reinstatement and Landscaping Plan according to following performance indicators:

- Cut-tree register
- Records of revegetated areas
- Records of biorestoration results if applicable during the construction period
- Terrestrial critical habitat registers including seed, plant bulb and herbaceous plant collection, storage and replantation
- Records of excessive slope instability or soil erosion
- Record of deviations from the delineated ROW and additional work areas
- Recorded sediment loading due to project related activities

Non- compliance records.

Appendix A - Topsoil Stripping Register

APPENDIX A **TOPSOIL STRIPPING REGISTER**

KP Start	KP End	Depth of the topsoil stripped	Where topsoil is stripped? (riverbank, potential erosion area etc.)	Labeling of topsoil Pile (Yes/No)	Implementation of Required Conditions for topsoil Piles (Yes/No)	Comments	Name of the Environment Inspector

Appendix B - Sensitive Areas Register

APPENDIX B SENSITIVE AREAS REGISTER

SENSITIVE AREA REGISTER																										
LOT 4																										
TERRESTRIAL CRITICAL HABITATS																										
KP Start (Rev H)	KP End	ID	Was the no- frame enforced?	Which seeds	Date seeds where	Amount of seeds	Seeds storage	Date seeds where	Location where replanted	Which collected	Date plants/bulbs	How many collected	Plants/bulbs	Date plants/bulbs During	How many replanted on RoW	Location where replanted	Date Herbaceous RoW	Storage location plants collected	herbaceous on RoW durig	Date topsoil was	Date topsoil was	Date when rock (30cm or larger)	Rock storage	Date rocks were	Invasive flora	Terracing during prevent erosion
1362+917	1363+753	CH58																								
1366+493	1366+692	CH59																								
1372+340	1372+683	CH60																								
1430+920	1432+305	CH61																								
1477+452	1477+833	CH62																								
1491+767	1496+340	CH63																								
1736+000	1738+300	CH64																								
1741+100	1741+500	CH65																								
1788+300	1788+500	CH66																								
1800+600	1805+000	CH67																								

Appendix C - Reinstatement Register

APPENDIX C REINSTATEMENT REGISTER

REINSTATEMENT REGISTER						
SPREAD 7						
KP Start	**KP End**	**Original Countours restrored?**	**Date topsoil was spread**	**Date seeding was conducted**	**Date permanent Erosion controls installed**	**Date area was signed off**

REINSTATEMENT REGISTER						
SPREAD 8						
KP Start	**KP End**	**Original Countours restrored?**	**Date topsoil was spread**	**Date seeding was conducted**	**Date permanent Erosion controls installed**	**Date area was signed off**

Appendix D - Tree Cutting Register

APPENDIX D TREE CUTTING REGISTER

TREE CUTTING REGISTER						
SPREAD 7						
KP	Number of Trees	Tree/Shrub Species (Latin/English)	Photo	Cutting or Relocation Date (C for cutting RL for relocating)	Remarks	

TREE CUTTING REGISTER						
SPREAD 8						
KP	Number of Trees	Tree/Shrub Species (Latin/English)	Photo	Cutting or Relocation Date (C for cutting RL for relocating)	Remarks	

TANAP

TRANS ANATOLIAN NATURAL GAS PIPELINE PROJECT

BIORESTORATION MONITORING PLAN

Agreement No INEA/CEF/ENER/M2014/0019

CIN-PLN-ENV-GEN-014-Rev-P3-1	47 Pages

Rev	Status	Date	Status Description	Issued by	Checked by	Approved by
P3-1	Re-IFA	12.10.2016	Issued for approval	KECT HASA OZEC ATAT	MANE	AKYH
P3-0	IFA	29.08.2016	Issued for approval	KECT HASA OZEC ATAT	MANE	AKYH
P3-B	IDC	20.08.2016	Inter discipline check	KECT HASA OZEC ATAT	MANE	AKYH
P3-A	DIC	19.08.2016	Discipline internal check	KECT HASA OZEC ATAT	MANE	AKYH

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DOCUMENT REVISION HISTORY SHEET

Rev	REVISION DESCRIPTION	DATE ISSUED	UPDATE / AMENDMENT DETAILS
P3-0	IFA	29.08.2016	Issued for approval
P3-1	Re-IFA	12.10.2016	The plan was revised based on the comments of TANAP and World Bank.

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DEFINITION and ABBREVIATIONS

AGI	Above Ground Installation
BAP	Biodiversity Action Plan
CC	Construction Contractor
CIN	Çınar Mühendislik Müşavirlik A.Ş.
DIC	Discipline Internal Check
EPCM	Engineering, Procurement, Construction, Management Consultant
ESIA	Environmental and Social Impact Assessment
GTA	Gas Transport Agreement
KP	Kilometer Point
NDVI	Normalised Difference Vegetation Index
NIR	Near Infrared Reflectance Values
ROW	Right of Way
SCADA	Supervisory Control and Data Acquisition
SCP	South Caucasus Pipeline
TANAP (TNP)	TANAP Doğalgaz İletim A.Ş.
TANAP Project	Trans Anatolian Natural Gas Pipeline Project
TAP	Trans-Adriatic Pipeline
TPMC	Third Party Monitoring Contractor
VIS	Visible Reflectance Values

1. INTRODUCTION

1.1. Description of the Project

Trans-Anatolian Natural Gas Pipeline (TANAP) Project is part of the Southern Gas Corridor, which aims to transport natural gas from Shah Deniz 2 Gas Field and other fields in the South Caspian Sea to Turkey and Europe in Azerbaijan.

The Southern Gas Corridor comprises the South Caucasus Pipeline (SCP), TANAP and the Trans-Adriatic Pipeline (TAP) as shown in Figure 1-1.

The TANAP corridor starts from the Georgia/Turkey border at Türkgözü/Posof/Ardahan where it connects to SCP and ends at the Turkey/Greece border in İpsala/Edirne, where it feeds into the TAP Pipeline. There is an off-take station at Eskişehir, Turkey, and another one at Thrace, Turkey to connect to the Turkish natural gas distribution network.

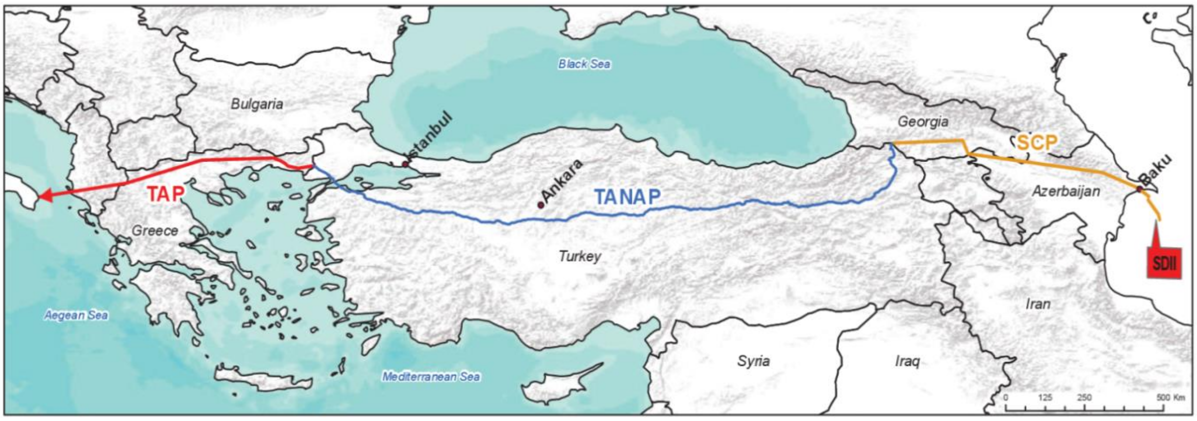

Figure 1-1 Project Pipeline International Route Connections

Figure 1-1The site location map showing the southern gas corridor the South Caucasus Pipeline (SCP), TANAP and the Trans-Adriatic Pipeline (TAP)

TANAP Project is a 56-inch and 48-inch pipeline system of 1850 km, and will transport natural gas to the required specifications and quantity in stages starting with 16 bcma as initial phase leading up to a high flow case of 31 bcma which is the last phase. 6 bcma will be delivered to BOTAŞ (Boru Hatları ile Petrol Taşıma A.Ş.) to be used within the Republic of Turkey via off-take stations by Gas Transport Agreement (GTA).

The construction of the Project is expected to last for 4 years, and a phased approach will be pursued where the target for completion of the construction and starting operation is by the middle of 2018. The initial capacity of 16 bcma (First Stage) is expected to expand to 24 bcma by 2023 (Second Stage) and to 31 bcma by 2026 (Third Stage), upon construction of the required additional compressor stations.

TANAP is planned to begin from the Georgia/Turkey border and go through the provincial borders of Ardahan, Kars, Erzurum, Erzincan, Bayburt, Gümüşhane, Giresun, Sivas, Yozgat, Kırşehir, Kırıkkale, Ankara, Eskişehir, Bilecik, Kütahya, Bursa, Balıkesir, Çanakkale, Tekirdağ and Edirne.

At the beginning of the Environmental and Social Impact Assessment (ESIA) process the pipeline was planned to be divided into two branches after crossing Marmara Sea and the second branch would pass Tekirdağ and enter Bulgaria through Kırklareli. However, due to the change in the marketing strategy of Azerbaijan, natural gas to Europe by the Bulgarian section was cancelled. The baseline studies were performed for both sections and the baseline reports include all the results. The cancelled section is indicated with yellow line in Figure 1-2.

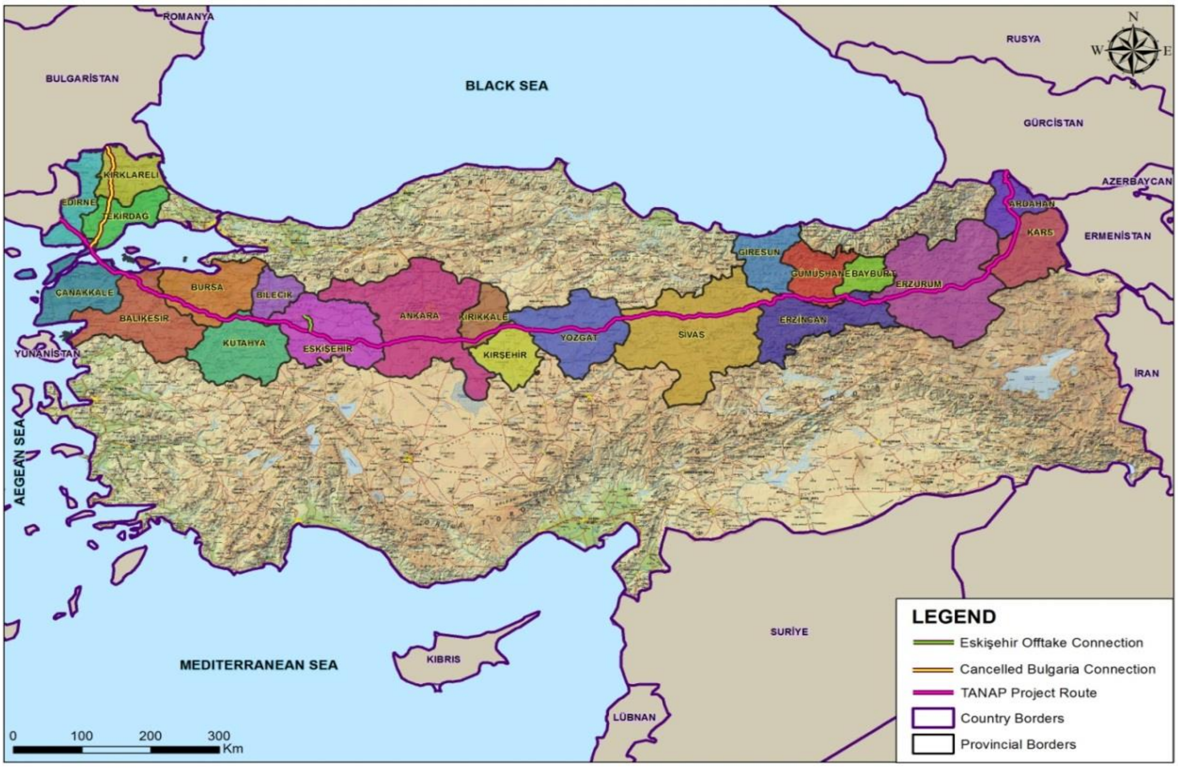

Figure 1-2 TANAP Project Route

The TANAP system will be fully automated with main and back-up control centres to meet the requirements of gas transmissions and associated environmental and safety considerations. The main pipeline facilities include the required number of compression facilities, block valve stations, distribution and custody transfer metering facilities. The pipeline crosses terrain with challenging geotechnical features, including landslides and other geo-hazards, in addition to crossing regions with different levels of urbanization and economic activity.

TANAP, for the purpose of the ESIA Report, includes:

1. Onshore pipeline:

• A main natural gas pipeline from the Turkey/Georgia border to the Turkey/Greece border

• Diameter: 56 inches to the Eskişehir Compressor Station and 48 inches from Eskişehir Compressor Station to the Turkey/Greece border

• Total pipe length: 1850 km

• Onshore length: 1832 km

• Nominal capacity: 31 bcma in high-flow case

• Design Pressure: 95.5 barg

• Main design according to ASME B31.8, 2012.

2. Offshore pipeline section:

• Looping at Marmara Sea crossing

• Diameter: 2 x 36 inches

• Length: 18 km, approximately.

3. Compressor Stations:

• 7 compressor stations (2 at First Stage, 2 more at Second Stage, and 3 more[1] at Third Stage) at intermediate points for fulfilling pressure requirements. A separate compressor train is foreseen for the gas supply to BOTAS in CST-5A (identified as CST-5AL).

4. Metering Stations:

• 1 custody receiving border metering station at the entry point

• 1 delivery border metering station at the exit point.

• 2 fiscal metering stations at Eskişehir and Thrace Offtakes

5. Pig Launcher and Receiver facilities[2]:

• at each compressor station (including phase compressors)

• at each metering station

• at both sides of the shore approaches of the Dardanelles Strait Crossing

6. Block Valve Stations:

• 49 in accordance with ASME B31.8, 2012 requirements.

7. Off-take Points:

• 2 in Turkey, with metering stations.

8. Supervisory Control and Data Acquisition (SCADA) automation, control and Telecommunication equipment:

• Main Control Centre in Ankara, Turkey.

• Back-up Control Centre located with Compressor Station CST-5A in Eskişehir, Turkey

1.2. Purpose & Scope

The overall objective of the biorestoration monitoring plan that will be undertaken for TANAP Project will be to monitor the success of biorestoration of the project affected areas as far as practicable to its pre-construction state.

This Biorestoration Monitoring Plan is applicable to the biorestoration activities performed in both terrestrial and freshwater critical habitats defined in BAP, which includes wetlands, river crossings, karstic areas and marl areas. In addition to critical habitats, other areas

[1] The ESIA Report includes the first and second stage compressor stations. The third stage compressors stations will be subject to a separate ESIA process and report when the decision for the construction of these compressor stations will be completed.

[2] Intermediate launcher/receiver facilities shall be located along the pipeline route between the compressor stations as required to facilitate effective pigging distances.

require biorestoration activities, such as slopes on ROW (steep slope, side slope, narrow ridge) and off-ROW sites, such as access roads, dump sites, camp sites etc. disturbed by project activities will be included in the scope of this plan.

The objectives of biorestoration are:

(1) to reinstate the variety and distribution pattern of the original plant species with the long term objective of reinstating the local ecology;

(2) to establish sufficient vegetation cover to reduce erosion to meet the performance requirement defined by the Project Reinstatement and Control Specifications through restoration of the local plant community.

The plan has been developed to accommodate the variety of biogeographic conditions encountered from Ardahan, the start point of the pipeline route of TANAP to Edirne, where the pipeline exits the country.

Regarding the offshore section of the pipeline, according to results of baseline site surveys and impact assessment studies in the scope of ESIA and BAP, no SCC species were identified. Thus, no biorestoration activities will be performed on the offshore section of the pipeline. Although no biorestoration activities are planned on especially each land fall in the offshore section, a monitoring plan was prepared by TANAP and the plan was approved by Ministry of Environment and Urbanization. The plan covers the pre-construction, construction and post-construction monitoring of seawater quality and visual assessment of fauna and flora presence at each landfall. The results of each monitoring study will be submitted to the Ministry of Environment and Urbanization.

It is expected that vegetation cover monitoring will be required annually, at least initially. Thereafter, monitoring will be only required in areas where re-growth is inherently slower due to local environmental conditions (e.g. low soil nutrient, low rainfall, etc.) where reinstatement has been less successful, or where a combination of the two is evident. In contrast, it will be necessary to monitor species diversity over a much longer timeframe, albeit at periodic and less frequent intervals. In each case timing will be dictated by the time required to meet relevant performance objectives.

2. BIORESTORATION ACTIVITIES

A key element for minimization of medium to long-term biodiversity impacts is the timely and successful restoration of biological processes in areas where vegetation and physical habitats have been cleared during the construction phase, particularly within the RoW and off-RoW sites.

The biorestoration activities cover the implementation of practices that will return the habitats disturbed by construction activities to a condition that allows the return of the dominant ecosystem processes and the redevelopment of pre-construction habitats.

The requirements for biorestoration activities are defined in Section 1.3.12 of Erosion, Reinstatement and Landscaping Plan, Appendix 5.9 of ESIA. The requirements were defined for both agricultural/developed and undeveloped areas together with the reforestation activities.

In line with those requirements, EPCM prepared “Specification for Reinstatement” (WRP-SPC-EGG-PLG-001) and in Section 6 of this specification, detailed information is given in procedures, techniques, schedule for biorestoration activities with the details of aftercare, monitoring and corrective actions those need to be followed by each construction contractor (CC).

In the light of the requirements stated in Erosion, Reinstatement and Landscaping Plan and details given in Specification for Reinstatement document, each CC prepared their own Erosion, Reinstatement and Landscaping Plans. In addition to Erosion, Reinstatement and Landscaping Plans, each CC will prepare a Biorestoration Schedule including pre-construction transplanting or cultivation in addition to post-construction soil preparation, planting and aftercare. In addition to Biorestoration Schedule documents, each CC will prepare Reforestation Strategy and Schedule document and define the details of reforestation activities. Scheduling of the biorestoration and reforestation will be aligned with the ESIA requirements and management plans and will be issued to TANAP for confirmation before being applied.

3. GENERAL REQUIREMENTS

The overall objectives of the biorestoration activities are to:

- Establish sufficient vegetation cover to reduce erosion to meet the performance requirement of Erosion Class 3 or better through restoration of the local plant community;

- Reinstate the variety and distribution pattern of the original plant species with the long-term objective to restore the land to condition that is equal to or an enhancement of the pre-disturbed state.

In agricultural areas, the objective is to return the land to the landowner in a fit state for the landowner to re-plant with his own seed crops. In these and other developed areas, the project requirement is to leave the land in the condition specified in the pre-entry agreements.

Except where agreed otherwise, it is assumed that the land is to be made ready for re-planting with crops, the land shall be graded and tined to remove compaction. Application of fertilizer and other soil amendments (if needed), and planting on permanent growing areas shall be carried out by the landowner or tenant.

In non-agricultural areas (except in project areas with permanent surface development, e.g., AGIs), the long-term cover shall be the native flora.

The biorestoration strategy is based on supplementing the seed bank of species remaining in the preserved topsoil with equivalent materials (seeds, bulbs, and plants) from suppliers and/or re-planted after removal from project areas before construction disturbance.

The objectives seek to achieve and demonstrate the following:

- An increasing trend in vegetation regrowth in all non-agricultural areas requiring full restoration, to pre-disturbed conditions

- An increasing trend in species diversity (and specifically species composition) in reinstated areas and nearby areas undisturbed by project activities.

- An increasing trend in the number of areas classified as Erosion Class 3 or better and Erosion Class 2 or better in critical habitats.

In each case, it is recognized that the rate of change should be commensurate with habitat type, local biophysical setting and short and long term climatic conditions.

Reforestation of the ROW shall occur wherever a forest existed before construction of the pipeline. For the purposes of this specification, a forest is defined in accordance with Article 1 of the Forest Law that states ‘trees and small trees, naturally or artificially grown, together with their surrounding area are considered as forest areas’. The objective of reforestation activities is to successfully replace every tree felled during ROW clearance. However, not all trees will be able to be replaced in the same location from which they were removed, as trees will not be able to be replanted along a 16 m wide strip above the pipeline.

4. LEGAL FRAMEWORK

The relevant laws, regulations, conventions, principles and standards are given in Table 4-1.

Table 4-1 National & International laws, regulations, conventions standards

Law, Regulation, Convention, Principle and Standards	National (N) / International (I)	Purpose and / or Scope	Enforcement dates and numbers and dates of the Official Gazette
Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)	I	This Convention, prepared by the EU member states, intends to conserve the natural plant and animal species and their habitats. Bern Convention consists of 3 appendices.	Published in the Official Gazette no. 18318 on February 20, 1984 and entered into force on September 1, 1984.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1975)	I	CITES is an international regulation prescribing the issuance of permissions and certificates for the import, export, re-export, introduction from the sea of, briefly international trade in, specimens of wild animal and plant species, alive or dead, as well as the readily recognizable part or derivative thereof between signatory countries, provided that some requirements mentioned in the Convention are met. Appendix I, about 1200 species, contains species that are threatened with extinction and are or may be affected by trade. Commercial trade in wild-caught specimens of these species is illegal. Appendix II, about 21,000 species, contains species that are not necessarily threatened with extinction. Appendix III, about 170 species, contains species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species. The species are not necessarily threatened with extinction globally.	Published in the Official Gazette no. 22672 on June 20, and entered into force on December 22, 1996.
NATURA 2000	I	In May 1992, the member states of the European Union put into force legislation for the conservation of critically threatened species throughout Europe. Having been named as the Habitats Directive, this legislation was complementary to the Birds Directive enacted in 1979. Such directives define the needs and requirements for the establishment and management of the protected areas network, named as NATURA 2000. The Birds Directive requires the establishment of Special Protection Areas (SPA) for birds. Similarly, the Habitats Directive was enacted to take other species and habitats under protection through Special Areas of Conservation (SAC). SPA and SAC together for the Natura 2000 network.	Turkey became a party in 1992.
International Union for Conservation of Nature (IUCN)	I	International Union for Conservation of Nature, also known as *International Union for Conservation of Nature and Natural Resources or (IUCN)*, is an international organization founded for the conservation of natural resources.	Turkey is one of the member countries.

Law, Regulation, Convention, Principle and Standards	National (N) / International (I)	Purpose and / or Scope	Enforcement dates and numbers and dates of the Official Gazette
		NE : Not Evaluated **DD** : Data deficient **EX** : Extinct: **EW** : Extinct in the wild **CR** : Critically endangered **EN** : Endangered: **VU** : Vulnerable **NT** : Near threatened **LC** : Least concern For the plant species protected by IUCN in Turkey, the IUCN Red Data Book categories used in the publication named "Red Data Book of Turkish plants" and prepared by Ekim, T. et al. (2000) are listed below: **EX** : Extinct **EW** : Extinct in the wild **CR** : Critically endangered **EN** : Endangered **VU** : Vulnerable **DD** : Data Deficient **NE** : Not evaluated **LR** : Lower risk. It has 3 sub-categories that may be listed according to their future threat level: **1) cd - Conservation Dependent**: This group contains the taxa that may be included in one of the above-mentioned categories in 5 years. **2) nt - Near Threatened**: This group contains the plant species that are not listed in the previous sub-category, but are likely to be included in VU category in the future. **3) lc - Least Concern**: This group contains the plant species that are not threatened and do not require any protection.	
The Convention on Wetlands of International Importance, especially as Waterfowl Habitat (RAMSAR Convention)	I	The objective of this Regulation, especially on implementation of The Convention on Wetlands of International Importance, especially as Waterfowl Habitat (RAMSAR Convention), is to conserve and improve all the wetlands whether they have an international importance or not, and to determine the principles of the coordination and cooperation between the appointed agencies and organizations in this regard.	Published in Official Gazette No. 21937 dated May 17, 1994.
Convention on Biological Diversity (Rio Conference, 1994)	I	Countries that are party to this Convention, including Turkey, undertake to •fully conserve the diversity of plants, animals and microbiological life within their territories, •sustainably use biodiversity, and equally share benefits arising out of biological diversity.	Turkey became a party in 1992.
Directives on Habitats and Bird	I	With the Directive 92/43/EEC, the European Union envisaged the establishment of European Protected Areas Network titled Natura 2000. The idea behind the establishment of this conservation network is about the necessity to adopt an integrative approach covering the entire Europe beyond all administrative borders to conserve the biological diversity of Europe since the nature does not act according to administrative borders. The EU countries identified the Natura 2000 areas in line with the Directives on Habitats and Birds. The directives intend to conserve 200 habitats and approximately 1000 species listed in their appendices. The appendices are as follows:	Turkey became a party in 1992.

Law, Regulation, Convention, Principle and Standards	National (N) / International (I)	Purpose and / or Scope	Enforcement dates and numbers and dates of the Official Gazette
		•Appendix I covers the habitats. •Appendix II covers the species living in Special Protection Areas requiring protection. •Appendix IV covers species requiring strict protection. Appendix V covers species detached from the nature, which are restricted by the European law.	
Regulation on the Implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora	N	The objective of this Regulation is to set out the procedures and principles for controlling the international trade in animal and plant species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) through coordination with relevant organizations and institutions in order to ensure sustainable use of these species.	Published in the Official Gazette no. 24623 on December 27, 2001.
Regulation on Dismantling, Production and Export of Natural Flower Bulbs	N	The objective of this Regulation is to regulate the procedures and principles regarding the collection directly from nature, production, harvesting, storage and exportation of the seed, bulb or other parts of the bulbous plants that exist in nature with the aim of protecting them. This Regulation includes the plant species with bulbs, tubers and rhizomes described as natural flower bulbs whether they are found in nature or not.	Published in Official Gazette No. 28358 dated July 19, 2012.
Law (5042-08.01.2004) and regulations on the Protection of Plant Breeders' Rights for New Plant Varieties	N	The objective of this Law is to encourage the improvement of plant varieties, and to protect the rights of the breeders and the new varieties. This Law includes all plant species.	Published in Official Gazette No. 25551 dated August 12, 2004.
Seed Law (5553-31.10.2006)	N	The objective of this Law is to increase the efficiency and quality in plant production; to provide quality assurance in seed plants; to make arrangements regarding seed plant production and trade; and to perform necessary arrangements for restructuring and development of seed planting sector. This Law includes keeping records of the genetic resources and varieties belonging to the reproduction materials of field crops, vineyards and orchards plants, forest plants and other plant species; and regulations regarding production, certification, market supervision of seed plants, and institutional structuring.	Published in Official Gazette No. 26340 dated November 8, 2006.
Pasture Law (4342-25.02.1998) and Regulation	N	The objective of this Regulation is to regulate the procedures and principles regarding the implementation of the Act on Amending Certain Provision of the Pasture Law No. 4342, 25/02/1998 and Pasture Law No. 4368, 11/06/1998 This Regulation includes meadows, mountain pastures, winter shelters, and public prairies and grasslands	Published in Official Gazette No. 23272 dated February 28, 1998.
Law on Plant Protection and Agricultural Quarantine (6968-15.05.1957)	N	Includes the procedures and principles in regards to the usage, sales, citation, manufacturing, export, import of the agricultural pest control tools and pesticides; protection of all plants from diseases and pests, and their exportation, importation and transportation within the country.	Came into effect on December 22, 2000.

Law, Regulation, Convention, Principle and Standards	National (N) / International (I)	Purpose and / or Scope	Enforcement dates and numbers and dates of the Official Gazette
Regulation on Plans to be Engineered in Protected Areas	N	The objective of this Regulation is to determine the procedures and principles in regard to the preparation, construction principles, representation, approval, implementation, supervision of the plans that will be engineered in national parks, nature parks, natural monuments, natural conservation areas, wetlands, special environmental protection areas and other areas with similar conservation status and of the zoning plans that will be engineered with the objective of protection in natural protected areas; and the qualifications and duties, powers and responsibilities of the authors that will be in charge of preparation of these plans.	Published in Official Gazette No. 28242 dated March 23, 2012.
Regulation on the Procedures and Principles Concerning Identification, Registration and Approval of Protected Areas	N	The objective of this Regulation is the determination of the procedures and principles concerning registration, approval and announcement of national parks, nature parks, natural monuments, nature conservation areas and wetlands and identification, registration, approval, amendment and announcement of the natural asset, natural protected areas and special environmental protection areas.	Published in Official Gazette No. 28358 dated July 19, 2012.
Law on Conservation of Cultural and Natural Assets	N	The objective of this Law is to establish the definitions related to the movable and immovable cultural and natural assets that need to be protected, to organize operations and activities to be carried out, to determine the establishment and duties of the organization which will be taking necessary decisions on principles and practices on this issue.	Published in Official Gazette No. 18113 dated July 23, 1983.
Regulation on the Establishment and Operational Principles and Procedures of Natural Heritage Preservation Commissions	N	The objective of this Regulation is to determine the procedures and principles regarding the establishment and operations of the Central Commission for Natural Heritage Protection and the regional commissions for protection of natural asset to ensure the performance of the duties given to the Ministry in relation to the natural protection areas and immovable natural properties that need to be protected.	Published in Official Gazette No. 28088 dated October 18, 2012.
Regulation on Wildlife Conservation and Wildlife Improvement Sites	N	This Regulation regulates the procedures and principles regarding the establishment, management and supervision of the wildlife conservation and improvement sites with the objective of protecting game and wild animals that are within the scope of the Hunting Law No.4915, along with their habitats; and the activities that will be allowed and banned in these sites.	Published in Official Gazette No. 25637 dated November 18, 2004.
National Parks Act (2873 - 09/08/1983) and Regulation	N	The objective of this Act is to regulate the principles regarding the selection, identification, development, management and protection of them without harming the quality and characteristics of national parks, nature parks, natural monuments and nature conservation sites in our country that has values on national and international level.	Published in Official Gazette No. 18132 dated August 11, 1983.
The Law on the Conservation of Cultural and Natural Asset (2863-23.07.1983)	N	The objective of this Law is to identify all the descriptions regarding the movable and immovable cultural and natural asset that need to be protected, to organize the activities and actions to be taken, and to determine the establishment and duties of the institution that will make the necessary decisions on principles and practices in this regard.	Published in Official Gazette No. 18113 dated July 23, 1983.

Law, Regulation, Convention, Principle and Standards	National (N) / International (I)	Purpose and / or Scope	Enforcement dates and numbers and dates of the Official Gazette
		This Law includes the matters regarding the movable and immovable cultural and natural assets that need to be protected and the duties and responsibilities of the relevant individuals and legal entities	
Regulation on Conservation of Wetlands	N	The objective of this Regulation, aimed at implementation of the Convention on Wetlands of International Importance, especially as Waterfowl Habitat the Ramsar Convention), is to protect and improve all the wetlands whether or not they have an international importance, and to determine the principles of cooperation and coordination between the relevant institutions and organizations.	Published in Official Gazette No. 25818 dated May 17, 2005.
Fishery Products Law no. 1380	N	This Law covers basis of the conservation, production and control of fishery products.	Published in the Official Gazette no. 13799 on April 4, 1971.
Regulation on Fishery Products	N	In order to conserve and benefit from the stocks of fishery products, this Regulation covers the issues relating to the procedures, principles, prohibitions, restrictions, responsibilities, precautions, control and inspection of fishery product licenses, amateur fishing, change of production sites, use of explosive and detrimental materials in fishing, harmful and pollutant materials prohibited from being dumped into fishery production sites, qualities, conditions and use of the means of productions, hunting of fishery products, trawling, fishery products produced incidentally, health of fishery products, production of finished and semi-finished products to be made from fishery products, and marketing of fishery products.	Published in the Official Gazette no. 22223 on March 10, 1995.
Statutory Decree on Establishment of Authority for the Protection of Special Areas (383-19.10.1989)	N	The purpose of this Statutory Decree is to set out the principles relating to the establishment, organization and duties of the Authority for the Protection of Special Areas, which will be a legal entity subject to the Ministry of Environment and conserve the environmental values possessed by areas declared or to be declared as "Specially Protected Areas" under article 9 of the Environmental Law no. 2872, take all measures to eliminate the existing environmental problems, identify the principles for the conservation and use of such areas, devise development plans, and revise and approve the plans and plan orders of any scale.	Published in the Official Gazette no. 20341 on November 13, 1989.
Regulation on the Procedures and Principles of Conservation of Game and Wildlife Animals and Their Living Spaces and Fight against Harmful Individuals	N	The purpose of this Regulation is to set out the procedures and principles regarding the conservation of game and wildlife animals and their living spaces, habitat change and placement of species, conservation measures, capturing of species, their collection from the environment, management of predatory species and fight against harmful and diseased individuals.	Published in the Official Gazette no. 25976 on October 24, 2005.
IFC Performance Standard 6 (PS6)	I	IFC's Environmental and Social Performance Standards define IFC clients' responsibilities for managing their environmental and social risks. The 2012 edition of IFC's Sustainability Framework, which includes the Performance Standards, applies to all investment and advisory clients whose projects go through IFC's initial credit review process after January 1, 2012.	Published in January 1, 2012.

Law, Regulation, Convention, Principle and Standards	National (N) / International (I)	Purpose and / or Scope	Enforcement dates and numbers and dates of the Official Gazette
		Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in this Performance Standard have been guided by the Convention on Biological Diversity, which defines biodiversity as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems." Based on the risks and impacts identification process, the requirements of this Performance Standard are applied to projects (i) located in modified, natural, and critical habitats; (ii) that potentially impact on or are dependent on ecosystem services over which the client has direct management control or significant influence; or (iii) that include the production of living natural resources (e.g., agriculture, animal husbandry, fisheries, forestry).	

5. METHODOLOGY

This section includes the details of methodology, schedule and targets of biorestoration monitoring studies that will be conducted on the areas mentioned below on and off-RoW. The special areas listed below are the areas those require particular attention throughout construction and reinstatement;

- Slopes on ROW (Side slopes, Steep slopes, Narrow ridges),
- Critical habitats (River crossings, Wetlands, Karstic areas and marl),
- Temporarily Used Areas.

The slopes on ROW and related biorestoration activities, which will be implemented on each of them are already determined and provided to each CC. During the biorestoration activities, each CC will implement the decided biorestoration activities which are mostly hydroseeding or hydromulching to the determined slopes. The list showing the start and end KPs, decided biorestoration activity and other details for each determined slope, where biorestoration activities will be performed by CCs is given in Appendix A.

Regarding the critical habitats, a separate Biodiversity Action Plan was prepared after the approval of ESIA and both terrestrial and freshwater critical habitats were determined along the ROW. During the determination of terrestrial critical habitats, sensitivity of habitat types were assessed and areas having sensitive habitats such as wetlands or showing karstic and marl characteristics were determined as terrestrial critical habitats. In addition to terrestrial critical habitats, river crossings along the ROW were assessed in terms of the sensitivity and importance of habitat and freshwater critical habitats were determined among the river crossings on ROW. The tables including the pre and post-construction mitigation measures, monitoring methodology, frequency, period and achievement criteria for critical habitats were separately prepared for terrestrial flora, terrestrial fauna and freshwater fauna are given in Appendix B.1, Appendix B.2 and Appendix B.3, respectively.

This plan does not cover the AGIs where permanent surface development will occur such as Compressor Stations, Metering Stations or Block Valve Stations. Biorestoration activities on temporarily used areas such as camp sites, pipe stockyards, dump sites, access roads etc. will be performed by CCs after completion of use of those areas. The areas temporarily used during the construction activities will be listed and finalized after the construction activities are completed and those areas will be taken into biorestoration monitoring scope of work once they are all determined.

Bio-restoration monitoring on the ROW consists of the vegetation cover and species diversity monitoring together with monitoring the success of pre and post-construction mitigation measures taken for SCC species identified in each critical habitat in BAP to ensure that the biorestoration objectives as set out in the ESIA and BAP are maintained during the operation phase. These objectives seek to achieve and demonstrate the following:

- An increasing trend in vegetation regrowth in all non-agricultural areas requiring full restoration, to pre-disturbed conditions,
- Species diversity composition increasingly drawing closer to the one in areas undisturbed by the project activities,
- An increasing trend in the number of areas classified as Erosion Class 3 or better and Erosion Class 2 or better in critical habitats.

In each case it is recognized that the rate of change should be commensurate with habitat type, local biophysical setting and short and long term climatic conditions.

In the following sections of this plan, the details of methodology that will be used during the monitoring of biorestoration process for vegetation cover, species diversity assessment together with the techniques for monitoring the success of pre and post-construction mitigation measures taken for SCC species identified in each critical habitat in BAP are given separately.

The methodology for monitoring of vegetation cover and species diversity involves four steps.

1. The first step involves **acquisition of orthorectified satellite imagery** of the project area. Initially, coverage of the whole project area is required as this will form a baseline against subsequent change will be measured and trends established. Subsequently, routine coverage will only be required of selected areas.
2. The second step involves **sample site selection**. This requires randomly determining a set of number of sites along the ROW and within off-ROW project areas for the purposes of conducting site surveys, such that these sites are representative of the range of conditions experienced within the project area[3]. This step shall be conducted once, with the chosen sites being re-visited in subsequent monitoring rounds.
3. The third step involves **site surveys**. Separate techniques will be required for measuring vegetation cover and recording species diversity. It is anticipated that site surveys and acquisition of orthorectified satellite imagery will be conducted simultaneously.

[3] Refer to Site Selection Methodology (Appendix C.1);

4. The fourth step involves **data analysis and reporting**. Vegetation cover assessments shall assess re-growth trends and species diversity data shall be analysed and compared with data collected in nearby, undisturbed areas, as well as against theoretical species diversity projections.

In addition to monitoring of vegetation cover and species diversity, the methodology for monitoring of flora, terrestrial fauna and freshwater fauna SCC species in each critical habitat defined in BAP is detailed in the below sections of this plan.

5.1. Flora

The methodology for monitoring of vegetation cover and species diversity of flora species are described from Section 3.1.1 to Section 3.1.7 below. In Section 3.1.8, the methodology for monitoring of the SCC flora species is detailed.

5.1.1. Acquire satellite imagery

High resolution satellite imagery shall be acquired, initially for the entire project area, and adjacent margins as necessary, and subsequently in areas exhibiting high erosion risk, slower than expected vegetation regrowth, or elements of both. It is envisaged that both the frequency and area of coverage will diminish over time.

The imagery shall be orthorectified to remove geometric distortions and therefore allow accurate co-registration of multi-temporal images and data sets, i.e., those acquired or derived over the course of the monitoring programme. Ground Control Points collected in the project area shall be used to facilitate this process.

5.1.2. Sample Site Selection along and Off-ROW

A stratified random sampling regime shall be employed using habitat maps and associated proportionality index maps[4]. The proportionality index maps will indicate the number of sample sites to be allocated for each habitat. Random Table Numbers shall then be used to identify the exact position within the habitat type at which transects should be located (Appendix C.1). The process shall then be repeated until the allocated number of transects within each habitat has been reached and shall include the ROW, access roads, new borrow pits, pipe dump sites, camps/yards, where these areas were previously undisturbed, non-agricultural and subject to full reinstatement with the objective of restoring original conditions.

The KP location of each transect shall be imported into a GIS and merged with a base map. The geographical co-ordinates of the start and end points of the transect shall then be determined and the results, together with the base map, uploaded into a GPS. The GPS shall then be used to locate the required starting point in the field.

The total number of transects will be set taking resources and time constraints into account[5]. Nominally, six quadrats shall be located along each ROW transect, with the number being halved in forest habitats. At off-ROW locations, transects shall comprise six quadrats, spread equally within the disturbed and un-disturbed areas.

[4] These maps will be prepared in order to ensure that finite monitoring resources are effectively deployed in important habitats according to statistically justifiable methods (Refer to Site Selection Methodology Appendix C.1).

[5] The number of transects will be reviewed after species variability has been determined. This will occur after the first round of sampling.

Transects shall be permanent in the sense that they will be revisited year after year for the purposes of collecting field data. In areas demonstrating progressive revegetation, the vegetation cover on the ROW or other disturbed areas will begin to approximate the pre-disturbed condition (as indicated by the measurement of vegetation cover in adjacent undisturbed areas). The need for ongoing ground measurements in these areas for the purpose of calibrating satellite data, will therefore, diminish and some transects will become redundant for the purposes of assessing vegetation cover[6]. It will, however, be necessary to maintain a minimum number of transects in order to ensure appropriate statistical representation. Accordingly, new transects will need to be established. These shall be located in areas where regeneration is either regressive or slow, as these will remain target areas for future satellite data acquisitions. New transects shall be selected using the same proportional approach described in this procedure in order to maintain appropriate habitat representation.

New transects will also need to be established if significant changes occur at existing transect sites, either through land use change (e.g., agricultural development, reforestation) or as a result of an oil spill, fire, etc.

5.1.3. Site Surveys

5.1.3.1. Transect Layout on ROW

The total number of transects will be initially set taking resources and time constraints into account. Nominally, six quadrats will be located along each ROW transect, and four in forest habitats. At off-ROW locations, transects will comprise six quadrats, spread equally within the disturbed and un-disturbed areas.

In the field; at each site, a 75m transect rope shall be laid out perpendicular to the ROW, as determined by a compass, except in forest habitats and shrub habitats, where the transects shall be parallel to the ROW in order to accommodate the larger quadrat size required for measuring species diversity (Figure 5-1, Figure 5-2). The rope shall be marked at 1m intervals.

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[6] The transects shall still be used to collect species diversity data.

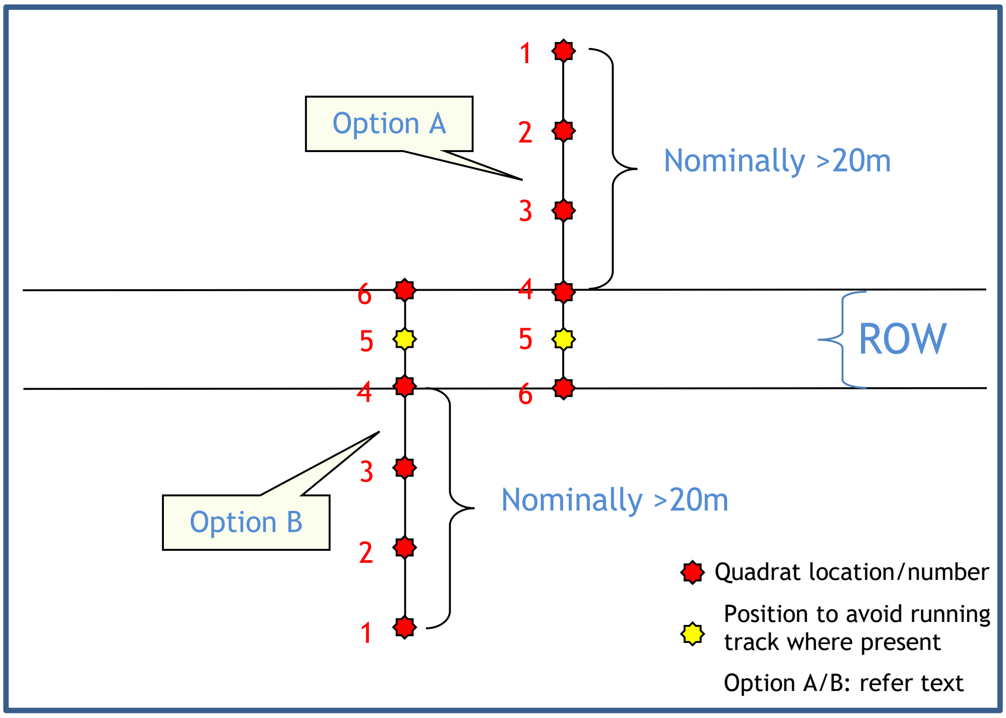

Figure 5-1 Transect and Quadrat Layout

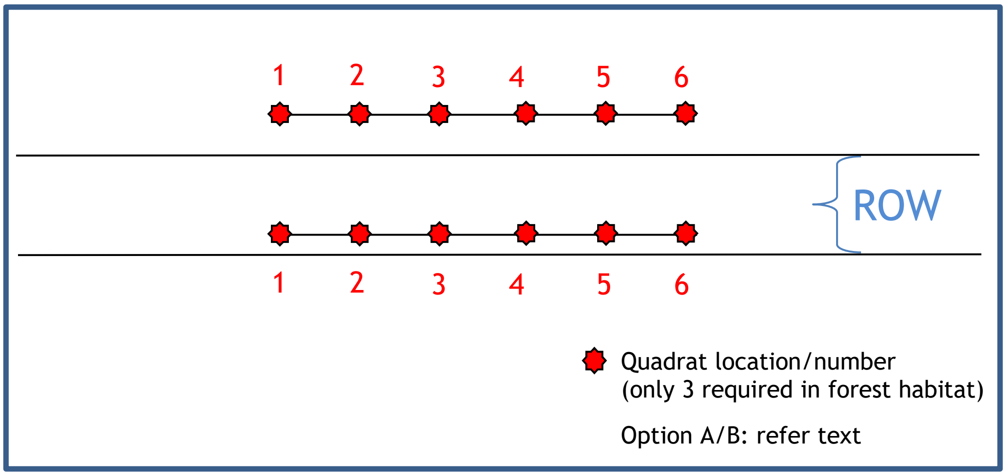

Figure 5-2 Transect and Quadrat Layout for Forest Areas

Where the transect rope is aligned perpendicular to the ROW, one end shall be located approximately 1-2m off the ROW, with the other end extending at least 20m into the undisturbed landscape (Figure 5-1). The starting side of transects aligned perpendicular to the ROW shall be determined in the field, taking into account access, representativeness, etc., (Options A & B on Figure 5-2). In the event that adjacent areas on either side of the ROW are significantly different from each other (e.g. top of a hill where one side is forest the other side is shrub), the transect shall be extended so as to allow sampling on both sides.

The end-points of the transect tape shall be marked by a small metal plate, fixed to the ground by a stake. The plates shall be distinguishable from metal stakes that may have been used to anchor jute matting to the ground in high erosion risk areas. Where the ground is too hard to penetrate with a stake some other visible marker shall be installed (e.g. painted rock), recognising that any overly conspicuous object may be stolen or moved by a third party. A compass bearing of the transect shall be taken in all cases as shall a GPS reading of the end points. Metal detectors and a GPS shall be used to relocate the transect marker plate in subsequent years.

Where the tape is aligned parallel to the ROW it shall be positioned to minimise the effects of the running track (where present) and the central restricted planting area, where deep-rooted species are not permitted (Figure 5-1, Figure 5-2). Both factors will have an important bearing on the succession process and will ensure that the species composition on the ROW will never reach a climax (hence the need for an off-set programme). This factor will need to be taken into account when interpreting species diversity data and in particular, percent commonality indices.

In all instances expert judgment will need to be applied in the field when laying out transects and quadrats in order to account for local variations and circumstances, e.g. edge effects such as shading in forest areas, local drainage, etc.

The ROW transects shall be used to locate quadrats for measuring both vegetation cover assessment and species diversity. The same transects will be used for monitoring in subsequent years.

5.1.3.2. Transect Layout Off-ROW

The same principles shall apply for transects located in off-ROW sites. Here, the orientation shall be east-west (unless physically constrained), along a line defined as the midpoint due north of the south-west corner of the site (Figure 5-3). Quadrats shall be located so that they are a minimum of 5m apart, and cover disturbed and un-disturbed areas.

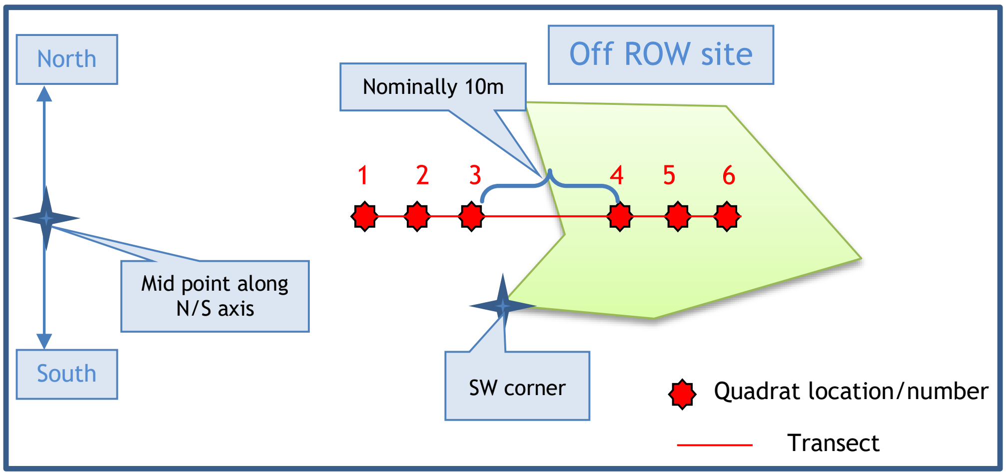

Figure 5-3 Transect Layout for off-ROW sites

As for the ROW transects, the off-ROW transects shall be used for both the assessment of vegetation cover and the measurement of species diversity.

5.1.3.3. Quadrat Location, Size and Number

Sampling plots (i.e., quadrats) for species diversity shall be located along the transect using the 1m transect rope markers as a guide, with the center of the quadrat corresponding to a rope marker. Each quadrat location shall be recorded as a distance (in metres) from the starting end of the transect. The corner-points of the quadrats shall be marked by a small metal plate, fixed to the ground by a stake.

Except in forest and shrub habitats, the quadrats shall be nominally located to correspond to edge, intermediate and center positions across the ROW corridor. For forest and shrub habitats the center points of the quadrats shall be evenly distributed along the transect.

Quadrats shall always be numbered consistently, starting in the undisturbed areas. For quadrats located on transects running parallel to the ROW, quadrat 1 shall be on the positive end of the transect, as defined by the KP ROW sequence.

The number of quadrats per transect, together with the size of the quadrat shall vary in accordance with the type of community being sampled and the measurement being taken, i.e., vegetation cover or species diversity. Table 5-1 summarises the quadrat sizes to be used in each community[7], as well as the minimum number per transect. The number of quadrats per transect needs to remain somewhat flexible because of the varying width of the ROW.

Table 5-1 Quadrat Size and Number for Different Habitats

Vegetation community /habitat	Quadrat size		Minimum quadrats per transect[2]	
	Vegetation cover	Species diversity[1]	Vegetation cover	Species diversity
Coastal Habitats (B)	1m x 1m	2m x 2m	6	6
Heathland, scrub and tundra (F)	1m x 1m	10m x 10m	6	2
Grasslands and lands dominated by forbs, mosses lichens and habitat complexes (E, X)(grasslands including steppes)	1m x 1m	3m x 3m	6	6
Grasslands and lands dominated by forbs, mosses lichens (E)	1m x 1m	2m x 2m	6	6
Woodland, Forest and other wooded land (G)	1m x 1m	10m x 20m	6	2

[1] Adapted from British National Vegetation Classification, Rodwell et al. (1991) British Plant Communities, Cambridge University Press

[2] Except in forest habitats, three quadrats shall be located off the ROW or outside the off-ROW site. The number of quadrats that can be physically located on the ROW will necessarily decrease as the size of the quadrat increases, given the finite width of the ROW and the need to avoid overlapping quadrats. Field judgment shall take local circumstances (e.g., physical constraints) into account when determining quadrat numbers and final location. For example, in habitats with high inherent species diversity (grasslands, meadows) an increased sample size (i.e., more quadrats per transect and/or more transects) may be warranted. This need shall be determined through the application of a Power Analysis on the first years' data.

Quadrat sizes for vegetation cover need to be smaller than for species diversity because of the high error factor associated with using large quadrats when measuring this attribute. This is less of a problem when assessing species diversity although it will be necessary to employ an internal grid system for quadrats greater 2m x 2m to ensure systematic coverage within the quadrat.

The vegetation cover quadrats shall be 'nested' within the larger species diversity quadrats. This will avoid the need to lay out two sets of quadrats at each sampling site and therefore save time (Figure 5-4). In shrub and forest habitats, where large quadrats are required,

[7] The nominated quadrat sizes are based on convention (e.g., Hill et al. 2005, *Handbook on Biodiversity Methods*) and practicality. A key consideration is the fact that larger quadrats are accompanied by greater potential error, and therefore a greater number of smaller quadrats will yield more accurate and statistically valid outcomes than a smaller number of larger quadrats.

multiple nested quadrats will be required to measure vegetation cover in order to meet the minimum quota specified in Table 5-1 (Figure 5-4).

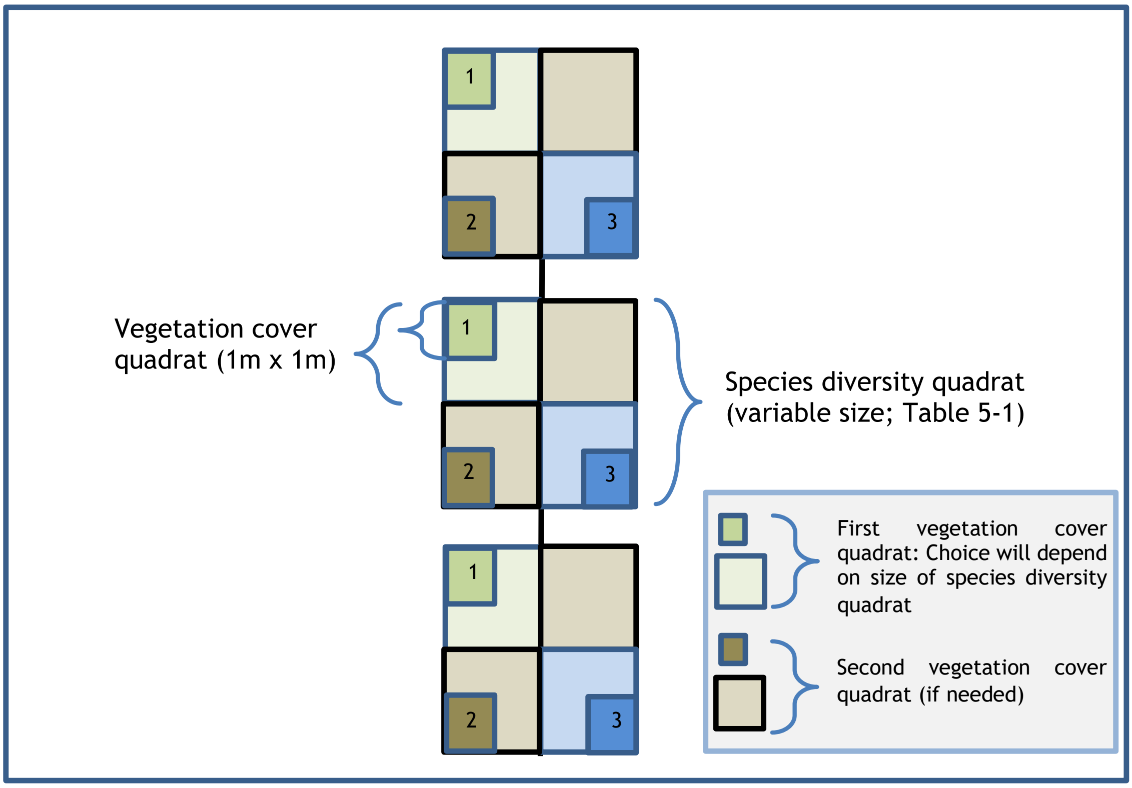

Figure 5-4 Nested Quadrat Layout for Measuring Vegetation Cover

Quadrat sizes shall remain fixed from one sampling period to another and for each attribute. This will ensure that a comparison of data sets will be statistically valid.

It should be noted that vegetation cover estimates in forest and shrub habitats should logically require the use of quadrats greater than 1m x 1m, however, it must be remembered that the measurements will be taken in cleared areas (not containing forest or shrub) where the early stages of vegetation regeneration will be dominated by herbaceous and grass species. As it is these species that will combine to form the initial cover (and be compared against the performance targets), a quadrat size that minimizes cover estimate errors, is appropriate.

Larger quadrat sizes may, however, be appropriate in undisturbed (control) areas as it may be impractical to use 1m x 1m quadrats in these locations. In these instances cover estimates for disturbed and undisturbed areas can still be compared because cover is *independent* of area (i.e., greater area doesn't necessarily imply greater percent cover). This is not the case for species diversity (where greater area equates to more species), and is why the quadrat size for this attribute must remain constant for reinstated and undisturbed areas.

5.1.3.4. Baseline Site Record

Background data shall be obtained at all transect sites and recorded electronically in a GPS mapping device with in-built GIS display functionality and data recording capability and on hard copy proformas (Appendix C.2).

At each transect a digital photograph shall be taken at a standard height of 1.50m, with the line of the transect bisecting the field of view. If possible, the horizon will be present in the photograph.

A white board containing a photograph ID and sample site reference shall be placed within the field of view (refer Appendix C.2 for ID nomenclature).

The photos shall be stored in the Species Diversity database, as per the guidelines presented in Appendix C.2.

Photographs of each quadrat shall also be taken and stored Species Diversity database, again incorporating a white board ID system. The perimeter of the quadrat shall fill the frame of the photograph.

5.1.3.5. Site Assessment Check List

A site assessment check list shall be completed during each site assessment (Appendix C.3). Any variations from the procedure shall be noted.

5.1.4. Percent Vegetation Cover Measurement

Percent vegetation cover is an assessment of the proportion of plant material covering the ground, as viewed from a vertical perspective.

The primary source of data for calculating vegetation cover will be high resolution satellite data from a system such as GeoEye. In the event that this data set is unavailable for a given location (e.g., if there is persistent cloud cover), then vegetation cover shall be assessed using field data only).

The satellite data shall be processed to generate a Normalised Difference Vegetation Index (NDVI) that essentially allows areas covered by vegetation to be distinguished from bare ground, and is derived from the following equation:

$$NDVI = (NIR - VIS) / (NIR + VIS)$$

where NIR = near infrared reflectance values and

VIS = visible reflectance values, with the contrast between the two spectral bands being related to the greenness of the vegetation[8].

NDVIs shall initially be developed for the entire ROW as well as off-ROW project areas undergoing reinstatement. This initial assessment of vegetation cover shall serve as the baseline against which future estimates shall be compared and trends determined.

NDVIs shall be derived from satellite data recorded to coincide with peak chlorophyll levels, i.e., late Spring/early Summer. Timing will necessarily vary with location and shall be based on field observations. A minimum of three weeks, preferably four, shall be allowed to acquire the satellite data in June-July months of the year. To the extent possible, the collection of field data for ground truthing purposes should occur within this acquisition window.

[8] An NDVI of 1 corresponds to maximum ‘greenness’ due to the fact that the reflectance of vegetation in the red region is low (due to the presence of chlorophyll in green vegetation which is highly absorbing) and sharply increases towards the near-infrared (due to the higher reflective properties of plant cells to this section of the electromagnetic spectrum). Conversely, soil or senescent vegetation has higher reflectance in the red region and lower reflectance in the near-infrared region, resulting in an NDVI approaching -1.

NDVI values shall also be determined for adjacent, undisturbed areas for the purposes of assessing the ‘original’ vegetation cover. These estimates are required to establish endpoints for each habitat. These endpoints will serve as the maximum vegetation cover that can be realistically be achieved under local conditions, and therefore the ‘endpoint’ of the trend line.

5.1.5. Field Measurement of Vegetation Cover

Field measurement of vegetation cover is required for two reasons:

- to ground truth the NDVI values
- to assess re- growth trend where satellite data are not available (e.g., due to cloud cover).

5.1.5.1. Ground Truthing Assessments

By definition, NDVI is not an intrinsic physical quantity, although numerous studies spanning many years have shown a positive and generally linear relationship between NDVI and vegetation cover (Huete & Liu 1994; Carlson & Ripley 1997, Leprieur 2000). This observation forms the basis of the null hypothesis which is that NDVI is unrelated to vegetation cover. One of the objectives of collecting field data is therefore to test the hypothesis within established limits of confidence.

The strength of the observed relationship between NDVI and vegetation cover has been shown to be influenced by a variety of biophysical factors such as plant structure, background soil reflectance, shadow effects, solar and viewing angle, and atmospheric effects. These factors vary locally, and hence there is a need to ground truth the satellite data, measure the strength of the correlation in different habitats, and use the information to determine re- growth trends.

The following discussion details the following:

- The methods to be used for measuring vegetation cover in the field,
- The approach to be taken to determine the correlation between the field measurements of vegetation cover and NDVI values,
- The method to be used to map re-growth trends.

Field measurement of vegetation cover shall involve the use of quadrates. At each quadrat, vegetation cover shall be assessed by determining the relative proportion of bare ground to vegetation that can be seen when looking vertically onto the quadrat. It is recorded as the percentage of vegetation to bare ground. Where interspatial gaps within a plant exist (i.e. space between branches within a plant) they shall be ignored. Thus, the edge of a plant serves as the cover boundary for an individual plant. Where plants are intersected by the frame of the quadrat, only that portion occurring inside the frame shall be considered as part of the percent cover estimate.

Percent vegetation cover shall be recorded in 10 percent intervals (0-10%, 11-20%, etc.), using the median values of each interval (i.e., 5%, 15%, etc.) to calculate an average percent cover for the on ROW portion of the transect and a separate average for the off ROW portion.

A field guide is presented in Appendix C.4 to assist in the accurate assessment of percent cover, as this assessment is subjective and a potential source of significant error.

In addition to field measurements, an average NDVI value shall be calculated for a cluster of pixels, located to coincide with the transects and quadrats at each transect. The details of the calculation of average NDVI values are presented in Appendix C.5.

5.1.5.2. Direct Measurement for Trend Assessment

In instances where satellite data are not available for specific areas of interest, field measurements shall be used to measure trends in lieu of NDVIs. Data collected from the transects and quadrats described above shall then be used to develop estimates of vegetation cover. More specifically, median values shall be used to estimate average cover values for each transect where cover measurements have been made, as per the hypothetical example given in Figure 5-5. The same approach shall be applied to off-ROW sites.

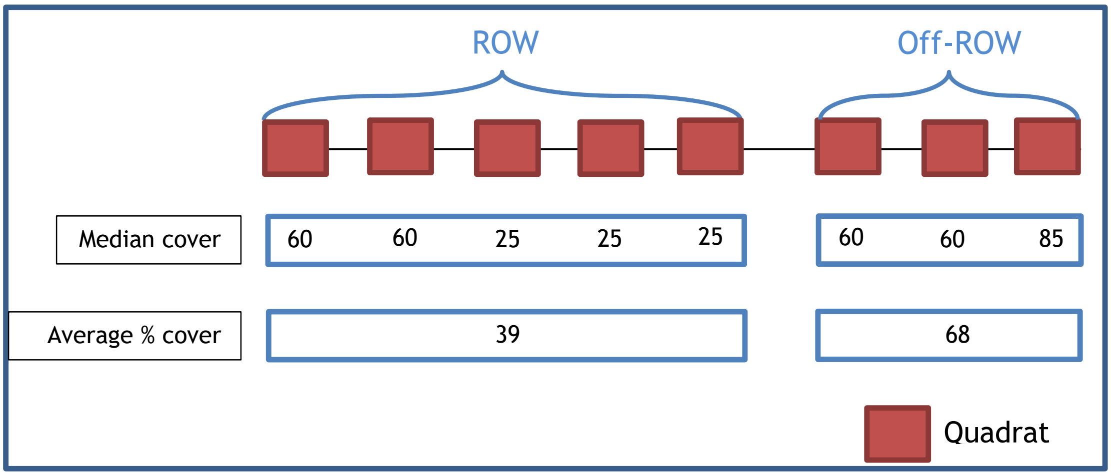

Figure 5-5 Calculation of Average Percent Vegetation Cover

Regrowth trends will be established by comparing direct cover estimates for each transect with previous direct field measurements, previous satellite-based assessments, or a combination of the two.

5.1.6. Field Measurement of Species Diversity

Species lists shall be developed during each sampling round, for each quadrat and along all transects, as described in Section 5.1.2. These lists shall be used to measure the attributes and variables listed in Table 5-2.

Table 5-2 Measured Attributes and Variables

Attribute/variable	Definition	Rationale
Presence/absence	Distribution (range) of species across the project site	Species lists will allow measurement of the transition from initial colonization by ruderal species through to climax communities, and hence the trend towards pre-disturbed conditions
Frequency (abundance)	Proportion of quadrats examined in which each identified species occurs, expressed as a percentage	Describes relative abundance. Will assist in the measurement of rate of change towards pre-disturbed conditions
Percent coefficient of variation	Measure of relative variability, and determined by calculating the coefficient of variation (% cv), which is the standard deviation expressed as a percentage of the sample mean	Allows Power Analysis, a method for establishing the number of samples required to detect a given change with a given level of certainty

Species lists will be prepared initially for each transect in Spring/Summer season of the first year for those areas that have been reinstated for a year or more, and in the next year for other areas.

It is inevitable in vegetation surveying that some species will not be identifiable in the field. This may be because only poor specimens are available, because the survey is conducted outside of the ideal time for recording of a particular species, or for critical species it may be necessary to examine a specimen in a laboratory. Where specimens within the species diversity quadrats cannot be identified in the field, they will be assigned with a unique code, a sample will be collected and a photograph taken. The code will comprise the transect number, followed by the quadrat number in which it was first recorded, followed by a two digit number starting from 01 and the photograph ID number (e.g. PH1-Q1-SP01-0039). If the same unidentified species is recorded elsewhere on the ROW it will be recorded on the quadrat proforma using the same ID code. The collected specimen will be pressed and labeled for future reference, and the photograph retained on the camera memory for quick reference in the field.

Invasive species will be identified during the site surveys and recorded to site forms presented in Appendix C.2, as other determined species.

Data from quadrats located off the ROW and in undisturbed areas shall be used to calculate variability for each habitat. Variability data shall then be used in a Power Analysis to recalculate the number of samples required to detect a change in species composition at the 95% significance level. The newly derived sample number shall be compared with the initial (first year) sample number and revised accordingly. The revised sample number shall then be used as described in the next sampling 3 years after the initial sampling. Thereafter, measurements of species diversity shall be nominally conducted 5 and 10 years after the initial sample, with a review after 5 years to confirm the appropriate frequency of future sampling, based on apparent and emerging trends.

5.1.7. Data Analysis

5.1.7.1. Vegetation Cover

Vegetation re-growth shall be mapped for all non-agricultural project areas (ROW and off-ROW) requiring full restoration to pre-disturbed conditions. This effectively equates to areas within the project footprint that were either covered by natural vegetation or that were being used exclusively for grazing activities at the commencement of construction.

Mapping classes shall be defined in terms of percent cover, using intervals of 10% (i.e., 0-10, 11-20, 21-30, etc.). The standard unit of measurement for reporting vegetation cover along the ROW shall be the pixel size of the satellite used to image the area. Other (coarser) units of measurement will be possible given the raster format of the NDVI data and the reporting functionality of the GIS, and shall be used at the discretion of each individual country, depending on specific in-country reporting and assurance needs.

In the first year of the monitoring program the results of the mapping task shall be used to prepare a baseline map of vegetation cover. The mapping task shall be repeated in subsequent monitoring periods and the results compared against previous results to establish regrowth trends.

A **Vegetation Cover Trend Rating Map** shall be produced for each monitoring period. This map will classify all reinstated areas in terms of one of three categories, as summarized in Table 5-3.

Table 5-3 Vegetation Cover Trend Rating

Category	Description
A	Vegetation cover increasing progressively
B	Vegetation cover showing little or no signs of increase between monitoring periods
C	Vegetation cover receding

Once an area has reached the relevant habitat endpoint, that section of the ROW or off-ROW plot of land shall cease to be systematically monitored unless routine field observations indicate that vegetation cover is regressing (notwithstanding natural seasonal dieback), or where the area of interest coincides with Erosion Class 5 conditions or greater.

In addition to the Vegetation Cover Trend Rating maps, at a minimum, vegetation re-growth data shall be summarized and reported as per Table 5-4. Supporting graphics shall be prepared as appropriate to illustrate trends over time.

Table 5-4 Vegetation Re-growth Data Assessment and Reporting; Hypothetical Example

Habitat Type	% showing increased cover from previous monitoring period /long term average	% showing no change in cover from previous monitoring period /long term average	% showing regression in cover from previous monitoring period /long term average	% Reaching Habitat Endpoint
Coastal Habitats (B)	60/50	20/25	20/30	20
Heathland, scrub and tundra (F)				
Grasslands and lands dominated by forbs, mosses lichens and habitat complexes (E, X)(grasslands including steppes)				
Grasslands and lands dominated by forbs, mosses lichens (E)				
Woodland, Forest and other wooded land (G)				

5.1.7.2. Species Diversity

Vegetation re-growth will initially involve predominantly ruderal species. These species will be gradually replaced by locally endemic perennial species. It may take many years before a climax community resembling pre-disturbed conditions is attained. Analysis of species diversity data shall aim to measure this trend.

Initially, the percent frequency difference between undisturbed and disturbed populations will be large. Indeed, initially there are likely to be few species that are present in both populations. Over time the species composition of the two populations is expected to converge, as will the percent frequency of individual species. Cover-abundance data shall be derived from the quadrat data, tabulated and presented in graphical form to assist the observation of successional trends (Table 5-5 and Table 5-6).

Table 5-5 Population Commonality Index (disturbed versus undisturbed populations; hypothetical data assuming successional trend)

Sampling period	Habitat	No. species recorded in disturbed area quadrats/habitat*	No. species recorded in adjacent undisturbed area quadrats/habitat*	No. species recorded in disturbed AND undisturbed quadrats/habitat*	% commonality (D) D=2C/(A+B)*100**
Column number		**A**	**B**	**C**	**D**
Year 1	Habitat A	3	9	0	0
	Habitat B	4	12	0	0
	Habitat C	5	15	0	0
Year 3	Habitat A	4	9	0	0
	Habitat B[9]	5	13	2	11
	Habitat C	6	14	1	5
Year 5	Habitat A	5	8	1	8
	Habitat B	6	12	2	11
	Habitat C	7	14	3	14
Year 10	Habitat A	6	9	4	27
	Habitat B	7	13	5	25
	Habitat C	5	14	6	32

** Presence/absence; refer Table 5-2*

Table 5-6 Species Convergence (hypothetical data assuming successional trend)

Species	Sampling period	% Frequency (undisturbed) based on presence/absence	% Frequency (disturbed) based on presence/absence	% Frequency similarity[10]
Species A	Year 1	30	0	0
	Year 3	45	0	0
	Year 5	40	5	13
	Year 10	50	25	50
Species B	Year 1	0	80	0
	Year 3	0	70	0
	Year 5	5	50	10
	Year 10	10	20	50

As apparent trends become evident, their statistical significance shall be assessed using a chi-squared test (X^2), where the null hypothesis is that the proportion of quadrats in which

[9] For example, for this habitat 18, species are recorded, 2 of which occur in both disturbed and undisturbed habitats. Therefore 11% (2/18) are common to both. Over time the number of species common to both is likely to increase. This will be reflected by the Commonality Index.

[10] Percent Frequency Similarity measures how species re-establish in disturbed areas (e.g., Year 5: 5/40*100 = 13%)

a species is present is the same in each sampling period. This assessment shall be achieved by comparing the observed data set with the ones, which would be expected, if no change had occurred. The chi-square test shall then be used to see whether the observed and expected values are sufficiently different for it to be unlikely that no change has occurred, viz.,

$$X^2 = \sum (0_i - E_i)^2 / E_i$$

where 0_i is the observed frequency of the species in a given year *i* and

E_i the expected frequency if the species is not changing. Expected values shall be calculated by:

E (one year) = (total quadrats in which species present/total number of quadrats) x total quadrats taken that year.

This value is compared with X^2 from statistical tables, with the degrees of freedom given by the number of years minus 1 (Hill et al, 2005)[11].

5.1.8. SCC Flora Species

The monitoring of SCC flora species, which were determined in the BAP, will be performed in three subjects; Flowering Time, Seed Maturation and Evaluation of Monitoring Results.

The table including the pre and post-construction mitigation measures, monitoring methodology, frequency, period and achievement criteria for each terrestrial critical habitat having SCC flora species was prepared and given in Appendix B.1.

5.1.8.1. Flowering Time

First, for each species, during flowering time interval specified in the table, by visiting the locality (critical habitat) of each individual species, border to be taken around is determined by GPS coordinates. Within this polygon, the exact point of the coordinates of individual species and number of individuals within the range is noted. The area of the polygon and plant (general stems, leaves, flowers, shoot tip, bud, branch, etc. Parts that represent taxonomic characters) are photographed.

Number of flowers of individuals that contain many flowers/ show good progress and number of flowers of individuals that contain few flowers/ show bad progress must be noted.

Ecological characteristics of the area in which the plant spread (the slope of the field in terms of erosion, maintenance of soil-bedrock structure, etc.) is noted.

Factors that threats (with threatening potential) on species population and habitat (anthropological factors, grazing pressure, invasive species, etc.). are noted and photographed.

Other plants growing around species' population and in dominant position are noted and photographed.

5.1.8.2. Seed Maturation Period

In each seed maturation period specified for each species, fruit/seed growth in flowering individuals will be controlled by visiting the related critical habitat. The individuals-shoots which are succeeded in fruit/seed growth have been recorded. If there are no fruits/seeds

[11] Handbook of Biodiversity Methods; Hill, D. et al (2005), Cambridge University Press

in flowered branches, that will also be recorded. Photographs are taken closely for both situations.

Two fruits taken from two different individuals of the SCC species are opened and number of seeds found in them is recorded. The photographs of these processes should also be taken.

These processes should be repeated for every year in between appropriate dates and variations should be reported in the chart. Negative situations such as decrease in individual number of SCC species' population, improvement disabilities/weaknesses in individuals, fertilization and seed holding/decline in improvement etc. should be noted. In these situations germination ratios of seeds should be reviewed and seed aliveness tests should be conducted. The existence or increase of invasive species in the region should also be recorded in the site forms. 5 years of monitoring period is recommended.

5.1.8.3. Evaluation of Monitoring Results

If there is a healthy increase and improvement observed in SCC species population at the end of 5 years monitoring period, it means that the monitoring period have been succeeded. However, if there is a decrease in population or a regression in individuals' development, some negative impacts on seed production have been observed, then the existing situation should be reviewed in order to develop a series of precautions (such as irrigation, struggle with invasive species, prevention of anthropological impacts, etc.). This situation may be caused by climatic conditions and anthropological impacts. Also, variations in biotic/abiotic conditions which may affect the monitoring period should be observed during the period and recorded.

From the second year of monitoring period for the SCC species in which there is a decrease observed in germination ratios, experiments should be conducted in laboratory and if the results shows that the decrease in germination ratios is lower than 40%, seed aliveness tests should be carried out. The ratio of effective seeds of SCC species number to the total number of seeds is an important criterion. This ratio should be higher than 40%. If individuals of the species cannot produce seeds with enough effectiveness, then ex-situ protection precautions should be applied. Some vegetative reproduction trials also should be conducted for unsuccessful species in terms of effective seed production/successful seed germination (leaf, tuber, steel, tissue culture etc.). The individuals which have been produced by this procedure should be transferred to the critical habitat and planted.

All these periods should be conducted by considering the spread and growth in natural environment of populations of plant species in critical habitat / applying monitoring methodology by comparing it in each stage.

If it is monitored that the achievement criteria stated in table Appendix B.1 are not satisfied for a particular SCC species or critical habitat due to improper implementation of pre and post-construction mitigation measures stated for that particular SCC species or critical habitat, proper implementation of the missing mitigation measures will be required. It is expert's opinion that if the mitigation measures are properly implemented by CCs, it is highly likely that the achievement criteria will be satisfied.

If the monitoring results demonstrate that criteria are not achieved even the stated pre and post-construction mitigation measures are properly implemented, the reasons of this will be evaluated by the experts which can be anthropological factors, grazing, seasonal or natural affects etc. Then, recommendations of expert's for habitat restoration specific to the SCC species or critical habitats will be shared in the monitoring reports.

The Interim First Findings of each site survey will be submitted to TANAP in Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report that will cover the results of the entire monitoring study will be submitted to TANAP in 45 days after the completion of all site visits.

5.2. Fauna

5.2.1. Terrestrial Fauna

The table including the pre and post-construction mitigation measures, monitoring methodology, frequency, period and achievement criteria for each terrestrial critical habitat having SCC fauna species was prepared and given in Appendix B.2.

Basic principles for faunistic follow-up studies;

It is important to obtain standard data for monitoring activities. Therefore, it is important to consider the following criteria in all faunistic monitoring studies. These criteria;

- At critical habitats below 400 m length the entire area should be studied.
- At critical habitats having length between 400 m and 1,000 m, a determined area of 400 m should be investigated.
- At critical habitats longer than 1,500 m, two 400m-transects and at critical habitats longer than 2,500 m, three two 400m-transects should be studied.
- At critical habitats shorter than 400m, if there is no suitable habitat for mammals, birds, reptiles, amphibians and insects to any of the groups, monitoring studies should be done for those groups. In these areas, only SCC species found in the field should be monitored.
- During mammals monitoring studies, a photo-trap should be installed at every 400 m to represent the critical habitat. There is no need for photo-trap at places less than 400 m and where there are no suitable habitats.
- Sherman and tomahawk traps used to capture the small and medium size mammals should be installed every 20 m in habitat transect along line.
- Photo-traps which will be established to monitor large mammals, should be positioned approximately 1.5 m height at appropriate trees on the edge of fields. If the trees are not appropriate, they should be established at sticks mounted at 1.5 m height.
- Dates to monitor common insect species must be determined by considering climatic conditions and vegetation. Therefore, monitoring of common insect species work must be done at an appropriate time in May-June at critical habitats between Eskisehir-Sivas and in June-July at critical habitat between Sivas and Ardahan.
- At critical habitats having multiple species, a field form should be filled for each critical species.

To standardize the researches, it is recommended that site surveys should be done by the same research team at least the first 3 years.

If it is monitored that the achievement criteria stated in table Appendix B.2 are not satisfied for a particular SCC species or critical habitat due to improper implementation of pre and post-construction mitigation measures stated for that particular SCC species or critical habitat, proper implementation of the missing mitigation measures will be required. It is expert's opinion that if the mitigation measures are properly implemented by CCs, it is highly likely that the achievement criteria will be satisfied.

If the monitoring results demonstrate that criteria are not achieved even the stated pre and post-construction mitigation measures are properly implemented, the reasons of this will be evaluated by the experts which can be anthropological factors or natural affects. Then, recommendations of expert's specific to the SCC species or critical habitats will be shared in the monitoring reports.

The Interim First Findings of each site survey will be submitted to TANAP in Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report that will cover the results of the entire monitoring study will be submitted to TANAP in 45 days after the completion of all site visits.

5.2.1.1. General Methodology for Common Mammals

Basic Principles

Terrestrial mammal species in critical habitats have a significant effect on preservation and regulation of ecological balance in its field. To monitor the common mammal species in critical habitat, many different monitoring methodologies should be applied. To determine the presence of individuals belonging to the mammalian species in critical habitat and to assess the status of the population the following methods and monitoring studies must be performed at the first 3 years and then 5, 7 and 10 years.

These studies must be performed by minimum 1 expert zoologist and 1 assistant researcher.

Small Mammal Monitoring Methodology

Small mammal species, for many groups of animals (birds of prey, some snakes, such as medium and large mammals) is an important source of food. Therefore, the critical small mammal species monitoring work must be performed to determine the ecological value of habitats. The standard method used in small mammals' inventory and monitoring is Sherman trap method.

In this method, a total 20 traps should be installed at 400 m transect line at every 20 m.

While installing traps, tempting food (peanuts, nuts) should be placed inside. These traps should be installed at evening 1 hour before sunset, just after sunrise in the morning, at the latest at 08:00 they should be collected. Captured individuals should be released in the same area once they are diagnosed and received a photo.

In order to correctly evaluate the acquired data, the data should be ensured to be standard. Therefore, transects which identified in the first study in critical habitats and trap points established on this line should be marked on map to be used in the next monitoring study.

Medium and Large-Sized Mammals Monitoring Methodology

Large mammals, from herbivores (eg. Wild goat), to medium carnivores (eg. Marten) and to top level carnivores (eg. Bears) ranging from different trophic (nutritional) consist of various types of fairly level. The density of the population towards the large mammals to medium-sized mammals is lower than lower trophic level species. Therefore, the effort for the species to be detected per unit is relatively low. On the other hand, they have an important role on structuring of populations and communities of the carnivores. Due to their status they have an impact on many aspects of sustainability. In addition, carnivores need attention and require special interest at forest or any special area.

Therefore, to determine the ecological value of critical habitat, medium-sized and large mammals monitoring study should be done. Standard method used in inventory and monitoring work of medium-sized mammal species is Tomahawk traps. However, in many studies photo-traps method are shown to be more effective in determining these species. For this purpose, it is necessary to use multiple types of inventory and monitoring methods. The main protocol of this method is photo-trap method. In addition, track work must be performed.

Photo-trap Studies

Trees and shrubs in the area of photo-traps should be directed by connecting to trees and shrubs at active section of the activity. In this method, 1 photo-traps will be appropriate to be placed for each 400 m in critical habitats and a total of 2 photo-traps will be suitable. To determine exactly the species who use the area, enticing foods should be placed in front of those photo-traps. Photo-traps established at critical habitats must work at least 48 hours.

Within 15 minutes, if the individuals of the same species have been photographed by photo-traps neighbours who, they should be considered as distinct individuals, the individuals photographed in this time period should be considered as the same individual. Population conditions must be interpreted accordingly.

Transect Studies

At woodlands and in habitats with riparian vegetation, transect surveys must be performed to determine the species using the area. In this method, by walking along the transect line counting should be done in the area of 1 meter each side of the line. Transect surveys should be performed by walking for 2 hours. In transect study, faeces, footprints, nest entrance and bumps should be investigated.

Reporting

Information obtained from photo-traps, transect surveys, from sherman and tomahawk traps, must be marked on the map, so further evaluation objective data should be established.

The following information in the site forms shall be recorded for each observation on the survey form given in Form-1 in Appendix D: day/time, study duration, type, determine shape, the age group of individuals (children, pre-adult, adult), surface type (rocks, stumps, bare ground) and location in the transect line.

5.2.1.2. General Methodology for Common Bird Species

Basic Principles

Bird species in the critical habitats, due to their feature of spreading the seeds of the plant in its field, control of pest populations, due to features such as destroying carcasses and waste, has important implications for the preservation of ecological balance and regulation. For the monitoring of common bird species in the critical habitats, special monitoring methodology to be applied to the groups.

The purpose of monitoring is to detect the presence of individuals of bird species in critical habitats and monitoring activities by the method described below to assess the population status in the first 3 years and then 5th, 7th and 10th years.

These studies must be performed by minimum 1 expert zoologist and 1 assistant researchers.

Monitoring Methodology

Transect census method should be applied for the birds. 400 m transect line, identified in critical habitats should be observed by walking in 2 hours. During the observation on the transect line, counting and listening to the sound of the species should be performed. In addition, on or around the line, active slot investigation and/or species, indicating the reproductive behaviour and individuals must be recorded. To determine the nocturnal predators, trace faeces and pellets should be investigated along transect line. To standardize the data, these transect should be recorded and same transects must be used in each survey. Detected bird species, counts and their behaviour should be recorded properly on the on the survey form given in Form-2 in Appendix D.

5.2.1.3. General Methodology for Common Reptiles

Basic Principles

Terrestrial environments contain various reptile species. This extraordinary diversity of life strategies and species of vertebrate class makes it critical to examine these groups. As a result of effective forest or habitat monitoring program to make inferences about the diversity of species and related research groups with specific research methods should be applied.

To determine the presence of members of the reptile species in the critical habitats and to assess the status of the population; monitoring studies by the methods below should be conducted at the first 3 years and then should be repeated in the 5th, 7th and 10th years.

These studies must be performed by minimum 1 expert zoologist and 1 assistant researcher.

Lizards, Snakes and Turtles Monitoring Methodology

Reptiles include turtles, snakes and lizards species. Some of the predatory reptiles, some are herbivores. Some species of turtles have adapted to aquatic habitats, while the other side shows the distribution of terrestrial habitats. Lizard species have made a very good adaptation to terrestrial habitats. They feed on insects and small invertebrates. They are also food for birds and mammals.

Snakes are predator species, some species are aquatic, some species have adapted to the terrestrial habitats. Insects, amphibians, reptiles, birds and small mammals, are the food of the snakes. Birds of prey are nutrient source for mammals and other reptiles, they are therefore important for ecological balance and food chain.

Therefore reptile species monitoring work must be done to determine the ecological value of critical habitats.

Since reptiles include lizards, snakes and turtles, monitoring methodology must be applied separately. Aquatic turtles and snakes of aquatic monitoring methodologies should be performed only in appropriate habitats.

Transect surveys

Ideally, transect surveys must meet the following assumptions:

Transect lines should be chosen randomly. All individuals should be observed in the transect, animals should not be counted twice in or between transects. A 400 m long transect line should be established for lizards, snakes and turtles that spread in the terrestrial part of the critical habitats. Transect lines should be walked for 2 hours. Every 100 meters must be walked in 30 minutes. Natural shelters along these lines should be checked. Identified reptile species, should be recorded on the forms properly.

Transect surveys should generally be done between hours 08:00 and 17:00 because it is expected that during the hours of the day specified ectoderm active and visible. Observers must conduct monitoring on at both sides of the transect line within 1 meter, but on both sides of the transect line, high-quality habitats within 10 meters (where the natural shelter) can be divided to investigate. To minimize discomfort, stone, rock or other materials should be replaced after observation.

Animals, for verification of the type, should only be caught when needed. As evidence, samples may be needed to verify the rare species that are difficult to be recognized. Time used to identify the species and to record information should not be included in the total survey time.

The following information should be recorded for each point on the on the survey form given in Form-3 in Appendix D: observer, day/time, study duration, type, determination of the shape, the age group of individuals (children, pre-adult, adult), surface type (rocks, stumps, bare ground) and location in the transect.

5.2.1.4. General Methodology for Common Amphibian Species

Basic Principles

Amphibians, at least at a certain period of their lives, are species dependent on water. This class includes salamander and frog species. Amphibians live in water, soil, under stones and in leaf litter or fully water. As they are ecologically dependent on humidity, their distribution area is restricted. Amphibians are one of the important ecosystem species. Amphibian species in critical habitats have significant influence on protection and the regulation of ecological balance in its field. For the monitoring of the common amphibians in the critical habitats, a variety of group-specific monitoring methodology must be applied.

Adult amphibians are predators, they feed on insects and other invertebrates. They contribute significantly to the ecological balance of habitats. Dual life cycle of amphibians (water and soil), reveals the importance of determining the ecosystem health of this group. To reproduce the adults are dependent on forest habitat and wetlands, they are susceptible to changes in habitat use.

Thus, amphibian species monitoring work must be done to determine the ecological value of critical habitats.

To determine the presence of members of the amphibian species in the critical habitats and to assess the status of the population monitoring work should be performed in the first 3 years and then should be repeated in the 5^{th}, 7^{th} and 10^{th} years.

These studies must be performed by minimum 1 expert zoologist and 1 assistant researcher.

Common Frog Monitoring Methodology

Since frogs live in aquatic and terrestrial habitats, aquatic and terrestrial habitats (semi-aquatic) methodology to be applied should be evaluated differently. In aquatic habitats, species suitable method for monitoring the level of the frog species and population is the use of aquatic scoop. A bag-shaped nets should be planted to a hoop mounted on the end of a stick. Bag net mesh size should not be large, thus, the animals cannot go through the holes; also if mesh of the nets size is very fine, it reduces the speed of the net in the water, fine sand and grass clog pores and net becomes bulky. 2-4 mm mesh size is suitable. Bucket to be used, must be made strong and durable material, when it hit the rocks or when it is inserted in the bush, it should not be torn easily. In a study conducted in the aquatic portion of the critical areas, right and left of the midline, a 300 meter area with 150 m at each sides, should be scanned with a bucket. In the aquatic portion of the critical habitats, screening must be performed for 1 hour with a bucket. Along the same lines, the bottom of the natural shelter on the edge of the water should be viewed. Time spent at this stage should not be included in the time spent with the scoop. Species and individuals observed and captured with scoop must be released once recorded on site forms.

For the common frog species in terrestrial habitats, a 400 m transect line has to be created. 400 m transect should be observed within 2 hours. Along the transect line, observations should be done and natural shelter (stone, rock or other materials under the slab) should be checked.

Observed amphibian species should be recorded properly on the survey form given in Form-3 in Appendix D.

5.2.1.5. General Methodology for Common Insect Species

Basic Principles

Insects constitute the biological basis of all terrestrial ecosystems. They contribute to nutrient cycling, they provide plant pollination, the dispersion of seed, control of populations of other organisms they are the main source of food and other living things (major, 1987). Although food chain structure of terrestrial and aquatic ecosystems are quite different, they are an important component of these two ecosystem food chain (shurin et al., 2005). Insects are the main food source of the lizards. Also they are among some amphibians and birds' food sources (scudder, 2009). Therefore, to determine the ecological value of critical habitats, monitoring studies of terrestrial invertebrates, insects should be made.

In critical habitats, to determine the presence and assess the status of the population of individuals of the species of Coleoptera, Diptera, Lepidoptera and Odonata, monitoring work should be performed in the first 3 years and then should be repeated in the 5th, 7th and 10th years with the following methods;

Feeding, resting and breeding place of most of the species of Coleoptera, Diptera, Lepidoptera and Odonata composed of herbaceous, shrub or high growing plants. Therefore, vegetation cover of the critical habitats should be at the desired level.

Therefore, along the 400 m long transect lines, Coleoptera, Diptera, Lepidoptera and Odonata samples should be collected by using sweep net by a researcher. By other researchers, samples of Coleoptera circulating under the floor and stone should be collected.

These studies must be performed by a minimum of two expert zoologist (at least master's degree in Entomology field) and 1 assistant reserarcher.

Identification of the species collected from the critical habitats should be done by experts and species diversity and species population status in the critical habitats will be determined.

Monitoring Methodology for Terrestrial Invertebrates (Coleoptera, Diptera, Lepidoptera and Odonata)

Transect survey method should be used during the monitoring studies of Coleoptera, Diptera, Lepidoptera and Odonata species. In this method;

400 m transect line in the critical habitats should be walked with slow and constant speed for 60-90 minutes and species should be collected.

Studies should be done between hours 09:00 and 17:00, which is the most active period of insects. In adverse weather conditions (extreme wind, rain), there must be no study. The working day temperature should be the 13°C or above.

Along the transectline , the area between 2.5 meters right and left side and 5 meters front and up is the counting area, which collection and enumeration of species observed will be done (Figure 5-6).

From the counting area on the transect line, samples of Coleoptera, Diptera, Lepidoptera and Odonata species will be collected and collected individuals will be counted.

The critical habitats and the species will be photographed during the monitoring studies.

Weather conditions of the day (temperature, cloud cover, wind), the number of individuals, date/hour, name of expert etc. should be written on the survey form which is given in Form 4 in Appendix D.

If known, name of the sample species collected from the site and if name is not known and it needs to be identified, the family name should be written on the survey forms. After species identification is done, the monitoring report should be written.

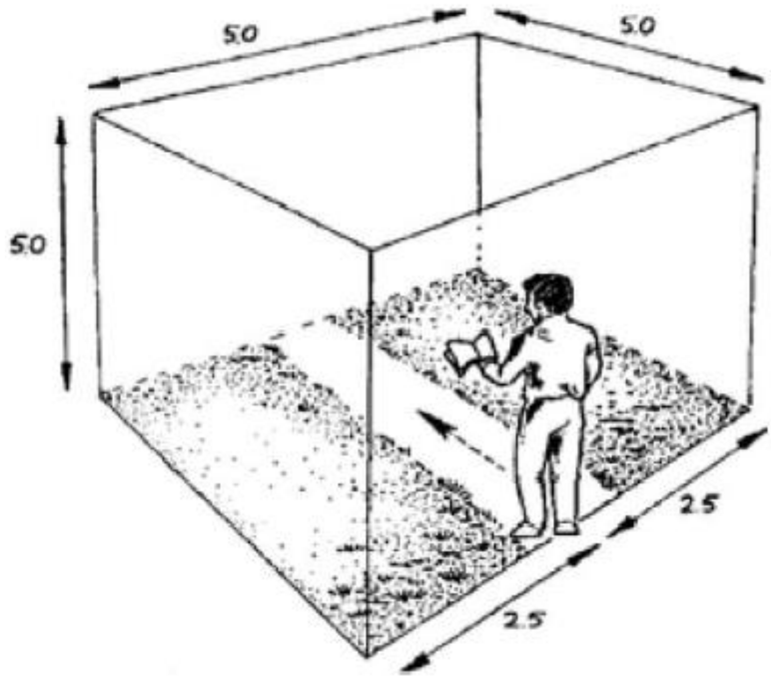

Figure 5-6 Counting Area during Transect Survey (Swaay et al., 2012).

5.2.2. Freshwater Fauna

The table including the pre and post-construction mitigation measures, monitoring methodology, frequency, period and achievement criteria for each freshwater critical habitat was prepared and given in Appendix B.3.

If it is monitored that the achievement criteria stated in table Appendix B.3 are not satisfied for a particular SCC species or freshwater critical habitat due to improper implementation of pre and post-construction mitigation measures stated for that particular SCC species or critical habitat, proper implementation of the missing mitigation measures will be required. It is expert's opinion that if the mitigation measures are properly implemented by CCs, it is highly likely that the achievement criteria will be satisfied.

If the monitoring results demonstrate that criteria are not achieved even the stated pre and post-construction mitigation measures are properly implemented, the reasons of this will be evaluated by the experts which can be anthropological factors or natural affects. Then, recommendations of expert's specific to the SCC species or freshwater critical habitats will be shared in the monitoring reports.

5.2.2.1. Monitoring Methodology for Benthic Species

For monitoring and sampling of benthic macroinvertebrates, the following tools should be used: dip net, rectangular dip net, hand or pond net with riffle/run habitats more than 0.5 meter wide, D-net with riffle/run habitats below 0.5 meter wide or in the absence of flowing water (generally used in low-gradient streams and glide/pool habitat) and hand-picking (used in very small streams where other sampling devices cannot be used) (Stark et al., 2001[12]).

Monitoring site surveys should be carried out using the standardised survey technique mentioned above (dip-net and hand-picking) to collect macroinvertebrates (Molluscs, Annelids, Platyhelminthes and Arthropods - especially the Insecta family) from each of the major habitat types at the sampling sites (e.g. gravel, silt, weed beds).

In order to reduce the effort and taxonomic expertise, the Biological Monitoring Working Party score (BMWP) should be used (Hawkes, 1998[13]; Armitage et al., 1983[14]).

BMWP Score is an index for measuring the biological quality of rivers using species of macroinvertebrates as biological indicators.

In the monitoring surveys, macroinvertebrates should be collected from different habitats (e.g. gravel, silt, weed beds) at representative sites on river stretches and identified to the required taxonomic level (family level). Each group or family is allocated a score between 1 and 10, according to their sensitivity to environmental disturbance. The index does not take into account the abundance of each family, merely the presence or absence of each family at the sampling location. Each family reflects their perceived susceptibility to pollution which is based on the principle that different aquatic invertebrates have different tolerances to pollutants. The most sensitive organisms, such as stoneflies, score 10 and the least sensitive, such as oligochaete worms, score 1. The scores for each family represented in the sample are then summed to give the BMWP score.

The overall BMWP Score for a site is the sum of all of the scores of each family present at that site. Values greater than 100 are associated with clean rivers, whilst values less than 10 are associated with heavily polluted rivers. BMWP Score is categorized as given in below.

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[12] STARK, J. D.; BOOTHROYD, I. K. G; HARDING, J. S.; MAXTED, J. R.; SCARSBROOK, M. R., 2001. Protocols for sampling macroinvertebrates in wadeable streams, New Zealand Macroinvertebrate Working Group Report No. 1, Prepared for the Ministry for the Environment. Sustainable Management Fund Project No. 5103. 57p.

[13] HAWKES, H. A., 1998. Origin and development of the Biological Monitoring Working Party score system. Water Research 32: 964-968.

[14] ARMITAGE, PD., MOSS, D., WRIGHT, JF. and FURSE, MT., 1983. "The performance of a new biological water quality score system based on macroinvertebrates over a wide range of unpolluted running-water sites", Water Research, vol. 17, no. 3, p. 333-347.

0 – 10	Very poor- Heavily polluted
11 – 40	Poor - Polluted or impacted
41 – 70	Moderate- Moderately polluted
71 - 100	Good - Clean but slightly polluted
> 100	Very good – Unpolluted / polluted

5.2.2.2. Monitoring Methodology for Fish Species

The monitoring studies for fish species should be conducted using the electrofishing or trammel nets methods depending on the river or stream characteristics.

Electrofishing is the technique of passing electric current through the water to attract and immobilize fish for capture. It is most efficiently used in contained areas of small rivers and streams that are difficult to sample using nets or traps. Most electrofishing is done on foot using a backpack or portable shocking device or from a specially modified boat. Crew members received certification and first aid training from qualified persons before working with electrofishing equipment.

Trammel nets method capture fish by tangling them in the meshes or loose folds in the nets. These nets are not as size selective as gill nets so that a single net can catch a wider range of fish sizes. Trammel nets are also often used for fish, such as flatfish or sturgeon, that are not easily caught in gillnets (Backiel and Welcomme, 1980[15]).

For each of the captured individuals, the following information should be collected before the species was released:

- catch effort (e.g. time of fishing activity, length of trammel nets);
- species classification;
- fork, standard and total length of each specimen;
- weight of each specimen.

Catch per unit effort (CPUE) values is calculated according to the formula below. Catch per unit effort (CPUE) expresses the number and weight of fish caught in a given time and given area.

$CPUE = \sum (Y/n)N$

where:

Y: Amount of catch

n: Length of the fishing area / Length of the fishing net

N: Number of operations

For the areas where electric shocker is used in the study, ‘n’ is taken as 400m according to the length of the fishing area. In the area where fishing net is used, ‘n’ is taken as 100m, which is the length of the fishing net. For all the occurrences the number of operations (N) is 1.

[15] BACKIEL, T. AND WELCOMME, R.L. (Eds), 1980. Guidelines for sampling fish in inland waters, EIFAC Tech. Paper, (33), 176 p.

5.3. Reforestation

The requirements for reforestation activities are defined in Section 1.3.12 of Erosion, Reinstatement and Landscaping Plan, Appendix 5.9 of ESIA.

Two methods will be adopted (including for river bank reinstatement) for reforestation activities according to Specification of Reinstatement (WRP-SPC-EGG-PLG-001):

1. When trees from the ROW are less than 1m high, they have to be carefully excavated, including roots, by an excavator. The earth and trees are then removed to a storage place where they are supplied with water. During reinstatement the same trees are replanted.

2. When trees on the ROW are higher than one metre and cannot be replanted, 3 year to 5 year old plants from plantations are reforested. Bailed or container plants are to be used and planted in a spacing of 2x2m for softwoods and 1.5 x 1.5m for hardwoods. In poor soils (as on tuff or sandstone) a dressing of fertilizer is to be placed in the planting hole.

At the end of construction works, reforestation will be done by Construction Contractors, at least equal to the number of trees cut during site preparation, in line with the opinion of the Regional Directorates of Forestry. In addition, during permitting phase for the route of pipeline which passes through forest areas, the worth of the trees to be cut were paid to the Provincial Regional Directorates of Forest at least for one three. Within the scope of Social and Environmental Investment Programme of TANAP, a project will be developed for additional tree planting. Then, throughout the project, 1:3 ratio for tree planting is aimed to be met.However, not all trees will be able to be replaced in the same location from which they were removed as trees will not be able to be replanted along a 16 m wide strip above the pipeline. For this purpose, a statement as “deep rooted plants will not be planted in 16 m” was added as footnote to the title deeds for the lands situated on the pipeline route. Moreover, there will be no toxic herbicide use for the prevention of deep rooted grow on the 16 m wide strip above the pipeline. The monitoring of deep rooted plants presence on 16 m wide strip above the pipeline will be done via site surveys during biorestoration monitoring programme and continuous patrolling by TANAP maintenance site teams during the operation phase.

According to Appendix 5.9 of ESIA and Specification for Reinstatement (WRP-SPC-EGG-PLG-001) document, which was prepared in light of the Erosion, Reinstatement and Landscaping Plan, each CC shall provide a detailed reforestation strategy as part of the Reinstatement Plan and Method Statements as required which specify in detail how the project objectives will be met. The following information should be included in the reforestation strategy:

- species to be used and where;
- specific planting methods;
- detailed requirements for fertilizer use;
- detailed requirements for aftercare and monitoring;
- supervision of reforestation activities.

The location (KP), number and name of each tree/shrub species replanted or cut during the ROW clearance construction activities are recorded by each CC and submitted to TANAP in monthly bases. According to these records of cut trees/shrubs, Reforestation Strategy and Schedule documents are being prepared by CCs and the proposed reforestation activities with details of number and name of species those need to be replanted, replanting methodology, schedule, location and maintenance will be defined in these documents.

With the approval of CC’s Reforestation Strategy and Schedule documents by TANAP, the location and schedule of monitoring of reforestation activities will be determined. The monitoring of reforestation activities is planned to be performed with the methods and details provided below.

In order to understand the compliance of reforestation activities, monitoring methodology should include two tasks; desktop study and site surveys those are required to be performed by an expert (Forest Engineer). The monitoring of reforestation activities should be conducted between June – August. In order to understand the success of the reforestation activities, monitoring studies should be performed each year in the first 5 year and then in 8^{th} and in 10^{th} year of reforestation activities.

5.3.1. Desktop Study

A desktop study will be performed before the site survey in order to have knowledge on the performed reforestation activities on each reforestation area. Therefore, the plans, procedures, records, reports and other documents of ongoing or completed reforestation activities will be reviewed with a desktop study and basic knowledge on reforestation activities will be gained before conducting site surveys.

5.3.2. Site Surveys

Site surveys to each reforestation areas will be performed by the expert in order to identify completion status, success of the reforestation activities and visual assessment of the current situation will be done. The site survey will be conducted by using the following methods;

• Visiting of reforestation sites.

• Verification of coordinates for the determined site by GPS.

• On-site monitoring of the reforestation activities (planting, aftercare, maintenance, amount and species of planted trees).

• Taking photographs of sites and implementations

• Verifying reforestation implementations through face to face meetings with relevant persons and institutions in charge.

During the on-site monitoring of the reforestation activities, the reforestation area will be separated into homogenous parts (specific hillsides, inner surfaces of creeks, passes and crests) and at every part, number of 8 - 10 random transect lines will be examined. Each line will have length of 25 m. On each line, numbers of dead and alive saplings will be determined. Observations will be done between lines and planted species will be determined. The number of transect lines depends on the size of the reforestation area. Thus, the expert will decide the number of transect lines for each reforestation area at the site survey.

5.3.3. Data Analysis & Reporting

The amount of samplings, number of live sapling, number of dead sapling, total amount of sapling and percentage of living will be recorded during the site survey and will be presented in the following table.

Table 5-7 Percentage of living planted saplings for each transect line (Sample table format)

NUMBER OF TRANSECT LINE (Qty)	LIVE SAPLING (Qty)	DEAD SAPLING (Qty)	TOTAL AMOUNT OF SAPLING (Qty)	PERCENTAGE OF LIVING %
1	9	2	11	77.78
2	9	2	11	77.78
3	9	2	11	77.78
4	9	1	10	88.89
5	12	1	13	91.67
TOTAL	48	8	56	83.33

In addition to the number of saplings, name of species will be recorded and provided in the report of the monitoring study.

The Interim First Findings Report of each reforestation area will be submitted to TANAP in 5 days after the completion of site survey for that reforestation area and Annual Reforestation Monitoring Report that will cover the results of the entire monitoring study will be submitted to TANAP in 45 days after the completion of all site visits.

6. BUDGET

The details of estimated annual budget for the implementation of biorestoration monitoring plan is presented in below table for each task. For particular tasks, such as acquisition of satellite imagery and analysis of them, site selection along and Off-ROW, monitoring of reforestation areas, the budget could not be given since it is difficult to estimate the cost related with those tasks at the moment due to not having information on the number of areas to be monitored.

Table 6-1 Estimated Approximate Annual Budget for the implementation of Biorestoration Monitoring Plan

Task	Estimated Annual Cost (USD)
Acquisition of satellite imagery	-
Site Selection along and Off-ROW	-
Monitoring Species Diversity and Vegetation Cover	70,000 – 90,000
Monitoring Terrestrial Flora Critical Habitats & SCC Species	90,000 – 100,000
Monitoring Terrestrial Fauna Critical Habitats & SCC Species	110,000 – 120,000
Monitoring Freshwater Critical Habitats & SCC Species	25,000 – 30,000
Monitoring Reforestation Activities	-

* Cost for the tasks are presented as an estimation regarding the previous similar studies.

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APPENDIX A LIST OF SLOPES AND RELATED BIORESTORATION ACTIVITIES

The slopes on ROW and biorestoration activities, which will be implemented on each of them are already determined. During the biorestoration activities, each CC will implement the biorestoration activities determined for each slope on ROW. The biorestoration activity code determined in each slope is explained in Table 1 below. The list showing the start and end KPs and biorestoration activity code of determined slopes is given in Table 2.

Table 1 Biorestoration Code and Descriptions

Biorestoration Code	Description
HM	Hydromulching of slope surface
HS	Hydroseeding of slope surface
BR	Bioremedial scheme, Number identifies which BR from list in Table 6.1 of Specification of Reinstatement (WRP-SPC-EGG-PLG-001)
J	Jute Matting

Table 2 List of Slopes and Related Biorestoration Codes

Route ID	KP Start	KP End	Local KP Start (Reroute)	Local KP End (Reroute)	Length (m)	LOT	Spread	Biorestoration Code
WRP_RevJ	0+515	0+543			28,00	1	1	HM+BR1a
WRP_RevJ	1+515	1+598			83,00	1	1	HM+BR1a
WRP_RevJ	1+796	1+816			20,00	1	1	HM+J+BR1a
WRP_RevJ	2+194	2+274			80,00	1	1	HM+BR1a
WRP_RevJ	2+445	2+669			223,51	1	1	HM+BR1a
WRP_RevJ	2+753	3+002			249,00	1	1	HM+BR1a
WRP_RevJ	3+061	3+096			35,00	1	1	HM+J+BR1a
WRP_RevJ	3+114	3+223			108,70	1	1	HM+BR1a
WRP_RevJ	3+335	3+370			35,00	1	1	HM+J+BR1a
WRP_RevJ	3+550	3+736			186,00	1	1	HM+BR1a
WRP_RevJ	3+796	3+942			146,00	1	1	HM+BR1a
WRP_RevJ	4+062	4+233			170,97	1	1	HM+BR1a
WRP_RevJ	4+233	4+312			79,13	1	1	HS+BR1a
WP0054	4+312		0+000	0+089	88,98	1	1	HM+BR1a
WP0054			0+264	0+446	181,55	1	1	HM+BR1a
WP0054		4+950	0+566	0+582	16,27	1	1	HM+J+BR1a
WRP_RevJ	5+176	5+258			82,00	1	1	HM+BR1a
WRP_RevJ	5+586	5+800			214,00	1	1	HS+BR1a
WRP_RevJ	6+626	6+731			105,00	1	1	HM+BR1b
WRP_RevJ	7+050	7+340			289,50	1	1	HM+BR1a

WRP_RevJ	7+340	7+919			579,00	1	1	HS+BR1a
WRP_RevJ	7+919	8+208			289,50	1	1	HM+BR1a
WRP_RevJ	8+394	8+529			135,00	1	1	HM+BR1a
WRP_RevJ	8+612	8+636			23,87	1	1	HM+BR1a
WRP_RevJ	8+696	8+849			153,00	1	1	HS+BR1a
WRP_RevJ	8+849	8+974			125,00	1	1	HM+J+BR1a
WRP_RevJ	9+290	9+628			338,00	1	1	HM+BR1a
WRP_RevJ	9+694	9+716			22,00	1	1	HM+J+BR1a
WRP_RevJ	9+871	10+095			224,00	1	1	HM+BR1a
WRP_RevJ	10+318	10+512			194,00	1	1	HM+BR1b
WRP_RevJ	11+215	11+521			306,00	1	1	HM+BR1b
WRP_RevJ	11+636	11+826			190,00	1	1	HM+BR1b
WRP_RevJ	11+826	12+080			254,00	1	1	HS+BR1b
WRP_RevJ	12+168	12+323			155,00	1	1	HM+BR1b
WRP_RevJ	12+323	12+478			155,00	1	1	HS+BR1a
WRP_RevJ	12+581	12+983			402,00	1	1	HM+BR1a
WRP_RevJ	13+065	13+141			76,00	1	1	HM+BR1a
WRP_RevJ	13+204	13+265			61,00	1	1	HM+J+BR1a
WRP_RevJ	13+433	13+626			193,00	1	1	HM+BR1a
WRP_RevJ	14+479	14+503			24,00	1	1	HM+J+BR1a
WRP_RevJ	14+665	15+181			516,00	1	1	HM+BR1a
WRP_RevJ	15+270	15+413			143,00	1	1	HS+BR1a
WP0051	15+470	16+103	0+021	0+280	258,46	1	1	HM+BR1b
WRP_RevJ	16+216	16+259			43,00	1	1	HS+J+BR1b
WRP_RevJ	16+856	16+888			32,00	1	1	HS+J+BR1b
WP0055	17+211	17+845	0+079	0+596	517,09	1	1	HM+BR1b
WRP_RevJ	17+980	18+143			163,00	1	1	HM+BR1b
WRP_RevJ	18+546	18+666			120,00	1	1	HS+BR1b
WRP_RevJ	18+897	18+965			68,00	1	1	HM+J+BR1b
WRP_RevJ	19+649	20+030			380,55	1	1	HM+BR1b
WRP_RevJ	20+067	20+187			120,00	1	1	HM+BR1b
WRP_RevJ	20+481	20+636			155,00	1	1	HS+BR1b
WRP_RevJ	21+015	21+119			104,00	1	1	HM+BR1b
WRP_RevJ	21+204	21+292			88,00	1	1	HM+BR1b
WRP_RevJ	21+434	21+565			130,51	1	1	HM+BR1b
WRP_RevJ	21+650	21+677			27,00	1	1	HM+J+BR1b
WRP_RevJ	21+806	22+315			509,00	1	1	HM+BR1b
WRP_RevJ	22+446	22+747			301,00	1	1	HM+BR1b
WRP_RevJ	22+840	23+041			201,21	1	1	HS+BR1b
WRP_RevJ	23+041	23+422			380,93	1	1	HM+BR1b

WP0056	23+422	24+076	0+000	0+009	9,22	1	1	HM+BR1b
WRP_RevJ	24+187	25+146			959,00	1	1	HM+BR1b
WRP_RevJ	25+277	25+586			309,00	1	1	HM+BR1b
WRP_RevJ	26+455	26+688			233,00	1	1	HM+BR1b
WRP_RevJ	26+688	26+921			233,00	1	1	HM+BR1b
WRP_RevJ	27+463	27+526			63,00	1	1	HM+J+BR1b
WRP_RevJ	30+240	30+345			105,00	1	1	HS+BR1a
WRP_RevJ	31+510	31+541			31,00	1	1	HM+J+BR1b
WRP_RevJ	31+760	31+805			45,00	1	1	HS+J+BR1b
WRP_RevJ	31+963	31+983			20,00	1	1	HM+J+BR1b
WRP_RevJ	32+667	32+848			181,00	1	1	HM+BR1b
WRP_RevJ	33+171	33+195			24,00	1	1	HM+J+BR1b
WRP_RevJ	33+257	33+385			128,00	1	1	HM+BR1b
WRP_RevJ	33+777	33+857			80,00	1	1	HS+BR1b
WRP_RevJ	34+130	34+162			32,00	1	1	HS+J+BR1b
WRP_RevJ	35+380	35+445			65,00	1	1	HS+J+BR1b
WRP_RevJ	36+103	36+201			98,00	1	1	HM+BR1b
WRP_RevJ	36+345	36+530			185,00	1	1	HM+BR1b
WRP_RevJ	37+265	37+298			33,00	1	1	HS+J+BR1b
WRP_RevJ	37+998	38+208			209,79	1	1	HM+BR1b
WRP_RevJ	38+542	38+594			52,00	1	1	HM+J+BR1b
WRP_RevJ	40+564	40+828			264,00	1	1	HM+BR1b
WRP_RevJ	46+260	46+315			55,00	1	1	HM+J+BR1b
WRP_RevJ	47+607	47+763			156,00	1	1	HM+BR1b
WRP_RevJ	50+224	50+268			44,00	1	1	HS+J+BR1b
WRP_RevJ	51+676	51+839			163,00	1	1	HM+BR1b
WRP_RevJ	51+910	52+270			360,00	1	1	HM+BR1b
WRP_RevJ	52+566	52+645			79,00	1	1	HM+BR1b
WRP_RevJ	53+705	53+768			63,00	1	1	HM+J+BR1b
WRP_RevJ	60+052	60+112			60,00	1	1	HM+J+BR1b
WRP_RevJ	63+077	63+517			440,00	1	1	HM+BR1b
WRP_RevJ	63+615	63+991			376,00	1	1	HM+BR1b
WRP_RevJ	65+728	66+508			780,00	1	1	HS+BR1b
WRP_RevJ	66+508	66+760			252,00	1	1	HM+BR1b
WRP_RevJ	67+420	67+927			507,00	1	1	HM+BR1b
WRP_RevJ	67+927	68+891			964,00	1	1	HS+BR1b
WRP_RevJ	69+105	69+185			80,00	1	1	HM+BR1b
WRP_RevJ	72+542	72+623			81,00	1	1	HM+BR1b
WRP_RevJ	72+743	72+793			50,00	1	1	HM+J+BR1b
WRP_RevJ	72+936	73+008			72,00	1	1	HM+J+BR1b

WRP_RevJ	75+994	76+269			275,00	1	1	HS+BR1b
WRP_RevJ	76+269	76+544			275,00	1	1	HM+BR1b
WRP_RevJ	76+569	76+726			156,18	1	1	HM+BR1b
WRP_RevJ	76+968	77+133			165,00	1	1	HS+BR1b
WRP_RevJ	78+843	79+083			240,00	1	1	HM+BR1b
WRP_RevJ	80+961	81+183			222,00	1	1	HM+BR1b
WRP_RevJ	81+528	81+608			80,00	1	1	HS+BR1a
WRP_RevJ	81+752	82+201			449,00	1	1	HM+BR1a
WRP_RevJ	84+751	84+862			111,00	1	1	HS+BR1b
WRP_RevJ	85+083	85+123			40,00	1	1	HS+J+BR1b
WRP_RevJ	87+666	87+718			52,00	1	1	HS+J+BR1b
WRP_RevJ	87+870	87+910			40,00	1	1	HM+J+BR1b
WRP_RevJ	92+600	92+767			166,77	1	1	HM+BR1b
WRP_RevJ	100+248	100+283			35,00	1	1	HM+J+BR1b
WRP_RevJ	100+483	100+540			57,00	1	1	HM+J+BR1b
WRP_RevJ	101+400	101+635			235,00	1	1	HS+BR1b
WRP_RevJ	103+963	104+013			50,00	1	1	HM+J+BR1b
WRP_RevJ	106+929	106+965			36,00	1	1	HS+J+BR1b
WRP_RevJ	107+754	107+793			39,00	1	1	HM+J+BR1b
WRP_RevJ	109+854	109+927			73,00	1	1	HS+J+BR1b
WRP_RevJ	122+019	122+183			164,00	1	1	HM+BR1b
WRP_RevJ	124+239	124+296			57,00	1	1	HM+J+BR1b
WRP_RevJ	124+383	124+428			45,00	1	1	HM+J+BR1b
WRP_RevJ	125+896	126+162			266,00	1	1	HS+BR2c
WRP_RevJ	130+822	131+686			864,23	1	1	HM+BR2c
WRP_RevJ	132+058	132+144			86,00	1	1	HM+BR2c
WRP_RevJ	132+170	132+205			35,00	1	1	HM+J+BR2c
WRP_RevJ	132+762	132+983			221,00	1	1	HS+BR2c
WRP_RevJ	133+140	133+200			60,00	1	1	HS+J+BR2c
WRP_RevJ	133+507	133+790			283,00	1	1	HS+BR2c
WRP_RevJ	134+127	134+475			348,02	1	1	HM+BR2c
WRP_RevJ	134+640	134+749			108,77	1	1	HM+BR2c
WRP_RevJ	134+762	134+800			38,00	1	1	HM+J+BR2c
WRP_RevJ	136+146	136+191			45,00	1	1	HM+J+BR2c
WRP_RevJ	136+202	136+232			30,00	1	1	HM+J+BR2c
WRP_RevJ	137+220	137+502			282,00	1	1	HM+BR2c
WRP_RevJ	141+857	141+967			110,00	1	1	HS+BR2c
WRP_RevJ	143+158	143+331			173,00	1	1	HS+BR2c
WRP_RevJ	143+585	143+683			98,00	1	1	HS+BR2c
WRP_RevJ	144+096	144+246			150,00	1	1	HS+BR2c

WRP_RevJ	144+752	144+792			40,00	1	1	HM+J+BR2c
WRP_RevJ	146+014	146+160			146,00	1	1	HS+BR2c
WRP_RevJ	148+294	148+342			48,00	1	1	HM+J+BR2c
WRP_RevJ	148+996	149+033			37,00	1	1	HM+J+BR2c
WRP_RevJ	149+246	149+340			94,00	1	1	HS+BR2c
WRP_RevJ	149+815	149+839			24,00	1	1	HM+J+BR2c
WRP_RevJ	150+636	150+801			165,00	1	1	HM+BR2c
WRP_RevJ	150+801	150+966			165,00	1	1	HS+BR2c
WRP_RevJ	158+304	158+338			34,00	1	1	HM+J+BR2c
WRP_RevJ	165+375	165+572			197,00	1	1	HM+BR2c
WRP_RevJ	167+382	167+441			59,00	1	1	HM+J+BR2c
WRP_RevJ	167+742	168+100			358,00	1	1	HM+BR2c
WRP_RevJ	173+250	173+420			170,00	1	1	HS+BR2c
WRP_RevJ	173+444	173+516			72,00	1	1	HM+J+BR2c
WRP_RevJ	173+647	173+690			43,00	1	1	HS+J+BR2c
WRP_RevJ	176+885	176+948			63,00	1	1	HM+J+BR2c
WRP_RevJ	178+265	178+359			94,00	1	1	HS+BR2c
WRP_RevJ	178+535	178+695			160,00	1	1	HS+BR2c
WRP_RevJ	179+273	179+357			84,00	1	1	HM+BR2c
WRP_RevJ	184+485	184+650			165,00	1	1	HM+BR2c
WRP_RevJ	184+653	184+818			165,00	1	1	HS+BR2c
WRP_RevJ	185+200	185+224			24,00	1	1	HS+J+BR2c
WRP_RevJ	185+632	186+015			383,37	1	1	HM+BR2c
WRP_RevJ	186+015	186+080			64,63	1	2	HM+BR2c
WRP_RevJ	186+475	186+795			320,00	1	2	HM+BR2c
WRP_RevJ	187+801	187+978			177,00	1	2	HS+BR2c
WRP_RevJ	188+065	188+115			50,00	1	2	HM+J+BR2c
WRP_RevJ	188+131	188+332			201,00	1	2	HM+BR2c
WRP_RevJ	190+572	190+672			100,00	1	2	HM+BR2c
WRP_RevJ	191+003	191+047			44,00	1	2	HS+J+BR2c
WRP_RevJ	191+172	191+208			36,00	1	2	HM+J+BR2c
WRP_RevJ	192+531	192+575			44,00	1	2	HM+J+BR2c
WRP_RevJ	192+733	192+792			59,00	1	2	HM+J+BR2c
WRP_RevJ	193+224	193+392			168,00	1	2	HM+BR2c
WRP_RevJ	193+636	193+826			189,50	1	2	HS+BR2c
WRP_RevJ	193+826	194+015			189,50	1	2	HM+BR2c
WRP_RevJ	194+429	194+539			110,00	1	2	HM+BR2c
WRP_RevJ	194+815	194+857			42,00	1	2	HM+J+BR2c
WRP_RevJ	195+186	195+262			76,00	1	2	HM+BR2c
WRP_RevJ	195+295	195+315			20,00	1	2	HM+J+BR2c

WRP_RevJ	195+631	195+838			206,15	1	2	HM+BR2c
WRP_RevJ	195+838	196+044			206,00	1	2	HM+BR2c
WRP_RevJ	196+763	196+837			74,00	1	2	HM+J+BR2c
WRP_RevJ	200+161	200+191			30,00	1	2	HM+J+BR2c
WRP_RevJ	202+005	202+430			425,00	1	2	HM+BR2c
WRP_RevJ	203+864	203+956			92,00	1	2	HM+BR2c
WRP_RevJ	205+388	205+415			27,00	1	2	HM+J+BR2c
WRP_RevJ	207+144	207+265			121,00	1	2	HM+BR2c
WRP_RevJ	207+290	207+563			273,00	1	2	HM+BR2c
WRP_RevJ	207+953	208+001			48,00	1	2	HM+J+BR2c
WRP_RevJ	217+600	217+628			28,00	1	2	HM+J+BR3b
WRP_RevJ	219+038	219+138			100,00	1	2	HS+BR3b
WRP_RevJ	220+015	220+051			36,00	1	2	HS+J+BR3a
WRP_RevJ	220+091	220+127			36,00	1	2	HM+J+BR3a
WRP_RevJ	220+272	220+331			59,00	1	2	HM+J+BR3a
WRP_RevJ	220+365	220+423			58,00	1	2	HM+J+BR3a
WRP_RevJ	220+559	220+618			59,00	1	2	HM+J+BR3a
WRP_RevJ	221+433	221+492			59,00	1	2	HM+J+BR3a
WRP_RevJ	222+983	223+005			22,00	1	2	HM+J+BR3a
WRP_RevJ	223+010	223+038			28,37	1	2	HS+J+BR3a
WRP_RevJ	223+094	223+115			21,00	1	2	HM+J+BR3a
WRP_RevJ	223+256	223+277			21,00	1	2	HM+J+BR3a
WRP_RevJ	223+330	223+354			24,00	1	2	HM+J+BR3a
WRP_RevJ	224+599	224+630			30,63	1	2	HM+J+BR3a
WRP_RevJ	224+634	224+674			40,00	1	2	HM+J+BR3a
WRP_RevJ	225+473	225+497			24,00	1	2	HM+J+BR3a
WRP_RevJ	226+315	226+339			24,00	1	2	HM+J+BR3a
WRP_RevJ	228+135	228+155			20,00	1	2	HM+J+BR3a
WRP_RevJ	228+262	228+301			39,00	1	2	HM+J+BR3a
WRP_RevJ	229+772	229+821			49,00	1	2	HM+J+BR3a
WRP_RevJ	233+715	233+842			127,00	1	2	HM+BR3a
WRP_RevJ	234+577	234+650			73,00	1	2	HM+J+BR3a
WRP_RevJ	236+339	236+500			161,00	1	2	HS+BR3a
WRP_RevJ	240+483	240+538			55,00	1	2	HM+J+BR3a
WRP_RevJ	242+459	242+520			61,00	1	2	HM+J+BR3a
WRP_RevJ	243+142	243+205			63,00	1	2	HM+J+BR3a
WRP_RevJ	243+655	243+742			87,00	1	2	HS+BR3a
WRP_RevJ	250+354	250+389			35,00	1	2	HM+J+BR3a
WRP_RevJ	250+398	250+444			46,00	1	2	HM+J+BR3a
WRP_RevJ	250+630	250+683			53,00	1	2	HM+J+BR3a

WRP_RevJ	250+824	250+851			27,00	1	2	HM+J+BR3a
WRP_RevJ	251+275	251+345			70,00	1	2	HM+J+BR3a
WRP_RevJ	251+386	251+415			29,00	1	2	HM+J+BR3a
WRP_RevJ	256+345	256+373			28,00	1	2	HS+J+BR3a
WRP_RevJ	258+505	258+536			31,00	1	2	HM+J+BR3a
WRP_RevJ	259+140	259+172			32,00	1	2	HM+J+BR3a
WRP_RevJ	259+945	259+995			50,00	1	2	HS+J+BR3a
WRP_RevJ	275+680	275+704			24,00	1	2	HM+J+BR3b
WRP_RevJ	275+727	275+750			23,00	1	2	HM+J+BR3b
WRP_RevJ	281+222	281+260			38,00	1	2	HM+J+BR3a
WRP_RevJ	281+748	281+786			38,00	1	2	HM+J+BR3a
WRP_RevJ	284+034	284+060			26,00	1	2	HS+J+BR3b
WRP_RevJ	284+954	285+003			49,00	1	2	HM+J+BR3b
WRP_RevJ	287+590	287+720			130,00	1	2	HM+BR3a
WRP_RevJ	288+519	288+559			40,00	1	2	HS+J+BR3a
WRP_RevJ	298+640	298+662			22,00	1	2	HM+J+BR3b
WRP_RevJ	299+683	299+750			67,00	1	2	HM+J+BR3b
WRP_RevJ	299+897	300+141			244,00	1	2	HM+BR3b
WRP_RevJ	300+212	300+269			57,00	1	2	HS+J+BR3b
WP0044	300+427		0+052	0+310	258,35	1	2	HS+BR3b
WP0044		301+495	1+182	1+280	98,04	1	2	HS+BR3b
WRP_RevJ	301+496	301+623			126,80	1	2	HS+BR3b
WRP_RevJ	302+438	302+688			250,00	1	2	HM+BR3a
WRP_RevJ	302+710	302+730			20,00	1	2	HM+J+BR3b
WRP_RevJ	304+274	304+305			31,00	1	2	HM+J+BR3b
WP0045	304+689		0+543	0+769	226,62	1	2	HM+BR3b
WP0045			0+864	1+142	277,84	1	2	HM+BR3b
WP0045			1+278	1+532	254,26	1	2	HM+BR3b
WP0045			1+532	2+217	684,53	1	2	HM+BR3b
WP0045		307+234	2+217	2+444	66,33	1	2	HS+BR3a
WP0085	307+234	308+364	0+000	0+107	106,61	1	2	HS+BR3a
WRP_RevJ	336+542	336+566			24,00	1	2	HM+J+BR3b
WRP_RevJ	337+173	337+200			27,00	1	2	HM+J+BR3b
WRP_RevJ	338+432	338+514			82,00	1	2	HM+BR3b
WRP_RevJ	338+557	338+628			71,00	1	2	HM+J+BR3b
WRP_RevJ	339+466	339+498			32,00	1	2	HM+J+BR3b
WRP_RevJ	349+793	349+925			132,00	1	2	HM+BR3b
WRP_RevJ	355+577	355+619			42,00	1	2	HM+J+BR3a
WRP_RevJ	357+400	357+519			119,00	1	2	HS+BR3a
WRP_RevJ	357+783	357+851			68,00	1	2	HM+J+BR3a

WRP_RevJ	358+660	358+681			21,00	1	2	HM+J+BR3a
WRP_RevJ	358+691	358+723			32,00	1	2	HS+J+BR3a
WRP_RevJ	359+867	359+939			72,00	1	2	HS+J+BR3a
WRP_RevJ	360+391	360+452			61,00	1	2	HS+J+BR3a
WRP_RevJ	360+784	360+873			89,00	1	2	HM+BR3a
WRP_RevJ	361+480	361+737			257,00	1	2	HM+BR3a
WRP_RevJ	363+730	363+806			76,00	1	2	HS+BR3a
WRP_RevJ	363+943	364+128			185,00	1	2	HM+BR3a
WRP_RevJ	365+424	365+544			120,00	1	2	HM+BR3a
WRP_RevJ	366+873	366+913			40,00	1	2	HM+J+BR3a
WRP_RevJ	366+921	366+959			38,00	1	2	HM+J+BR3a
WRP_RevJ	367+856	367+885			29,00	1	2	HM+J+BR3a
WRP_RevJ	368+151	368+207			56,00	1	2	HM+J+BR3a
WRP_RevJ	369+558	369+585			27,00	1	2	HM+J+BR3a
WRP_RevJ	369+914	369+947			33,00	1	2	HM+J+BR3a
WRP_RevJ	370+009	370+033			24,00	1	2	HM+J+BR3a
WRP_RevJ	370+436	370+506			70,00	1	2	HM+J+BR3a
WRP_RevJ	371+333	371+429			96,00	1	2	HM+BR3a
WRP_RevJ	372+409	372+439			30,00	1	2	HM+J+BR3a
WRP_RevJ	373+960	374+047			87,00	1	2	HM+BR3a
WRP_RevJ	375+362	375+386			24,00	1	2	HM+J+BR3a
WRP_RevJ	375+408	375+440			32,00	1	2	HM+J+BR3a
WRP_RevJ	378+304	378+747			443,00	2	3	HM+BR3a
WRP_RevJ	379+576	380+049			473,00	2	3	HM+BR3a
WRP_RevJ	381+172	381+232			60,00	2	3	HM+J+BR3a
WRP_RevJ	381+255	381+600			345,00	2	3	HM+BR3a
WRP_RevJ	383+120	383+192			72,00	2	3	HM+J+BR3a
WRP_RevJ	383+274	383+308			34,00	2	3	HM+J+BR3a
WRP_RevJ	383+426	383+596			170,00	2	3	HM+BR3a
WRP_RevJ	383+596	383+766			170,00	2	3	HM+BR3b
WRP_RevJ	383+800	383+935			135,00	2	3	HM+BR3b
WRP_RevJ	384+306	384+622			316,00	2	3	HM+BR3b
WRP_RevJ	384+636	384+666			30,00	2	3	HM+J+BR3b
WRP_RevJ	384+772	384+839			67,00	2	3	HM+J+BR3b
WRP_RevJ	385+358	385+388			30,00	2	3	HS+J+BR3b
WRP_RevJ	385+495	385+529			34,00	2	3	HS+J+BR3b
WP0074	387+690	388+544	0+442	0+588	146,35	2	3	HM+BR3b
WRP_RevJ	389+019	389+036			16,39	2	3	HM+J+BR3b
WRP_RevJ	389+036	389+090			54,61	2	3	HM+J+BR3b
WRP_RevJ	389+461	389+494			33,00	2	3	HM+J+BR3b

WRP_RevJ	390+189	390+499			310,00	2	3	HS+BR3b
WRP_RevJ	390+550	390+642			92,00	2	3	HM+BR3b
WRP_RevJ	390+930	390+968			38,00	2	3	HS+J+BR3b
WRP_RevJ	391+226	391+325			99,00	2	3	HM+BR3b
WRP_RevJ	391+423	391+481			58,00	2	3	HM+J+BR3b
WRP_RevJ	391+548	391+614			66,00	2	3	HM+J+BR3b
WRP_RevJ	391+980	392+219			239,00	2	3	HM+BR3b
WRP_RevJ	392+459	392+907			447,50	2	3	HM+BR3b
WRP_RevJ	392+907	393+354			447,50	2	3	HM+BR4c
WRP_RevJ	393+354	393+626			272,00	2	3	HM+BR4c
WRP_RevJ	394+245	394+895			650,10	2	3	HM+BR4c
WRP_RevJ	395+070	395+175			105,00	2	3	HM+BR4c
WRP_RevJ	395+243	395+456			213,00	2	3	HM+BR4c
WRP_RevJ	395+456	395+669			213,00	2	3	HM+BR4b
WRP_RevJ	395+678	395+706			28,00	2	3	HM+J+BR4b
WRP_RevJ	395+903	395+941			38,00	2	3	HM+J+BR4b
WRP_RevJ	395+962	396+031			69,00	2	3	HM+J+BR4b
WRP_RevJ	396+312	396+354			42,00	2	3	HS+J+BR4b
WRP_RevJ	396+758	396+789			31,00	2	3	HM+J+BR4b
WRP_RevJ	397+088	397+143			55,00	2	3	HM+J+BR4b
WRP_RevJ	397+415	397+490			75,01	2	3	HM+BR4b
WRP_RevJ	397+544	397+572			28,00	2	3	HM+J+BR4b
WRP_RevJ	397+590	397+618			28,00	2	3	HM+J+BR4b
WRP_RevJ	397+917	398+364			447,00	2	3	HM+BR4b
WRP_RevJ	398+500	398+640			140,00	2	3	HM+BR4b
WRP_RevJ	398+880	398+948			68,00	2	3	HM+J+BR4b
WRP_RevJ	399+453	399+623			170,00	2	3	HM+BR4c
WRP_RevJ	399+865	400+065			200,00	2	3	HM+BR4c
WRP_RevJ	400+118	400+711			592,95	2	3	HM+BR4c
WRP_RevJ	400+795	401+148			353,00	2	3	HM+BR4c
WRP_RevJ	401+285	401+335			50,00	2	3	HM+J+BR4c
WRP_RevJ	402+485	402+819			334,00	2	3	HM+BR4c
WRP_RevJ	402+957	403+195			238,00	2	3	HM+BR4c
WRP_RevJ	403+455	403+706			251,00	2	3	HM+BR4c
WRP_RevJ	403+748	403+785			37,00	2	3	HM+J+BR4c
WRP_RevJ	404+162	404+285			123,00	2	3	HM+BR4c
WRP_RevJ	404+826	405+073			247,00	2	3	HM+BR4c
WRP_RevJ	405+098	405+270			172,00	2	3	HM+BR4c
WRP_RevJ	405+295	405+565			270,00	2	3	HM+BR4c
WRP_RevJ	406+271	406+401			130,00	2	3	HM+BR4c

WRP_RevJ	406+853	406+922			69,00	2	3	HS+J+BR4c
WRP_RevJ	407+103	407+463			360,00	2	3	HM+BR4c
WRP_RevJ	407+463	407+981			518,19	2	3	HM+BR4c
WRP_RevJ	408+903	409+085			182,00	2	3	HM+BR4c
WRP_RevJ	409+832	410+092			260,00	2	3	HM+BR4b
WRP_RevJ	410+896	410+995			99,00	2	3	HM+BR4b
WRP_RevJ	411+217	411+288			71,00	2	3	HS + J+BR4b
WRP_RevJ	411+527	411+568			41,00	2	3	HM + J+BR4b
WRP_RevJ	412+142	412+342			200,00	2	3	HS+BR4b
WRP_RevJ	413+678	413+828			150,00	2	3	HM+BR4b
WRP_RevJ	416+070	416+104			34,00	2	3	HM+BR4b
WRP_RevJ	416+835	416+864			29,00	2	3	HM + J+BR4b
WRP_RevJ	417+145	417+217			72,00	2	3	HM+BR4b
WRP_RevJ	419+310	419+350			40,00	2	3	HS+BR4b
WRP_RevJ	424+929	425+029			100,00	2	3	HS+BR4a
WRP_RevJ	426+002	426+111			109,00	2	3	HS+BR4a
WRP_RevJ	426+657	426+696			38,50	2	3	HM + J+BR4a
WRP_RevJ	426+947	427+019			72,00	2	3	HM+BR4a
WRP_RevJ	427+765	427+843			78,00	2	3	HM+BR4a
WRP_RevJ	428+946	428+985			39,00	2	3	HM + J+BR4a
WRP_RevJ	429+333	429+394			61,00	2	3	HS+BR4a
WRP_RevJ	429+464	429+485			21,00	2	3	HM + J+BR4a
WRP_RevJ	429+912	429+943			31,00	2	3	HS + J+BR4a
WRP_RevJ	430+039	430+100			61,00	2	3	HM + J+BR4a
WRP_RevJ	430+158	430+232			74,00	2	3	HM + J+BR4a
WRP_RevJ	430+281	430+375			94,00	2	3	HM+BR4a
WRP_RevJ	430+664	430+685			21,00	2	3	HS + J+BR4a
WRP_RevJ	430+817	431+090			273,00	2	3	HM+BR4a
WRP_RevJ	431+230	431+347			117,00	2	3	HM+BR4a
WRP_RevJ	433+054	433+241			187,00	2	3	HM+BR4a
WRP_RevJ	433+349	433+385			36,00	2	3	HM+BR4a
WRP_RevJ	433+532	433+772			240,00	2	3	HM+BR4a
WRP_RevJ	433+861	433+965			104,00	2	3	HM+BR4b
WRP_RevJ	434+059	434+092			33,00	2	3	HM+BR4b
WRP_RevJ	434+148	434+220			72,00	2	3	HM + J+BR4b
WRP_RevJ	434+563	434+807			243,47	2	3	HM+BR4b
WRP_RevJ	435+480	435+640			160,00	2	3	HM+BR4b
WRP_RevJ	435+870	435+897			27,00	2	3	HM + J+BR4b
WRP_RevJ	436+334	436+507			173,00	2	3	HM+BR4b
WRP_RevJ	436+904	437+314			409,79	2	3	HM+BR4a

WRP_RevJ	437+685	437+731			46,21	2	3	HM+BR4a
WRP_RevJ	438+946	438+997			51,00	2	3	HM+BR4a
WRP_RevJ	439+350	439+417			67,00	2	3	HM+BR4a
WRP_RevJ	439+776	439+855			79,00	2	3	HM+BR4a
WRP_RevJ	440+085	440+276			191,00	2	3	HM+BR4a
WRP_RevJ	440+747	440+865			118,00	2	3	HM+BR4a
WRP_RevJ	441+600	441+706			106,21	2	3	HS+BR4b
WRP_RevJ	442+460	442+479			19,00	2	3	HM + J+BR4b
WRP_RevJ	443+285	443+420			135,00	2	3	HM+BR4b
WRP_RevJ	443+458	443+689			231,00	2	3	HM+BR4a
WRP_RevJ	443+689	443+920			231,00	2	3	HM+BR4b
WRP_RevJ	444+695	444+800			105,00	2	3	HS+BR4b
WRP_RevJ	445+242	445+323			81,00	2	3	HM+BR4b
WRP_RevJ	446+365	446+392			27,00	2	3	HM + J+BR4b
WRP_RevJ	446+895	446+995			100,00	2	3	HM+BR4b
WRP_RevJ	447+818	448+028			210,00	2	3	HM+BR4b
WRP_RevJ	448+028	448+238			210,00	2	3	HS+BR4b
WRP_RevJ	448+826	448+907			81,00	2	3	HS+BR4c
WRP_RevJ	449+020	449+108			88,00	2	3	HS+BR4c
WRP_RevJ	449+472	449+605			133,00	2	3	HM+BR4c
WRP_RevJ	451+216	451+269			53,00	2	3	HM + J+BR5a
WRP_RevJ	451+639	452+148			509,00	2	3	HM+BR5a
WRP_RevJ	452+945	453+021			76,00	2	3	HM+BR5a
WRP_RevJ	453+110	453+350			240,00	2	3	HM+BR5a
WRP_RevJ	453+598	453+672			74,00	2	3	HM + J+BR5a
WRP_RevJ	453+932	453+991			59,39	2	3	HM+BR5a
WRP_RevJ	454+153	454+185			32,00	2	3	HM + J+BR5a
WRP_RevJ	454+269	454+355			86,00	2	3	HM+BR5a
WRP_RevJ	455+310	455+365			55,00	2	3	HM + J+BR5a
WRP_RevJ	455+400	455+800			400,00	2	3	HM+BR5a
WRP_RevJ	455+985	456+085			100,00	2	3	HM+BR5a
WRP_RevJ	456+325	456+345			20,00	2	3	HM + J+BR5a
WRP_RevJ	456+450	456+662			212,00	2	3	HM+BR5a
WP0098	456+764		0+350	0+440	89,97	2	3	HM + BR5b
WP0098		458+154	0+651	0+726	74,85	2	3	HM + BR5b
WP0089	458+567		0+424	0+707	95,94	2	3	HS+BR5a
WP0089		459+325	0+707	0+803	283,45	2	3	HM+BR5a
WRP_RevJ	459+326	459+502			176,45	2	3	HS+BR5a
WRP_RevJ	460+036	460+323			287,00	2	3	HM+BR5a
WRP_RevJ	460+397	460+567			170,00	2	3	HM+BR5a

WRP_RevJ	460+608	460+778			170,00	2	3	HS+BR5a
WRP_RevJ	461+100	461+146			46,00	2	3	HM + J+BR5a
WRP_RevJ	461+585	461+745			160,00	2	3	HM+BR5a
WRP_RevJ	474+399	474+475			76,00	2	3	HM+BR5a
WRP_RevJ	474+932	474+955			23,00	2	3	HM + J+BR5a
WRP_RevJ	475+078	475+113			35,00	2	3	HM + J+BR5a
WRP_RevJ	475+755	476+085			330,00	2	3	HM+BR5a
WRP_RevJ	478+141	478+307			166,00	2	3	HM+BR5a
WRP_RevJ	478+324	478+439			115,00	2	3	HM+BR5a
WRP_RevJ	479+253	479+325			72,00	2	3	HS + J+BR5a
WRP_RevJ	480+335	480+359			24,00	2	3	HM + J+BR5a
WRP_RevJ	481+198	482+222			1024,00	2	3	HS+BR5a
WRP_RevJ	482+222	482+480			257,79	2	3	HM+BR5a
WRP_RevJ	482+606	482+715			109,00	2	3	HM+BR5a
WRP_RevJ	483+254	483+292			38,00	2	3	HM + J+BR5a
WRP_RevJ	483+372	483+413			41,00	2	3	HM+BR5a
WRP_RevJ	485+460	485+493			33,00	2	3	HS + J+BR5a
WP0099	491+986		1+200	1+312	112,38	2	3	HM+BR5b
WP0099			1+545	1+614	69,08	2	3	HM+BR5b
WP0099			1+905	2+029	124,01	2	3	HM+BR5b
WP0099			2+994	3+106	111,54	2	3	HM+BR5b
WP0099		495+862	3+321	4+739	1418,29	2	3	HM+BR5b
WRP_RevJ	496+160	496+240			80,00	2	3	HS+BR5b
WRP_RevJ	496+660	496+800			140,00	2	3	HM+BR5b
WRP_RevJ	497+090	497+124			34,00	2	3	HM+BR5b
WRP_RevJ	497+278	497+423			145,00	2	3	HM+BR5b
WRP_RevJ	497+572	497+607			35,00	2	3	HM + J+BR5b
WRP_RevJ	497+887	497+925			38,00	2	3	HM + J+BR5b
WRP_RevJ	498+422	498+620			198,00	2	3	HM+BR5b
WRP_RevJ	498+837	499+090			253,14	2	3	HM+BR5b
WRP_RevJ	499+167	499+314			147,00	2	3	HM+BR5b
WRP_RevJ	500+017	500+117			100,00	2	3	HS+BR5b
WRP_RevJ	500+539	500+571			32,00	2	3	HS + J+BR5b
WRP_RevJ	500+969	501+164			194,47	2	3	HS+BR5b
WRP_RevJ	501+197	501+473			276,00	2	3	HM+BR5b
WRP_RevJ	501+684	501+962			278,00	2	3	HM+BR5b
WRP_RevJ	504+398	504+571			173,00	2	3	HM+BR5b
WRP_RevJ	504+598	504+645			47,00	2	3	HM + J+BR5b
WRP_RevJ	504+707	504+788			81,00	2	3	HS+BR5b
WRP_RevJ	504+890	504+952			61,66	2	3	HS + J+BR5b

WRP_RevJ	505+208	505+256			48,00	2	3	HM + J+BR5b
WRP_RevJ	505+298	505+327			29,00	2	3	HM + J+BR5b
WRP_RevJ	505+898	505+983			85,00	2	3	HM+BR5b
WRP_RevJ	507+373	507+463			90,00	2	3	HM+BR5b
WRP_RevJ	507+775	507+826			51,00	2	3	HM + J+BR5b
WRP_RevJ	507+944	507+975			31,00	2	3	HM + J+BR5b
WRP_RevJ	508+214	508+248			34,00	2	3	HM+BR5b
WRP_RevJ	509+650	509+677			27,00	2	3	HM + J+BR5b
WRP_RevJ	510+463	510+493			30,00	2	3	HM+BR5b
WRP_RevJ	510+580	510+603			23,00	2	3	HM + J+BR5b
WRP_RevJ	510+993	511+092			99,00	2	3	HM+BR5b
WRP_RevJ	513+915	513+975			59,66	2	3	HM + BR5b
WRP_RevJ	514+110	514+155			45,00	2	3	HS + J + BR5b
WRP_RevJ	515+115	515+239			124,00	2	3	HS + BR5b
WRP_RevJ	515+657	515+769			112,00	2	3	HM + BR5b
WRP_RevJ	517+168	517+278			110,00	2	3	HM + BR5b
WRP_RevJ	517+313	517+530			217,00	2	3	HM + BR5b
WRP_RevJ	518+160	518+210			50,00	2	3	HS + J + BR5b
WRP_RevJ	518+223	518+336			113,50	2	3	HM + BR5b
WRP_RevJ	518+485	518+565			80,00	2	3	HM + BR5b
WRP_RevJ	520+056	520+086			30,00	2	3	HM + J + BR5b
WRP_RevJ	520+618	520+662			44,00	2	3	HM + J + BR5b
WRP_RevJ	521+265	521+296			31,00	2	3	HS + J + BR5b
WRP_RevJ	521+384	521+429			45,00	2	3	HM + J + BR5b
WRP_RevJ	522+437	522+480			43,00	2	3	HM + J + BR5b
WRP_RevJ	522+891	522+953			62,00	2	3	HM + J + BR5b
WRP_RevJ	523+127	523+149			22,00	2	3	HM + J + BR5b
WRP_RevJ	523+224	523+390			166,00	2	3	HM + BR5b
WRP_RevJ	523+486	523+532			46,00	2	3	HS + J + BR5b
WRP_RevJ	523+757	523+902			145,00	2	3	HS + BR5b
WRP_RevJ	524+870	524+916			46,00	2	3	HS + J + BR5b
WRP_RevJ	525+467	525+527			60,00	2	3	HM + J + BR5b
WRP_RevJ	525+880	526+005			125,00	2	3	HM + BR5b
WRP_RevJ	526+174	526+264			90,00	2	3	HM + BR5b
WRP_RevJ	527+461	527+659			198,00	2	3	HS + BR5b
WRP_RevJ	527+659	527+857			198,00	2	3	HM + BR5b
WRP_RevJ	529+444	529+614			170,00	2	3	HM + BR5b
WRP_RevJ	529+670	529+892			221,54	2	3	HS + BR5b
WRP_RevJ	531+156	531+206			50,00	2	3	HS + J + BR5b
WRP_RevJ	531+295	531+440			145,00	2	3	HM + BR5b

WP0079	532+200	533+400	0+506	0+606	99,60	2	3	HM + BR5b
WRP_RevJ	533+699	533+772			73,00	2	3	HS + J + BR5b
WRP_RevJ	534+541	534+564			23,00	2	3	HM + J + BR5b
WRP_RevJ	535+392	535+481			89,00	2	3	HS + BR5b
WRP_RevJ	537+292	537+322			30,00	2	3	HM + J + BR5b
WRP_RevJ	537+409	537+431			22,00	2	3	HM + J + BR5b
WRP_RevJ	538+480	538+620			140,00	2	3	HM + BR5b
WRP_RevJ	538+739	538+879			140,00	2	3	HM + BR5b
WP0081	538+900		0+037	0+157	120,30	2	3	HM + BR5b
WP0081		539+391	0+353	0+419	66,00	2	3	HM + J + BR5b
WRP_RevJ	539+552	539+712			160,00	2	3	HS + BR5b
WRP_RevJ	539+763	539+792			29,00	2	3	HM + J + BR5b
WRP_RevJ	539+874	539+898			24,00	2	3	HM + J + BR5b
WRP_RevJ	540+985	541+120			135,00	2	3	HM + BR5b
WRP_RevJ	541+667	541+830			163,00	2	3	HM + BR5b
WRP_RevJ	542+310	542+354			44,00	2	3	HM + J + BR5b
WRP_RevJ	542+782	542+873			91,00	2	3	HM + BR5b
WRP_RevJ	542+931	542+960			29,00	2	3	HM + BR5b
WRP_RevJ	543+820	543+994			174,00	2	3	HS + BR5b
WRP_RevJ	544+174	544+279			105,00	2	3	HM + BR5b
WRP_RevJ	544+860	544+920			60,00	2	3	HS + J + BR5b
WRP_RevJ	546+707	546+729			22,00	2	3	HS + J + BR5b
WRP_RevJ	546+829	546+860			31,46	2	3	HS + J + BR5b
WRP_RevJ	547+153	547+192			39,00	2	3	HM + J + BR5b
WRP_RevJ	548+218	548+320			102,46	2	3	HM + BR5b
WRP_RevJ	548+467	548+541			74,00	2	3	HM + J + BR5b
WRP_RevJ	549+131	549+179			48,00	2	3	HM + J + BR5b
WRP_RevJ	549+333	549+376			43,00	2	3	HM + J + BR5b
WRP_RevJ	549+842	549+872			30,00	2	3	HS + J + BR5b
WRP_RevJ	550+060	550+326			266,00	2	3	HM + BR5b
WRP_RevJ	551+381	551+567			186,50	2	3	HM + BR5b
WRP_RevJ	551+567	551+754			186,50	2	3	HS + BR5b
WRP_RevJ	553+730	553+796			66,00	2	3	HM + J + BR5b
WP0082	553+800	554+600	0+341	0+373	32,00	2	3	HM + J + BR5b
WRP_RevJ	554+431	554+533			102,00	2	3	HM + BR5b
WRP_RevJ	555+260	555+370			110,00	2	3	HS + BR5b
WRP_RevJ	555+747	555+792			45,00	2	3	HM + J + BR5b
WRP_RevJ	556+355	556+420			65,00	2	3	HM + J + BR5b
WRP_RevJ	556+447	556+536			89,00	2	3	HS + BR5b
WRP_RevJ	556+721	556+782			60,50	2	3	HM + J + BR5b

WRP_RevJ	556+946	557+102			155,21	2	3	HM + BR5b
WRP_RevJ	557+232	557+407			175,00	2	3	HM + BR5b
WRP_RevJ	557+625	557+690			65,00	2	3	HM + J + BR5b
WRP_RevJ	558+541	558+582			41,00	2	3	HS + J + BR5b
WRP_RevJ	559+413	559+492			79,00	2	3	HM + BR5b
WRP_RevJ	559+751	559+877			126,00	2	3	HM + BR5b
WRP_RevJ	559+999	560+157			158,00	2	3	HM + BR5b
WRP_RevJ	560+736	560+986			250,00	2	3	HM + BR5b
WRP_RevJ	562+286	562+392			106,00	2	3	HS + BR5b
WRP_RevJ	562+573	562+741			168,50	2	3	HM + BR5b
WRP_RevJ	562+741	562+910			168,50	2	3	HS + BR5b
WRP_RevJ	563+040	563+170			130,00	2	3	HM + BR5b
WRP_RevJ	563+218	563+246			28,00	2	3	HM + J + BR5b
WRP_RevJ	563+270	563+380			110,00	2	3	HM + BR5b
WRP_RevJ	563+413	563+442			28,50	2	3	HM + J + BR5b
WRP_RevJ	563+592	563+626			34,00	2	3	HS + J + BR5b
WRP_RevJ	563+903	563+942			39,00	2	3	HS + J + BR5b
WRP_RevJ	564+000	564+108			107,54	2	3	HM + BR5b
WRP_RevJ	564+776	564+808			32,00	2	3	HM + J + BR5b
WRP_RevJ	564+900	564+965			65,00	2	3	HM + J + BR5b
WRP_RevJ	566+695	566+735			40,00	2	3	HM + J + BR5b
WRP_RevJ	567+760	567+836			76,46	2	3	HS + BR5b
WRP_RevJ	568+337	568+384			47,41	2	3	HM + J + BR5b
WRP_RevJ	568+541	568+677			136,00	2	3	HM + BR5b
WRP_RevJ	568+821	568+850			29,21	2	3	HM + J + BR5b
WRP_RevJ	569+248	569+609			361,00	2	3	HM + BR5b
WRP_RevJ	569+843	569+985			142,00	2	3	HM + BR5b
WRP_RevJ	570+210	570+570			360,00	2	3	HS + BR5b
WRP_RevJ	571+360	571+422			62,00	2	3	HM + BR5b
WRP_RevJ	571+622	571+762			140,00	2	3	HM + BR5b
WRP_RevJ	571+897	572+628			731,00	2	3	HM + BR5b
WRP_RevJ	573+406	573+467			61,00	2	3	HM + J + BR5b
WRP_RevJ	573+500	573+560			60,00	2	3	HM + J + BR5b
WRP_RevJ	573+916	574+001			85,00	2	3	HM + BR5b
WRP_RevJ	574+267	574+346			79,00	2	3	HM + BR5b
WRP_RevJ	574+986	575+016			30,00	2	3	HM + J + BR5b
WRP_RevJ	575+077	575+145			68,00	2	3	HM + J + BR5b
WRP_RevJ	577+599	577+642			43,00	2	3	HM + J + BR5b
WRP_RevJ	577+891	577+935			44,00	2	3	HM + BR5b
WRP_RevJ	578+234	578+276			42,00	2	3	HM + J + BR5b

WRP_RevJ	578+440	578+531			91,00	2	3	HM + BR5b
WRP_RevJ	578+542	578+571			29,00	2	3	HS + J + BR5b
WRP_RevJ	579+385	579+435			50,00	2	3	HM + BR5b
WRP_RevJ	582+172	582+227			55,00	2	3	HM + J + BR6
WRP_RevJ	582+353	582+535			182,00	2	3	HM + BR6
WRP_RevJ	582+945	583+030			85,00	2	3	HM + BR6
WRP_RevJ	584+652	585+112			460,32	2	3	HM + BR6
WRP_RevJ	587+009	587+060			51,00	2	3	HM + BR6
WRP_RevJ	587+247	587+486			238,50	2	4	HS + BR6
WRP_RevJ	588+496	588+534			38,00	2	4	HS + J + BR6
WRP_RevJ	588+677	588+754			77,00	2	4	HS + BR6
WRP_RevJ	589+005	589+039			34,00	2	4	HM + J + BR6
WRP_RevJ	589+288	589+646			358,00	2	4	HM + BR6
WRP_RevJ	589+760	589+800			40,00	2	4	HS + J + BR6
WRP_RevJ	590+830	591+128			298,00	2	4	HM + BR6
WRP_RevJ	591+128	591+724			596,00	2	4	HS + BR6
WRP_RevJ	591+724	592+022			298,00	2	4	HM + BR6
WRP_RevJ	592+545	592+660			115,00	2	4	HS + BR6
WRP_RevJ	592+806	592+844			38,00	2	4	HM + J + BR6
WRP_RevJ	595+444	595+544			100,00	2	4	HM + BR6
WRP_RevJ	597+577	597+626			49,00	2	4	HS + J + BR6
WRP_RevJ	598+628	598+684			56,00	2	4	HM + J + BR6
WRP_RevJ	598+736	598+860			124,00	2	4	HS + BR6
WRP_RevJ	599+992	600+040			48,00	2	4	HM + BR6
WRP_RevJ	600+110	600+195			85,00	2	4	HS + BR6
WRP_RevJ	603+329	603+439			110,00	2	4	HS + BR6
WRP_RevJ	606+430	606+538			108,00	2	4	HM + BR7e
WRP_RevJ	607+071	607+144			73,00	2	4	HM + J + BR7e
WRP_RevJ	607+952	608+256			304,50	2	4	HM + BR7e
WRP_RevJ	608+360	608+415			55,00	2	4	HM + J + BR7e
WRP_RevJ	609+440	609+484			44,00	2	4	HM + J + BR7e
WRP_RevJ	609+650	610+048			398,00	2	4	HM + BR7e
WRP_RevJ	610+115	610+350			235,00	2	4	HM + BR7e
WRP_RevJ	611+007	611+208			201,00	2	4	HM + BR7e
WRP_RevJ	611+299	611+390			91,00	2	4	HM + BR7e
WRP_RevJ	611+623	611+647			24,00	2	4	HM + J + BR7e
WRP_RevJ	611+763	611+808			45,00	2	4	HM + BR7e
WRP_RevJ	616+000	616+159			159,00	2	4	HM + BR7e
WRP_RevJ	616+589	616+749			160,00	2	4	HM + BR7e
WRP_RevJ	616+845	616+939			94,00	2	4	HM + BR7e

WRP_RevJ	618+564	618+646			82,00	2	4	HS + BR7e
WRP_RevJ	619+048	619+178			130,00	2	4	HS + BR7e
WRP_RevJ	619+400	619+714			314,00	2	4	HM + BR7e
WRP_RevJ	619+908	619+963			55,00	2	4	HS + J + BR7e
WRP_RevJ	620+074	620+103			29,00	2	4	HM + J + BR7e
WRP_RevJ	620+203	620+317			114,00	2	4	HM + BR7e
WRP_RevJ	620+480	620+527			47,00	2	4	HM + J + BR7e
WRP_RevJ	620+752	620+844			92,00	2	4	HM + BR7e
WRP_RevJ	620+942	621+531			589,00	2	4	HM + BR7e
WRP_RevJ	621+648	621+740			92,26	2	4	HM + BR7e
WRP_RevJ	621+747	621+937			190,00	2	4	HS + BR7e
WRP_RevJ	622+826	623+003			177,00	2	4	HS + BR7e
WRP_RevJ	623+724	625+124			1400,00	2	4	HM + BR7e
WRP_RevJ	625+368	625+708			340,00	2	4	HM + BR7e
WRP_RevJ	626+136	626+217			81,00	2	4	HS + BR7e
WRP_RevJ	626+752	626+803			51,00	2	4	HM + J + BR7e
WRP_RevJ	627+143	627+267			124,00	2	4	HM + BR7e
WRP_RevJ	627+476	627+618			142,00	2	4	HM + BR7e
WRP_RevJ	627+814	628+203			389,00	2	4	HM + BR7e
WRP_RevJ	628+315	628+375			60,00	2	4	HS + J + BR7e
WRP_RevJ	628+640	628+740			100,00	2	4	HM + BR7e
WRP_RevJ	628+740	628+785			45,00	2	4	HM + J + BR7e
WRP_RevJ	628+850	628+886			36,00	2	4	HM + J + BR7e
WRP_RevJ	629+211	629+293			82,00	2	4	HM + BR7e
WRP_RevJ	629+658	629+728			70,00	2	4	HS + J + BR7e
WRP_RevJ	630+195	630+402			207,00	2	4	HM + BR7e
WRP_RevJ	630+415	630+622			207,00	2	4	HM + BR7d
WRP_RevJ	630+622	630+829			207,00	2	4	HS + BR7d
WRP_RevJ	630+903	631+045			142,00	2	4	HM + BR7d
WRP_RevJ	631+103	631+334			231,00	2	4	HM + BR7d
WRP_RevJ	631+334	631+565			231,00	2	4	HM + BR7e
WRP_RevJ	631+815	631+862			47,00	2	4	HM + BR7e
WRP_RevJ	631+972	632+017			45,00	2	4	HM + BR7e
WRP_RevJ	632+303	632+366			63,00	2	4	HM + BR7e
WRP_RevJ	632+466	632+678			212,00	2	4	HS + BR7e
WRP_RevJ	632+678	633+102			424,00	2	4	HM + BR7d
WRP_RevJ	633+155	633+275			120,00	2	4	HM + BR7d
WRP_RevJ	633+419	633+697			278,00	2	4	HM + BR7d
WRP_RevJ	633+730	633+912			182,00	2	4	HM + BR7d
WRP_RevJ	634+015	634+215			200,00	2	4	HS + BR7d

WRP_RevJ	634+740	634+807			67,00	2	4	HS + J + BR7d
WRP_RevJ	635+435	635+484			49,00	2	4	HM + J + BR7d
WRP_RevJ	635+789	635+822			33,00	2	4	HM + J + BR7d
WRP_RevJ	636+017	636+292			275,00	2	4	HM + BR7d
WRP_RevJ	636+603	636+650			47,00	2	4	HM + J + BR7d
WRP_RevJ	636+760	636+811			51,00	2	4	HM + J + BR7d
WRP_RevJ	636+868	636+979			111,00	2	4	HM + BR7c
WRP_RevJ	637+027	637+218			191,50	2	4	HM + BR7d
WRP_RevJ	637+218	637+410			191,50	2	4	HS + BR7d
WRP_RevJ	637+866	637+935			69,00	2	4	HS + J + BR7d
WRP_RevJ	638+240	638+270			30,00	2	4	HM + J + BR7d
WRP_RevJ	640+503	640+846			343,00	2	4	HM + BR7e
WRP_RevJ	640+885	641+074			189,00	2	4	HM + BR7e
WRP_RevJ	641+074	641+263			189,00	2	4	HM + BR7e
WRP_RevJ	641+317	641+390			73,00	2	4	HM + J + BR7d
WRP_RevJ	641+512	641+550			38,00	2	4	HM + BR7d
WRP_RevJ	641+692	641+803			111,00	2	4	HM + BR7d
WRP_RevJ	643+327	643+360			33,00	2	4	HM + BR7d
WRP_RevJ	643+545	643+716			171,00	2	4	HM + BR7c
WRP_RevJ	643+730	643+955			225,00	2	4	HM + BR7d
WRP_RevJ	644+503	644+561			58,00	2	4	HM + BR7d
WRP_RevJ	644+688	644+762			74,00	2	4	HM + J + BR7d
WRP_RevJ	644+794	644+859			65,00	2	4	HS + BR7d
WRP_RevJ	645+065	645+240			175,00	2	4	HM + BR7c
WRP_RevJ	645+275	645+343			68,00	2	4	HM + J + BR7c
WRP_RevJ	645+529	645+554			25,00	2	4	HM + BR7d
WRP_RevJ	645+803	645+873			70,00	2	4	HM + BR7d
WRP_RevJ	646+515	646+657			142,00	2	4	HM + BR7c
WRP_RevJ	647+416	647+455			39,00	2	4	HM + BR7c
WRP_RevJ	647+569	647+603			34,00	2	4	HM + J + BR7c
WRP_RevJ	651+172	651+231			59,00	2	4	HM + J + BR7c
WRP_RevJ	651+893	651+922			29,00	2	4	HM + BR7c
WRP_RevJ	651+969	651+989			20,00	2	4	HM + BR7c
WRP_RevJ	652+211	652+239			28,00	2	4	HM + J + BR7c
WRP_RevJ	652+283	652+303			20,00	2	4	HM + J + BR7c
WRP_RevJ	652+466	652+487			21,00	2	4	HM + J + BR7c
WRP_RevJ	652+834	652+861			27,00	2	4	HM + J + BR7c
WRP_RevJ	652+966	653+010			44,00	2	4	HM + J + BR7c
WRP_RevJ	653+141	653+164			23,00	2	4	HM + J + BR7c
WRP_RevJ	653+248	653+273			25,00	2	4	HM + J + BR7c

WRP_RevJ	653+453	653+478			24,74	2	4	HM + J + BR7c
WRP_RevJ	653+503	653+544			41,00	2	4	HM + J + BR7c
WRP_RevJ	653+689	653+873			184,00	2	4	HM + BR7c
WRP_RevJ	654+039	654+071			32,00	2	4	HM + J + BR7c
WRP_RevJ	654+111	654+131			20,00	2	4	HM + J + BR7c
WRP_RevJ	654+175	654+203			28,00	2	4	HM + J + BR7c
WRP_RevJ	654+413	654+448			35,00	2	4	HM + J + BR7c
WRP_RevJ	654+576	654+647			71,00	2	4	HM + J + BR7c
WRP_RevJ	654+795	654+891			96,00	2	4	HM + BR7c
WRP_RevJ	655+456	655+512			56,00	2	4	HM + J + BR7c
WRP_RevJ	655+726	655+747			21,00	2	4	HM + J + BR7c
WRP_RevJ	656+505	656+529			24,00	2	4	HM + J + BR7c
WRP_RevJ	656+551	656+571			20,00	2	4	HM + J + BR7c
WRP_RevJ	656+850	656+887			37,00	2	4	HM + J + BR7c
WRP_RevJ	657+376	657+396			20,00	2	4	HM + J + BR7c
WRP_RevJ	658+011	658+035			24,00	2	4	HM + J + BR7c
WRP_RevJ	658+503	658+527			24,00	2	4	HM + J + BR7c
WRP_RevJ	658+531	658+560			28,50	2	4	HM + J + BR7c
WRP_RevJ	658+921	658+941			20,00	2	4	HM + J + BR7c
WRP_RevJ	659+203	659+256			53,00	2	4	HM + J + BR7c
WRP_RevJ	659+904	659+948			44,00	2	4	HM + BR7c
WRP_RevJ	660+040	660+066			26,00	2	4	HM + J + BR7c
WRP_RevJ	660+603	660+631			28,00	2	4	HM + J + BR7c
WRP_RevJ	661+818	661+844			26,00	2	4	HM + J + BR7c
WRP_RevJ	662+993	663+103			110,00	2	4	HS + BR7b
WRP_RevJ	663+470	663+503			33,00	2	4	HM + J + BR7b
WRP_RevJ	663+628	663+808			179,81	2	4	HM + BR7b
WRP_RevJ	663+909	663+936			27,00	2	4	HM + BR7b
WRP_RevJ	664+581	664+615			34,00	2	4	HM + J + BR7b
WRP_RevJ	665+512	665+552			40,00	2	4	HM + J + BR7b
WRP_RevJ	666+261	666+351			90,00	2	4	HM+BR7b
WRP_RevJ	666+373	666+548			175,00	2	4	HM+BR7a
WRP_RevJ	670+340	670+384			43,74	2	4	HS+BR7a
WRP_RevJ	670+974	671+019			45,00	2	4	HM+BR7a
WRP_RevJ	672+003	672+054			51,00	2	4	HM+J+BR7a
WRP_RevJ	672+126	672+172			46,00	2	4	HM+BR7a
WRP_RevJ	680+418	680+449			31,00	2	4	HM+J+BR7b
WRP_RevJ	683+572	683+613			41,00	2	4	HM+BR7a
WRP_RevJ	689+173	689+211			38,00	2	4	HM+BR7b
WRP_RevJ	690+808	690+864			56,00	2	4	HM+J+BR7a

WRP_RevJ	691+061	691+114			53,00	2	4	HM+J+BR7a
WRP_RevJ	701+482	701+547			65,00	2	4	HM+J+BR7a
WRP_RevJ	703+329	703+381			52,00	2	4	HM+J+BR7a
WRP_RevJ	704+281	704+308			27,00	2	4	HM+J+BR7a
WRP_RevJ	704+445	704+489			44,00	2	4	HM+J+BR7a
WRP_RevJ	711+238	711+262			24,00	2	4	HM+BR7a
WRP_RevJ	713+157	713+211			54,00	2	4	HM+J+BR7a
WRP_RevJ	718+255	718+309			54,00	2	4	HM+J+BR7a
WRP_RevJ	721+212	721+283			71,00	2	4	HM+J+BR7a
WRP_RevJ	721+329	721+384			55,00	2	4	HM+BR7a
WRP_RevJ	723+410	723+520			110,00	2	4	HM+BR7a
WRP_RevJ	734+581	734+824			243,00	2	4	HM+BR7a
WRP_RevJ	735+507	735+548			41,00	2	4	HM+BR7b
WRP_RevJ	735+625	735+656			31,00	2	4	HM+BR7b
WRP_RevJ	735+991	736+042			51,00	2	4	HM+BR7b
WRP_RevJ	737+369	737+388			19,31	2	4	HM+BR7a
WRP_RevJ	738+522	738+578			56,00	2	4	HM+BR7a
WRP_RevJ	738+648	738+788			140,00	2	4	HM+BR7a
WRP_RevJ	738+856	738+879			23,00	2	4	HM+BR7a
WRP_RevJ	739+418	739+460			41,60	2	4	HS+BR7a
WRP_RevJ	739+811	739+894			83,00	2	4	HS+BR7a
WRP_RevJ	744+697	744+825			128,00	2	4	HM+BR7b
WRP_RevJ	744+977	745+015			38,00	2	4	HM+BR7b
WRP_RevJ	746+396	746+442			46,00	2	4	HM+BR7b
WRP_RevJ	747+488	747+531			43,00	2	4	HM+BR7c
WRP_RevJ	760+088	760+111			23,00	2	4	HM+BR7b
WRP_RevJ	760+497	760+562			65,00	2	4	HM+BR7b
WRP_RevJ	761+423	761+523			100,00	2	4	HM+BR7b
WRP_RevJ	761+997	762+044			47,00	2	4	HS+BR7b
WRP_RevJ	762+334	762+406			72,00	2	4	HM+BR7b
WRP_RevJ	763+044	763+336			292,00	2	4	HM+BR7b
WRP_RevJ	765+576	765+654			78,00	2	4	HM+BR7a
WRP_RevJ	766+505	766+574			69,00	2	4	HM+J+BR7a
WRP_RevJ	766+941	766+966			25,00	2	4	HM+BR7a
WRP_RevJ	768+246	768+288			42,00	2	4	HS+J+BR7a
WRP_RevJ	769+916	770+106			190,00	2	4	HM+BR7b
WRP_RevJ	772+237	772+382			145,00	2	4	HM+BR7b
WRP_RevJ	773+710	773+796			86,00	2	4	HS+BR7b
WRP_RevJ	774+008	774+078			70,00	2	4	HM+BR7b
WRP_RevJ	774+126	774+177			51,00	2	4	HM+J+BR7b

WRP_RevJ	774+288	774+459			171,00	2	4	HS+BR7b
WRP_RevJ	775+536	775+574			38,00	2	4	HM+BR7b
WRP_RevJ	776+218	776+358			140,00	2	4	HM+BR7b
WRP_RevJ	776+446	776+488			42,00	2	4	HM+BR7b
WRP_RevJ	777+534	777+674			140,00	2	4	HM+BR7a
WRP_RevJ	777+888	778+122			234,00	2	4	HM+BR7a
WRP_RevJ	778+636	778+663			27,00	2	4	HM+J+BR7b
WRP_RevJ	779+790	779+818			28,00	2	4	HM+J+BR7b
WRP_RevJ	780+093	780+118			25,00	2	4	HM+J+BR7b
WRP_RevJ	781+407	781+606			199,00	2	4	HM+BR7b
WRP_RevJ	782+421	782+455			34,00	2	4	HM+BR7b
WRP_RevJ	782+988	783+158			170,00	2	4	HM+BR7b
WRP_RevJ	789+170	789+250			80,00	2	4	HS+BR7b
WRP_RevJ	789+340	789+410			70,00	2	4	HM+BR7b
WRP_RevJ	790+813	790+963			150,00	2	4	HM+BR7b
WRP_RevJ	791+230	791+285			55,00	2	4	HS+J+BR7b
WRP_RevJ	794+737	794+902			165,00	2	4	HS+BR7b
WRP_RevJ	796+305	796+366			61,00	2	4	HS+J+BR7b
WRP_RevJ	796+538	796+607			69,00	2	4	HM+J+BR7b
WRP_RevJ	797+718	797+788			70,00	2	4	HM+J+BR7b
WRP_RevJ	798+062	798+267			205,00	2	4	HM+BR7b
WRP_RevJ	798+654	798+850			196,00	2	4	HM+BR7b
WRP_RevJ	799+070	799+290			220,00	2	4	HS+BR7b
WRP_RevJ	799+340	799+410			70,00	2	4	HS+J+BR7b
WRP_RevJ	802+546	802+582			36,00	2	4	HM+J+BR7b
WRP_RevJ	803+127	803+182			55,00	2	4	HS+J+BR7b
WRP_RevJ	804+439	804+464			25,00	2	4	HS+J+BR7b
WRP_RevJ	804+464	804+494			30,00	2	4	HM+J+BR7b
WRP_RevJ	805+045	805+065			20,00	2	4	HM+J+BR7b
WRP_RevJ	805+428	805+448			20,00	2	4	HM+J+BR7b
WRP_RevJ	805+456	805+505			49,00	2	4	HM+J+BR7b
WRP_RevJ	805+542	805+573			31,00	2	4	HM+J+BR7b
WRP_RevJ	805+597	805+642			45,00	2	4	HM+J+BR7a
WRP_RevJ	805+695	805+760			65,00	2	4	HM+J+BR7a
WRP_RevJ	806+893	806+958			65,00	2	4	HM+J+BR7a
WRP_RevJ	815+852	815+916			64,00	2	4	HM+J+BR7a
WRP_RevJ	818+742	818+762			20,00	2	4	HM+J+BR7a
WRP_RevJ	818+774	818+870			96,00	2	4	HM+BR7a
WRP_RevJ	819+764	819+965			201,00	2	4	HS+BR7a
WRP_RevJ	820+412	820+530			118,00	2	4	HM+BR7a

WRP_RevJ	821+329	821+374			45,00	2	4	HM+J+BR7a
WRP_RevJ	821+404	821+449			45,00	2	4	HM+J+BR7a
WRP_RevJ	821+781	821+867			86,00	2	4	HM+BR7a
WRP_RevJ	821+927	822+087			159,67	2	4	HM+BR7a
WRP_RevJ	822+101	822+206			105,00	2	4	HM+BR7a
WRP_RevJ	822+596	822+656			60,00	2	4	HM+BR7a
WRP_RevJ	823+056	823+077			21,00	2	4	HM+BR7a
WRP_RevJ	823+955	824+027			72,00	2	4	HS+J+BR7a
WRP_RevJ	824+167	824+207			40,00	2	4	HM+J+BR7a
WRP_RevJ	824+228	824+338			110,00	2	4	HM+BR7a
WRP_RevJ	824+360	824+410			50,00	2	4	HM+BR7a
WRP_RevJ	825+236	825+256			20,00	2	4	HM+J+BR7a
WRP_RevJ	826+932	826+955			23,00	2	4	HM+BR7a
WRP_RevJ	832+118	832+329			211,00	3	5	HM+BR7a
WRP_RevJ	832+413	832+443			30,00	3	5	HM+BR7a
WRP_RevJ	832+510	832+588			78,00	3	5	HM+BR7a
WRP_RevJ	832+861	832+945			84,00	3	5	HM+BR7a
WRP_RevJ	832+981	833+024			43,00	3	5	HM+BR7a
WRP_RevJ	833+045	833+088			43,00	3	5	HS+J+BR7a
WRP_RevJ	833+158	833+188			30,00	3	5	HM+J+BR7a
WRP_RevJ	833+327	833+348			21,00	3	5	HS+J+BR7a
WRP_RevJ	833+988	834+135			147,00	3	5	HM+BR7a
WRP_RevJ	834+207	834+236			29,00	3	5	HM+BR7a
WRP_RevJ	834+328	834+368			40,00	3	5	HM+BR7a
WRP_RevJ	834+845	834+909			64,00	3	5	HM+J+BR7b
WRP_RevJ	835+616	835+635			19,00	3	5	HM+BR7b
WRP_RevJ	835+645	835+664			19,00	3	5	HM+BR7b
WRP_RevJ	835+699	835+720			21,00	3	5	HM+J+BR7b
WRP_RevJ	835+795	835+847			52,00	3	5	HS+J+BR7a
WRP_RevJ	839+551	839+641			90,00	3	5	HM+BR7a
WRP_RevJ	839+857	839+878			21,00	3	5	HS+J+BR7a
WRP_RevJ	839+910	839+944			34,00	3	5	HS+J+BR7a
WRP_RevJ	842+012	842+042			30,00	3	5	HM+J+BR8c
WRP_RevJ	842+203	842+293			90,00	3	5	HM+BR8c
WRP_RevJ	850+831	850+971			140,00	3	5	HS+BR8c
WRP_RevJ	850+933	850+961			28,00	3	5	HM+J+BR8c
WRP_RevJ	853+622	853+666			44,00	3	5	HS+J+BR8b
WRP_RevJ	854+023	854+110			87,00	3	5	HS+BR8a
WRP_RevJ	855+447	855+566			119,00	3	5	HM+BR8b
WRP_RevJ	856+754	856+780			26,00	3	5	HM+J+BR8b

WRP_RevJ	860+269	860+308			39,00	3	5	HS+J+BR8b
WRP_RevJ	870+006	870+066			60,00	3	5	HM+J+BR8c
WRP_RevJ	877+181	877+239			58,00	3	5	HM+BR8c
WRP_RevJ	878+269	878+318			49,00	3	5	HM+BR8c
WRP_RevJ	878+688	878+715			27,00	3	5	HM+BR8c
WRP_RevJ	879+626	879+780			154,00	3	5	HS+BR8a
WRP_RevJ	879+954	880+034			80,00	3	5	HS+BR8c
WRP_RevJ	880+782	880+845			63,00	3	5	HM+BR8c
WRP_RevJ	882+897	883+147			250,00	3	5	HM+BR8c
WRP_RevJ	883+713	883+814			101,00	3	5	HM+BR8c
WRP_RevJ	884+450	884+731			281,00	3	5	HM+BR8c
WRP_RevJ	884+731	885+012			281,00	3	5	HM+BR8c
WRP_RevJ	886+027	886+057			30,00	3	5	HS+BR8c
WRP_RevJ	887+372	887+480			108,00	3	5	HM+BR8c
WRP_RevJ	889+588	889+751			163,00	3	5	HS+BR8c
WRP_RevJ	890+788	890+830			42,00	3	5	HM+BR8c
WRP_RevJ	892+604	892+659			55,00	3	5	HM+J+BR8c
WRP_RevJ	892+888	893+007			119,00	3	5	HM+BR8c
WRP_RevJ	893+121	893+148			27,00	3	5	HM+BR8c
WRP_RevJ	893+259	893+297			38,00	3	5	HM+BR8c
WRP_RevJ	893+872	893+958			86,00	3	5	HM+BR8c
WRP_RevJ	894+498	894+535			37,00	3	5	HS+J+BR8c
WRP_RevJ	894+728	894+777			49,00	3	5	HM+BR8c
WRP_RevJ	895+853	895+874			21,00	3	5	HM+BR8c
WRP_RevJ	896+546	896+566			20,00	3	5	HM+J+BR8c
WRP_RevJ	897+524	897+559			35,00	3	5	HM+BR8c
WRP_RevJ	901+088	901+115			27,00	3	5	HM+J+BR8b
WRP_RevJ	901+323	901+388			65,00	3	5	HM+BR8b
WRP_RevJ	909+394	909+412			18,00	3	5	HM+BR8b
WRP_RevJ	922+039	922+115			76,00	3	5	HS+BR8b
WRP_RevJ	932+566	932+616			50,00	3	5	HM + BR8b
WRP_RevJ	936+485	936+507			22,00	3	5	HS + BR8b
WRP_RevJ	941+395	941+474			79,00	3	5	HM + BR8b
WRP_RevJ	946+080	946+130			50,00	3	5	HM + BR8b
WRP_RevJ	946+370	946+554			184,07	3	5	HM + BR8b
WRP_RevJ	948+590	948+743			153,00	3	5	HM + BR8b
WRP_RevJ	950+106	950+203			97,00	3	5	HM + BR8c
WRP_RevJ	951+326	951+381			55,00	3	5	HM + BR8c
WRP_RevJ	951+513	951+584			71,00	3	5	HM + BR8c
WRP_RevJ	953+488	953+712			224,00	3	5	HM + BR8c

WRP_RevJ	955+808	955+851			43,00	3	5	HS + J + BR8c
WRP_RevJ	959+367	959+408			41,00	3	5	HM + J + BR8c
WRP_RevJ	959+657	959+694			37,00	3	5	HM + J + BR8c
WRP_RevJ	959+803	959+870			67,00	3	5	HM + BR8c
WRP_RevJ	960+004	960+104			100,00	3	5	HS + BR8c
WRP_RevJ	961+067	961+112			45,00	3	5	HM + BR8c
WRP_RevJ	961+776	961+876			100,00	3	5	HS + BR8c
WRP_RevJ	968+903	968+933			30,00	3	5	HM + BR8b
WRP_RevJ	971+989	972+099			110,00	3	5	HM + BR8b
WRP_RevJ	972+319	972+395			76,00	3	5	HM + BR8b
WRP_RevJ	972+889	972+949			60,00	3	5	HM + BR8b
WRP_RevJ	973+444	973+470			26,00	3	5	HM + BR8b
WRP_RevJ	975+295	975+319			24,00	3	5	HM + BR8b
WRP_RevJ	976+436	976+546			110,00	3	5	HM + BR8b
WRP_RevJ	979+503	979+624			121,00	3	5	HM + BR8b
WRP_RevJ	981+343	981+569			226,00	3	5	HM + BR8b
WRP_RevJ	981+642	981+668			26,00	3	5	HM + BR8a
WRP_RevJ	981+872	981+962			90,00	3	5	HM + BR8a
WRP_RevJ	983+537	983+589			52,00	3	5	HM + BR8a
WRP_RevJ	983+775	983+814			39,00	3	5	HM + BR8a
WRP_RevJ	983+907	983+935			28,00	3	5	HM + BR8a
WRP_RevJ	984+540	984+566			26,00	3	5	HM + BR8a
WP0050	988+376		2+804	2+839	35,00	3	5	HM + BR8a
WP0050		991+090	2+860	2+890	30,00	3	5	HM + J + BR8a
WRP_RevJ	993+880	994+034			154,00	3	5	HM + BR8a
WRP_RevJ	994+215	994+242			27,00	3	5	HM + J + BR8a
WRP_RevJ	994+465	994+532			67,00	3	5	HM + BR8a
WRP_RevJ	995+381	995+461			80,00	3	5	HM + BR8a
WRP_RevJ	996+132	996+185			53,00	3	5	HM + BR8a
WRP_RevJ	996+636	996+742			106,00	3	5	HM + J + BR8a
WRP_RevJ	996+838	996+898			60,00	3	5	HM + J + BR8a
WRP_RevJ	997+150	997+182			32,00	3	5	HS + J + BR8a
WRP_RevJ	997+245	997+299			54,00	3	5	HS + J + BR8a
WRP_RevJ	1010+048	1010+132			84,00	3	5	HM + BR9a
WRP_RevJ	1011+239	1011+288			49,00	3	5	HM + BR9a
WRP_RevJ	1011+576	1011+632			56,00	3	5	HM + BR9a
WRP_RevJ	1013+432	1013+527			95,00	3	5	HM + BR9a
WRP_RevJ	1013+924	1013+964			40,00	3	5	HM + BR9a
WRP_RevJ	1014+050	1014+150			100,00	3	5	HM + BR9a
WRP_RevJ	1014+567	1014+607			40,00	3	5	HM + BR9a

WRP_RevJ	1016+330	1016+400			70,00	3	5	HM + BR9a
WRP_RevJ	1016+443	1016+523			80,00	3	5	HM + BR9a
WRP_RevJ	1016+828	1017+025			197,00	3	5	HM + BR9a
WRP_RevJ	1018+125	1018+373			248,00	3	5	HM + BR9b
WRP_RevJ	1019+910	1019+957			47,00	3	5	HM + BR9b
WRP_RevJ	1020+215	1020+242			27,00	3	5	HM + BR9b
WRP_RevJ	1023+198	1023+232			34,00	3	5	HM + BR9b
WRP_RevJ	1023+594	1023+698			104,00	3	5	HM + BR9b
WRP_RevJ	1024+080	1024+112			32,00	3	5	HM + BR9b
WRP_RevJ	1025+270	1025+385			115,00	3	5	HM + BR9b
WRP_RevJ	1028+004	1028+057			53,00	3	5	HM + BR9b
WRP_RevJ	1029+637	1029+757			120,00	3	5	HM + BR9b
WRP_RevJ	1030+224	1030+274			50,00	3	5	HM + J + BR9b
WRP_RevJ	1030+883	1030+920			37,00	3	5	HM + J + BR9b
WRP_RevJ	1031+613	1031+657			44,00	3	5	HM + J + BR9b
WRP_RevJ	1036+078	1036+099			21,00	3	5	HM + J + BR10a
WRP_RevJ	1042+456	1042+518			62,00	3	5	HM + BR10a
WRP_RevJ	1044+557	1044+590			33,00	3	5	HM + BR10a
WRP_RevJ	1044+828	1044+964			136,00	3	5	HM + BR10a
WRP_RevJ	1044+981	1045+041			60,00	3	5	HM + BR10a
WRP_RevJ	1045+541	1045+604			63,00	3	5	HM + BR10a
WRP_RevJ	1046+107	1046+190			83,00	3	5	HM + BR10b
WRP_RevJ	1046+214	1046+339			125,00	3	5	HM + BR10b
WRP_RevJ	1047+590	1047+714			124,00	3	5	HM + BR10b
WRP_RevJ	1047+899	1047+956			57,49	3	5	HM + BR10b
WRP_RevJ	1048+226	1048+298			72,00	3	5	HM + J + BR10b
WRP_RevJ	1049+020	1049+134			114,00	3	5	HM + BR10b
WRP_RevJ	1049+874	1049+903			29,00	3	5	HM + BR10b
WRP_RevJ	1050+357	1050+433			76,00	3	5	HM + BR10b
WRP_RevJ	1050+788	1050+874			86,00	3	5	HM + BR10b
WRP_RevJ	1051+564	1051+649			85,00	3	5	HM + BR10b
WRP_RevJ	1051+707	1051+798			91,00	3	5	HM + BR10b
WRP_RevJ	1054+035	1054+187			152,00	3	5	HM + BR10b
WRP_RevJ	1054+223	1054+337			114,00	3	5	HM + BR10b
WRP_RevJ	1060+340	1060+386			46,00	3	5	HM + BR10b
WRP_RevJ	1060+438	1060+476			38,00	3	5	HM + BR10b
WRP_RevJ	1064+060	1064+100			40,00	3	5	HM + BR10b
WRP_RevJ	1065+135	1065+164			29,00	3	5	HM + BR10b
WRP_RevJ	1075+281	1075+361			80,00	3	5	HM + BR10b
WRP_RevJ	1077+518	1077+542			24,00	3	6	HM + BR10b

WRP_RevJ	1077+611	1077+661			50,00	3	6	HM + BR10b
WRP_RevJ	1082+430	1082+456			26,00	3	6	HS + J + BR10b
WRP_RevJ	1087+031	1087+054			23,00	3	6	HM + BR10b
WRP_RevJ	1094+360	1094+417			57,00	3	6	HM + BR10b
WRP_RevJ	1101+812	1101+917			105,00	3	6	HM + BR11
WRP_RevJ	1106+098	1106+135			37,00	3	6	HM + BR11
WRP_RevJ	1112+330	1112+540			210,00	3	6	HM + BR11
WRP_RevJ	1112+730	1112+915			185,00	3	6	HM + BR11
WRP_RevJ	1112+969	1113+294			325,00	3	6	HM + BR11
WRP_RevJ	1113+348	1113+370			22,00	3	6	HS + J + BR11
WRP_RevJ	1113+471	1113+547			76,00	3	6	HM + BR11
WRP_RevJ	1113+607	1113+659			52,00	3	6	HS + BR11
WRP_RevJ	1113+726	1113+759			33,00	3	6	HM + BR11
WRP_RevJ	1113+964	1114+009			45,00	3	6	HM + BR11
WRP_RevJ	1116+272	1116+320			48,00	3	6	HM + BR11
WRP_RevJ	1116+932	1116+956			24,52	3	6	HS + BR11
WRP_RevJ	1117+425	1117+475			49,76	3	6	HS + BR11
WRP_RevJ	1117+727	1117+797			70,00	3	6	HM + BR11
WRP_RevJ	1121+715	1121+805			90,00	3	6	HM + BR11
WRP_RevJ	1122+790	1122+866			76,00	3	6	HM + BR11
WRP_RevJ	1123+235	1123+336			101,00	3	6	HM + BR11
WRP_RevJ	1123+967	1124+049			82,00	3	6	HM + BR11
WRP_RevJ	1131+598	1131+625			27,00	3	6	HM + BR12
WRP_RevJ	1132+657	1132+690			33,00	3	6	HM + BR12
WRP_RevJ	1138+414	1138+461			47,00	3	6	HS + BR12
WRP_RevJ	1139+376	1139+432			56,37	3	6	HM + BR12
WRP_RevJ	1141+122	1141+149			27,00	3	6	HM + BR12
WRP_RevJ	1142+498	1142+558			60,00	3	6	HM + BR12
WRP_RevJ	1143+646	1143+766			120,00	3	6	HM + BR12
WRP_RevJ	1144+890	1144+927			37,00	3	6	HS + BR12
WRP_RevJ	1145+450	1145+498			48,00	3	6	HM + J + BR12
WRP_RevJ	1155+098	1155+159			61,00	3	6	HM+BR12
WRP_RevJ	1158+021	1158+040			19,00	3	6	HS+BR12
WRP_RevJ	1158+298	1158+351			53,00	3	6	HM+BR12
WRP_RevJ	1159+698	1159+732			34,00	3	6	HM+BR12
WRP_RevJ	1162+216	1162+326			110,00	3	6	HM+BR12
WRP_RevJ	1171+340	1171+390			50,00	3	6	HS+BR12
WRP_RevJ	1171+462	1171+496			34,00	3	6	HM+BR13
WRP_RevJ	1173+174	1173+225			51,00	3	6	HS+BR12
WRP_RevJ	1180+136	1180+161			25,00	3	6	HM+J+BR12

WRP_RevJ	1184+327	1184+379			52,00	3	6	HM+BR12
WRP_RevJ	1186+949	1187+082			133,00	3	6	HS+BR12
WP0094	1188+062	1188+853	0+150	0+450	300,00	3	6	HM+BR12
WRP_RevJ	1194+392	1194+468			76,00	3	6	HM+BR12
WRP_RevJ	1207+826	1207+856			30,00	3	6	HS+BR12
WRP_RevJ	1209+475	1209+509			34,00	3	6	HM+BR12
WRP_RevJ	1210+668	1210+688			20,00	3	6	HM+BR12
WRP_RevJ	1211+300	1211+336			35,67	3	6	HS+BR12
WRP_RevJ	1212+164	1212+192			28,00	3	6	HM+BR12
WRP_RevJ	1213+296	1213+349			53,00	3	6	HM+BR16
WRP_RevJ	1213+468	1213+510			42,00	3	6	HM+BR17
WRP_RevJ	1213+561	1213+671			110,00	3	6	HM+BR18
WRP_RevJ	1215+709	1215+820			111,00	3	6	HM+BR13
WRP_RevJ	1217+027	1217+100			73,00	3	6	HM+BR14
WRP_RevJ	1218+845	1218+932			87,00	3	6	HM+BR15
WRP_RevJ	1232+056	1232+077			21,00	3	6	HM+BR12
WRP_RevJ	1242+462	1242+503			41,00	3	6	HS+BR12
WRP_RevJ	1242+783	1242+846			63,00	3	6	HM+BR12
WRP_RevJ	1256+315	1256+377			62,00	3	6	HS+J+BR13
WRP_RevJ	1256+849	1257+099			250,00	3	6	HM+BR13
WRP_RevJ	1257+173	1257+236			63,00	3	6	HM+J+BR13
WRP_RevJ	1261+575	1261+615			40,00	3	6	HM+J+BR13
WRP_RevJ	1261+689	1261+734			45,00	3	6	HM+BR13
WRP_RevJ	1265+764	1265+790			26,00	3	6	HS+J+BR13
WRP_RevJ	1266+498	1266+761			263,00	3	6	HM+BR13
WRP_RevJ	1266+848	1266+908			60,00	3	6	HM+J+BR13
WRP_RevJ	1266+966	1267+000			34,00	3	6	HS+J+BR13
WRP_RevJ	1267+244	1267+302			58,00	3	6	HS+BR13
WRP_RevJ	1267+712	1267+893			181,00	3	6	HM+BR13
WRP_RevJ	1267+907	1267+967			60,00	3	6	HM+J+BR13
WRP_RevJ	1269+925	1269+951			26,00	3	6	HM+J+BR13
WRP_RevJ	1269+957	1269+979			22,00	3	6	HM+J+BR13
WRP_RevJ	1270+865	1270+895			30,00	3	6	HM+J+BR13
WRP_RevJ	1275+880	1275+912			32,00	3	6	HM+J+BR13
WRP_RevJ	1275+918	1275+940			22,00	3	6	HM+J+BR13
WRP_RevJ	1276+597	1276+617			20,00	3	6	HS+J+BR13
WRP_RevJ	1277+065	1277+112			47,00	3	6	HS+J+BR13
WRP_RevJ	1291+572	1291+672			100,00	3	6	HM+BR13
WRP_RevJ	1292+163	1292+190			27,00	3	6	HS+J+BR13
WRP_RevJ	1302+368	1302+400			32,00	3	6	HS+J+BR14

WRP_RevJ	1355+205	1355+263			58,00	4	7	HM+J+BR13
WRP_RevJ	1356+760	1356+783			23,00	4	7	HM+BR13
WRP_RevJ	1356+864	1356+889			25,00	4	7	HS+J+BR13
WRP_RevJ	1357+211	1357+299			88,00	4	7	HM+BR13
WRP_RevJ	1359+150	1359+190			40,00	4	7	HM+J+BR13
WRP_RevJ	1360+533	1360+636			103,00	4	7	HS+BR13
WRP_RevJ	1361+586	1361+646			60,00	4	7	HS+J+BR13
WRP_RevJ	1362+171	1362+199			28,00	4	7	HM+J+BR13
WRP_RevJ	1369+680	1369+900			220,00	4	7	HM+BR13
WRP_RevJ	1370+271	1370+295			24,00	4	7	HM+J+BR13
WRP_RevJ	1373+015	1373+125			110,25	4	7	HM+BR13
WRP_RevJ	1373+202	1373+242			40,00	4	7	HM+J+BR13
WRP_RevJ	1373+817	1373+948			130,75	4	7	HS+BR13
WRP_RevJ	1374+032	1374+112			80,00	4	7	HM+BR13
WRP_RevJ	1374+607	1374+648			41,00	4	7	HM+J+BR13
WRP_RevJ	1378+033	1378+123			90,00	4	7	HM+BR13
WRP_RevJ	1379+079	1379+194			115,00	4	7	HM+BR13
WRP_RevJ	1402+650	1402+704			54,00	4	7	HM+BR13
WRP_RevJ	1404+930	1405+017			87,00	4	7	HM+BR13
WRP_RevJ	1406+717	1406+767			50,00	4	7	HM+J+BR13
WRP_RevJ	1408+785	1408+813			28,00	4	7	HM+J+BR13
WRP_RevJ	1408+823	1408+877			54,00	4	7	HM+J+BR13
WRP_RevJ	1411+424	1411+492			68,00	4	7	HM+J+BR13
WRP_RevJ	1413+782	1413+823			41,00	4	7	HM+J+BR14a
WRP_RevJ	1419+245	1419+291			46,00	4	7	HS+J+BR14a
WRP_RevJ	1419+612	1419+650			38,00	4	7	HS+J+BR14a
WRP_RevJ	1419+797	1419+908			111,00	4	7	HS+BR14a
WRP_RevJ	1420+346	1420+466			120,00	4	7	HS+BR14a
WRP_RevJ	1420+950	1421+030			80,00	4	7	HM+BR14a
WRP_RevJ	1421+328	1421+578			250,00	4	7	HS+BR14a
WRP_RevJ	1421+847	1421+902			55,00	4	7	HS+J+BR14a
WRP_RevJ	1421+932	1421+997			65,00	4	7	HM+J+BR14a
WRP_RevJ	1422+032	1422+063			31,00	4	7	HS+J+BR14a
WRP_RevJ	1422+125	1422+212			87,00	4	7	HM+BR14a
WRP_RevJ	1423+587	1423+743			156,00	4	7	HM+BR14a
WRP_RevJ	1423+775	1423+800			25,00	4	7	HM+J+BR14a
WRP_RevJ	1423+810	1423+834			24,00	4	7	HM+J+BR14a
WRP_RevJ	1423+854	1424+080			226,43	4	7	HM+BR14a
WRP_RevJ	1425+136	1425+212			76,00	4	7	HM+BR14a
WRP_RevJ	1425+311	1425+531			220,00	4	7	HM+BR14a

WRP_RevJ	1425+805	1425+971			166,00	4	7	HM+BR14a
WRP_RevJ	1426+457	1426+505			48,00	4	7	HS+BR14a
WRP_RevJ	1427+443	1427+563			120,00	4	7	HM+BR14a
WRP_RevJ	1427+577	1427+739			162,00	4	7	HM+BR14a
WRP_RevJ	1427+950	1428+080			130,00	4	7	HM+BR14a
WRP_RevJ	1428+110	1428+160			50,00	4	7	HM+J+BR14a
WRP_RevJ	1428+340	1428+371			31,00	4	7	HM+BR14a
WRP_RevJ	1428+884	1428+931			47,00	4	7	HM+J+BR14a
WRP_RevJ	1428+961	1429+002			41,00	4	7	HM+BR14a
WRP_RevJ	1429+079	1429+102			23,00	4	7	HS+J+BR14a
WRP_RevJ	1429+125	1429+220			95,00	4	7	HM+BR14a
WRP_RevJ	1429+314	1429+434			120,00	4	7	HM+BR14a
WRP_RevJ	1432+981	1433+020			39,00	4	7	HM+J+BR14a
WRP_RevJ	1433+145	1433+211			66,00	4	7	HM+BR14a
WRP_RevJ	1433+263	1433+299			36,00	4	7	HS+J+BR14a
WRP_RevJ	1433+338	1433+450			112,43	4	7	HM+BR14a
WRP_RevJ	1433+472	1433+586			114,00	4	7	HM+BR14a
WRP_RevJ	1434+430	1434+620			190,00	4	7	HM+BR14a
WRP_RevJ	1434+780	1434+830			50,00	4	7	HM+J+BR14a
WRP_RevJ	1435+053	1435+163			110,00	4	7	HM+BR14a
WRP_RevJ	1435+224	1435+314			90,00	4	7	HM+BR14a
WRP_RevJ	1435+340	1435+744			404,00	4	7	HS+BR14a
WRP_RevJ	1435+977	1436+013			36,00	4	7	HS+J+BR14a
WRP_RevJ	1436+859	1437+039			180,00	4	7	HS+BR14a
WRP_RevJ	1437+514	1437+538			24,00	4	7	HS+J+BR14a
WRP_RevJ	1437+893	1438+118			225,00	4	7	HM+BR14a
WRP_RevJ	1439+130	1439+400			270,00	4	7	HM+BR14b
WRP_RevJ	1439+419	1439+476			57,00	4	7	HM+J+BR14b
WRP_RevJ	1441+970	1442+125			155,00	4	7	HM+BR14b
WRP_RevJ	1443+650	1443+701			51,00	4	7	HM+J+BR14b
WRP_RevJ	1445+152	1445+182			30,00	4	7	HS+J+BR14b
WRP_RevJ	1445+377	1445+440			63,00	4	7	HM+J+BR14b
WRP_RevJ	1445+640	1445+667			27,00	4	7	HM+J+BR14b
WRP_RevJ	1449+568	1449+683			115,00	4	7	HM+BR14b
WRP_RevJ	1450+017	1450+077			60,00	4	7	HS+J+BR14b
WRP_RevJ	1450+154	1450+178			24,00	4	7	HM+BR14b
WRP_RevJ	1450+194	1450+224			30,00	4	7	HM+J+BR14b
WRP_RevJ	1450+904	1450+928			24,00	4	7	HS+J+BR14b
WRP_RevJ	1451+634	1451+694			60,00	4	7	HM+J+BR14b
WRP_RevJ	1451+802	1451+866			64,00	4	7	HM+J+BR14b

WRP_RevJ	1452+263	1452+318			55,00	4	7	HM+J+BR14b
WRP_RevJ	1452+380	1452+440			60,00	4	7	HS+J+BR14b
WRP_RevJ	1452+532	1452+655			123,00	4	7	HM+BR14b
WRP_RevJ	1452+675	1452+720			45,00	4	7	HM+J+BR14b
WRP_RevJ	1452+745	1452+770			25,00	4	7	HM+J+BR14b
WRP_RevJ	1452+932	1452+958			26,00	4	7	HM+J+BR14b
WRP_RevJ	1453+224	1453+315			91,00	4	7	HM+BR14b
WRP_RevJ	1453+557	1453+582			25,00	4	7	HM+J+BR14b
WRP_RevJ	1456+221	1456+243			22,00	4	7	HM+J+BR14b
WP0102	1456+818		0+691	0+799	108,06	4	7	HM+BR14b
WP0102		1457+939	0+921	0+959	38,03	4	7	HM+J+BR14b
WRP_RevJ	1458+010	1458+120			110,00	4	7	HM+BR14b
WRP_RevJ	1459+046	1459+078			32,00	4	7	HS+J+BR14b
WRP_RevJ	1459+270	1459+335			65,00	4	7	HM+BR14b
WRP_RevJ	1459+450	1459+532			82,00	4	7	HM+BR14b
WRP_RevJ	1460+079	1460+135			56,00	4	7	HM+J+BR14b
WRP_RevJ	1460+395	1460+410			15,00	4	7	HM+J+BR14b
WRP_RevJ	1461+434	1461+460			26,00	4	7	HM+J+BR14b
WRP_RevJ	1463+770	1463+892			122,00	4	7	HM+BR14b
WRP_RevJ	1464+361	1464+526			165,00	4	7	HM+BR14b
WRP_RevJ	1464+526	1464+691			165,00	4	7	HS+BR14b
WRP_RevJ	1466+270	1466+466			196,00	4	7	HM+BR14b
WRP_RevJ	1466+617	1466+717			100,00	4	7	HM+BR14b
WRP_RevJ	1466+995	1467+045			50,00	4	7	HM+J+BR14b
WRP_RevJ	1467+061	1467+111			50,00	4	7	HM+J+BR14b
WRP_RevJ	1467+321	1467+366			45,00	4	7	HM+J+BR14b
WRP_RevJ	1467+449	1467+486			37,00	4	7	HM+J+BR14b
WRP_RevJ	1468+266	1468+342			76,00	4	7	HS+BR14b
WRP_RevJ	1468+902	1469+117			215,00	4	7	HM+BR14b
WRP_RevJ	1469+184	1469+370			186,00	4	7	HS+BR14b
WRP_RevJ	1469+370	1469+555			185,00	4	7	HM+BR14b
WRP_RevJ	1469+898	1470+138			240,00	4	7	HM+BR14b
WRP_RevJ	1470+411	1470+541			130,00	4	7	HM+BR14b
WRP_RevJ	1470+942	1471+207			265,00	4	7	HM+BR14b
WRP_RevJ	1471+298	1471+418			120,00	4	7	HS+BR14b
WRP_RevJ	1471+778	1471+898			120,00	4	7	HS+BR14b
WRP_RevJ	1471+947	1472+072			125,00	4	7	HM+BR14b
WRP_RevJ	1472+098	1472+249			151,00	4	7	HM+BR14b
WRP_RevJ	1473+585	1473+745			160,00	4	7	HM+BR14b
WRP_RevJ	1473+745	1473+984			239,00	4	7	HS+BR14b

WRP_RevJ	1474+022	1474+112			90,00	4	7	HM+BR14b
WRP_RevJ	1474+140	1474+320			180,00	4	7	HM+BR14b
WRP_RevJ	1474+504	1474+729			225,00	4	7	HS+BR14b
WRP_RevJ	1474+729	1474+954			225,00	4	7	HM+BR14b
WRP_RevJ	1475+480	1475+506			26,00	4	7	HS+J+BR14a
WRP_RevJ	1475+642	1475+687			45,00	4	7	HM+J+BR14a
WRP_RevJ	1477+515	1477+728			213,00	4	7	HS+BR14a
WRP_RevJ	1477+825	1478+005			180,00	4	7	HM+BR14a
WRP_RevJ	1478+555	1478+581			26,00	4	7	HM+J+BR14b
WRP_RevJ	1480+422	1480+449			27,00	4	7	HM+BR15d
WRP_RevJ	1480+775	1480+976			201,00	4	7	HS+BR15d
WRP_RevJ	1481+527	1481+560			33,00	4	7	HM+J+BR15d
WRP_RevJ	1481+870	1482+060			190,00	4	7	HM+BR15d
WRP_RevJ	1482+060	1482+250			190,00	4	7	HM+BR15a
WRP_RevJ	1482+266	1482+436			170,00	4	7	HM+BR15d
WRP_RevJ	1482+436	1482+606			170,00	4	7	HS+BR15d
WRP_RevJ	1483+225	1483+278			53,00	4	7	HM+BR15d
WRP_RevJ	1484+117	1484+143			26,00	4	7	HM+J+BR15d
WRP_RevJ	1484+675	1484+720			45,00	4	7	HM+J+BR15d
WRP_RevJ	1484+762	1484+863			101,00	4	7	HM+BR15d
WRP_RevJ	1484+984	1485+018			34,00	4	7	HM+BR15d
WRP_RevJ	1486+278	1486+338			60,00	4	7	HM+J+BR15d
WRP_RevJ	1486+453	1486+543			90,00	4	7	HM+BR15d
WRP_RevJ	1487+445	1487+491			46,00	4	7	HS+J+BR15d
WRP_RevJ	1489+413	1489+437			24,00	4	7	HM+J+BR15d
WRP_RevJ	1490+014	1490+041			27,00	4	7	HM+BR15d
WRP_RevJ	1490+412	1490+467			55,00	4	7	HM+J+BR15d
WRP_RevJ	1490+722	1490+756			34,00	4	7	HS+J+BR15d
WRP_RevJ	1492+120	1492+200			80,00	4	7	HS+BR15d
WRP_RevJ	1492+513	1492+539			26,00	4	7	HM+BR15d
WRP_RevJ	1492+701	1492+898			196,98	4	7	HM+BR15d
WRP_RevJ	1493+256	1493+288			32,00	4	7	HM+J+BR15d
WRP_RevJ	1495+905	1495+983			78,00	4	7	HM+BR15d
WRP_RevJ	1496+743	1496+883			140,00	4	7	HM+BR15d
WRP_RevJ	1497+991	1498+079			88,00	4	7	HM+BR15d
WRP_RevJ	1498+105	1498+327			222,00	4	7	HM+BR15d
WRP_RevJ	1498+428	1498+555			127,00	4	7	HS+BR15d
WRP_RevJ	1498+631	1498+679			48,00	4	7	HM+J+BR15d
WRP_RevJ	1500+343	1500+623			280,00	4	7	HM+BR15d
WRP_RevJ	1500+668	1500+893			225,00	4	7	HM+BR15d

WRP_RevJ	1500+893	1501+118			225,00	4	7	HS+BR15d
WRP_RevJ	1501+578	1501+750			171,54	4	7	HS+BR15d
WRP_RevJ	1501+850	1501+970			120,00	4	7	HS+BR15d
WRP_RevJ	1503+363	1503+525			162,00	4	7	HS+BR15d
WRP_RevJ	1503+768	1503+807			39,00	4	7	HM+J+BR15d
WRP_RevJ	1503+979	1504+289			309,82	4	7	HM+BR15d
WRP_RevJ	1504+300	1504+420			120,00	4	7	HM+BR15d
WRP_RevJ	1504+496	1504+529			33,00	4	7	HM+J+BR15d
WRP_RevJ	1504+565	1504+624			59,00	4	7	HM+J+BR15d
WRP_RevJ	1504+632	1504+870			238,00	4	7	HM+BR15d
WRP_RevJ	1504+910	1505+036			126,00	4	7	HM+BR15d
WRP_RevJ	1505+045	1505+104			59,00	4	7	HM+J+BR15d
WRP_RevJ	1505+418	1505+543			125,00	4	7	HM+BR15d
WRP_RevJ	1505+815	1505+885			70,00	4	7	HM+J+BR15d
WRP_RevJ	1505+979	1506+100			121,00	4	7	HS+BR15d
WRP_RevJ	1506+107	1506+152			45,00	4	7	HM+J+BR15d
WRP_RevJ	1506+260	1506+330			70,00	4	7	HM+J+BR15d
WRP_RevJ	1506+400	1506+660			260,00	4	7	HM+BR15d
WRP_RevJ	1506+748	1506+818			70,00	4	7	HM+J+BR15d
WRP_RevJ	1506+845	1506+934			89,00	4	7	HM+BR15d
WRP_RevJ	1507+046	1507+106			60,00	4	7	HM+J+BR15d
WRP_RevJ	1511+353	1511+412			59,00	4	7	HM+J+BR15d
WRP_RevJ	1512+238	1512+275			37,00	4	7	HM+J+BR15d
WRP_RevJ	1512+611	1512+643			32,00	4	7	HS+J+BR15d
WRP_RevJ	1513+507	1513+541			34,00	4	7	HM+BR15d
WRP_RevJ	1513+836	1514+001			165,00	4	7	HS+BR15d
WRP_RevJ	1514+007	1514+081			74,00	4	7	HM+J+BR15d
WRP_RevJ	1514+331	1514+461			130,00	4	7	HM+BR15d
WRP_RevJ	1514+637	1514+677			40,00	4	7	HM+BR15d
WRP_RevJ	1514+698	1514+733			35,00	4	7	HM+J+BR15d
WRP_RevJ	1514+779	1514+844			65,00	4	7	HM+J+BR15d
WRP_RevJ	1514+912	1514+976			64,00	4	7	HM+J+BR15d
WRP_RevJ	1515+107	1515+211			104,00	4	7	HM+BR15d
WRP_RevJ	1515+526	1515+636			110,00	4	7	HM+BR15d
WRP_RevJ	1515+997	1516+057			60,00	4	7	HM+J+BR15d
WRP_RevJ	1516+529	1516+562			33,00	4	7	HM+J+BR15d
WRP_RevJ	1517+432	1517+472			40,00	4	7	HM+J+BR15d
WRP_RevJ	1519+778	1519+829			51,00	4	7	HS+J+BR15d
WRP_RevJ	1520+832	1521+232			400,00	4	7	HM+BR15d
WRP_RevJ	1521+240	1521+550			310,00	4	7	HS+BR15d

WRP_RevJ	1522+696	1522+722			26,00	4	7	HM+J+BR15d
WRP_RevJ	1522+985	1523+090			105,00	4	7	HM+BR15d
WRP_RevJ	1523+094	1523+249			155,00	4	7	HM+BR15d
WRP_RevJ	1523+424	1523+456			32,00	4	7	HM+BR15d
WRP_RevJ	1523+601	1523+692			91,00	4	7	HM+BR15d
WRP_RevJ	1523+793	1523+829			36,00	4	7	HM+J+BR15d
WRP_RevJ	1523+921	1524+231			310,00	4	7	HM+BR15d
WRP_RevJ	1524+383	1524+553			170,00	4	7	HS+BR15d
WRP_RevJ	1524+722	1524+755			33,00	4	7	HS+J+BR15d
WRP_RevJ	1524+788	1524+890			101,75	4	7	HS+BR15d
WRP_RevJ	1525+030	1525+329			298,75	4	7	HM+BR15d
WRP_RevJ	1525+446	1525+556			110,00	4	7	HM+BR15d
WRP_RevJ	1525+589	1525+739			150,00	4	7	HS+BR15d
WRP_RevJ	1525+941	1525+971			30,00	4	7	HS+J+BR15d
WRP_RevJ	1526+128	1526+191			63,00	4	7	HM+J+BR15d
WRP_RevJ	1526+711	1526+737			25,98	4	7	HM+J+BR15d
WRP_RevJ	1526+783	1526+893			110,00	4	7	HM+BR15d
WRP_RevJ	1527+236	1527+496			260,00	4	7	HM+BR15d
WRP_RevJ	1527+543	1527+603			60,00	4	7	HM+J+BR15d
WRP_RevJ	1528+081	1528+163			82,00	4	7	HS+BR15d
WRP_RevJ	1529+947	1530+145			198,00	4	7	HM+BR15d
WRP_RevJ	1530+279	1530+488			209,00	4	7	HM+BR15d
WRP_RevJ	1530+745	1530+870			125,00	4	7	HS+BR15d
WRP_RevJ	1530+886	1530+942			56,00	4	7	HS+J+BR15d
WRP_RevJ	1532+042	1532+096			54,00	4	7	HM+BR15d
WRP_RevJ	1532+203	1532+325			122,00	4	7	HM+BR15d
WRP_RevJ	1532+461	1532+491			30,00	4	7	HS+J+BR15d
WRP_RevJ	1534+251	1534+283			32,00	4	7	HS+J+BR15d
WRP_RevJ	1534+655	1534+681			26,00	4	7	HS+J+BR15d
WRP_RevJ	1534+736	1534+846			110,00	4	7	HM+BR15d
WRP_RevJ	1535+021	1535+400			379,00	4	7	HM+BR15d
WRP_RevJ	1535+406	1535+451			45,00	4	7	HM+J+BR15d
WRP_RevJ	1535+470	1535+570			100,00	4	7	HM+BR15d
WRP_RevJ	1535+793	1535+827			34,00	4	7	HM+J+BR15d
WRP_RevJ	1535+849	1536+005			156,00	4	7	HM+BR15d
WRP_RevJ	1536+213	1536+287			74,09	4	7	HM+BR15d
WRP_RevJ	1536+537	1536+697			160,00	4	7	HM+BR15d
WRP_RevJ	1536+722	1536+912			190,00	4	7	HM+BR15d
WRP_RevJ	1537+147	1537+267			120,00	4	7	HM+BR15d
WRP_RevJ	1537+571	1537+790			218,75	4	7	HM+BR15d

WRP_RevJ	1538+006	1538+106			100,00	4	7	HS+BR15d
WRP_RevJ	1538+221	1538+565			344,00	4	7	HS+BR15d
WRP_RevJ	1538+822	1538+861			39,00	4	7	HM+BR15d
WRP_RevJ	1538+869	1539+139			270,00	4	7	HS+BR15d
WRP_RevJ	1539+139	1539+409			270,00	4	7	HM+BR15d
WRP_RevJ	1541+462	1541+637			175,00	4	7	HM+BR15d
WRP_RevJ	1542+471	1542+691			220,00	4	7	HS+BR15d
WRP_RevJ	1542+966	1543+026			60,00	4	7	HM+J+BR15d
WRP_RevJ	1543+096	1543+172			76,00	4	7	HM+BR15d
WRP_RevJ	1543+338	1543+372			34,00	4	7	HS+J+BR15d
WRP_RevJ	1543+564	1543+724			160,00	4	7	HM+BR15d
WRP_RevJ	1544+079	1544+115			35,75	4	7	HM+J+BR15d
WRP_RevJ	1544+115	1544+640			525,25	4	7	HM+BR15d
WRP_RevJ	1544+724	1544+899			175,00	4	7	HM+BR15d
WRP_RevJ	1545+044	1545+334			290,00	4	7	HM+BR15d
WRP_RevJ	1545+556	1545+632			76,00	4	7	HM+BR15d
WRP_RevJ	1545+701	1545+861			160,00	4	7	HM+BR15d
WRP_RevJ	1545+861	1546+021			160,00	4	7	HS+BR15d
WRP_RevJ	1547+413	1547+473			60,00	4	7	HS+J+BR15d
WRP_RevJ	1547+600	1548+020			420,00	4	7	HM+BR15d
WRP_RevJ	1548+403	1548+479			76,00	4	7	HS+BR15d
WRP_RevJ	1548+870	1548+911			41,00	4	7	HS+J+BR15d
WRP_RevJ	1550+826	1550+906			80,00	4	7	HS+BR15d
WRP_RevJ	1551+507	1551+662			155,00	4	7	HM+BR15d
WRP_RevJ	1551+662	1551+817			155,00	4	7	HS+BR15a
WRP_RevJ	1551+899	1552+124			225,00	4	7	HM+BR15d
WRP_RevJ	1552+124	1552+349			225,00	4	7	HS+BR15d
WRP_RevJ	1552+466	1552+503			37,65	4	7	HM+J+BR15d
WRP_RevJ	1552+620	1552+760			140,00	4	7	HS+BR15d
WRP_RevJ	1552+826	1552+935			108,64	4	7	HS+BR15d
WRP_RevJ	1552+947	1553+147			200,17	4	7	HM+BR15d
WRP_RevJ	1553+534	1553+714			180,00	4	7	HM+BR15d
WRP_RevJ	1553+899	1553+994			94,70	4	7	HM+BR15d
WRP_RevJ	1554+400	1554+691			291,04	4	7	HS+BR15c
WRP_RevJ	1554+691	1555+570			879,00	4	7	HM+BR15b
WRP_RevJ	1557+609	1557+709			100,00	4	7	HM+BR15c
WRP_RevJ	1557+744	1557+807			63,00	4	7	HM+J+BR15c
WRP_RevJ	1558+008	1558+128			120,00	4	7	HM+BR15d
WRP_RevJ	1563+900	1564+030			130,00	4	7	HM+BR15d
WRP_RevJ	1568+132	1568+175			43,00	4	7	HM+J+BR15a

WRP_RevJ	1568+250	1568+272			22,00	4	7	HM+J+BR15a
WRP_RevJ	1568+295	1568+315			20,00	4	7	HM+J+BR15a
WRP_RevJ	1568+481	1568+591			110,00	4	7	HM+BR15a
WRP_RevJ	1574+991	1575+013			22,00	4	7	HM+J+BR15a
WRP_RevJ	1576+663	1576+822			159,00	4	7	HM+BR15a
WRP_RevJ	1577+977	1578+027			50,00	4	7	HS+J+BR15a
WRP_RevJ	1579+857	1579+903			46,00	4	7	HM+J+BR15b
WRP_RevJ	1580+177	1580+197			20,00	4	7	HM+J+BR15b
WRP_RevJ	1580+221	1580+257			36,00	4	7	HS+J+BR15b
WRP_RevJ	1580+315	1580+347			32,00	4	7	HS+J+BR15b
WRP_RevJ	1580+427	1580+449			22,00	4	7	HM+J+BR15b
WRP_RevJ	1580+617	1580+663			46,00	4	7	HS+J+BR15b
WRP_RevJ	1580+825	1580+901			76,00	4	7	HS+BR15b
WRP_RevJ	1583+102	1583+134			32,00	4	7	HS+J+BR15b
WRP_RevJ	1583+467	1583+515			48,00	4	7	HS+J+BR15b
WRP_RevJ	1586+528	1586+564			36,00	4	8	HS+J+BR15a
WRP_RevJ	1587+544	1587+614			70,00	4	8	HM+BR15a
WRP_RevJ	1587+777	1587+887			110,00	4	8	HS+BR15a
WRP_RevJ	1588+499	1588+560			61,00	4	8	HS+J+BR15a
WRP_RevJ	1590+335	1590+373			38,00	4	8	HM+J+BR15a
WRP_RevJ	1590+480	1590+516			36,00	4	8	HS+J+BR15a
WRP_RevJ	1590+590	1590+815			225,00	4	8	HS+BR15a
WRP_RevJ	1592+338	1592+410			72,00	4	8	HM+J+BR15a
WRP_RevJ	1592+877	1592+921			44,00	4	8	HS+J+BR15a
WRP_RevJ	1593+013	1593+103			90,00	4	8	HS+BR15a
WRP_RevJ	1594+229	1594+289			60,00	4	8	HM+J+BR15a
WRP_RevJ	1594+982	1595+018			36,00	4	8	HS+J+BR15a
WP0088	1599+800	1600+800	0+732	0+847	114,84	4	8	HS+BR15a
WRP_RevJ	1602+233	1602+257			24,00	4	8	HM+BR15a
WRP_RevJ	1602+962	1603+052			90,00	4	8	HS+BR15a
WRP_RevJ	1604+168	1604+293			125,00	4	8	HS+BR15a
WRP_RevJ	1608+203	1608+258			55,00	4	8	HM+J+BR15a
WRP_RevJ	1608+273	1608+307			34,00	4	8	HS+J+BR15a
WRP_RevJ	1608+658	1608+686			28,00	4	8	HM+BR15a
WRP_RevJ	1608+954	1609+004			50,00	4	8	HS+J+BR15a
WRP_RevJ	1609+059	1609+159			100,00	4	8	HM+BR15a
WRP_RevJ	1609+232	1609+300			68,01	4	8	HS+J+BR15a
WRP_RevJ	1609+339	1609+439			100,00	4	8	HS+BR15a
WRP_RevJ	1612+235	1612+488			252,99	4	8	HS+BR15a
WRP_RevJ	1612+578	1612+703			125,00	4	8	HS+BR15a

WRP_RevJ	1613+201	1613+320			119,01	4	8	HS+BR15a
WRP_RevJ	1622+520	1622+581			61,00	4	8	HM+J+BR15a
WRP_RevJ	1623+490	1623+706			215,99	4	8	HS+BR15a
WRP_RevJ	1624+510	1624+558			48,00	4	8	HM+J+BR15a
WRP_RevJ	1656+284	1656+379			95,00	4	8	HS+BR15a
WRP_RevJ	1656+635	1656+955			320,00	4	8	HM+BR15a
WRP_RevJ	1661+318	1661+517			199,00	4	8	HM+BR15a
WRP_RevJ	1661+645	1661+791			146,00	4	8	HM+BR15a
WRP_RevJ	1663+569	1663+614			45,00	4	8	HM+J+BR15a
WRP_RevJ	1663+803	1663+846			43,00	4	8	HM+J+BR15a
WRP_RevJ	1663+929	1664+057			128,00	4	8	HM+J+BR15a
WRP_RevJ	1664+082	1664+221			139,15	4	8	HS+BR15a
WRP_RevJ	1664+463	1664+559			96,00	4	8	HM+BR15a
WRP_RevJ	1664+583	1664+705			122,00	4	8	HM+BR15a
WRP_RevJ	1666+715	1666+810			95,00	4	8	HS+BR15a
WRP_RevJ	1668+781	1668+973			192,00	4	8	HM+BR15a
WRP_RevJ	1669+110	1669+271			161,00	4	8	HM+BR15a
WRP_RevJ	1670+131	1670+207			76,00	4	8	HS+BR15a
WRP_RevJ	1670+499	1670+618			118,52	4	8	HM+BR15a
WRP_RevJ	1671+348	1671+400			52,00	4	8	HM+J+BR15a
WRP_RevJ	1671+843	1671+883			40,00	4	8	HM+J+BR15a
WRP_RevJ	1672+060	1672+125			65,00	4	8	HM+J+BR15a
WRP_RevJ	1672+210	1672+263			53,00	4	8	HS+J+BR15a
WRP_RevJ	1672+480	1672+556			76,00	4	8	HM+BR15a
WRP_RevJ	1672+620	1672+662			42,00	4	8	HS+J+BR15a
WRP_RevJ	1672+730	1672+855			125,00	4	8	HM+BR15a
WP0073	1673+400	1674+900	1+137	1+192	54,45	4	8	HM+J+BR15a
WRP_RevJ	1676+057	1676+079			22,00	4	8	HM+J+BR15a
WRP_RevJ	1676+283	1676+311			28,00	4	8	HM+J+BR15a
WRP_RevJ	1685+807	1685+861			54,00	4	8	HM+J+BR16
WRP_RevJ	1686+501	1686+601			100,00	4	8	HS+BR16
WRP_RevJ	1686+714	1686+801			87,00	4	8	HS+BR16
WRP_RevJ	1688+927	1688+977			50,00	4	8	HM+J+BR16
WRP_RevJ	1689+060	1689+120			60,00	4	8	HM+J+BR17
WRP_RevJ	1689+129	1689+156			27,00	4	8	HM+J+BR16
WRP_RevJ	1689+552	1689+584			32,00	4	8	HM+J+BR16
WRP_RevJ	1689+760	1689+790			30,00	4	8	HM+J+BR16
WRP_RevJ	1690+342	1690+371			29,00	4	8	HM+J+BR16
WRP_RevJ	1690+378	1690+417			39,00	4	8	HM+J+BR16
WRP_RevJ	1691+679	1691+724			45,00	4	8	HM+J+BR16

WRP_RevJ	1691+733	1691+763			30,00	4	8	HM+J+BR16
WRP_RevJ	1692+521	1692+543			22,00	4	8	HM+J+BR16
WRP_RevJ	1692+581	1692+606			25,00	4	8	HM+J+BR16
WRP_RevJ	1693+996	1694+066			70,00	4	8	HM+J+BR16
WRP_RevJ	1694+114	1694+179			65,00	4	8	HM+J+BR16
WRP_RevJ	1694+564	1694+605			41,00	4	8	HS+J+BR16
WRP_RevJ	1694+686	1694+737			51,00	4	8	HS+J+BR16
WRP_RevJ	1695+067	1695+099			32,00	4	8	HM+J+BR16
WRP_RevJ	1695+129	1695+172			43,00	4	8	HS+J+BR16
WRP_RevJ	1695+232	1695+256			24,00	4	8	HM+J+BR16
WRP_RevJ	1695+295	1695+365			70,00	4	8	HS+J+BR16
WRP_RevJ	1695+710	1695+770			60,00	4	8	HM+J+BR16
WRP_RevJ	1710+154	1710+205			51,00	4	8	HS+J+BR16
WRP_RevJ	1710+297	1710+439			142,00	4	8	HM+BR16
WRP_RevJ	1710+804	1710+934			130,00	4	8	HS+BR16
WRP_RevJ	1711+169	1711+229			60,00	4	8	HM+J+BR16
WRP_RevJ	1711+392	1711+417			25,00	4	8	HM+J+BR16
WRP_RevJ	1711+417	1711+440			23,00	4	8	HM+J+BR16
WRP_RevJ	1711+893	1711+953			60,00	4	8	HM+J+BR16
WRP_RevJ	1714+405	1714+520			115,00	4	8	HS+BR16
WRP_RevJ	1714+823	1714+882			59,00	4	8	HS+J+BR16
WRP_RevJ	1715+554	1715+624			70,00	4	8	HS+J+BR16
WRP_RevJ	1716+376	1716+440			64,28	4	8	HS+J+BR16
WRP_RevJ	1717+592	1717+628			36,00	4	8	HM+J+BR16
WRP_RevJ	1717+644	1717+706			62,00	4	8	HM+J+BR16
WRP_RevJ	1720+056	1720+146			90,00	4	8	HM+BR16
WRP_RevJ	1746+078	1746+228			150,00	4	8	HM+BR16
WRP_RevJ	1746+354	1746+409			55,00	4	8	HM+J+BR16
WRP_RevJ	1759+472	1759+562			90,00	4	8	HM+BR16
WRP_RevJ	1759+723	1760+102			378,86	4	8	HM+BR16
WRP_RevJ	1760+239	1760+319			80,00	4	8	HM+BR16
WRP_RevJ	1760+357	1760+477			120,00	4	8	HM+BR16
WRP_RevJ	1760+757	1760+823			66,00	4	8	HM+J+BR16
WRP_RevJ	1761+516	1761+660			144,09	4	8	HM+BR16
WRP_RevJ	1762+597	1762+687			90,00	4	8	HS+BR16
WRP_RevJ	1763+493	1763+538			45,00	4	8	HS+J+BR16
WRP_RevJ	1763+713	1763+745			32,00	4	8	HM+J+BR16
WRP_RevJ	1764+687	1764+907			220,00	4	8	HM+BR16
WRP_RevJ	1765+787	1765+827			40,00	4	8	HM+J+BR16
WRP_RevJ	1766+167	1766+297			130,00	4	8	HM+BR16

WRP_RevJ	1767+730	1767+756			26,00	4	8	HS+J+BR16
WRP_RevJ	1767+782	1767+810			28,00	4	8	HM+J+BR17
WRP_RevJ	1768+352	1768+398			46,00	4	8	HM+J+BR17
WRP_RevJ	1768+420	1768+470			50,00	4	8	HM+J+BR17
WRP_RevJ	1768+982	1769+102			120,00	4	8	HS+BR17
WRP_RevJ	1769+490	1769+540			50,00	4	8	HM+J+BR17
WRP_RevJ	1769+543	1769+675			132,09	4	8	HM+BR17
WRP_RevJ	1769+699	1769+879			180,00	4	8	HS+BR17
WRP_RevJ	1769+987	1770+058			71,00	4	8	HS+J+BR17
WRP_RevJ	1770+345	1770+430			85,00	4	8	HS+BR17
WRP_RevJ	1770+540	1770+606			66,00	4	8	HS+J+BR17
WRP_RevJ	1771+024	1771+049			25,00	4	8	HM+J+BR17
WRP_RevJ	1777+600	1777+626			26,00	4	8	HM+J+BR17
WRP_RevJ	1778+207	1778+227			20,00	4	8	HS+J+BR17
WRP_RevJ	1779+024	1779+053			29,00	4	8	HM+J+BR17
WRP_RevJ	1779+421	1779+448			27,00	4	8	HM+J+BR17
WRP_RevJ	1784+109	1784+156			47,00	4	8	HM+J+BR17
WRP_RevJ	1787+940	1787+980			40,00	4	8	HM+J+BR17
WRP_RevJ	1798+700	1798+767			67,00	4	8	HM+J+BR17
WRP_RevJ	1801+673	1801+763			90,00	4	8	HS+BR17

APPENDIX B.1 TERRESTRIAL FLORA MONITORING TABLE

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
1	003+186-003+921	Critical Habitat (CH1)	*Reseda armena var. armen*	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The seeds of *Reseda armena var. armena* shall be collected along one side of the ROW between 15 July-30 August. * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of the non-endemic native plants of the region shall be collected. **Post-Construction** * The collected seeds of *Reseda armena var. armena* species shall be planted according to the methodology and to the (38 T 318801.90-4603885.95/ 38 T 318738.00-4603635.00/38 T 318773.00-4603531.00/38 T 318649.00-4603478.00) coordinates between September-November. * The seeds of non-endemic native plants shall be planted on the ROW for erosion control in dip slopes.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First March-May period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		spread of the top soil			
2	004+126-004+237	Critical Habitat (CH2)	*Reseda armena var. armen*	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The seeds of *Reseda armena var. armena* shall be collected along one side of the ROW between 15 July-30 August. * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of the non-endemic native plants of the region shall be collected. **Post-Construction** * The collected seeds of *Reseda armena var. armena* species shall be planted according to the methodology and to the (38 T 318421.00-4603425.00 / 38 T 318351.00-4603438.00) coordinates between September-November. * The seeds of non-endemic native plants shall be planted on the ROW for erosion control in dip slopes.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First March-May period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction**	Please refer Chapter 5.1.5	The vegetative cover of the area	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		should be recovered by 20% in the first year following the spread of the top soil			
3	20+977-23+277	Critical Habitat (CH3)	*Centaurea macrocephala*	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The seeds of *Centaurea macrocephala* species shall be collected along one side of the ROW between 15 July-30 August. * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. **Post-Construction** * The habitat shall be rehabilitated. * The collected seeds of *Centaurea macrocephala* species shall be planted according to the methodology and to the (38 T 315863.00-4592192.00 / 38 T315851.00-4592099.00 / 38 T 315844.00-4591982.00) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First March-May period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In August - September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Lilium kesselringianum	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The bulbs of *Lilium kesselringianum* shall be collected before or during the top soil scraping and shall be stored along one side of the ROW. * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. **Post-Construction** * The habitat shall be rehabilitated. *The bulbs of *Lilium kesselringianum* shall be planted to the ROW according to the methodology to the ROW, after the construction.	Please refer Chapter 4.1.	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June-July) 3. Bulb maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 40% in the first year following the spread of the top soil	June-July	Annualy	
4	63+303-64+123	Critical Habitat (CH5)	*Lathyrus karsianus*	**Closed Construction Period: 1 June-15 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm with the plants on it as tufts (including *Sanguisorba sp.*), and shall be stored along one side of the ROW, and shall be irrigated once every two weeks. * The seeds of *Lathyrus karsianus* species shall be collected along one side of the ROW between 1 July-1 August. **Post-Construction** * The collected seeds of *Lathyrus karsianus* species shall be planted according to the methodology and to the (38 T 314559.00-4563256.00 / 38 T 314462.00-4563212.00 / 38 T 314357.00-4563161.00) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Tanacetum coccineum ssp. chamaemelifolium	**Closed Construction Period: 1 June-15 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm with the plants on it as tufts (including *Sanguisorba sp.*), and shall be stored along one side of the ROW, and shall be irrigated once every two weeks. * The seeds of *Tanacetum coccineum ssp. chamaemelifolium* species shall be collected along one side of the ROW between 15 July-15 August. **Post-Construction** * The collected seeds of *Tanacetum coccineum ssp. chamaemelifolium* species shall be planted according to the methodology and to the (38 T 314559.00-4563256.00 / 38 T 314462.00-4563212.00 / 38 T 314357.00-4563161.00) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 40% in the first year following the spread of the top soil	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
5	175+427-177+015	Critical Habitat (CH12)	*Hieracium sarykamyschense*	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. *The seeds of *Hieracium sarykamyschense* species shall be collected along one side of the ROW between 15 July-15 August. **Post-Construction** * The collected seeds of *Hieracium sarykamyschense* species shall be planted according to the methodology and to the (38 T 295146.00-4471939.00 / 38 T 295058.00-4471934.00 / 38 T 294888.00-4471917.00 / 38 T 294809.00-4471910.00 / 38 T 294403.00-4471874.00) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In July) 3. Seed maturation (In August-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction**	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 40% in the first year following the spread of the top soil	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.					
6	188+572-194+015	Critical Habitat (CH13)	*Lathyrus karsianus*	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Lathyrus karsianus* species shall be collected along one side of the ROW between 1 July-1 August. **Post-Construction** * The collected seeds of *Lathyrus karsianus* species shall be planted according to the methodology and to the (38 T 283458.00-4464029.00 / 38 T 283095.00-4463628.00 / 38 T 282935.00-4463512.00 / 38 T 282714.00-4463366.00 / 38 T 282416.00-4463214.00) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June – July) 3. Seed maturation (In July - August)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Hieracium sarykamyschense	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Hieracium sarykamyschense* species shall be collected along one side of the ROW between 1 July-1 August. **Post-Construction** * The collected seeds of *Hieracium sarykamyschense* species shall be planted according to the methodology and to the (38 T 283458.00-4464029.00 / 38 T 283095.00-4463628.00 / 38 T 282935.00-4463512.00 / 38 T 282714.00-4463366.00 / 38 T 282416.00-4463214.00) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In July) 3. Seed maturation (In August - September)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top	June-July	Biennially	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.			
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 40% in the first year following the spread of the top soil	June-July	Annualy	
7	215+900-220+656	Critical Habitat (CH15)	*Salvia huberi*	**Closed Construction Period: 1 March-15 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * * The seeds of *Salvia huberi* species shall be collected from the ROW between 1 July-1 August. **Post-Construction** * The collected seeds of *Salvia huberi* species shall be planted according to the methodology and to the (38 T 269181.00-4448569.00 / 38 T 269044.00-4448457.00 / 38 T268916.00-4448352.00 / 38 T 268806.00-4448262.00) coordinates between September-November. * Terracing shall be carried out to prevent erosion.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In May-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Cephalaria sparsipilosa	**Closed Construction Period: 1 March-15 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.		The data obtained by comparison of the species' population ratio (%) with its	1. Germination (First May - June period after seeding)	Once in each germination, flowering and mature	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The seeds of *Cephalaria sparsipilosa* species shall be collected from the ROW between 15 July-15 August. **Post-Construction** The collected seeds of *Cephalaria sparsipilosa*, species shall be planted according to the methodology and to the (38 T 269181.00-4448569.00 / 38 T 269044.00-4448457.00 / 38 T268916.00-4448352.00 / 38 T 268806.00-4448262.00) coordinates between September-November. * Terracing shall be carried out to prevent erosion.		situation in natural habitat (observation of healthy population development)	2. Flowering (In July-August) 3. Seed maturation (In August-September)	seed periods, three times per year	
			Eryngium wanaturi	**Closed Construction Period: 1 March-15 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Eryngium wanaturi* species shall be collected from the ROW between 15 July-15 August. **Post-Construction** The collected seeds of *Eryngium wanaturi*, species shall be planted according to the methodology and to the (38 T 269181.00-4448569.00 / 38 T 269044.00-4448457.00 / 38 T268916.00-4448352.00 / 38 T 268806.00-4448262.00) coordinates between September-November. Terracing shall be carried out to prevent erosion.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In July-August) 3. Seed maturation (In August-September)	Once in each germination, flowering and mature seed periods, three times per year	
			Cousinia bicolor	**Closed Construction Period: 1 March-15 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia bicolor* species shall be collected from the ROW between 15 July-15 August. **Post-Construction** * The collected seeds of *Cousinia bicolor*, species shall be planted according to the methodology and to the (38 T 269181.00-4448569.00 / 38 T 269044.00-4448457.00 / 38 T268916.00-4448352.00 / 38 T 268806.00-4448262.00) coordinates between September-November. Terracing shall be carried out to prevent erosion.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 25% in the first year following the spread of the top soil	June-July	Annualy	
8	233+187-233+802	Critical Habitat (CH16)	*Cousinia bicolor*	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia bicolor* species shall be collected from the ROW between 15 July-15 August. **Post-Construction** * The collected seeds of *Cousinia bicolor* species shall be planted according to the methodology and to the (38 T 255187.77-4440651.70 / 38 T 255020.00-4440629.00 / 38 T 254965.00-4440596.00 / 38 T 254901.00-4440558.00 / 38 T 254835.00-4440523.00) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
9	ROUTE CHANGE 307+380-313+386	Critical Habitat (CH17)	*Lepidium caespitosum*	**Closed Construction Period: March and 15 September-30 October** **Pre-Construction** The collected seeds of *Lepidium caespitosum* species shall be planted according to the methodology to the ROW between September-November. **Post-Construction** The riparian vegetation, aquatic and semi aquatic areas shall be rehabilitated. * The collected seeds of *Lepidium caespitosum* species shall be planted according to the methodology to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In May - June) 3. Seed maturation (In June- July)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring: Monitoring Period	Monitoring: Frequency	Monitoring: Reporting
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 40% in the first year following the spread of the top soil	June-July	Annualy	
10	371+311-371+400	Critical Habitat (CH18)	*Thymus canoviridis*	**Pre-Construction** * If the construction works start in March 2015; the seeds of *Thymus canoviridis* species shall be collected along one side of the ROW between 15 July-15 August. * The *Thymus canoviridis* species individuals shall be collected as tufts and shall be transferred to the (37 S 642551.00-423058.00) coordinates between 15 July-15 August. * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. **Post-Construction** * The collected seeds of *Thymus canoviridis* species shall be planted according to the methodology and to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In July – August) 3. Seed maturation (In August-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The translocated individual of the *Thymus canoviridis* species as tufts shall be planted to the ROW between September-November. Gypsum rocks stored nearby the construction site shall be spread over the ROW.					
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
11	435+077-437+304	Critical Habitat (CH21)	*Salvia huberi*	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Salvia huberi* species shall be collected between 1 July-1 August. **Post-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of	1. Germination (First May - June period after seeding) 2. Flowering (In May – August)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestor ation

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The collected seeds of *Salvia* species shall be planted according to the methodology and to (37 S 591511.00-4418898.00 / 37 S 590974.00-4418942.00 / 37 S 590452.00-4418838.00/ 37 S 589846.00-4418931.00) coordinates to the ROW between September-November.		healthy population development)	3. Seed maturation (In July-September)		Monitoring Report
			Cousinia halysensis	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia halyensis* species shall be collected between 15 July-15 August **Post-Construction** * The collected seeds of *Cousinia halyensis* species shall be planted according to the methodology and to (37 S 591511.00-4418898.00 / 37 S 590974.00-4418942.00 / 37 S 590452.00-4418838.00/ 37 S 589846.00-4418931.00) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June – August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction**	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.					
12	453+943-456+605	Critical Habitat (CH22)	*Isatis glauca ssp. sivasica*	**Pre-Construction** * The seeds of *Isatis glauca ssp. sivasica* species shall be collected between 15 July-15 August. * 20 cm of top soil of the ROW (which is ant's nest depth) shall be scraped together with rocks and stones 15 days before the construction works and shall be stored along one side of the ROW. **Post-Construction** * The collected seeds of *Isatis glauca ssp. sivasica* species shall be planted according to the methodology and to the (37 S 576028.17-4425766.25 / 37 S 576523.38-4425039.53 / 37 S 576546.39-4423957.85) coordinates to the ROW between September-November. * Terracing shall be carried out to prevent erosion.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.					
13	520+252-523+585	Critical Habitat (CH23)	*Tanacetum densum ssp. sivasicum*	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The seeds of *Tanacetum densum ssp. sivasicum* species shall be collected between 1 July-1 August. * 20 cm of top soil of the ROW (which is ant's nest depth) shall be scraped together with rocks and stones 15 days before the construction works and shall be stored along one side of the ROW. **Post-Construction** * The collected seeds of *Tanacetum densum ssp. sivasicum* species shall be planted according to the methodology and to the (37 S 523732.00-4427059.00 / 37 S 523091.00-4426900.00 / 37 S 522478.00-4426726.00 / 37 S 522307.00-4426273.00 / 37 S 521915.00-4425841.00) coordinates to the ROW between September-November. * The seeds of non-endemic native plants shall be collected and planted on the ROW for erosion control in dip slopes.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June – August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction**	Please refer Chapter 5.1.5	The vegetative cover of the area	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring: Monitoring Period	Monitoring: Frequency	Monitoring: Reporting
				* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		should be recovered by 20% in the first year following the spread of the top soil			
14	539+798-545+703	Critical Habitat (CH24)	*Tanacetum albipannosum*	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * * The seeds of *Tanacetum albipinnosum* species shall be collected between 1 July-1 August. **Post-Construction** * The collected seeds of *Tanacetum albipinnosum* species shall be planted according to the methodology and to the (37 T 507164.00-4428721.00 / 37 T 506251.00-4428878.00 / 37 T 506682.00-4428782.00 / 37 T 506043.00-429193.00 / 37 T 505799.00-4429399.00 / 37 T 505458.00-4429587.00 / 37 T 505096.00-4429820.00 / 37 T 504828.00-429928.00 / 37 T 504424.00-4429977.00 / 37 T 504079.00-4430096.00 / 37 T 503882.00-4430442.00 / 37 T 503699.00-4430709.00 / 37 T 503404.00-4430891.00 / 37 T 503049.00-4431161.00 / 37 T 502769.00-4431335.00 / 37 T 502556.29-4431464.16) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June – August) 3. Seed maturation (In July- August)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The	June-July	Biennially	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		achievement criteria for the following monitoring years will be defined based on the first year's value.			
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 10% in the first year following the spread of the top soil	June-July	Annualy	
15	566+417-567+117	Critical Habitat (CH25)	*Isatis undulata*	**Closed Construction Period: 1 June – 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Isatis undulata* species shall be collected between 1 July-1 August. **Post-Construction** * The collected seeds of *Isatis undulata* species shall be planted according to the methodology and to the (37 T 484208.00-4434554.00 / 37 T 484039.00-4434704.00 / 37 T 483877.00-4434805.00 /37 T 483732.00-4434817.00) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In April – May) 3. Seed maturation (In May- June)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction**	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement	June-July	Biennially	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		criteria for the following monitoring years will be defined based on the first year's value.			
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
16	590+940-592+418	Critical Habitat (CH26)	*Cochleria sintenisii*	**Closed Construction Period: 1 June – 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cochleria sintenisii* species shall be collected between 1 July-1 August. **Post-Construction** * The collected seeds of *Cochleria sintenisii* species shall be planted according to the methodology and to the (37 S 467562.00-4423758.00 / 37 S 467327.00-4423540.00 / 37 S 467222.00-4423461.00 / 37 S 467060.00-4423369.00 /37 S 466640.00-4423271.00) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June – August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The	June-July	Biennially	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		achievement criteria for the following monitoring years will be defined based on the first year's value.			
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
17	607+000-610+060	Critical Habitat (CH27)	*Cochleria sintenisii*	**Closed Construction Period: 1 June – 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. **Post-Construction** * The collected seeds of *Cochleria sintenisii* species shall be planted according to the methodology and to the (37 S 453088.00-4425551.00 / 37 S 453333.00-4425592.00 / 37 S 454270.00-4426118.00 / 37 S 454520.00-4426018.00 / 37 S 454806.00-4425766.00 / 37 S 454909.00-4425685.00) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June – August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction**	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement	June-July	Biennially	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		criteria for the following monitoring years will be defined based on the first year's value.			
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 10% in the first year following the spread of the top soil	June-July	Annualy	
18	616+751-628+103	Critical Habitat (CH28)	*Bellevalia crassa*	**Closed Construction Period: 1 June – 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The bulbs of *Bellevalia crassa* species shall be collected from the ROW between1 July-1 August. **Post-Construction** * The collected individuals or bulbs of the *Bellevalia crassa* species shall be planted planted on the ROW.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May - June period after seeding) 2. Flowering (In June) 3. Bulb maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Asperula capitellata	**Closed Construction Period: 1 June - 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of the *Asperula capitellata* species shall be collected between 1 July-1 August. **Post-Construction** * The collected seeds of *Asperula capitellata* species shall be planted according to the methodology and to the (37 S 443666.00-4421745.00/ 37 S443405.00-4421480.00/ 37 S 443357.00-4421037.00/ 37 S	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1.Germination (First May - June period after seeding) 2. Flowering (In May – July) 3.Seed maturation (In June- August)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				442990.00-4420861.00/ 37 S 442507.00-4421031.00/ 37 S 441965.00-4421153.00/ 37 S 441483.00-4421840.00/ 37 S 440156.00-4422101.00/ 37 S 438720.00-4422064.00/ 37 S 439346. 52-4422147.31) coordinates to the ROW between September-November.					
			Cochlearia sintenisii	**Closed Construction Period: 1 June - 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of the *Cochleria sintenisii* species shall be collected between 1 July-1 August. **Post-Construction** * The collected seeds of *Cochleria sintenisii* species shall be planted according to the methodology and to the (37 S 443666.00-4421745.00/ 37 S443405.00-4421480.00/ 37 S 443357.00-4421037.00/ 37 S 442990.00-4420861.00/ 37 S 442507.00-4421031.00/ 37 S 441965.00-4421153.00/ 37 S 441483.00-4421840.00/ 37 S 440156.00-4422101.00/ 37 S 438720.00-4422064.00/ 37 S 439346. 52-4422147.31) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (July-September)	Once in each germination, flowering and mature seed periods, three times per year	
			Thymus cappadocicus var. pruinosus	**Closed Construction Period: 1 June - 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of the *Thymus cappadocicus var. pruinosus* species shall be collected between 1 July-1 August. **Post-Construction** * *Thymus cappadocicus var. pruinosus* species shall be planted according to the methodology and to the (37 S 443666.00-4421745.00/ 37 S443405.00-4421480.00/ 37 S 443357.00-4421037.00/ 37 S 442990.00-4420861.00/ 37 S 442507.00-4421031.00/ 37 S 441965.00-4421153.00/ 37 S 441483.00-4421840.00/ 37 S 440156.00-4422101.00/ 37 S 438720.00-4422064.00/ 37 S 439346. 52-4422147.31) coordinates to the ROW between September-November.		The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Achillea sintenisii	**Closed Construction Period: 1 June – 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of the *Achillea sintenisii* species shall be collected between 15 July-15 August. **Post-Construction** * The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology and to the (37 S 443666.00-4421745.00/ 37 S443405.00-4421480.00/ 37 S 443357.00-4421037.00/ 37 S 442990.00-4420861.00/ 37 S 442507.00-4421031.00/ 37 S 441965.00-4421153.00/ 37 S 441483.00-4421840.00/ 37 S 440156.00-4422101.00/ 37 S 438720.00-4422064.00/ 37 S 439346. 52-4422147.31) coordinates to the ROW between September-November.		The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 10% in the first year following the spread of the top soil	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.					
19	634+738-636+286	Critical Habitat (CH29)	*Isatis undulata*	**Closed Construction Period: 1 June – 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * Seeds of *Isatis undulata* and *Cochleria sintenisii* species shall be collected along one side of the ROW, from the (37 S 431034.20-4418698.72) coordinates between 1 July-1 August. **Post-Construction** * The collected seeds of *Isatis undulata* and *Cochleria sintenisii* species shall be planted according to the methodology and to the (37 S 431163.69-4418762.97 / 37 S 431439.06-4419180.05 / 37 S 431767.75-4419424.63) coordinates to the ROW between September-November. Terracing shall be carried out to prevent erosion on the dip slopes.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In April-May) 3. Seed maturation (In May-June)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Cochlearia sintenisii	**Closed Construction Period: 1 June – 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * Seeds of *Cochleria sintenisii* species shall be collected along one side of the ROW, from the (37 S 431034.20-4418698.72) coordinates between 1 July-1 August. **Post-Construction** * The collected seeds of *Cochleria sintenisii* species shall be planted according to the methodology and to the (37 S 431163.69-4418762.97 / 37 S 431439.06-4419180.05 / 37 S 431767.75-4419424.63) coordinates to the ROW between September-November. Terracing shall be carried out to prevent erosion on the dip slopes.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
20	636+388-636+967	Critical Habitat (CH30)	*Isatis undulata*	**Closed Construction Period: 1 June – 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Isatis undulata* species shall be collected between 1 July-1 August. **Post-Construction** * The collected seeds of *Isatis undulata* species shall be planted according to the methodology and to the (37 S 430808.10-4418378.12 / 37 S 430612.02-4418232.81) coordinates to the ROW between September-November. Terracing shall be carried out to prevent erosion on the dip slopes.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In April-May) 3. Seed maturation (In May-June)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Cochlearia sintenisii	**Closed Construction Period: 1 June – 1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * * The seeds of *Cochleria sintenisii* species shall be collected between 1 July-1 August. **Post-Construction** * The collected seeds of *Cochleria sintenisii* species shall be planted according to the methodology and to the (37 S 430808.10-4418378.12 / 37 S 430612.02-4418232.81) coordinates to the ROW between September-November. Terracing shall be carried out to prevent erosion on the dip slopes.		The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 10% in the first year following the spread of the top soil	June-July	Annualy	

<table>
<tr><th rowspan="2">No</th><th rowspan="2">Specific Location and KP</th><th rowspan="2">Importance of Area</th><th rowspan="2">SCC Species</th><th rowspan="2">Mitigation Measures</th><th rowspan="2">Monitoring Methodology After Biorestoration</th><th rowspan="2">Achievement Criteria</th><th colspan="3">Monitoring</th></tr>
<tr><th>Monitoring Period</th><th>Frequency</th><th>Reporting</th></tr>
<tr><td rowspan="3">21</td><td rowspan="3">654+103-656+98</td><td rowspan="3">Critical Habitat (CH32)</td><td>Gypsophila heteropoda ssp. minutiflora</td><td>Closed Construction Period: 1 May – 1 June
Pre-Construction
* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.
* The seeds of Gypsophila heteropoda ssp. minutiflora species shall be collected between1 June-20 July.

Post-Construction
* The collected seeds of Gypsophila heteropoda ssp. minutiflora, species shall be planted according to the methodology and to the (37 S 416467.82-4414801.73/ 37 S 416377.69-4414800.92/37 S 416306.80-4414801.76/37 S 416251.56-4414800.98/37 S 416084.26-4414800.34/37 S 415833.94-4414800.57/ 37 S 415591.47-4414801.24 /37 S 413891.73-4414797.64) coordinates to the ROW between September-November.</td><td rowspan="2">Please refer Chapter 5.1.8</td><td>The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)</td><td>1. Germination (First May-June period after seeding)
2. Flowering (In May-July)
3. Seed maturation (In June-August)</td><td>Once in each germination, flowering and mature seed periods, three times per year</td><td rowspan="3">Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report</td></tr>
<tr><td>Astragalus zaraensis</td><td>Closed Construction Period: 1 May – 1 June
Pre-Construction
* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.
* The seeds of Astragalus zaraensis species shall be collected between 15 June-15 July.

Post-Construction
* The collected seeds of Astragalus zaraensis, species shall be planted according to the methodology and to the (37 S 416467.82-4414801.73/ 37 S 416377.69-4414800.92/37 S 416306.80-4414801.76/37 S 416251.56-4414800.98/37 S 416084.26-4414800.34/37 S 415833.94-4414800.57/ 37 S 415591.47-4414801.24 /37 S 413891.73-4414797.64) coordinates to the ROW between September-November.</td><td>The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)</td><td>1. Germination (First May-June period after seeding)
2. Flowering (In June)
3. Seed maturation (In July)</td><td>Once in each germination, flowering and mature seed periods, three times per year</td></tr>
<tr><td>Chrysocamela noeana</td><td>Closed Construction Period: 1 May – 1 June
Pre-Construction
* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.
* The seeds of Chrysocamela noeana species shall be collected between1 June-20 July. Some of the</td><td>Please refer Chapter 5.1.8</td><td>The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat</td><td>1. Germination (First May-June period after seeding)
2. Flowering (April-May)</td><td>Once in each germination, flowering and mature seed periods,</td></tr>
</table>

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				collected seeds of *Chrysocamela noeana* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Chrysocamela noeana*, species shall be planted according to the methodology and to the (37 S 416467.82-4414801.73/ 37 S 416377.69-4414800.92/37 S 416306.80-4414801.76/37 S 416251.56-4414800.98/37 S 416084.26-4414800.34/37 S 415833.94-4414800.57/ 37 S 415591.47-4414801.24 /37 S 413891.73-4414797.64) coordinates to the ROW between September-November.		(observation of healthy population development)	3. Seed maturation (In May-June)	three times per year	
			Minuartia corymbulosa var. gypsophiloides	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Minuartia corymbulosa var. gypsophiloides*, species shall be planted according to the methodology and to the (37 S 416467.82-4414801.73/ 37 S 416377.69-4414800.92/37 S 416306.80-4414801.76/37 S 416251.56-4414800.98/37 S 416084.26-4414800.34/37 S 415833.94-4414800.57/ 37 S 415591.47-4414801.24 /37 S 413891.73-4414797.64) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In August) 3. Seed maturation (In September)	Once in each germination, flowering and mature seed periods, three times per year	
			Achillea sintenisii	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Achillea sintenisii* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology and to	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				the (37 S 416467.82-4414801.73/ 37 S 416377.69-4414800.92/37 S 416306.80-4414801.76/37 S 416251.56-4414800.98/37 S 416084.26-4414800.34/37 S 415833.94-4414800.57/ 37 S 415591.47-4414801.24 /37 S 413891.73-4414797.64) coordinates to the ROW between September-November.					
			Centaurea sivasica	**Closed Construction Period: 1 May - 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Centaurea sivasica* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Centaurea sivasica*, species shall be planted according to the methodology and to the (37 S 416467.82-4414801.73/ 37 S 416377.69-4414800.92/37 S 416306.80-4414801.76/37 S 416251.56-4414800.98/37 S 416084.26-4414800.34/37 S 415833.94-4414800.57/ 37 S 415591.47-4414801.24 /37 S 413891.73-4414797.64) coordinates to the ROW between September-November. * Gypsum rocks stored nearby the construction site shall be spread over the ROW.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Gypsophila aucheri	**Closed Construction Period: 1 May - 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila aucheri* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Gypsophila aucheri* species shall be planted according to the methodology and to the (37 S 416467.82-4414801.73/ 37 S 416377.69-4414800.92/37 S 416306.80-4414801.76/37 S 416251.56-4414800.98/37 S 416084.26-4414800.34/37 S 415833.94-4414800.57/ 37 S 415591.47-4414801.24 /37 S 413891.73-4414797.64) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Isatis glauca ssp. sivasica	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Isatis glauca ssp. sivasica* species shall be collected between 15 June-15 July. Some of the collected seeds of *Isatis glauca ssp. sivasica* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Isatis glauca ssp. sivasica* species shall be planted according to the methodology and to the (37 S 416467.82-4414801.73/ 37 S 416377.69-4414800.92/37 S 416306.80-4414801.76/37 S 416251.56-4414800.98/37 S 416084.26-4414800.34/37 S 415833.94-4414800.57/ 37 S 415591.47-4414801.24 /37 S 413891.73-4414797.64) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	
			Scorzonera aucherana	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Scorzonera aucherana*, species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Scorzonera aucherana*, species shall be planted according to the methodology and to the (37 S 416467.82-4414801.73/ 37 S 416377.69-4414800.92/37 S 416306.80-4414801.76/37 S 416251.56-4414800.98/37 S 416084.26-4414800.34/37 S 415833.94-4414800.57/ 37 S 415591.47-4414801.24 /37 S 413891.73-4414797.64) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July- August)	Once in each germination, flowering and mature seed periods, three times per year	
			Scrophularia lepidota	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in	1. Germination (First May-June period after seeding)	Once in each germination, flowering and mature seed	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The seeds of *Scrophularia lepidota* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Scrophularia lepidota*, species shall be planted according to the methodology and to the (37 S 416467.82-4414801.73/ 37 S 416377.69-4414800.92/37 S 416306.80-4414801.76/37 S 416251.56-4414800.98/37 S 416084.26-4414800.34/37 S 415833.94-4414800.57/ 37 S 415591.47-4414801.24 /37 S 413891.73-4414797.64) coordinates to the ROW between September-November.		natural habitat (observation of healthy population development)	2. Flowering (In May-June) 3. Seed maturation (In June-July)	periods, three times per year	
			Thesium stelleroides	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Thesium stelleroides* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Thesium stelleroides* species shall be planted according to the methodology and to the (37 S 416467.82-4414801.73/ 37 S 416377.69-4414800.92/37 S 416306.80-4414801.76/37 S 416251.56-4414800.98/37 S 416084.26-4414800.34/37 S 415833.94-4414800.57/ 37 S 415591.47-4414801.24 /37 S 413891.73-4414797.64) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined	June-July	Biennially	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
						based on the first year's value.			
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
22	658+103-658+534	Critical Habitat (CH33)	*Gypsophila heteropoda ssp. minutiflora*	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila heteropoda ssp. minutiflora* between 1 June-20 July. **Post-Construction** * The collected seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be planted according to the methodology and to the (37 S 412591.57-4414507.49/ 37 S 412429.08-4414443.13/ 37 S 412246.27-4414412.27) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Astragalus zaraensis	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Astragalus zaraensis* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Astragalus zaraensis* species shall be planted according to the methodology and to the (37 S 412591.57-4414507.49/ 37 S 412429.08-		The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				4414443.13/ 37 S 412246.27-4414412.27) coordinates to the ROW between September-November.					
			Chrysocamela noeana	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Chrysocamela noeana* species shall be collected between 1 June-20 July* Some of the collected seeds of *Chrysocamela noeana* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Chrysocamela noeana* species shall be planted according to the methodology and to the (37 S 412591.57-4414507.49/ 37 S 412429.08-4414443.13/ 37 S 412246.27-4414412.27) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In April-May) 3. Seed maturation (In May-June)	Once in each germination, flowering and mature seed periods, three times per year	
			Minuartia corymbulosa var. gypsophiloides	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Minuartia corymbulosa var. gypsophiloides* shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be planted according to the methodology and to the (37 S 412591.57-4414507.49/ 37 S 412429.08-4414443.13/ 37 S 412246.27-4414412.27) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In August) 3. Seed maturation (In September)	Once in each germination, flowering and mature seed periods, three times per year	
			Achillea sintenisii	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Achillea sintenisii* species shall be collected between 15 June-15 July. **Post-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy	1. Germination (First May-June period after seeding) 2. Flowering (In May-July)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology and to the (37 S 412591.57-4414507.49/ 37 S 412429.08-4414443.13/ 37 S 412246.27-4414412.27) coordinates to the ROW between September-November.		population development)	3. Seed maturation (In June-August)		
			Centaurea sivasica	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Centaurea sivasica* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Centaurea sivasica*, species shall be planted according to the methodology and to the (37 S 412591.57-4414507.49/ 37 S 412429.08-4414443.13/ 37 S 412246.27-4414412.27) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Gypsophila aucheri	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila aucheri* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Gypsophila aucheri* species shall be planted according to the methodology and to the (37 S 412591.57-4414507.49/ 37 S 412429.08-4414443.13/ 37 S 412246.27-4414412.27) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Isatis glauca ssp. sivasica	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Isatis glauca ssp. sivasica* species shall be collected between 15 June-15 July. Some of the collected seeds of *Isatis glauca ssp. sivasica* species shall be given to the seed gene bank. **Post-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The collected seeds of *Isatis glauca ssp. sivasica* species shall be planted according to the methodology and to the (37 S 412591.57-4414507.49/ 37 S 412429.08-4414443.13/ 37 S 412246.27-4414412.27) coordinates to the ROW between September-November.					
			Scorzonera aucherana	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Scorzonera aucherana* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Scorzonera aucherana* species shall be planted according to the methodology and to the (37 S 412591.57-4414507.49/ 37 S 412429.08-4414443.13/ 37 S 412246.27-4414412.27) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July- August)	Once in each germination, flowering and mature seed periods, three times per year	
			Scrophularia lepidota	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Scrophularia lepidota*, species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Scrophularia lepidota*, species shall be planted according to the methodology and to the (37 S 412591.57-4414507.49/ 37 S 412429.08-4414443.13/ 37 S 412246.27-4414412.27) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-June) 3. Seed maturation (In June-July)	Once in each germination, flowering and mature seed periods, three times per year	
			Thesium stelleroides	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Thesium stelleroides* species shall be collected between 15 June-15 July.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of	1. Germination (First May-June period after seeding) 2. Flowering (In June)	Once in each germination, flowering and mature seed periods,	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * The collected seeds of *Thesium stelleroides* species shall be planted according to the methodology and to the (37 S 412591.57-4414507.49/ 37 S 412429.08-4414443.13/ 37 S 412246.27-4414412.27) coordinates to the ROW between September-November.		healthy population development)	3. Seed maturation (In July)	three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
23	662+456-662+559	Critical Habitat (CH34)	*Gypsophila heteropoda ssp. minutiflora*	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila heteropoda ssp. minutiflora* between 1 June-20 July. **Post-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy	1. Germination (First May-June period after seeding) 2. Flowering (In May-July)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration

<table>
<tr><th rowspan="2">No</th><th rowspan="2">Specific Location and KP</th><th rowspan="2">Importance of Area</th><th rowspan="2">SCC Species</th><th rowspan="2">Mitigation Measures</th><th rowspan="2">Monitoring Methodology After Biorestoration</th><th rowspan="2">Achievement Criteria</th><th colspan="3">Monitoring</th></tr>
<tr><th>Monitoring Period</th><th>Frequency</th><th>Reporting</th></tr>
<tr><td rowspan="4"></td><td rowspan="4"></td><td rowspan="4"></td><td></td><td>* The collected seeds of Gypsophila heteropoda ssp. minutiflora species shall be planted according to the methodology and to the (37 S 408394.58-4414398.36/ 37 S 408331.00-4414381.37) coordinates to the ROW between September-November.</td><td rowspan="2"></td><td>population development)</td><td>3. Seed maturation (In June-August)</td><td></td><td rowspan="4">Monitoring Report</td></tr>
<tr><td>Astragalus zaraensis</td><td>Closed Construction Period: 1 May – 1 June
Pre-Construction
* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.
* The seeds of Astragalus zaraensis between 15 June-15 July.

Post-Construction
* The collected seeds of Astragalus zaraensis species shall be planted according to the methodology and to the (37 S 408394.58-4414398.36/ 37 S 408331.00-4414381.37) coordinates to the ROW between September-November.</td><td>The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)</td><td>1. Germination (First May-June period after seeding)
2. Flowering (In June ayında)
3. Seed maturation (In July)</td><td>Once in each germination, flowering and mature seed periods, three times per year</td></tr>
<tr><td>Chrysocamela noeana</td><td>Closed Construction Period: 1 May – 1 June
Pre-Construction
* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.
* The seeds of Chrysocamela noeana species shall be collected between 1 June-20 July
* Some of the collected seeds of Chrysocamela noeana species shall be given to the seed gene bank.

Post-Construction
* The collected seeds of Chrysocamela noeana species shall be planted according to the methodology and to the (37 S 408394.58-4414398.36/ 37 S 408331.00-4414381.37) coordinates to the ROW between September-November.</td><td>Please refer Chapter 5.1.8</td><td>The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)</td><td>1. Germination (First May-June period after seeding)
2. Flowering (In April-May)
3. Seed maturation (In May-June)</td><td>Once in each germination, flowering and mature seed periods, three times per year</td></tr>
<tr><td>Minuartia corymbulosa var. gypsophiloides</td><td>Closed Construction Period: 1 May – 1 June
Pre-Construction
* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.
* The seeds of Minuartia corymbulosa var. gypsophiloides species shall be collected between 15 June-15 July.</td><td>Please refer Chapter 5.1.8</td><td>The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy</td><td>1. Germination (First May-June period after seeding)
2. Flowering (In August)</td><td>Once in each germination, flowering and mature seed periods, three times per year</td></tr>
</table>

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * The collected seeds of *Minuartia corymbulosa var. gypsophiloides* shall be planted according to the methodology and to the (37 S 408394.58-4414398.36/ 37 S 408331.00-4414381.37) coordinates to the ROW between September-November.		population development)	3. Seed maturation (In September)		
			Achillea sintenisii	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Achillea sintenisii* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology and to the (37 S 408394.58-4414398.36/ 37 S 408331.00-4414381.37) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Centaurea sivasica	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Centaurea sivasica* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Centaurea sivasica* species shall be planted according to the methodology and to the (37 S 408394.58-4414398.36/ 37 S 408331.00-4414381.37) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Gypsophila aucheri	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila aucheri* species shall be collected between 15 June-15 July. **Post-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy	1. Germination (First May-June period after seeding) 2. Flowering (In June-July)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The collected seeds of *Gypsophila aucheri* species shall be planted according to the methodology and to the (37 S 408394.58-4414398.36/ 37 S 408331.00-4414381.37) coordinates to the ROW between September-November.		population development)	3. Seed maturation (In July-August)		
			Isatis glauca ssp. sivasica	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Isatis glauca ssp. sivasica* species shall be collected between 15 June-15 July. Some of the collected seeds of *Isatis glauca ssp. sivasica* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Isatis glauca ssp. sivasica* species shall be planted according to the methodology and to the (37 S 408394.58-4414398.36/ 37 S 408331.00-4414381.37) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	
			Scorzonera aucherana	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Scorzonera aucherana* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Scorzonera aucherana* species shall be planted according to the methodology and to the (37 S 408394.58-4414398.36/ 37 S 408331.00-4414381.37) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July- August)	Once in each germination, flowering and mature seed periods, three times per year	
			Scrophularia lepidota	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Scrophularia lepidota* species shall be collected between 15 June-15 July. **Post-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy	1. Germination (First May-June period after seeding) 2. Flowering (In May-June)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The collected seeds of *Scrophularia lepidota* species shall be planted according to the methodology and to the (37 S 408394.58-4414398.36/ 37 S 408331.00-4414381.37) coordinates to the ROW between September-November.		population development)	3. Seed maturation (In June-July)		
			Thesium stelleroides	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Thesium stelleroides* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Thesium stelleroides* species shall be planted according to the methodology and to the (37 S 408394.58-4414398.36/ 37 S 408331.00-4414381.37) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction**	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.					
24	663+309-663+812	Critical Habitat (CH35)	*Gypsophila heteropoda ssp. minutiflora*	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be collected along one side of the ROW between 1 June-20 July. **Post-Construction** * The collected seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be planted according to the methodology and to the (37 S 407582.00-4414160.00/ 37 S 407486.00-4414130.00) coordinates between September-November. * Terracing shall be carried out.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Astragalus zaraensis	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Astragalus zaraensis* species shall be collected along one side of the ROW between 15 June-15 July. The *Astragalus zaraensis* species individuals shall be removed as and shall be transferred to the (37 S 407182.00-4414267.00) coordinates. **Post-Construction** * The collected seeds of *Astragalus zaraensis* species shall be planted according to the methodology and to the (37 S 407582.00-4414160.00/ 37 S 407486.00-4414130.00) coordinates between September-November. * Terracing shall be carried out .		The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	
			Chrysocamela noeana	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Chrysocamela noeana* species shall be	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in	1. Germination (First May-June period after seeding)	Once in each germination, flowering and mature seed	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring			Reporting
							Monitoring Period	Frequency		
				collected along one side of the ROW between 1 June-20 July. Some of the collected seeds of *Chrysocamela noeana* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Chrysocamela noeana* species shall be planted according to the methodology and to the (37 S 407582.00-4414160.00/ 37 S 407486.00-4414130.00) coordinates between September-November. * Terracing shall be carried out.		natural habitat (observation of healthy population development)	2. Flowering (In April-May) 3. Seed maturation (In May-June)	periods, three times per year		
			Minuartia corymbulosa var. gypsophiloides	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be planted according to the methodology and to the (37 S 407582.00-4414160.00/ 37 S 407486.00-4414130.00) coordinates between September-November. * Terracing shall be carried out .	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In August) 3. Seed maturation (In September)	Once in each germination, flowering and mature seed periods, three times per year		
			Achillea sintenisii	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Achillea sintenisii* species shall be collected along one side of the ROW between 15 June-15 July. The *Achillea sintenisii* species individuals shall be removed as tufts and shall be transferred to the (37 S 407182.00-4414267.00) coordinates. **Post-Construction** * The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology and to the (37 S 407582.00-4414160.00/ 37 S 407486.00-4414130.00) coordinates between September-November. * Terracing shall be carried out.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year		

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Centaurea sivasica	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Centaurea sivasica* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Centaurea sivasica* species shall be planted according to the methodology and to the (37 S 407582.00-4414160.00/ 37 S 407486.00-4414130.00) coordinates between September-November. * Terracing shall be carried out.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Gypsophila aucheri	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila aucheri* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Gypsophila aucheri* species shall be planted according to the methodology and to the (37 S 407582.00-4414160.00/ 37 S 407486.00-4414130.00) coordinates between September-November. * Terracing shall be carried out.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Isatis glauca ssp. sivasica	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Isatis glauca ssp. sivasica* species shall be collected along one side of the ROW between 15 June-15 July. Some of the collected seeds of *Isatis glauca ssp. sivasica* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Isatis glauca ssp. sivasica* species shall be planted according to the methodology	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				and to the (37 S 407582.00-4414160.00/ 37 S 407486.00-4414130.00) coordinates between September-November. * Terracing shall be carried out.					
			Scorzonera aucherana	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Scorzonera aucherana* species shall be collected along one side of the ROW between 15 June-15 July. The *Scorzonera aucherana* species individuals shall be removed as tufts and shall be transferred to the (37 S 407182.00-4414267.00) coordinates. **Post-Construction** * The collected seeds of *Scorzonera aucherana* species shall be planted according to the methodology and to the (37 S 407582.00-4414160.00/ 37 S 407486.00-4414130.00) coordinates between September-November. * Terracing shall be carried out.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July- August)	Once in each germination, flowering and mature seed periods, three times per year	
			Scrophularia lepidota	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Scrophularia lepidota* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Scrophularia lepidota* according to the methodology and to the (37 S 407582.00-4414160.00/ 37 S 407486.00-4414130.00) coordinates between September-November. * Terracing shall be carried out.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July- August)	Once in each germination, flowering and mature seed periods, three times per year	
			Thesium stelleroides	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Thesium stelleroides* species shall be	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat	1. Germination (First May-June period after seeding) 2. Flowering (In June)	Once in each germination, flowering and mature seed periods,	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Thesium stelleroides* species shall be planted according to the methodology and to the (37 S 407582.00-4414160.00/ 37 S 407486.00-4414130.00) coordinates between September-November. * Terracing shall be carried out.		(observation of healthy population development)	3. Seed maturation (In July)	three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
25	687+002-687+037	Critical Habitat (CH36)	*Gypsophila heteropoda ssp. minutiflora*	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be collected along one side of the ROW between 1 June-20 June.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat	1. Germination (First May-June period after seeding) 2. Flowering (In May-July)	Once in each germination, flowering and mature seed periods,	Interim First-Findings in Monthly Report & Annual

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * The collected seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be planted according to the methodology and to the (37 S 386751.62-4408725.89) coordinates between September-November.		(observation of healthy population development)	3. Seed maturation (In June-August)	three times per year	Biorestoration Monitoring Report
			Astragalus zaraensis	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Astragalus zaraensis* species shall be collected along one side of the ROW between 15 June-15 July * The *Astragalus zaraensis* species individuals shall be removed as tufts from the (37 S 386761.62 4408728.69) coordinates and shall be transferred to the (37 S 386759.46-4408680.42) coordinates. * The individuals of the *Achillea sintenisii* species shall be transferred to the (37 S 386759.46-4408680.42) coordinates. **Post-Construction** * The collected seeds of *Astragalus zaraensis* species shall be planted according to the methodology and to the (37 S 386751.62-4408725.89) coordinates between September-November. * The transferred individuals of the *Astragalus zaraensis* species shall be planted to the (37 S 386761.62-4408728.69) coordinates.		The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	
			Chrysocamela noeana	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Chrysocamela noeana* shall be collected along one side of the ROW between 1 June-20 June. * Some of the collected seeds of *Chrysocamela noeana* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Chrysocamela noeana* species shall be planted according to the methodology and to the (37 S 386751.62-4408725.89) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In April-May) 3. Seed maturation (In May-June)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Minuartia corymbulosa var. gypsophiloides	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be planted according to the methodology and to the (37 S 386751.62-4408725.89) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In August) 3. Seed maturation (In September)	Once in each germination, flowering and mature seed periods, three times per year	
			Achillea sintenisii	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Achillea sintenisii* species shall be collected along one side of the ROW between 15 June-15 July. * The individuals of the *Achillea sintenisii* species shall be transferred to the (37 S 386759.46-4408680.42) coordinates. **Post-Construction** * The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology and to the (37 S 386751.62-4408725.89) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Centaurea sivasica	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Centaurea sivasica*, species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Centaurea sivasica* species shall be planted according to the methodology and to the (37 S 386751.62-4408725.89) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	

<table>
<tr><th rowspan="2">No</th><th rowspan="2">Specific Location and KP</th><th rowspan="2">Importance of Area</th><th rowspan="2">SCC Species</th><th rowspan="2">Mitigation Measures</th><th rowspan="2">Monitoring Methodology After Biorestoration</th><th rowspan="2">Achievement Criteria</th><th colspan="3">Monitoring</th></tr>
<tr><th>Monitoring Period</th><th>Frequency</th><th>Reporting</th></tr>
<tr><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td>Astragalus aytachii</td><td>Closed Construction Period: 1 May – 1 June
Pre-Construction
* 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW.
* The seeds of Astragalus aytatchii species shall be collected along one side of the ROW between 15 June-15 July;

Post-Construction
* The collected seeds of Astragalus aytatchii species shall be planted according to the methodology and to the (37 S 386751.62-4408725.89) coordinates between September-November.</td><td>Please refer Chapter 5.1.8</td><td>The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)</td><td>1. Germination (First May-June period after seeding)
2. Flowering (In June-July)
3. Seed maturation (In June-July)</td><td>Once in each germination, flowering and mature seed periods, three times per year</td><td rowspan="3"></td></tr>
<tr><td>Species Diversity</td><td>Pre-Construction
* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.
* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected.

Post-Construction
* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.</td><td>Please refer Chapter 5.1.6</td><td>The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.</td><td>June-July</td><td>Biennially</td></tr>
<tr><td>Vegetation Cover</td><td>Pre-Construction
* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.
* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected.

Post-Construction
* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.</td><td>Please refer Chapter 5.1.5</td><td>The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil</td><td>June-July</td><td>Annualy</td></tr>
<tr><td>26</td><td>687+313-687+352</td><td>Critical Habitat (CH37)</td><td>Gypsophila heteropoda ssp. minutiflora</td><td>Closed Construction Period: 1 May – 1 June
Pre-Construction</td><td>Please refer Chapter 5.1.8</td><td>The data obtained by comparison of the species'</td><td>1. Germination (First May-</td><td>Once in each germination,</td><td>Interim First-Findings</td></tr>
</table>

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be collected between 1 June-20 June. **Post-Construction** * The collected seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be planted according to the methodology to the ROW between September-November.		population ratio (%) with its situation in natural habitat (observation of healthy population development)	June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	flowering and mature seed periods, three times per year	in Monthly Report & Annual Biorestoration Monitoring Report
			Astragalus zaraensis	**Pre-Construction** * 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Astragalus zaraensis* species shall be collected along one side of the ROW between 15 June-15 July. * The *Astragalus zaraensis* species individuals shall be removed as tufts and shall be transferred to the (37 S 386463.44-4408686.64) coordinates. **Post-Construction** * The collected seeds of *Astragalus zaraensis* species shall be planted according to the methodology between September-November. * The removed individuals of the *Astragalus zaraensis* species as tufts shall be planted where the terracing shall be carried out to prevent erosion and shall be irrigated until they root again.		The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	
			Chrysocamela noeana	**Closed Construction Period: 1 May - 1 June** **Pre-Construction** * 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Chrysocamela noeana* species shall be collected between 1 June-20 June. Some of the collected seeds of *Chrysocamela noeana* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Chrysocamela noeana, s* species shall be planted according to the methodology and between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In April-May) 3. Seed maturation (In May-June)	Once in each germination, flowering and mature seed periods, three times per year	
			Minuartia corymbulosa var. gypsophiloides	**Closed Construction Period: 1 May - 1 June** **Pre-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species'	1. Germination (First May-	Once in each germination,	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Minuartia corymbulosa var. gypsophiloides*, species shall be planted according to the methodology and between September-November.		population ratio (%) with its situation in natural habitat (observation of healthy population development)	June period after seeding) 2. Flowering (In August) 3. Seed maturation (In September)	flowering and mature seed periods, three times per year	
			Achillea sintenisii	**Closed Construction Period: 1 May - 1 June** **Pre-Construction** * 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Achillea sintenisii* species shall be collected along one side of the ROW between 15 June-15 July. * The *Achillea sintenisii* species individuals shall be removed as tufts and shall be transferred to the (37 S 386463.44-4408686.64) coordinates. **Post-Construction** * The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology to the ROW between September-November. * The removed individuals of the *Achillea sintenisii*, species as tufts shall be planted where the terracing shall be carried out to prevent erosion and shall be irrigated until they root again.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Centaurea sivasica	**Closed Construction Period: 1 May - 1 June** **Pre-Construction** * 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Centaurea sivasica* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Centaurea sivasica* species shall be planted according to the methodology between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Astragalus aytachii	**Closed Construction Period: 1 May - 1 June** **Pre-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species'	1. Germination (First May-	Once in each germination,	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. * The seeds of *Astragalus aytatchii* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Astragalus aytatchii* species shall be planted according to the methodology between September-November.		population ratio (%) with its situation in natural habitat (observation of healthy population development)	June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In June-July)	flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
27	703+938-704+476	Critical Habitat (CH38)	*Gypsophila heteropoda ssp. minutiflora*	**Closed Construction Period: 1 May – 1 June** **Pre-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species'	1. Germination (First May-	Once in each germination,	Interim First-Findings

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring Period	Frequency	Reporting
							Monitoring		
				* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be collected along one side of the ROW between 1 June-20 June. **Post-Construction** * The collected seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be planted according to the methodology and to the (37 S 369839.96-4408605.07/ 37 S 369786.46-4408543.51/37 S 370048.89-4408740.47) coordinates between September-November.		population ratio (%) with its situation in natural habitat (observation of healthy population development)	June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	flowering and mature seed periods, three times per year	in Monthly Report & Annual Biorestoration Monitoring Report
			Astragalus zaraensis	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Astragalus zaraensis* species shall be collected along one side of the ROW between 15 June-15 July. * The *Astragalus zaraensis* species individuals shall be removed as tufts and shall be transferred to the (37 S 370016.63-4408569.92 /37 S 370096.00-4408596.00) coordinates. **Post-Construction** * The collected seeds of *Astragalus zaraensis* species shall be planted according to the methodology and to the (37 S 369839.96-4408605.07/ 37 S 369786.46-4408543.51/37 S 370048.89-4408740.47) coordinates between September-November. * The removed individuals of the *Astragalus zaraensis* species as tufts shall be planted where the terracing shall be carried out to prevent erosion and shall be irrigated until they root again.		The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	
			Chrysocamela noeana	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Chrysocamela noeana* species shall be	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat	1. Germination (First May-June period after seeding) 2. Flowering (In April-May)	Once in each germination, flowering and mature seed periods,	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				collected along one side of the ROW between 1 June-20 June. * Some of the collected seeds of *Chrysocamela noeana* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Chrysocamela noeana* species shall be planted according to the methodology and to the (37 S 369839.96-4408605.07/ 37 S 369786.46-4408543.51/37 S 370048.89-4408740.47) coordinates between September-November.		(observation of healthy population development)	3. Seed maturation (In May-June)	three times per year	
			Minuartia corymbulosa var. gypsophiloides	**Closed Construction Period: 1 May - 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be planted according to the methodology and to the (37 S 369839.96-4408605.07/ 37 S 369786.46-4408543.51/37 S 370048.89-4408740.47) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In August) 3. Seed maturation (In September)	Once in each germination, flowering and mature seed periods, three times per year	
			Achillea sintenisii	**Closed Construction Period: 1 May - 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Achillea sintenisii* species shall be collected along one side of the ROW between 15 June-15 July; * The *Achillea sintenisii* species individuals shall be removed as tufts and shall be transferred to the (37 S 370016.63-4408569.92 /37 S 370096.00-4408596.00) coordinates. **Post-Construction** * The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology and to the (37 S 369839.96-4408605.07/ 37 S 369786.46-	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				4408543.51/37 S 370048.89-4408740.47) coordinates between September-November. * The removed individuals of the *Achillea sintenisii,* species as tufts shall be planted where the terracing shall be carried out to prevent erosion and shall be irrigated until they root again.					
			Centaurea sivasica	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Centaurea sivasica* shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Centaurea sivasica* species shall be planted according to the methodology and to the (37 S 369839.96-4408605.07/ 37 S 369786.46-4408543.51/37 S 370048.89-4408740.47) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Astragalus aytachii	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Astragalus aytatchii* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Astragalus aytatchii* species shall be planted according to the methodology and to the (37 S 369839.96-4408605.07/ 37 S 369786.46-4408543.51/37 S 370048.89-4408740.47) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In June-July)	Once in each germination, flowering and mature seed periods, three times per year	
			Onobrychis stenostcahya ssp. krausei	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Onobrychis stenostcahya ssp. krausei* species shall be collected along one side of the ROW between 15 June-15 July.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy	1. Germination (First May-June period after seeding) 2. Flowering (In June)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * The collected seeds of *Onobrychis stenostcahya ssp. krausei* species shall be planted according to the methodology and to the (37 S 369839.96-4408605.07/ 37 S 369786.46-4408543.51/37 S 370048.89-4408740.47) coordinates between September-November.		population development)	3. Seed maturation (In July)		
			Isatis glauca ssp. sivasica	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds *Isatis glauca ssp. sivasica* species shall be collected along one side of the ROW between 15 June-15 July. * Some of the collected seeds of *Isatis glauca ssp. sivasica* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Isatis glauca ssp. sivasica* species shall be planted according to the methodology and to the (37 S 369839.96-4408605.07/ 37 S 369786.46-4408543.51/37 S 370048.89-4408740.47) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	
			Achillea sipikorensis	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Achillea sipikorensis* species shall be collected along one side of the ROW between 15 June-15 July. * The *Achillea sipikorensis* species individuals shall be removed as tufts and shall be transferred to the (37 S 370016.63-4408569.92 /37 S 370096.00-4408596.00) coordinates. **Post-Construction** * The collected seeds of *Achillea sipikorensis* species shall be planted according to the methodology and to the (37 S 369839.96-4408605.07/ 37 S 369786.46-4408543.51/37 S 370048.89-4408740.47) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The removed individuals of *Achillea sipikorensis* species as tufts shall be planted where the terracing shall be carried out to prevent erosion and shall be irrigated until they root again.					
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
28	712+066-712+279	Critical Habitat (CH39)	*Astragalus zaraensis*	**Closed Construction Period: 1 May - 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Astragalus zaraensis* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Astragalus zaraensis* species shall be planted according to the methodology and to	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				the (37 S 362348.79-4410413.51/ 37 S 362385.09-4410392.30/37 S 362445.47-4410357.19/37 S 362483.09-4410335.10) coordinates between September-November.					
			Chrysocamela noeana	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Chrysocamela noeana* species shall be collected along one side of the ROW between 1 June-20 June. * Some of the collected seeds of *Chrysocamela noeana* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Chrysocamela noeana* species shall be planted according to the methodology and to the (37 S 362348.79-4410413.51/ 37 S 362385.09-4410392.30/37 S 362445.47-4410357.19/37 S 362483.09-4410335.10) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In April-May) 3. Seed maturation (In May-June)	Once in each germination, flowering and mature seed periods, three times per year	
			Minuartia corymbulosa var. gypsophiloides	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be planted according to the methodology and to the (37 S 362348.79-4410413.51/ 37 S 362385.09-4410392.30/37 S 362445.47-4410357.19/37 S 362483.09-4410335.10) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In August) 3. Seed maturation (In September)	Once in each germination, flowering and mature seed periods, three times per year	
			Achillea sintenisii	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its	1. Germination (First May-June period after seeding)	Once in each germination, flowering and mature	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The seeds of *Achillea sintenisii* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Achillea* species shall be planted according to the methodology and to the (37 S 362348.79-4410413.51/ 37 S 362385.09-4410392.30/37 S 362445.47-4410357.19/37 S 362483.09-4410335.10) coordinates between September-November.		situation in natural habitat (observation of healthy population development)	2. Flowering (In May-July) 3. Seed maturation (In June-August)	seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
29	717+244-717+345	Critical Habitat (CH40)	*Achillea sintenisii*	**Closed Construction Period: 1 May – 1 June** **Pre-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species'	1. Germination (First May-	Once in each germination,	Interim First-Findings

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Achillea sintenisii* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology and to the (37 S 357833.67-4411319.36/37 S 357807.42-4411296.16/37 S 357783.72-4411275.56) coordinates between September-November.		population ratio (%) with its situation in natural habitat (observation of healthy population development)	June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	flowering and mature seed periods, three times per year	in Monthly Report & Annual Biorestoration Monitoring Report
			Gypsophila aucheri	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila aucheri,* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Gypsophila aucheri* species shall be planted according to the methodology and to the (37 S 357833.67-4411319.36/37 S 357807.42-4411296.16/37 S 357783.72-4411275.56) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Gypsophila heteropoda ssp. minutiflora	**Closed Construction Period: 1 May – 1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be collected along one side of the ROW between 1 June-20 June. **Post-Construction** * The collected seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be planted according to the methodology and to the (37 S 357833.67-4411319.36/37 S 357807.42-4411296.16/37 S 357783.72-4411275.56) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Onosma sintenisii	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Onosma sintenisii* species shall be collected along one side of the ROW between 15 June-15 July. * Some of the collected seeds of *Onosma sintenisii* species shall be given to the seed gene bank. **Post-Construction** The collected seeds of *Onosma sintenisii* species shall be planted according to the methodology and to the (37 S 357833.67-4411319.36/37 S 357807.42-4411296.16/37 S 357783.72-4411275.56) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Centaurea sivasica	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Centaurea sivasica* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Centaurea sivasica* species shall be planted according to the methodology and to the (37 S 357833.67-4411319.36/37 S 357807.42-4411296.16/37 S 357783.72-4411275.56) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction**	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the	June-July	Biennially	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		following monitoring years will be defined based on the first year's value.			
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
30	723+424-723+679	Critical Habitat (CH41)	*Gypsophila heteropoda ssp. minutiflora*	**Closed Construction Period: 1 May - 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be collected along one side of the ROW between 1 June-20 June. **Post-Construction** * The collected seeds of *Gypsophila heteropoda ssp. minutiflora* species shall be planted according to the methodology and to the (37 S 352322.75-4408468.34/37 S 352395.20-4408471.60/37 S 352452.02-4408473.12) coordinates between September-November. * Terracing shall be carried out .	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Astragalus zaraensis	**Closed Construction Period: 1 May - 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Astragalus zaraensis* species shall be collected along one side of the ROW between 15 June-15 July.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of	1. Germination (First May-June period after seeding) 2. Flowering (In June)	Once in each germination, flowering and mature seed periods,	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * The collected seeds of *Astragalus zaraensis* species shall be planted according to the methodology and to the (37 S 352322.75-4408468.34/37 S 352395.20-4408471.60/37 S 352452.02-4408473.12) coordinates between September-November. * Terracing shall be carried out.		healthy population development)	3. Seed maturation (In July)	three times per year	
			Minuartia corymbulosa var. gypsophiloides	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be planted according to the methodology and to the (37 S 352322.75-4408468.34/37 S 352395.20-4408471.60/37 S 352452.02-4408473.12) coordinates between September-November. * Terracing shall be carried out.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In August) 3. Seed maturation (In September)	Once in each germination, flowering and mature seed periods, three times per year	
			Achillea sintenisii	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Achillea sintenisii* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology and to the (37 S 352322.75-4408468.34/37 S 352395.20-4408471.60/37 S 352452.02-4408473.12) coordinates between September-November. * Terracing shall be carried out.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Gypsophila aucheri	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila aucheri* species shall be collected along one side of the ROW between 15 June-15 July. **Post-Construction** * The collected seeds of *Gypsophila aucheri* species shall be planted according to the methodology and to the (37 S 352322.75-4408468.34/37 S 352395.20-4408471.60/37 S 352452.02-4408473.12) coordinates between September-November. * Terracing shall be carried out.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Onosma sintenisii	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Onosma sintenisii* species shall be collected along one side of the ROW between 15 June-15 July. * Some of the collected seeds of *Onosma sintenisii* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of , *Onosma sintenisii* species shall be planted according to the methodology and to the (37 S 352322.75-4408468.34/37 S 352395.20-4408471.60/37 S 352452.02-4408473.12) coordinates between September-November. * Terracing shall be carried out.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction**	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the	June-July	Biennially	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		following monitoring years will be defined based on the first year's value.			
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
31	732+873-732+959	Critical Habitat (CH42)	*Astragalus zaraensis*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Astragalus zaraensis* species shall be collected along one side of the ROW between 15 June-15 July. * The species individuals shall be removed as tufts and shall be transferred to the (37 S 343055.79-4409365.90) coordinates. **Post-Construction** The collected seeds of *Astragalus zaraensis* species shall be planted according to the methodology between September-November. * The removed individuals of the species as tufts shall be planted to the ROW.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Achillea sintenisii	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Achillea sintenisii* species shall be	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat	1. Germination (First May-June period after seeding) 2. Flowering (In May-July)	Once in each germination, flowering and mature seed periods,	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				collected along one side of the ROW between 15 June-15 July. * The species individuals shall be removed as tufts and shall be transferred to the (37 S 343055.79-4409365.90) coordinates. **Post-Construction** The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology between September-November. * The removed individuals of the species as tufts shall be planted to the ROW.		(observation of healthy population development)	3. Seed maturation (In June-August)	three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
32	736+589-736+754	Critical Habitat (CH43)	*Onosma sintenisii*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its	1. Germination (First May-June period after seeding)	Once in each germination, flowering and mature	Interim First-Findings in Monthly

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The seeds of *Onosma sintenisii* species shall be collected along one side of the ROW between 15 June-15 July. * The *Onosma sintenisii* species individuals shall be and shall be transferred to the (37 S 339751.11-4407877.07) coordinates. * Some of the collected seeds of *Onosma sintenisii* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Onosma sintenisii* species shall be planted according to the methodology and to the (37 S 339593.61-4408086.60/ 37 S 339650.73-4408112.15) coordinates between September-November. * The translocated *Onosma sintenisii* species individuals shall be planted to the ROW.		situation in natural habitat (observation of healthy population development)	2. Flowering (In May-July) 3. Seed maturation (In July-August)	seed periods, three times per year	Report & Annual Biorestoration Monitoring Report
			Isatis glauca ssp. sivasica	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Isatis glauca ssp. sivasica* species shall be collected along one side of the ROW between 15 June-15 July. * Some of the collected seeds of *Isatis glauca ssp. sivasica* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Isatis glauca ssp. sivasica* species shall be planted according to the methodology and to the (37 S 339593.61-4408086.60/ 37 S 339650.73-4408112.15) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	
			Achillea sintenisii	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds *Achillea sintenisii* species shall be collected along one side of the ROW between 15 June-15 July.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The *Achillea sintenisii* species individuals shall be collected and shall be transferred to the (37 S 339751.11-4407877.07) coordinates. **Post-Construction** * The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology and to the (37 S 339593.61-4408086.60/ 37 S 339650.73-4408112.15) coordinates between September-November. * The translocated *Achillea sintenisii* species individuals shall be planted to the ROW.		population development)			
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
33	744+689-744+834	Critical Habitat (CH44)	*Achillea sintenisii*	**Closed Construction Period: 1 May – 15 July Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio	1. Germination (First May-	Once in each germination, flowering	Interim First-Findings in

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				ROW. * The seeds of *Achillea sintenisii* species shall be collected along one side of the ROW between 15 June-15 July **Post-Construction** * The collected seeds of *Achillea sintenisii* species shall be planted according to the methodology and to the (37 S 332486.75-4408322.38/37 S 332507.73-4408280.80/37 S 332517.23-4408261.61) coordinates between September-November.		(%) with its situation in natural habitat (observation of healthy population development)	June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	and mature seed periods, three times per year	Monthly Report & Annual Biorestoration Monitoring Report
			Chrysocamela noeana	**Closed Construction Period: 1 May – 15 July Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Chrysocamela noeana* species shall be collected along one side of the ROW between 1 June-20 June. Some of the collected seeds of *Chrysocamela noeana* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Chrysocamela noeana,* species shall be planted according to the methodology and to the (37 S 332486.75-4408322.38/37 S 332507.73-4408280.80/37 S 332517.23-4408261.61) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In April-May) 3. Seed maturation (In May-June)	Once in each germination, flowering and mature seed periods, three times per year	
			Astragalus zaraensis	**Closed Construction Period: 1 May – 15 July Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Astragalus zaraensis* species shall be collected along one side of the ROW between 15 June-15 July * The *Astragalus zaraensis* species individuals shall be removed as and shall be transferred to the (37 S 332575.24-4408252.16) coordinates **Post-Construction** * The collected seeds of *Astragalus zaraensis,* species shall be planted according to the methodology and to the (37 S 332486.75-4408322.38/37 S 332507.73-	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June) 3. Seed maturation (In July)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				4408280.80/37 S 332517.23-4408261.61) coordinates between September-November. * The removed individuals of the *Astragalus zaraensis* species as tufts shall be planted, where the terracing shall be carried out to prevent erosion and shall be irrigated until they root again.					
			Cousinia sivasica	**Closed Construction Period: 1 May – 15 July Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia sivasica* species shall be collected along one side of the ROW between 15 June-15 July. * Some of the collected seeds of *Cousinia sivasica* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Cousinia sivasica,* species shall be planted according to the methodology and to the (37 S 332486.75-4408322.38/37 S 332507.73-4408280.80/37 S 332517.23-4408261.61) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		spread of the top soil			
34	805+749-805+816	Critical Habitat (CH46)	*Cousinia halysensis*	**Closed Construction Period: 1 May – 15 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia halysensis* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Cousinia halysensis* species shall be planted according to the methodology and to the (37 S 277036.02-4415687.53) coordinates ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction**	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.					
35	805+842-806+143	Critical Habitat (CH47)	*Cousinia halysensis*	**Closed Construction Period: 1 May – 15 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia halysensis* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Cousinia halysensis* species shall be planted according to the methodology and to the (37 S 276937.99-4415685.90/37 S 276803.30-4415655.66/37 S 276720.58-4415638.33) coordinates ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction**	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.					
36	948+615-949+002	Critical Habitat (CH50)	*Cousinia halysensis*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia halysensis* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Cousinia halysensis* species shall be planted according to the methodology and to the (36 S 663165.43-4391184.04/ 36 S 663018.07-4391201.63/ 36 S 662922.53-4391149.88) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction**	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 30% in the first year following the spread of the top soil	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.					
37	996+630-997+352	Critical Habitat (CH51)	*Cousinia halysensis*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia halysensis* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Cousinia halysensis* species shall be planted according to the methodology and to the (36 S 617215.12-4393683.66/36 S 616926.44-4393808.19/36 S 616741.98-4393948.53) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (June-August) 3. Seed maturation (July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction**	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 30% in the first year following the spread of the top soil	June-July	Annualy	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.					
38	1034+862-1035+061	Critical Habitat (CH52)	*Cousinia halysensis*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia halysensis* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Cousinia halysensis* species shall be planted according to the methodology and to the (36 S 584017.01-4395503.88/ 36 S 583929.05-4395490.21) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Thymus leucostomus	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Thymus leucostomus* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Thymus leucostomus* species shall be planted according to the methodology and to the (36 S 584017.01-4395503.88/ 36 S 583929.05-4395490.21) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-June) 3. Seed maturation (In June-July)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years	June-July	Biennially	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
						will be defined based on the first year's value.			
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 30% in the first year following the spread of the top soil	June-July	Annualy	
39	1035+348-1035+567	Critical Habitat (CH53)	*Cousinia halysensis*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia halysensis* species shall be collected between 15 June-15 July. **Post-Construction** The collected seeds of *Cousinia halysensis* species shall be planted according to the methodology and to the (36 S 583553.69-4395479.62/36 S 583442.02-4395487.31) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Thymus leucostomus	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Thymus leucostomus* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Thymus leucostomus* species shall be planted according to the methodology and to the (36 S 583553.69-4395479.62/36 S 583442.02-4395487.31) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-June) 3. Seed maturation (In June-July)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 30% in the first year following the spread of the top soil	June-July	Annualy	
40	1144+988-1145+800	Critical Habitat (CH54)	*Cousinia halysensis*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia halysensis* species shall be collected between 15 June-15 July. **Post-Construction** The collected seeds of *Cousinia halysensis* species shall be planted according to the methodology and to the (36 S 484883.24-4376744.59/36 S 484666.23-4376765.52/36 S 484422.25-4376788.47) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-August) 3. Seed maturation (In July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring: Monitoring Period	Monitoring: Frequency	Monitoring: Reporting
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 30% in the first year following the spread of the top soil	June-July	Annualy	
41	1155+228-1155+398	Critical Habitat (CH55)	*Cousinia halysensis*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cousinia halysensis* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Cousinia halysensis* species shall be planted according to the methodology and to the (36 S 475038.74-4376991.91/36 S 474951.33-4376999.24) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (June-August) 3. Seed maturation (July-September)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Thymus leucostomus	**Closed Construction Period: 1 May – 1 June Pre-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of	1. Germination	Once in each	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Thymus leucostomus* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Thymus leucostomus* species shall be planted according to the methodology and to the (36 S 475038.74-4376991.91/36 S 474951.33-4376999.24) coordinates between September-November.		the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	(First May-June period after seeding) 2. Flowering (In May-June) 3. Seed maturation (In June-July)	germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 30% in the first year following the spread of the top soil	June-July	Annualy	
42	ROUTE CHANGE	Critical Habitat (CH56)	*Thymus leucostomus*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio	1. Germination (First May-	Once in each germination, flowering	Interim First-Findings in

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				ROW. * The seeds of *Thymus leucostomus* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Thymus leucostomus* species shall be planted according to the methodology and to the (36 S 418710.48-4367664.42/ 36 S 418619.59-4367673.73) coordinates between September-November.		(%) with its situation in natural habitat (observation of healthy population development)	June period after seeding) 2. Flowering (In May-June) 3. Seed maturation (In June-July)	and mature seed periods, three times per year	Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 30% in the first year following the spread of the top soil	June-July	Annualy	
43	ROUTE CHANGE 1229+052-1229+504	Critical Habitat (CH57)	*Scutellaria yildirimli*	**Closed Construction Period: 1 May – 30 June Pre-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species'	1. Germination (First May-	Once in each germination,	Interim First-Findings

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Scutellaria yildirimli* species shall be collected between 1 June- 1 July. **Post-Construction** * The collected seeds of *Scutellaria yildirimli* species shall be planted according to the methodology and to the (36 S 405549.00-4363042.00/36 S 405621.85-4363058.29/36 S 405679.83-4363074.44/36 S 405784.91-4363093.32/36 S 405844.76-4363108.21/36 S 405912.62-4363121.76) coordinates between September-November.		population ratio (%) with its situation in natural habitat (observation of healthy population development)	June period after seeding) 2. Flowering (In June-September) 3. Seed maturation (In August-October)	flowering and mature seed periods, three times per year	in Monthly Report & Annual Biorestoration Monitoring Report
			Achillea ketenoglui	**Closed Construction Period: 1 May – 30 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Achillea ketenoglui* species shall be collected between 1 June- 1 July. * Some of the collected seeds of *Achillea ketenoglui* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Achillea ketenoglui* species shall be planted according to the methodology and to the (36 S 405549.00-4363042.00/36 S 405621.85-4363058.29/36 S 405679.83-4363074.44/36 S 405784.91-4363093.32/36 S 405844.76-4363108.21/36 S 405912.62-4363121.76) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May) 3. Seed maturation (In June)	Once in each germination, flowering and mature seed periods, three times per year	
			Astragalus physodes ssp. acikirensis	**Closed Construction Period: 1 May – 30 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Astragalus physodes ssp. acikirensis* species shall be collected between 15 May-15 June. Some of the collected seeds of *Astragalus physodes ssp. acikirensis* species shall be given to the seed gene bank. **Post-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-June) 3. Seed maturation (In June-July)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The collected seeds of *Astragalus physodes ssp. acikirensis* species shall be planted according to the methodology and to the (36 S 405549.00-4363042.00/36 S 405621.85-4363058.29/36 S 405679.83-4363074.44/36 S 405784.91-4363093.32/36 S 405844.76-4363108.21/36 S 405912.62-4363121.76) coordinates between September-November.					
			Minuartia corymbulosa var. gypsophiloides	**Closed Construction Period: 1 May – 30 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be collected between 15 July-15 August. Some of the collected seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Minuartia corymbulosa var. gypsophiloides* species shall be planted according to the methodology and to the (36 S 405549.00-4363042.00/36 S 405621.85-4363058.29/36 S 405679.83-4363074.44/36 S 405784.91-4363093.32/36 S 405844.76-4363108.21/36 S 405912.62-4363121.76) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In August) 3. Seed maturation (In September)	Once in each germination, flowering and mature seed periods, three times per year	
			Astragalus kochakii	**Closed Construction Period: 1 May – 30 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Astragalus kochakii* species shall be collected between 1 June- 1 July. * Some of the collected seeds of *Astragalus kochakii* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Astragalus kochakii* species shall be planted according to the methodology and to the (36 S 405549.00-4363042.00/36 S 405621.85-4363058.29/36 S 405679.83-4363074.44/36 S 405784.91-4363093.32/36 S 405844.76-4363108.21/36 S 405912.62-4363121.76) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Cyathobasis fruticulosa	**Closed Construction Period: 1 May – 30 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cyathobasis fruticulosa* species shall be collected between 1 July-1 August. Some of the collected seeds of *Cyathobasis fruticulosa* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Cyathobasis fruticulosa* species shall be planted according to the methodology and to the (36 S 405549.00-4363042.00/36 S 405621.85-4363058.29/36 S 405679.83-4363074.44/36 S 405784.91-4363093.32/36 S 405844.76-4363108.21/36 S 405912.62-4363121.76) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In July-August) 3. Seed maturation (In August-September)	Once in each germination, flowering and mature seed periods, three times per year	
			Onobrychis paucijuga	**Closed Construction Period: 1 May – 30 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Onobrychis paucijuga* species shall be collected between 1 June- 1 July. * Some of the collected seeds of *Onobrychis paucijuga* species shall be given to the seed gene bank. **Post-Construction** * The collected seeds of *Onobrychis paucijuga*, species shall be planted according to the methodology and to the (36 S 405549.00-4363042.00/36 S 405621.85-4363058.29/36 S 405679.83-4363074.44/36 S 405784.91-4363093.32/36 S 405844.76-4363108.21/36 S 405912.62-4363121.76) coordinates between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-July) 3. Seed maturation (In June-August)	Once in each germination, flowering and mature seed periods, three times per year	
			Thymus leucostomus	**Closed Construction Period: 1 May – 30 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Thymus leucostomus* species shall be collected between 15 June-15 July.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of	1. Germination (First May-June period after seeding) 2. Flowering (In May-June)	Once in each germination, flowering and mature seed periods,	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * The collected seeds of *Thymus leucostomus* species shall be planted according to the methodology and to the (36 S 405549.00-4363042.00/36 S 405621.85-4363058.29/36 S 405679.83-4363074.44/36 S 405784.91-4363093.32/36 S 405844.76-4363108.21/36 S 405912.62-4363121.76) coordinates between September-November.		healthy population development)	3. Seed maturation (In June-July)	three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 30% in the first year following the spread of the top soil	June-July	Annualy	
44	1369+450 – 1370+286	Critical Habitat (CH58)	*Thymus leucostomus*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Thymus leucostomus* species shall be collected between 15 June-15 July.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat	1. Germination (First May-June period after seeding) 2. Flowering (In May-June)	Once in each germination, flowering and mature seed periods,	Interim First-Findings in Monthly Report & Annual

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * The collected seeds of *Thymus leucostomus* species shall be planted according to the methodology and to the (36 S 279214.33-4394348.83/36 S 278842.86-4394361.93/36 S 278571.49-4394453.64) coordinates between September-November.		(observation of healthy population development)	3. Seed maturation (In June-July)	three times per year	Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 30% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 30% in the first year following the spread of the top soil	June-July	Annualy	
45	1373+026 – 1373+225	Critical Habitat (CH59)	*Salvia tchihatcheffii*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Salvia tchihatcheffii* species shall be collected between 1 June-1 July. The *Salvia tchihatcheffii* species individuals shall be collected as	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy	1. Germination (First May-June period after seeding) 2. Flowering (In May-June)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				tufts and shall be transferred to the (36 S 276899.00-4396448.00) coordinates. **Post-Construction** * The collected seeds of *Salvia tchihatcheffii* species shall be planted according to the methodology and to the (36 S 276971.00-4396421.00/ 36 S 276939.00-4396478.00) coordinates between September-November. * The translocated individuals of the *Salvia tchihatcheffii* species as tufts shall be where the terracing shall be carried out to prevent erosion and shall be irrigated until they root again.		population development)	3. Seed maturation (In June-July)		Monitoring Report
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 15% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 15% in the first year following the spread of the top soil	June-July	Annualy	
46	1378+873 – 1379+216	Critical Habitat (CH60)	*Cephalaria aytachii*	**Closed Construction Period: 1 May – 1 June Pre-Construction**	Please refer Chapter 5.1.8	The data obtained by comparison of the species'	1. Germination (First May-	Once in each germination,	Interim First-Findings

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Cephalaria aytachii*, species shall be collected between 1 July-August. **Post-Construction** * The collected seeds of *Cephalaria aytachii*, species shall be planted according to the methodology to the ROW and to the (36 S 272726.00-4399906.00/36 S 272758.00-4399896.00) coordinates between September-November. * Terracing shall be carried out to prevent erosion.		population ratio (%) with its situation in natural habitat (observation of healthy population development)	June period after seeding) 2. Flowering (In June-September) 3. Seed maturation (In September)	flowering and mature seed periods, three times per year	in Monthly Report & Annual Biorestoration Monitoring Report
			Gypsophila osmangaziensis	**Closed Construction Period: 1 May - 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Gypsophila osmangaziensis* species shall be collected between 1 July-August. **Post-Construction** * The collected seeds of *Gypsophila osmangaziensis* species shall be planted according to the methodology to the ROW and to the (36 S 272726.00-4399906.00/36 S 272758.00-4399896.00) coordinates between September-November. * Terracing shall be carried out to prevent erosion.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In August) 3. Seed maturation (In September)	Once in each germination, flowering and mature seed periods, three times per year	
			Alyssum niveum	**Closed Construction Period: 1 May - 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Alyssum niveum* species shall be collected between 15 July-15 August. **Post-Construction** * The collected seeds of *Alyssum niveum* species shall be planted according to the methodology to the ROW and to the (36 S 272726.00-4399906.00/36 S 272758.00-4399896.00) coordinates between September-November. * Terracing shall be carried out to prevent erosion.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May) 3. Seed maturation (In June)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Scabiosa hololeuca	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Scabiosa hololeuca* species shall be collected between 1 July-August. **Post-Construction** * The collected seeds of *Scabiosa hololeuca* species shall be planted according to the methodology to the ROW and to the (36 S 272726.00-4399906.00/36 S 272758.00-4399896.00) coordinates between September-November. * Terracing shall be carried out to prevent erosion.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-June) 3. Seed maturation (In June-July)	Once in each germination, flowering and mature seed periods, three times per year	
			Salvia tchihatcheffii	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of Salvia *tchihatcheffii* species shall be collected between 15 July-15 August. **Post-Construction** * The collected seeds of *Salvia tchihatcheffii* species shall be planted according to the methodology to the ROW and to the (36 S 272726.00-4399906.00/36 S 272758.00-4399896.00) coordinates between September-November. * Terracing shall be carried out to prevent erosion.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-June) 3. Seed maturation (In June-July)	Once in each germination, flowering and mature seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined	June-July	Biennially	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
						based on the first year's value.			
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
47	1437+587 - 1438+972	Critical Habitat (CH61)	*Erodium sibthorpianum ssp. sibthorpianum*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. **Post-Construction** * The collected seeds of *Erodium sibthorpianum ssp. sibthorpianum* species shall be planted according to the methodology and to the (35 S 732388.00-4404501.00/35 S 732171.00-4404907.00/35 S 731635.00-4405086.00) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In July-September) 3. Seed maturation (In August-October)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Astragalus densifolius ssp. ayashensis	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. **Post-Construction** * The collected seeds of *Erodium sibthorpianum ssp. sibthorpianum* species shall be planted according to the methodology and to the (35 S 732388.00-4404501.00/35 S 732171.00-4404907.00/35 S 731635.00-4405086.00) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In June-July) 3. Seed maturation (In August-October)	Once in each germination, flowering and mature seed periods, three times per year	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
48	1484+122 - 1484+503	Critical Habitat (CH62)	*Onosma briquetii*	**Closed Construction Period: 1 May - 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. **Post-Construction** * The collected seeds of *Onosma briquetii* species shall be planted according to the methodology and to the (35 S 692106.00-4399251.00/35 S 691979.00-4399305.00/35 S 691815.00-4399375.00) coordinates to the ROW between September-November.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In July) 3. Seed maturation (In August)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Species Diversity	**Pre-Construction**	Please refer Chapter 5.1.6	The species diversity of the	June-July	Biennially	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.		area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.			
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	
49	1500+178 – 1505+242	Critical Habitat (CH63)	*Alyssum dudleyi*	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * The seeds of *Alyssum dudleyi* species shall be collected between 1 June-1 July. **Post-Construction** * The collected seeds of *Alyssum dudleyi* species shall be planted according to the methodology and to the (35 S 677213.00-4403775.00/ 35 S 677793.00-4403410.00) coordinates.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its situation in natural habitat (observation of healthy population development)	1. Germination (First May-June period after seeding) 2. Flowering (In May-June) 3. Seed maturation (In July-August)	Once in each germination, flowering and mature seed periods, three times per year	Interim First-Findings in Monthly Report & Annual Biorestoration Monitoring Report
			Dianthus goekayi	**Closed Construction Period: 1 May – 1 June Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW.	Please refer Chapter 5.1.8	The data obtained by comparison of the species' population ratio (%) with its	1. Germination (First May-June period after seeding)	Once in each germination, flowering and mature	

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The seeds of *Dianthus goekayi* species shall be collected between 15 June-15 July. **Post-Construction** * The collected seeds of *Dianthus goekayi* species shall be planted according to the methodology and to the (35 S 677213.00-4403775.00/ 35 S 677793.00-4403410.00) coordinates.		situation in natural habitat (observation of healthy population development)	2. Flowering (In June-September) 3. Seed maturation (In June-September)	seed periods, three times per year	
			Species Diversity	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.6	The species diversity of the area should be recovered by 20% in the first year following the spread of the top soil. The achievement criteria for the following monitoring years will be defined based on the first year's value.	June-July	Biennially	
			Vegetation Cover	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm minimum and shall be stored along one side of the ROW. * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be collected. **Post-Construction** * To control erosion at sloping areas, seeds of the non-endemic natural plants of the region should be planted on the ROW.	Please refer Chapter 5.1.5	The vegetative cover of the area should be recovered by 20% in the first year following the spread of the top soil	June-July	Annualy	

APPENDIX B.2 TERRESTRIAL FAUNA MONITORING TABLE

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
1	003+186-003+921	Critical Habitat (CH1)	*Mertensiella caucasica*	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * If *Mertensiella caucasica* species will be observed in the ROW, the construction works cannot be done before the April, because this species is going to hibernation. * At the beginning of April, a field study should be carried out by experts, and if this species will be observed, individuals should be carried to the appropriate and close aquatic areas by specialists according to the methodology. **Post-Construction** * If *Mertensiella caucasica* species is observed in the area, it should be ensured that the habitat is restored by restoring the stones and rocks in and near the aquatic environment.	**Basic Principles** This species, living in wooded areas near the creeks, is widely present in Georgia and north-eastern part of Turkey. The population of the species is generally rare. They hide under rocks and plants during the daytime. In order to determine the presence and population of *Mertensiella caucasica* in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year. If the individuals of *Mertensiella caucasica* are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Salamender Monitoring Methodology** **Leaf-Litter Bag Searches** Leaf-litter search searches are special method for salamenders, it is difficult to observe the individuals due to hardness of viewing species. It is widely used technique to observe individuals in the litters located near the creeks (Peterson and Cummins, 1974). It is a proven method for the inventory studies near the creeks (Waldron et al., 2003). **Basic Design** The observations should be performed for 1 day at the rocky areas and bushes near creeks at 150m distance from each side of the construction corridor. Leaf-litter bag search should be done in the same day. Rectangular plastic net (generally size of 70cm x 70cm, with mesh size of 1.9cm) is the main material used in this technique. First, small stones and litters are placed onto the net and the edges of the net are connected via fiber or cable to form the bag. The prepared bags are put near the creeks along the transect line. After the couple of weeks familirization periof of the animal, each bag are dipped into a bucket filled with water and checked after dipping out. The bag is dipped into the buckect for several times and water is poured onto the bag. Individuals are taken out of the bag. Bags are placed near the creeks again. In order to determine the presence and population	Detection of 1-3 individuals each year	April - May	1 day in 15 days	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					situation of the species, total of 10 leaf-litter bags should be placed (5 for each side of the construction corridor) along the transect line with 30m apart. In order not to count the same individuals, ventral pattern photographing technique should be used, which is a proven technique to distinguish different salamander species (Hagstrom, 1973). During the site studies, even in relatively small populations, it is hard to distinguish the species by naked eye. Therefore, the photographs of the individuals should be taken. The individuals should be laid flat during taking photographs. These studies should be performed by an expert on zoology and an assistant researcher.				
			Zygaena armena	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * If the construction works start in March 2015, the seeds of *Coronilla* and *Onobrychis* species, which are the feeding plants of *Zygaena armena* shall be collected along one side of the ROW between 15 July-30 August. * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * The collected seeds of *Coronilla* and *Onobrychis* species shall be planted according to the methodology and to the (38 T 318801.90-4603885.95/ 38 T 318738.00-4603635.00/38 T 318773.00-4603531.00/38 T 318649.00-4603478.00) coordinates between September-November.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. The monitoring should be done by the same team in at least first 3 years in order to have standard evaluation. In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed. The presence of species of *Coronilla* and *Onobrychis* genus, which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The counting of feeding plants should be done and the numbers should be recorded in the first 3 years. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals,	-Vegetation cover of species of *Coronilla* and *Onobrychis* genus in the ROW should be; -at least %10 in the 1. year -at least %20 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. year of the vegetation cover of the areas adjacent to ROW -Population of the *Zygaena armena species should be;* *-"rare" in the end of 1. year* -"low" in the end of 2. And other monitoring years.	Between 15 July - 30 August	2 days in 15 days	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					the day of monitoring, name of the expert etc. should be written onto the survey form. These studies should be performed by an expert on zoology and an assistant researcher. **Adult Butterfly Monitoring Scheme Methodology** The counting of the species should be done along the 400m long transect line. Slow walking at the same speed should be performed along the transect for 45-60 minutes. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees.				
2	004+126-004+237	Critical Habitat (CH2)	*Mertensiella caucasica*	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * If *Mertensiella caucasica* species will be observed in the ROW, the construction works cannot be done before the April, because this species is going to hibernation. * At the beginning of April, a field study should be carried out by experts, and if this species will be observed, individuals should be carried to the appropriate and close aquatic areas by specialists according to the methodology. **Post-Construction**	**Basic Principles** This species, living in wooded areas near the creeks, is widely present in Georgia and north-eastern part of Turkey. The population of the species is generally rare. They hide under rocks and plants during the daytime. In order to determine the presence and population of *Mertensiella caucasica* in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year. If the individuals of *Mertensiella caucasica* are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Salamender Monitoring Methodology** **Leaf-Litter Bag Searches** The observations should be performed for 1 day at the rocky areas and bushes near creeks	Detection of 1-3 individuals each year	April - May	1 day in 15 days	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio n Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* If *Mertensiella caucasica* species is observed in the area, it should be ensured that the habitat is restored by restoring the stones and rocks in and near the aquatic environment.	at 150m distance from each side of the construction corridor. Leaf-litter bag search should be done in the same day. Rectangular plastic net (generally size of 70cm x 70cm, with mesh size of 1.9cm) is the main material used in this technique. First, small stones and litters are placed onto the net and the edges of the net are connected via fiber or cable to form the bag. The prepared bags are put near the creeks along the transect line. After the couple of weeks familirization periof of the animal, each bag are dipped into a bucket filled with water and checked after dipping out. The bag is dipped into the buckect for several times and water is poured onto the bag. Individuals are taken out of the bag. Bags are placed near the creeks again. In order to determine the presence and population situation of the species, total of 10 leaf-litter bags should be placed (5 for each side of the construction corridor) along the transect line with 30m apart. In order not to count the same individuals, ventral pattern photographing technique should be used, which is a proven technique to distinguish different salamander species (Hagstrom, 1973). During the site studies, even in relatively small populations, it is hard to distinguish the species by naked eye. Therefore, the photographs of the individuals should be taken. The individuals should be laid flat during taking photographs. These studies should be performed by an expert on zoology and an assistant researcher.				
			Zygaena armena	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * If the construction works start in March 2015, the seeds of *Coronilla* and *Onobrychis* species, which are the feeding plants of *Zygaena armena* shall be collected along one side of the ROW between 15 July-30 August. * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * The collected seeds of *Coronilla* and *Onobrychis* species shall be planted	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. The monitoring should be done by the same team in at least first 3 years in order to have standard evaluation. In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed.	-Vegetation cover of species of *Coronilla* and *Onobrychis* genus in the ROW should be; -at least %10 in the 1. year -at least %20 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. year	Between 15 July - 30 August	2 days in 15 days	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio n Monitoring Report in 45 days after the

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				according to the methodology and to the (38 T 318421.00-4603425.00 / 38 T 318351.00-4603438.00) coordinates between September-November.	The presence of species of *Coronilla* and *Onobrychis* genus, which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The counting of feeding plants should be done and the numbers should be recorded in the first 3 years. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. These studies should be performed by an expert on zoology and an assistant researcher. **Adult Butterfly Monitoring Scheme Methodology** The counting of the species should be done along the 400m long transect line. Slow walking at the same speed should be performed along the transect for 45-60 minutes. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind	of the vegetation cover of the areas adjacent to ROW -Population of the *Zygaena armena species should be;* *-"rare" in the end of 1. year* -"low" in the end of 2. And other monitoring years.			completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					causing movement of medium sized tree branches and leafs of small trees.				
3	20+977-23+277	Critical Habitat (CH3)	*Tipula n.sp*	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction**	**Basic Principles** This species mostly lives in the wet meadows. In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. If the vegetation cover is not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. These studies should be performed by an expert on zoology and an assistant researcher. **Monitoring Methodology** The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the 400m long 2 transect lines. The samples of *Tipula sp*. should be captured by using sweep net. The monitoring should be done by slow walking at the same speed along the transect lines for 60-90 minutes between hours 09.30-17.30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The photographs of	-Vegetation cover of ROW should be; -at least %10 in the 1. year -at least %20 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. year of the vegetation cover of the areas adjacent to ROW -Population of the *Tipula n.sp* should be "high" during the monitoring years.	Between 1 June - 25 July	Once in every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					the critical habitat and individials should be taken during the monitoring.				
			Erebia ottomana	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * The areas which *Poaceae* is very dense (between 20+725-21+078 / 22+235-22+615 KP's) shall be harvested and shall be stored along one side of the ROW. **Post-Construction** * Harvested herbaceous plants shall be laid on the ROW.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed. The presence of species of *Festuca and* species of *Poaceae* family, which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The counting of feeding plants should be done and the numbers should be recorded in the first 3 years. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. These studies should be performed by an expert on butterflies and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. **Adult Butterfly Monitoring Scheme Methodology**	-Vegetation cover of species of Festuca and Poaceae family in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. year of the vegetation cover of the areas adjacent to ROW -Population of the *Erebia ottomana* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.	Between 15 July - 30 August	Once in every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					The counting of the species should be done along the 400m long transect line. Slow walking at the same speed should be performed along the transect for 45-60 minutes. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees.				
4	23+947-27+358	Critical Habitat (CH4)	*Prometheomys schaposchnikowi*	**Closed Construction Period: 15 May-15 August** **Pre-Construction** *The area should be restricted between 15 May-15 August because this period is a breeding period for Prometheomys schaposchnikowi. *The top soil between 23+670-27+081 KP's should be scraped at a depth of 10-15 cm after 15 August. *Prometheomys schaposchnikowi individuals should be carried to the appropriate and close areas by specialists according to the methodology. *When the nest gallery system is being excavated, the nest material and the stored food found in the nest should also be carried to the new transferred nesting area and should be placed inside the gallery entrance so that the members can take them in their new nests they are building.	**Basic Principles** In order to determine the presence and population of *Prometheomys schaposchnikowi* in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** Vegetation cover and species diversity in the first year is expected to be 30% and 40%, respectively. Nest mounds in the critical habitat should be observed for the presence of *Prometheomys schaposchnikowi*. New nests should be observed to determined the population situation. In order to determine new nests, 400m long 3 transects at the start, center and end of the critical habitat should be monitored. New nest mounds in 5 m distance to the transect lines should be counted and	Detection of; - 1-2 individuals in each transect in the 1. Year - 2-4 individuals in each transect in the 2. Year - 5-8individuals in each transect in the 3. Year - 8-12 individuals in each transect in the 5. Year - 13-20 individuals in each transect in the 7. Year - 20 and above individuals in each transect in the 10. Year	Between June - July	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction -	new mounds should be marked with stakes in each transect. The marked mounds should be accepted as centre and each new mounds in 10m distance to the center are considered as new individuals. The count of individuals are determined at the end of survey in three transects. The areas where individuals are determined are shown in maps. The name of expert, date and time, new nest location should be recorded for each observation. These studies should be performed by an expert on zoology and two assistant researcher.				
5	63+303-64+123	Critical Habitat (CH5)	*Phengaris nausithous*	**Closed Construction Period: 1 June-15 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm with the plants on it as tufts (including *Sanguisorba sp.*), and shall be stored along one side of the ROW, and shall be irrigated once every two weeks. * Stones and rocks of 30 cm or larger on the soil shall be stored nearby the construction site, without mixing them with the top soil. * Herbaceous plants shall be harvested and stored along one side of the ROW. **Post-Construction** * The removed individuals of the species as tufts shall be planted on the ROW and shall be irrigated until they root again. * The stones and rocks shall be re-organized on top of the soil for ants nesting at the end of the excavation according to the methodology. * The harvested plants, containing eggs shall be transferred to the area and spread on the soil. * The creek rehabilitation shall be done between the (62+845-62+910) KP's.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed. The presence of *Sanguisorba sp.*, which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The counting of feeding plants should be done and the numbers should be recorded in the first 3 years. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. It should be monitored that the stones with 30cm and larger those were placed near ROW were taken into the ROW and dumped 5-10cm into the soil. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals,	-Vegetation cover of *Sanguisorba sp.* in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. year of the vegetation cover of the areas adjacent to ROW -Population of the *Phengaris nausithous* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years. -The number of nests (especially *Myrmica* species) under stones on ROW should be; -at least %10 in the 1. year -at least %30 in the 2. year	-Adult individual monitoring between 1 July – 30 August in the 1., 2., 3., 5., 7. and 10. year -Larvae monitoring between 20 August – 15 September in the 1., 2., 3. years	Once in every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					the day of monitoring, name of the expert etc. should be written onto the survey form. **Adult Butterfly Monitoring Scheme Methodology** The counting of the species should be done along the 400m long transect line. Slow walking at the same speed should be performed along the transect for 45-60 minutes. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. **Butterfly Larvae Monitoring Methodology and Basic Principles** Larvae observations and countings will provide information on the presence of species. Although the count of larvae does not provide sufficient information on the prediction of population size of the species, it will give information about the population during the monitoring. Although the count of larvae does not provide sufficient information on the prediction of population size of the species, it will give information about the population during the monitoring. These studies should be performed by an expert on zoology and an assistant researcher. The vegetation status of the critical habitat should be observed before the larvae	-at least %50 in the 3. year -at least %70 in the 5. year of the number of nests in the areas adjacent to ROW.			

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					observation and count. The presence of Sanguisorba sp., which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The feeding plant of the species should be observed and counted along the construction corridor in the critical habitat. The location of feeding plants in the critical habitat should be recorded with GPS. The location of feeding plants in the critical habitat should be shown in a map. In the first year of the monitoring, the determined feeding plants should be observed and if there is larvae on them, larvaes should be counted and their location should be shown in a map. In the second year of monitoring, the feeding plants determined in the first year should be observed and also new feeding plants should be observed in the critical habitat, if there is larvae on them, larvaes should be counted and their location should be be shown in a map. In the third year of monitoring, the feeding plants determined in the previous years should be observed and also new feeding plants should be observed in the critical habitat, if there is larvae on them, larvaes should be counted and their location should be be shown in a map. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The photographs of the critical habitat and larvae of the species should be taken. The details on the monitoring day should be recorded onto larvae survey form.				

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Tipula n.sp	**Closed Construction Period: 1 June-15 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm with the plants on it as tufts, and shall be stored along one side of the ROW, and shall be irrigated once every two weeks. * Herbaceous plants shall be harvested and stored along one side of the ROW. **Post-Construction** * * The harvested plants, containing eggs shall be transferred to the area and spread on the soil. * The creek rehabilitation shall be done between the (62+845-62+910) KP's.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. If the vegetation cover is not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. These studies should be performed by an expert on zoology and an assistant researcher. **Monitoring Methodology** The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The observation of the species should be done along the 400m long 2 transect lines in the critical habitat. The samples of *Tipula sp.* should be captured by using sweep net. The monitoring should be done by slow walking at the same speed along the transect lines for 60-90 minutes between hours 09.30-17.30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The photographs of the critical habitat and individials should be taken during the monitoring.	-Vegetation cover of ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. year. - Population of the Tipula n.sp should be “high” during the monitoring years.	1 June - 25 July	In every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Erebia ottomana	**Closed Construction Period: 1 June-15 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm with the plants on it as tufts, and shall be stored along one side of the ROW, and shall be irrigated once every two weeks. * Herbaceous plants shall be harvested and stored along one side of the ROW. **Post-Construction** * The removed individuals of the species as tufts shall be planted on the ROW and shall be irrigated until they root again. * The harvested plants, containing eggs shall be transferred to the area and spread on the soil. * The creek rehabilitation shall be done between the (62+845-62+910) KP's.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed. The presence of Festuca species, which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The counting of species of *Festuca* and species of *Poaceae* family, which are feeding plants of the species, should be done along the construction corridor in the critical habitat in first 3 years. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. These studies should be performed by an expert on butterflies and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. **Butterfly Monitoring Scheme Methodology** The counting of the species should be done along the 400m long transect line. Slow walking at the same speed should be performed along the transect for 45-60 minutes. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing.	-Vegetation cover of species of Festuca and Poaceae family in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year -Population of the *Erebia ottomana* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.	Between 15 July - 30 August	3 times in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					Each individual should be counted for one time. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees.				
6	85+741-87+983	Critical Habitat (CH6)	*Phengaris nausithous*	**Pre-Construction** * Top soil shall be scraped at a depth of 10-15 cm with the plants on it as tufts (including Sanguisorba sp.), and shall be stored along one side of the ROW, and shall be irrigated once every two weeks. * The seeds of *Sanguisorba*, which is the feeding plant of *Phengaris nausithous*, shall be collected along one side of the ROW. * Stones and rocks of 30 cm or larger on the soil shall be stored nearby the construction site, without mixing them with the top soil. **Post-Construction** * The removed individuals of the species as tufts shall be planted on the ROW and shall be irrigated until they root again. * The stones and rocks shall be re-organized on top of the soil for ants nesting at the end of the excavation according to the methodology.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed. The presence of Sanguisorba sp., which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The counting of feeding plants should be done and the numbers should be recorded in the first 3 years. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. It should be monitored that the stones with 30cm and larger those were placed near ROW were taken into the ROW and dumped 5-10cm into the soil. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and	-Vegetation cover of Sanguisorba sp. in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. year. -Population of the *Phengaris nausithous* species should be; -“rare” *in the end of 1. year* -“low” in the end of 2. and other monitoring years. -The number of nests (especially *Myrmica* species) under stones on ROW should be; -at least %10 in the 1. year -at least %30 in the 2. year	-Adult individual monitoring between 1 July – 30 August in the 1., 2., 3., 5., 7. and 10. year -Larvae monitoring between 20 August – 15 September in the 1., 2., 3. years	Once in every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. **Adult Butterfly Monitoring Scheme Methodology** The counting of the species should be done along the 400m long transect line. Slow walking at the same speed should be performed along the transect for 45-60 minutes. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. **Butterfly Larvae Monitoring Methodology and Basic Principles** Larvae observations and countings will provide information on the presence of species.Although the count of larvae does not provide sufficient information on the prediction of population size of the species, it will give information about the population during the monitoring. These studies should be performed by an expert on zoology and an assistant researcher. The vegetation status of the critical habitat should be observed before the larvae observation and count. The presence of	-at least %50 in the 3. year -at least %70 in the 5. year of the number of nests in the areas adjacent to ROW.			

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					Sanguisorba sp., which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The feeding plant of the species should be observed and counted along the construction corridor in the critical habitat. The location of feeding plants in the critical habitat should be recorded with GPS. The location of feeding plants in the critical habitat should be shown in a map. In the first year of the monitoring, the determined feeding plants should be observed and if there is larvae on them, larvaes should be counted and their location should be shown in a map. In the second year of monitoring, the feeding plants determined in the first year should be observed and also new feeding plants should be observed in the critical habitat, if there is larvae on them, larvaes should be counted and their location should be be shown in a map. In the third year of monitoring, the feeding plants determined in the previous years should be observed and also new feeding plants should be observed in the critical habitat, if there is larvae on them, larvaes should be counted and their location should be be shown in a map. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The photographs of the critical habitat and larvae of the species should be taken. The details on the monitoring day should be recorded onto larvae survey form.				
7	116+376-116+983	Critical Habitat (CH7)	*Phengaris nausithous*	**Pre-Construction** * The top soil in the shall be scraped at a depth of 10-15 cm with the plants on it as tufts (including *Sanguisorba sp.*) and shall be stored along one side of the ROW, and shall be irrigated once every two weeks. * The seeds of *Sanguisorba*, which is the feeding plant of *Phengaris nausithous*, shall be collected along one side of the ROW.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. In the first year of monitoring of the species in the critical habitat, vegetation status of the	-Vegetation cover of Sanguisorba sp. in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year	-Adult individual monitoring between 1 July – 30 August in the 1., 2., 3., 5., 7. and 10. year	Once in every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* Stones and rocks of 30 cm or larger on the soil shall be stored nearby the construction site, without mixing them with the top soil. **Post-Construction** * The removed individuals of the species as tufts shall be planted on the ROW and shall be irrigated until they root again. * The stones and rocks shall be re-organized on top of the soil for ants nesting at the end of the excavation according to the methodology.	area should be observed. The presence of Sanguisorba sp., which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The counting of feeding plants should be done and the numbers should be recorded in the first 3 years. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. It should be monitored that the stones with 30cm and larger those were placed near ROW were taken into the ROW and dumped 5-10cm into the soil. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. **Adult Butterfly Monitoring Scheme Methodology** The counting of the species should be done along the 400m long transect line. Slow walking at the same speed should be performed along the transect for 45-60 minutes. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C.	-at least %60 in the 5. year. -Population of the *Phengaris nausithous* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years. -The number of nests (especially *Myrmica* species) under stones on ROW should be; -at least %10 in the 1. year -at least %30 in the 2. year -at least %50 in the 3. year -at least %70 in the 5. year of the number of nests in the areas adjacent to ROW.	-Larvae monitoring between 20 August – 15 September in the 1., 2., 3. years		n Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					If the weather temperature is between 13-17˚C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17˚C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. **Butterfly Larvae Monitoring Methodology and Basic Principles** Larvae observations and countings will provide information on the presence of species.Although the count of larvae does not provide sufficient information on the prediction of population size of the species, it will give information about the population during the monitoring. These studies should be performed by an expert on zoology and an assistant researcher. The vegetation status of the critical habitat should be observed before the larvae observation and count. The presence of Sanguisorba sp., which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The feeding plant of the species should be observed and counted along the construction corridor in the critical habitat. The location of feeding plants in the critical habitat should be recorded with GPS. The location of feeding plants in the critical habitat should be shown in a map. In the first year of the monitoring, the determined feeding plants should be observed and if there is larvae on them, larvaes should be counted and their location should be shown in a map. In the second year of monitoring, the feeding plants determined in the first year should be observed and also new feeding plants should be observed in the critical habitat, if there is larvae on them, larvaes should be counted and their location should be be shown in a map. In the				

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					third year of monitoring, the feeding plants determined in the previous years should be observed and also new feeding plants should be observed in the critical habitat, if there is larvae on them, larvaes should be counted and their location should be be shown in a map. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The photographs of the critical habitat and larvae of the species should be taken. The details on the monitoring day should be recorded onto larvae survey form.				
8	117+052-117+620	Critical Habitat (CH8)	*Phengaris nausithous*	**Pre-Construction** * The top soil in the shall be scraped at a depth of 10-15 cm with the plants on it as tufts (including *Sanguisorba sp.*) and shall be stored along one side of the ROW, and shall be irrigated once every two weeks. * The seeds of *Sanguisorba*, which is the feeding plant of *Phengaris nausithous*, shall be collected along one side of the ROW. * Stones and rocks of 30 cm or larger on the soil shall be stored nearby the construction site, without mixing them with the top soil. **Post-Construction** * The removed individuals of the species as tufts shall be planted on the ROW and shall be irrigated until they root again. * The stones and rocks shall be re-organized on top of the soil for ants nesting at the end of the excavation according to the methodology.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed. The presence of Sanguisorba sp., which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The counting of feeding plants should be done and the numbers should be recorded in the first 3 years. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. It should be monitored that the stones with 30cm and larger those were placed near ROW were taken into the ROW and dumped 5-10cm into the soil. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form.	-Vegetation cover of Sanguisorba sp. in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. year. -Population of the *Phengaris nausithous* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years. -The number of nests (especially *Myrmica* species) under stones on ROW should be; -at least %10 in the 1. year -at least %30 in the 2. year -at least %50 in the 3. year -at least %70 in the 5. year of the number of nests in	-Adult individual monitoring between 1 July – 30 August in the 1., 2., 3., 5., 7. and 10. year -Larvae monitoring between 20 August – 15 September in the 1., 2., 3. years	Once in every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio n Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					Adult Butterfly Monitoring Scheme Methodology The counting of the species should be done along the 400m long transect line. Slow walking at the same speed should be performed along the transect for 45-60 minutes. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. **Butterfly Larvae Monitoring Methodology and Basic Principles** Larvae observations and countings will provide information on the presence of species.Although the count of larvae does not provide sufficient information on the prediction of population size of the species, it will give information about the population during the monitoring. These studies should be performed by an expert on zoology and an assistant researcher. The vegetation status of the critical habitat should be observed before the larvae observation and count. The presence of Sanguisorba sp., which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert.	the areas adjacent to ROW.			

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The feeding plant of the species should be observed and counted along the construction corridor in the critical habitat. The location of feeding plants in the critical habitat should be recorded with GPS. The location of feeding plants in the critical habitat should be shown in a map. In the first year of the monitoring, the determined feeding plants should be observed and if there is larvae on them, larvaes should be counted and their location should be shown in a map. In the second year of monitoring, the feeding plants determined in the first year should be observed and also new feeding plants should be observed in the critical habitat, if there is larvae on them, larvaes should be counted and their location should be be shown in a map. In the third year of monitoring, the feeding plants determined in the previous years should be observed and also new feeding plants should be observed in the critical habitat, if there is larvae on them, larvaes should be counted and their location should be be shown in a map. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The photographs of the critical habitat and larvae of the species should be taken. The details on the monitoring day should be recorded onto larvae survey form.				
9	165+360-165+581	Critical Habitat (CH9)	*Darevskia uzzelli*	**Closed Construction Period:** Closed prior to 15th of July **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * *Darevskia uzzelli* individuals shall be carried to the appropriate and close areas by specialists according to the methodology at the beginning of the July. * Stones and rocks of 30 cm or larger on the soil shall be stored nearby the construction site, without mixing them with the top soil. **Post-Construction**	**Basic Principles** The distribution of *Darevskia uzzelli* is very narrow and its population is generally rare. They live in forests or rocky areas with sparse vegetation. In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Reptilian Monitoring Methodology** **Transect Surveys** Ideally, transect survey should meet the following assumptions:	Detection of individuals of species and “low” population level	Between June - July	Once in a month	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The stored stones and rocks shall be spread by embedding them in 5-10 cm soil (in accordance with the original)	Transect lines should be selected arbitrarily. All samples on the transect lines should be observed. Individuals should not be counted more than once in or between the transect lines. Experts should do the observations on linear pattern during transect surveys. Experts should walk for one hour and do observations along transects in the critical habitat. Natural shelters (stone or other materials) should not be included in this one hour. Surveys should be done between 09:00-16:00 since ectotherm are expected to be active and observable between these hours. Experts observe within the area of 1m in each side of transect, also high quality habitats (where natural shelters are located) can be included in 10m each side of transect. The rocks, stones or other materials whose underneath was observed should be replaced to their original location to minimize the disturbance. The individuals should only be captured to verify identity. Samples may be needed to identify the rare species those are difficult to be identified. The time spent for the identification are not included in the survey duration. The following information should be recorded for identification: Expert, day and time, species, identification method, age of captured individual (infant, pre-adult adult), surface type (stone, stock, naked surface) and location in transect. Natural shelter surveys should be done along the transect line not to re-count the individuals. These studies should be performed by an expert on zoology and an assistant researcher.				of all site visits.
			Darevskia unisexualis	**Closed Construction Period:** Closed prior to 15th of July **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * *Darevskia unisexualis* individuals shall be carried to the appropriate and close areas by specialists according to the methodology at the beginning of the July.	**Basic Principles** The distribution of *Darevskia unisexualis* is very narrow and its population is generally rare. They live in forests or rocky areas with sparse vegetation. In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at	Detection of individuals of species and “rare” population level	Between June - July	Once in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio n Monitoring

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* Stones and rocks of 30 cm or larger on the soil shall be stored nearby the construction site, without mixing them with the top soil. **Post-Construction** * The stored stones and rocks shall be spread by embedding them in 5-10 cm soil (in accordance with the original)	least one of the counting years, the counting should be continued for at least 2 more years. **Reptilian Monitoring Methodology** Experts should do the observations on linear pattern during transect surveys. Experts should do the observations on linear pattern during transect surveys. Experts should walk for one hour and do observations along transects in the critical habitat. Natural shelters (stone or other materials) should not be included in this one hour. Surveys should be done between 09:00-16:00 since ectotherm are expected to be active and observable between these hours. Experts observe within the area of 1m in each side of transect, also high quality habitats (where natural shelters are located) can be included in 10m each side of transect. The rocks, stones or other materials whose underneath was observed should be replaced to their original location to minimize the disturbance. The individuals should only be captured to verify identity. Samples may be needed to identify the rare species those are difficult to be identified. The time spent for the identification are not included in the survey duration. The following information should be recorded for identification: Expert, day and time, species, identification method, age of captured individual (infant, pre-adult adult), surface type (stone, stock, naked surface) and location in transect. Natural shelter surveys should be done along the transect line not to re-count the individuals. These studies should be performed by an expert on zoology and an assistant researcher.				Report in 45 days after the completion of all site visits.
10	168+015-168+169	Critical Habitat (CH10)	*Darevskia uzzelli*	**Closed Construction Period:** Closed prior to 15th of July **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * *Darevskia uzzelli* individuals shall be carried to the appropriate and close areas by specialists according to the methodology at the beginning of the July.	**Basic Principles** The distribution of *Darevskia uzzelli* is very narrow and its population is generally rare. They live in forests or rocky areas with sparse vegetation. In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at	Detection of individuals of species and “rare” population level	May - July	Once in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio n Monitoring

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* Stones and rocks of 30 cm or larger on the soil shall be stored nearby the construction site, without mixing them with the top soil. **Post-Construction** * The stored stones and rocks shall be spread by embedding them in 5-10 cm soil (in accordance with the original)	least one of the counting years, the counting should be continued for at least 2 more years. **Reptilian Monitoring Methodology** **Transect Surveys** Ideally, transect survey should meet the following assumptions: Transect lines should be selected arbitrarily. All samples on the transect lines should be observed. Individuals should not be counted more than once in or between the transect lines. Experts should do the observations on linear pattern during transect surveys. Experts should walk for one hour and do observations along transects in the critical habitat. Natural shelters (stone or other materials) should not be included in this one hour. Surveys should be done between 09:00-16:00 since ectotherm are expected to be active and observable between these hours. Experts observe within the area of 1m in each side of transect, also high quality habitats (where natural shelters are located) can be included in 10m each side of transect. The rocks, stones or other materials whose underneath was observed should be replaced to their original location to minimize the disturbance. The individuals should only be captured to verify identity.Samples may be needed to identify the rare species those are difficult to be identified. The time spent for the identification are not included in the survey duration. The following information should be recorded for identification: Expert, day and time, species, identification method, age of captured individual (infant, pre-adult adult), surface type (stone, stock, naked surface) and location in transect. Natural shelter surveys should be done along the transect line not to re-count the individuals. These studies should be performed by an expert on zoology and an assistant researcher.				Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Darevskia unisexualis	**Closed Construction Period:** Closed prior to 15th of July **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * *Darevskia unisexualis* individuals shall be carried to the appropriate and close areas by specialists according to the methodology at the beginning of the July. * Stones and rocks of 30 cm or larger on the soil shall be stored nearby the construction site, without mixing them with the top soil. **Post-Construction** * The stored stones and rocks shall be spread by embedding them in 5-10 cm soil (in accordance with the original)	**Basic Principles** The distribution of *Darevskia unisexualis* is very narrow and its population is generally rare. They live in forests or rocky areas with sparse vegetation. In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Reptilian Monitoring Methodology** Experts should do the observations on linear pattern during transect surveys. Experts should do the observations on linear pattern during transect surveys. Experts should walk for one hour and do observations along transects in the critical habitat. Natural shelters (stone or other materials) should not be included in this one hour. Surveys should be done between 09:00-16:00 since ectotherm are expected to be active and observable between these hours. Experts observe within the area of 1m in each side of transect, also high quality habitats (where natural shelters are located) can be included in 10m each side of transect. The rocks, stones or other materials whose underneath was observed should be replaced to their original location to minimize the disturbance. The individuals should only be captured to verify identity. Samples may be needed to identify the rare species those are difficult to be identified. The time spent for the identification are not included in the survey duration. The following information should be recorded for identification: Expert, day and time, species, identification method, age of captured individual (infant, pre-adult adult), surface type (stone, stock, naked surface) and location in transect. Natural shelter surveys should be done along the transect line not to re-count the individuals. These studies should be performed by an expert on zoology and an assistant researcher.	Detection of individuals of species and “rare” population level	May - July	Once in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
11	170+015-175+015	Critical Habitat (CH11)	*Otis tarda*	**Pre-Construction** * The members and breeding activities in April-May should be investigated. Consequently, in case members in reproductive activity are observed, construction activities should not be starteded, studies accompanied by an expert should be carried out to wait for the offspring hatching from the egg, and it should be ensured that the members are removed from the area only after the young ones start going around with their mother. * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * Reinstate all habitats to baseline conditions existing prior to construction activities.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** Transect survey methodology should be used in the monitoring in the critical habitat. Transect line should cover the entire critical habitat. Transect survey should be done by two experts and each 1 km section of critical habitat should be surveyed in an hour. Experts should walk in 50 m distance at left and right side of ROW and entire area that is visible should be observed. Surveys should be started in early hours like 08:00. These studies should be performed by an expert on zoology and an assistant researcher. If individuals are observed, information on the aim of area usage and counts of individuals should be recorded on the survey form.	Detection of 1 or more individuals in the critical habitat and visible areas	May	Once in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.
12	175+427-177+015	Critical Habitat (CH12)	*Eulasia chrysopyga*	**Closed Construction Period:** 1 June-1 July **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction**	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The vegetation status of the critical habitat should be observed before the monitoring of the species. The presence of species of Compositae (Asteraceae) family, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year.	Detection of species of Compositae (Asteraceae) family on transect and detection of Eulasia chrysopyga on these plants at “rare” population level	Between June - July	Once in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					The individuals in the critical habitat should be observed along the 400m long 2 transect lines. The samples of species should be captured by using sweep net. The monitoring should be done by slow walking at the same speed along the transect lines for 60 minutes between hours 09.30-17.30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The photographs of the critical habitat and individials should be taken during the monitoring. These studies should be performed by an expert on zoology and an assistant researcher. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form.				
13	188+572-194+015	Critical Habitat (CH13)	*Eulasia chrysopyga*	**Closed Construction Period:** 1 June-1 July **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction**	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The vegetation status of the critical habitat should be observed before the monitoring of the species. The presence of species of Compositae (Asteraceae) family, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The individuals in the critical habitat should be observed along the 400m long 5 transect lines.	Detection of species of Compositae (Asteraceae) family on transect and detection of Eulasia chrysopyga on these plants at “rare” population level	Between June - July	Once in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					The samples of species should be captured by using sweep net. The monitoring should be done by slow walking at the same speed along the transect lines for 60 minutes between hours 09.30-17.30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The photographs of the critical habitat and individials should be taken during the monitoring. These studies should be performed by an expert on zoology and an assistant researcher. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form.				
			Phengaris nausithous	**Closed Construction Period:** 1 June-1 July **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * Tall plants belonging to the *Compositae*, *Labiatae*, *Leguminosae* families in the area shall be harvested at the end of August, at the end of the vegetation period from the ROW and shall be stored nearby the construction site. * Stones and rocks of 30 cm or larger on the soil shall be stored nearby the construction site, without mixing them with the top soil. **Post-Construction** * The stored stones and rocks shall be spread on top of the soil for ants nesting at the end of the excavation according to the methodology. * The harvested plants, containing eggs shall be transferred to the area and spread on the soil.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed. The presence of Sanguisorba sp., which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The counting of feeding plants should be done and the numbers should be recorded in the first 3 years. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. It should be monitored that the stones with 30cm and larger those were placed near ROW were taken into the ROW and dumped 5-10cm into the soil.	-Vegetation cover of Sanguisorba sp. in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year -Population of the *Phengaris nausithous* species should be; -“rare” *in the end of 1. year* -“low” in the end of 2. and other monitoring years. -The number of nests (especially *Myrmica* species) under stones on ROW should be; -at least %10 in the 1. year	-Adult individual monitoring between 1 July – 30 August in the 1., 2., 3., 5., 7. and 10. year -Larvae monitoring between 20 August – 15 September in the 1., 2., 3. years	Once in every two weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. **Adult Butterfly Monitoring Scheme Methodology** The counting of the species should be done along the 400m long transect line. Slow walking at the same speed should be performed along the transect for 45-60 minutes. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. **Butterfly Larvae Monitoring Methodology and Basic Principles** Larvae observations and countings will provide information on the presence of species.Although the count of larvae does not provide sufficient information on the prediction of population size of the species, it will give information about the population during the monitoring. These studies should be performed by an expert on zoology and an assistant researcher.	-at least %30 in the 2. year -at least %50 in the 3. year -at least %70 in the 5. year of the number of nests in the areas adjacent to ROW.			

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					The vegetation status of the critical habitat should be observed before the larvae observation and count. The presence of Sanguisorba sp., which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The feeding plant of the species should be observed and counted along the construction corridor in the critical habitat. The location of feeding plants in the critical habitat should be recorded with GPS. The location of feeding plants in the critical habitat should be shown in a map. In the first year of the monitoring, the determined feeding plants should be observed and if there is larvae on them, larvaes should be counted and their location should be shown in a map. In the second year of monitoring, the feeding plants determined in the first year should be observed and also new feeding plants should be observed in the critical habitat, if there is larvae on them, larvaes should be counted and their location should be be shown in a map. In the third year of monitoring, the feeding plants determined in the previous years should be observed and also new feeding plants should be observed in the critical habitat, if there is larvae on them, larvaes should be counted and their location should be be shown in a map. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The photographs of the critical habitat and larvae of the species should be taken. The details on the monitoring day should be recorded onto larvae survey form.				

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Zonitis nigriventris	**Closed Construction Period:** 1 June-1 July **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * Tall plants belonging to the *Compositae*, *Labiatae*, *Leguminosae* families in the area shall be harvested at the end of August, at the end of the vegetation period from the ROW and shall be stored nearby the construction site. **Post-Construction** * The harvested plants, containing eggs shall be transferred to the area and spread on the soil.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. The vegetation status of the critical habitat should be observed before the monitoring of the species. The presence of species of Compositae, Labiatae, Leguminosae family, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the 400m long 5 transect lines. The samples of species should be captured by using sweep net. The monitoring should be done by slow walking at the same speed along the transect lines for 60 minutes between hours 09.30-17.30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The samples should be collected to determine if the species is critical or not.	- No invasive plant species on ROW - Vegetation cover of species of Compositae, Labiatae, Leguminosae family in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year - Population of the *Zonitis nigriventris* species should be at least “low” in the monitoring years.	Between 1 June - 30 July	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
14	203+945-204+724	Critical Habitat (CH14)	*Zonitis nigriventris*	**Closed Construction Period:** 1 June-1 July **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * Tall plants belonging to the *Compositae*, *Labiatae*, *Leguminosae* families in the area shall be harvested at the end of August, at the end of the vegetation period from the ROW and shall be stored nearby the construction site. **Post-Construction** * The harvested plants, containing eggs shall be transferred to the area and spread on the soil.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. The vegetation status of the critical habitat should be observed before the monitoring of the species. The presence of species of Compositae, Labiatae, Leguminosae family, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the 400m long 1 transect line. The samples of species should be captured by using sweep net. The monitoring should be done by slow walking at the same speed along the transect lines for 60 minutes between hours 09.30-17.30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The photographs of the critical habitat and individials should be taken during the monitoring. These studies should be performed by an expert on zoology and an assistant researcher.	- No invasive plant species on ROW - Vegetation cover of species of Compositae, Labiatae, Leguminosae family in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year - Population of the *Zonitis nigriventris* species should be at least “low” in the monitoring years.	Between 1 June - 30 July	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form.				
15	215+900-220+656	Critical Habitat (CH15)	*Montivipera wagneri*	**Closed Construction Period:** 1 June-1 July **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * *Montivipera wagneri* individuals shall be carried to the appropriate and close areas by specialists according to the methodology and to the (38 T 268212.00-4446232.00) coordinates at the begining of the July. * Stones and rocks of 30 cm or larger on the soil shall be stored nearby the construction site, without mixing them with the top soil. **Post-Construction** * The stored stones and rocks shall be spread to the ROW by embedding them in 5-10 cm soil, in accordance with the methodology.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Reptilian Monitoring Methodology** **Transect Surveys** Ideally, transect survey should meet the following assumptions: Transect lines should be selected arbitrarily. All samples on the transect lines should be observed. Individuals should not be counted more than once in or between the transect lines. Expperts should do the survey 12 m apart from each other along the linear transect line. 500m long transects at the start, center and end of the critical habitat should be monitored for 90 minutes at early hours between 06:00-10:00. Experts observe within the area of 1m in each side of transect, also high quality habitats (where natural shelters are located) can be included in 10m each side of transect. In daytime hours, natural shelters should be observed between hours 10::00-16:00. The rocks, stones or other materials whose underneath was observed should be replaced to their original location to minimize the disturbance. The head of captured individuals should be photographed from side and top and they should be let free. Photographs are compared and re-counting of the same individuals should be avoided.	Presence of nests under rocks and stones on ROW, detection of individuals of species, at least “rare” population level	May - June - July	Once in a month	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					The following information should be recorded for identification: Expert, day and time, species, identification method, age of captured individual (infant, pre-adult adult), surface type (stone, stock, naked surface) and location in transect. These studies should be performed by an expert on herpetology and an assistant researcher.				
			Polyommatus merhaba	**Closed Construction Period: 1 June-1 July** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * The seeds of *Onobrychis* and *Astragalus* flora species shall be collected from the ROW between 15 July – 30 August. * Stones and rocks of 30 cm or larger on the soil shall be stored nearby the construction site, without mixing them with the top soil. **Post-Construction** * The stored stones and rocks shall be spread to the ROW by embedding them in 5-10 cm soil, in accordance with the methodology.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed. The presence of species of Onobrychis and Astragalus, which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The number of individuals of feeding plants should be recorded in first 3 years. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. It should be monitored that the stones with 30cm and larger those were placed near ROW were taken into the ROW and dumped 5-10cm into the soil. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. **Adult Butterfly Monitoring Scheme Methodology**	-Vegetation cover of Onobrychis and Astragalus in the ROW should be; -at least %10 in the 1. year -at least %25 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. Year -Population of the *Polyommatus merhaba* species should be; -“rare” *in the end of 1. year* -“low” in the end of 2. and other monitoring years. -The number of nests (especially *Myrmica* species) under stones on ROW should be; -at least %10 in the 1. year -at least %30 in the 2. year -at least %50 in the 3. year -at least %70 in the 5. year of the number of nests in the areas adjacent to ROW.	Between 15 July - 30 August	Once in fifteen days	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					Adult individuals of the species should be counted on 4 transect lines those will be determined in the critical habitat by walking for 45-60 minutes. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. Each individual should be counted for one time.				
16	307+380-313+386	Critical Habitat (CH17)	*Vanellus gregarius*	**Closed Construction Period: March, and between 15 September-30 October** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * The riparian vegetation, aquatic and semi aquatic areas shall be rehabilitated.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. This species has a regional distribution in the world and has quite low population. The majority of the population are seen in open grasslands in Russia and Kazakhstan. They put three to five eggs into ground nests. They elect their Insects and other small prey from pasture lands or farmlands. There is continuing decline in their population due to habitat fragmentation and loss. They use our country as migration route during migration season. **Monitoring Methodology** Site observations and counting should be done at the points in the critical habitat during migration seasons March and September for one day. Vantage point survey technique	Detection of 1 or more individuals in the observation area	March and 15th of September-30th of October	Twice a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio n Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					should be used in the observations. 3 vantage points should be determined to do the observation and counting. The observations should be done for 45 minutes at each point in the period 2 hours after sunrise. Binoculars and telescope should be used during the observations. These studies should be performed by an expert on zoology and an assistant researcher. The following information on the observed individuals should be recorded onto survey form; the aim of area usage, counts, duration of area usage.				
17	389+036-392+485	Critical Habitat (CH19)	*Polyommatus antidolus*	**Pre-Construction** * 20 cm of top soil of the ROW (which is ant's nest depth) shall be scraped 15 days before the construction works and shall be stored along one side of the ROW. * The stones and rocks shall be stored nearby the construction site. * The seeds of the plants of the *Onobrychis* and *Astragalus* genus, which are the food plants of the larvae, shall be collected between 15 July – 30 August. **Post-Construction** * Stone and rock restoration shall be done according to the methodology * The collected seeds of the *Onobrychis* and *Astragalus* plants shall be planted to the ROW and to the (37 S 625818.65-4418259.08 /37 S 626292.01-4418397.42 / 37 S 626832.86-4418541.91 /37 S 627342.77-4418689.28 / 37 S 628381.92-4419157.26) coordinates between September-November.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed. The presence of species of Onobrychis, Astragalus and Ononis spinosa, which are feeding plants of the species, should be detected along the construction corridor in the critical habitat. The number of individuals of feeding plants should be recorded in first 3 years. If the vegetation cover and presence of feeding plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. It should be monitored that the stones with 30cm and larger those were placed near ROW were taken into the ROW and dumped 5-10cm into the soil. These studies should be performed by an expert on zoology and an assistant researcher. **Adult Butterfly Monitoring Scheme Methodology** Adult individuals of the species should be counted on 5 transect lines those will be determined in the critical habitat by walking	-Vegetation cover of *Onobrychis*, *Astragalus* and *Ononis spinosa* in the ROW should be; -at least %10 in the 1. year -at least %20 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. Year -Population of the *Polyommatus antidolus* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years. -The number of nests (especially *Myrmica* species) under stones on ROW should be; -at least %10 in the 1. year -at least %30 in the 2. year -at least %50 in the 3. year -at least %70 in the 5. year of the	Adult Survey between 10 July - 30 August	In every 15 days	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio n Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					for 45-60 minutes. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form.	number of nests in the areas adjacent to ROW.			
18	395+974-396+824	Critical Habitat (CH20)	*Zonitis nigriventris*	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * Tall plants belonging to the *Compositae*, *Labiatae*, *Leguminosae* families in the area shall be harvested at the end of August, at the end of the vegetation period and shall be stored nearby the construction site. **Post-Construction** * The harvested plants, containing eggs shall be transferred to the area and spread on the soil.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. The vegetation status of the critical habitat should be observed before the monitoring of the species. The presence of species of Compositae, Labiatae, Leguminosae family, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert.	- No invasive plant species on ROW - Vegetation cover of species of Compositae, Labiatae, Leguminosae family in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year	Between 1 June - 30 July	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the 400m long 1 transect line. The samples of species should be captured by using sweep net. The monitoring should be done by slow walking at the same speed along the transect lines for 60 minutes between hours 09.30-17.30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The samples should be collected to determine if the species is critical or not.	- Population of the *Zonitis nigriventris* species should be at least "low" in the monitoring years.			
19	453+943-456+605	Critical Habitat (CH22)	*Polyommatus actis*	**Pre-Construction** * The seeds of *Onobrychis* and *Astragalus* species shall be collected along one side of the ROW between 15 July-15 August. * 20 cm of top soil of the ROW (which is ant's nest depth) shall be scraped together with rocks and stones 15 days before the construction works and shall be stored along one side of the ROW. **Post-Construction** * The collected seeds of *Onobrychis* and *Astragalus* species shall be planted according to the methodology and to the (37 S 576028.17-4425766.25 / 37 S 576523.38-4425039.53 / 37 S 576546.39-4423957.85) coordinates on the ROW between September-November. * The stones and rocks shall be re-organized on top of the soil according to the methodology.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed. The presence of species of Onobrychis, Astragalus, Coronilla and Fabaceae, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The number of individuals of feeding plants should be recorded in first 3 years. If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1	-Vegetation cover of *Onobrychis*, *Astragalus*, Coronilla and Fabaceae in the ROW should be; -at least %10 in the 1. year -at least %20 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. Year -Population of the *Polyommatus actis* species should be; -"rare" *in the end of 1. year*	Between 20 June - 20 August	In every 15 days	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. It should be monitored that the stones with 30cm and larger those were placed near ROW were taken into the ROW and dumped 5-10cm into the soil. These studies should be performed by an expert on zoology and an assistant researcher. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. **Adult Butterfly Monitoring Scheme Methodology** Adult individuals of the species should be counted on 2 transect lines those will be determined in the critical habitat by walking for 45-60 minutes. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The photographs of the critical habitat and individials should be taken during the monitoring.	-“low” in the end of 2. and other monitoring years. -The number of nests (especially *Myrmica* species) under stones on ROW should be; -at least %10 in the 1. year -at least %30 in the 2. year -at least %50 in the 3. year -at least %70 in the 5. year of the number of nests in the areas adjacent to ROW.			
20	520+252-523+585	Critical Habitat (CH23)	*Polyommatus actis*	**Closed Construction Period: 1 May-1 June** **Pre-Construction**	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be	-Vegetation cover of *Onobrychis*, *Astragalus*, Coronilla and	Between 20 June - 20 August	In every 15 days	The Interim First Findings in the Monthly

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				* The seeds of *Onobrychis* and *Astragalus* species shall be collected between 1 July-1 August. * 20 cm of top soil of the ROW (which is ant's nest depth) shall be scraped together with rocks and stones 15 days before the construction works and shall be stored along one side of the ROW. **Post-Construction** * The collected seeds of *Onobrychis* and *Astragalus* species shall be planted according to the methodology and to the (37 S 523732.00-4427059.00 / 37 S 523091.00-4426900.00 / 37 S 522478.00-4426726.00 / 37 S 522307.00-4426273.00 / 37 S 521915.00-4425841.00) coordinates to the ROW between September-November. * The stones and rocks shall be re-organized on top of the soil according to the methodology.	performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. In the first year of monitoring of the species in the critical habitat, vegetation status of the area should be observed. The presence of species of Onobrychis, Astragalus, Coronilla and Fabaceae, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The number of individuals of feeding plants should be recorded in first 3 years. If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. It should be monitored that the stones with 30cm and larger those were placed near ROW were taken into the ROW and dumped 5-10cm into the soil. These studies should be performed by an expert on zoology and an assistant researcher. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. **Adult Butterfly Monitoring Scheme Methodology** Adult individuals of the species should be counted on 400m logn 3 transect lines those will be determined in the critical habitat by walking for 45-60 minutes. The hours when butterflys area most active are 3.5 hours after sunrise and 3.5 hours before sunset. Thus, monitoring hours should be between hours 09:30 – 17:30. The weather temperature of the monitoring day should be above 13°C. If the weather temperature is between 13-17°C, the weather should be sunny and cloud cover should be 50% or less. If the weather temperature is above 17°C, cloud cover can be more than 50%. The wind should be 5 or less according to Beafort scale which is accepted as	Fabaceae in the ROW should be; -at least %10 in the 1. year -at least %20 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. Year -Population of the *Polyommatus actis* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years. -The number of nests (especially *Myrmica* species) under stones on ROW should be; -at least %10 in the 1. year -at least %30 in the 2. year -at least %50 in the 3. year -at least %70 in the 5. year of the number of nests in the areas adjacent to ROW.			Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					wind causing movement of medium sized tree branches and leafs of small trees. The area covering 2.5 m length in left and right sides and 5 m length in front and back of the observer is the counting area and the individuals in this area should be counted. The individuals in the counting area should be counted by observing. The photographs of the critical habitat and individials should be taken during the monitoring.				
21	637+009-637+035	Critical Habitat (CH31)	*Hexatoma n. sp.*	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * The riparian vegetation shall be restored and aquatic and semi-aquatic areas shall be re-created.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The river crossing and riparian vegetation status of the crossing in the critical habitat should be observed before the monitoring of the species. If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. Transect surveys should be done along the riparian vegetation in the critical habitat for 45 minutes between hours 09:30 – 17:30. The samples of species should be captured by using sweep net. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing	- Water flow in the river is at the same level before construction - Vegetation cover in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year -Population of the *Hexatoma n. sp.* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.	Between 1 May - 25 June	In every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					movement of medium sized tree branches and leafs of small trees. The samples should be collected to determine if the species is critical or not.				
			Tipula n.sp	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * The riparian vegetation shall be restored and aquatic and semi-aquatic areas shall be re-created.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The river crossing and riparian vegetation status of the crossing in the critical habitat should be observed before the monitoring of the species. If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. These studies should be performed by an expert on zoology and an assistant researcher. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. Transect surveys should be done along the riparian vegetation in the critical habitat for 45 minutes between hours 09:30 – 17:30. The samples of species should be captured by using sweep net. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The photographs of the critical habitat and individials should be taken during the monitoring.	- Water flow in the river is at the same level before construction - Vegetation cover in the ROW should be; -at least %10 in the 1. year -at least %20 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. Year -Population of the *Tipula n.sp*. species should be*;* -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.	Between 20 May - 15 July	In every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
22	654+103-656+981	Critical Habitat (CH32)	*Tipula n.sp*	**Closed Construction Period: 1 May-1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** *The stored top soil should be laid back in 3 months at the latest. *Habitat should be restored.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The river crossing and riparian vegetation status of the crossing in the critical habitat should be observed before the monitoring of the species. If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. These studies should be performed by an expert on zoology and an assistant researcher. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the 3 transect lines. The samples of species should be captured by using sweep net. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The photographs of the critical habitat and individials should be taken during the monitoring.	- Water flow in the river is at the same level before construction - Vegetation cover in the ROW should be; -at least %10 in the 1. year -at least %20 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. Year -Population of the *Tipula n.sp*. species should be*;* -“rare” *in the end of 1. year* -“low” in the end of 2. and other monitoring years.	Between 20 May - 15 July	In every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.
23	658+103-658+534	Critical Habitat (CH33)	*Tipula n.sp*	**Closed Construction Period: 1 May-1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction**	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively.If the individuals of species are not determined in at	- Water flow in the river is at the same level before construction - Vegetation cover in the ROW should be;	Between 20 May - 15 July	In every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				*The stored top soil should be laid back in 3 months at the latest. *Habitat should be restored.	least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The river crossing and riparian vegetation status of the crossing in the critical habitat should be observed before the monitoring of the species. If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. These studies should be performed by an expert on zoology and an assistant researcher. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the transect line. The samples of species should be captured by using sweep net. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The photographs of the critical habitat and individials should be taken during the monitoring.	-at least %10 in the 1. year -at least %20 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. Year -Population of the *Tipula n.sp.* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.			conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.
24	662+456-662+559	Critical Habitat (CH34)	*Tipula n.sp*	**Closed Construction Period: 1 May-1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** *The stored top soil should be laid back in 3 months at the latest. *Habitat should be restored.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The river crossing and riparian vegetation status of the crossing in the critical habitat should be observed before the monitoring of the species. If the vegetation cover and presence of plants are not at desired level in the monitoring	- Water flow in the river is at the same level before construction - Vegetation cover in the ROW should be; -at least %10 in the 1. year -at least %20 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. Year	Between 20 May - 15 July	In every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. These studies should be performed by an expert on zoology and an assistant researcher. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the transect line. The samples of species should be captured by using sweep net. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The photographs of the critical habitat and individials should be taken during the monitoring.	-Population of the *Tipula n.sp.* species should be*;* -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.			of all site visits.
25	663+309-663+812	Critical Habitat (CH35)	*Tipula n.sp*	**Closed Construction Period: 1 May-1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** *The stored top soil should be laid back in 3 months at the latest. *Habitat should be restored.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The river crossing and riparian vegetation status of the crossing in the critical habitat should be observed before the monitoring of the species. If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. These studies should be performed by an expert on zoology and an assistant researcher. The weather conditions (temperature, cloudness and wind), number of individuals,	- Water flow in the river is at the same level before construction - Vegetation cover in the ROW should be; -at least %10 in the 1. year -at least %20 in the 2. year -at least %40 in the 3. year -at least %60 in the 5. Year -Population of the *Tipula n.sp.* species should be*;* -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.	Between 20 May - 15 July	In every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio n Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the transect line. The samples of species should be captured by using sweep net. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. The individuals in the counting area should be counted by observing. Each individual should be counted for one time. The photographs of the critical habitat and individials should be taken during the monitoring.				
26	687+002-687+037	Critical Habitat (CH36)	*Dysmachus safranboluticus*	**Closed Construction Period: 1 May-1 June** **Pre-Construction** * Herbaceous plants shall be harvested and 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. **Post-Construction** * Harvested herbaceous plants, which carried *Dysmachus safranboluticus*'s eggs, shall be laid on the top soil.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The vegetation status of the critical habitat should be observed before the monitoring of the species. The presence of species of Poaceae family, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of Poaceae species are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the transect line. The samples of species on the Poaceae plants should be captured by using sweep net Transect surveys should be done along the critical habitat for 30 minutes between hours	- No invasive plant species on ROW - Vegetation cover of species of Poaceae family in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year - Population of the *Dysmachus safranboluticus* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.	Between 15 May - 30 June	Once in every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					09:30 – 17:30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring.				
27	687+313-687+352	Critical Habitat (CH37)	*Dysmachus safranboluticus*	**Closed Construction Period: 1 May-1 June** **Pre-Construction** * Herbaceous plants shall be harvested and 10-15 cm of top soil of the ROW shall be scraped and stored along one side of the ROW. **Post-Construction** * Harvested herbaceous plants, which carried *Dysmachus safranboluticus*'s eggs, shall be laid on the top soil.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The vegetation status of the critical habitat should be observed before the monitoring of the species. The presence of species of Poaceae family, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of Poaceae species are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the transect line. The samples of species on the Poaceae plants should be captured by using sweep net. Transect surveys should be done along the critical habitat for 30 minutes between hours 09:30 – 17:30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees.	- No invasive plant species on ROW - Vegetation cover of species of Poaceae family in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year - Population of the *Dysmachus safranboluticus* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.	Between 15 May - 30 June	Once in every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring.				
28	749+987-753+060	Critical Habitat (CH45)	*Dysmachus safranboluticus*	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * Herbaceous plants shall be harvested and stored along one side of the ROW. **Post-Construction** * Harvested herbaceous plants, which carried *Dysmachus safranboluticus*'s eggs, shall be laid on the top soil.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The vegetation status of the critical habitat should be observed before the monitoring of the species. The presence of species of Poaceae family, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of Poaceae species are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the 400m long 3 transect lines. The samples of species on the Poaceae plants should be captured by using sweep net. Transect surveys should be done along the critical habitat for 60-90 minutes between hours 09:30 – 17:30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring.	- No invasive plant species on ROW - Vegetation cover of species of Poaceae family in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year - Population of the *Dysmachus safranboluticus* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.	Between 15 May - 30 June	Once in every 2 weeks	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio n Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
29	805+749-805+816	Critical Habitat (CH46)	*Hexatoma n. sp.*	**Closed Construction Period: 1 May-15 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * *Juncus* species individuals shall be removed and transferred at the (37 S 276993.99-4415718.69) coordinates. **Post-Construction** * Riparian vegetation, aquatic and semi aquatic vegetation shall be restored. * *Juncus* species removed individuals shall be transferred on the ROW.	**General Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** It should be observed that the Juncus species those were taken out of ROW before construction activities are taken into ROW. If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the transect line. The samples of Hexatoma n. sp. should be captured by using sweep net. Transect surveys should be done along the critical habitat for 45 minutes between hours 09:30 – 17:30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring.	- *Juncus sp.* should be in ROW - Vegetation cover in the ROW should be; -at least %20 in the 1. year -at least %30 in the 2. year -at least %40 in the 3. year -at least %70 in the 5. Year - Population of the *Hexatoma n. sp.* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.	Between 1 May - 25 June	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.
30	805+842-806+143	Critical Habitat (CH47)	*Hexatoma n. sp.*	**Closed Construction Period: 1 May-15 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * *Juncus* species individuals shall be removed and transferred at the (37 S 276993.99-4415718.69) coordinates.	**General Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years.	- *Juncus sp.* should be in ROW - Vegetation cover in the ROW should be; -at least %20 in the 1. year	Between 1 May - 25 June	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * Riparian vegetation, aquatic and semi aquatic vegetation shall be restored. * *Juncus* species removed individuals shall be transferred on the ROW.	**Monitoring Methodology** It should be observed that the Juncus species those were taken out of ROW before construction activities are taken into ROW. If the vegetation cover and presence of plants are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the transect line. The samples of Hexatoma n. sp. should be captured by using sweep net. Transect surveys should be done along the critical habitat for 45 minutes between hours 09:30 – 17:30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring.	-at least %30 in the 2. year -at least %40 in the 3. year -at least %70 in the 5. Year - Population of the *Hexatoma n. sp.* species should be; -“rare” *in the end of 1. year* -“low” in the end of 2. and other monitoring years.			and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.
31	818+756-818+768	Critical Habitat (CH48)	*Hilara n. sp. 3*	**Pre-Construction** * The riparian vegetation at the creek bank between the (815+368-815+380) KP’s shall be scraped at a depth of 10-15 cm as a layer and stored at the creek side. **Post-Construction** * The riparian vegetation shall be restored between the (815+368-815+380) KP's and the creek flow shall be provided again.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The river crossing and riparian vegetation status of the crossing in the critical habitat should be observed before the monitoring of the species. Water should be following in the creek bed which is flying area of the species. If the water flow and riparian vegetation cover are not at desired level in the monitoring	- Water flow in the river is at the same level before construction - Riperian vegetation cover in the ROW should be; -at least %50 in the 1. year -at least %70 in the 2. year -at least %80 in the 3. year -at least %90 in the 5. Year	Between 1 May - 25 June	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					years, the monitoring should be extended for 1 more year. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. Transect surveys should be done along the riparian vegetation in the critical habitat for 45 minutes between hours 09:30 – 17:30. The samples of Hilara sp. flying over the creek should be captured by using sweep net. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring.	-Population of the *Hilara n. sp. 3* species should be*;* -"low" *in the end of 1. year* -"high" in the end of 2. and other monitoring years.			
32	849+409-849+612	Critical Habitat (CH49)	*Dioctria n. sp. 2*	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction**	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The vegetation status of the critical habitat should be observed before the monitoring of the species. The presence of species of Poaceae family, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of Poaceae species are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be	- No invasive plant species on ROW - Vegetation cover of species of Poaceae family in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year - Population of the *Dioctria n. sp. 2* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.	Between 1 June - 30 July	Once in every week	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	**Frequency**	**Reporting**
					observed along the transect line. The samples of species on the Poaceae plants should be captured by using sweep net. Transect surveys should be done along the critical habitat for 45-60 minutes between hours 09:30 – 17:30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring.				
			Dysmachus safranboluticus	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * Herbaceous plants shall be harvested at the (846+021-846+224) KP's and stored along one side of the ROW. **Post-Construction** * Harvested herbaceous plants, which carried the eggs of *Dysmachus safranboluticus*, shall be laid on the top soil.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The vegetation status of the critical habitat should be observed before the monitoring of the species. The presence of species of Poaceae family, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of Poaceae species are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the transect line. The samples of species on the Poaceae plants should be captured by using sweep net.	- No invasive plant species on ROW - Vegetation cover of species of Poaceae family in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year - Population of the *Dysmachus safranboluticus* species should be; -“rare” *in the end of 1. year* -“low” in the end of 2. and other monitoring years.	Between 15 May - 30 June	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					Transect surveys should be done along the critical habitat for 45-60 minutes between hours 09:30 – 17:30. No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring.				
34	1378+873 - 1379+216	Critical Habitat (CH60)	*Dioctria n. sp. 1*	**Closed Construction Period: 1 May-1 June** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * The stored top soil shall be laid again in 3 months.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The vegetation status of the critical habitat should be observed before the monitoring of the species. The presence of species of Poaceae family, which are resting and feeding plants of the species, should be detected along the construction corridor in the critical habitat. The determination if the vegetation cover and species diversity are at desired level should be done by a botanic expert. If the vegetation cover and presence of Poaceae species are not at desired level in the monitoring years, the monitoring should be extended for 1 more year. The weather conditions (temperature, cloudness and wind), number of individuals, the day of monitoring, name of the expert etc. should be written onto the survey form. The individuals in the critical habitat should be observed along the transect line. The samples of species on the Poaceae plants should be captured by using sweep net. Transect surveys should be done along the critical habitat for 45-60 minutes between hours 09:30 – 17:30.	- No invasive plant species on ROW - Vegetation cover of species of Poaceae family in the ROW should be; -at least %20 in the 1. year -at least %40 in the 2. year -at least %50 in the 3. year -at least %60 in the 5. Year - Population of the *Dioctria n. sp. 1* species should be; -"rare" *in the end of 1. year* -"low" in the end of 2. and other monitoring years.	Between 15 May - 30 June	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					No monitoring should be done at bad weather conditions (high winds, rainy, cloudy). The wind should be 5 or less according to Beafort scale which is accepted as wind causing movement of medium sized tree branches and leafs of small trees. These studies should be performed by an expert on zoology and an assistant researcher. The photographs of the critical habitat and individials should be taken during the monitoring.				
35	1746+722 - 1748+567	Critical Habitat (CH64)	*Phalacrocorax carbo*	**Closed Construction Period: 01 February-30 March** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The species agglomerate in this area in January-February for wintering. Thus, site observations and counting should be done at the points in February-March for one day. Vantage point survey technique should be used in the observations. The observations should be done for 45 minutes at each point in the period 2 hours after sunrise. Binoculars and telescope should be used during the observations. These studies should be performed by an expert on zoology and an assistant researcher. The following information on the observed individuals should be recorded onto survey form; the aim of area usage, counts, duration of area usage.	Detection of 30 individuals in the observation area during wintering counting	February - March	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Phalacrocorax pygmeus	**Closed Construction Period: 01 February-30 March** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The species agglomerate in this area in January-March and use the critical habitat for wintering. Thus, site observations and counting should be done at the points in February-March for one day. Vantage point survey technique should be used in the observations. The observations should be done for 45 minutes at each point in the period 2 hours after sunrise. Binoculars and telescope should be used during the observations. These studies should be performed by an expert on zoology and an assistant researcher. The following information on the observed individuals should be recorded onto survey form; the aim of area usage, counts, duration of area usage.	Detection of 10 individuals in the observation area during wintering counting	February - March	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.
36	1751+367 - 1751+767	Critical Habitat (CH65)	*Spermophilus citellus*	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * If the construction works start in March 2015; and if *Spermophilus citellus* individuals will be seen, they shall be carried to the appropriate and close areas by specialists according to the methodology. **Post-Construction** * The stored top soil shall be laid again in 3 months. * If *Spermophilus citellus* individuals will be seen, they shall be carried to the appropriate and close areas by specialists according to the methodology.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** This species is widely present in grasslands shorter than 10-15cm in steppes. In order to determine the presence and population of species in the critical habitat, nest holes should be observed. If nests are observed, Tomahawk trap technique should be used. The presence of the species in the critical habitat should be determined by the surveys done in the entire critical habitat. Even though this species was not observed in the inventory studies before, their presence is expected since appropriate distribution and habitat conditions are observed. 15 tomahawk	Detection of nest holes and individuals in the area	Between May - June	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					trap should be placed if the track of the species is observed and the survey should be done for 2 trap-days. The traps should be placed at 08:00 which is the starting hour of species activity and taken away before sunset. The tails of captured individuals should be painted with acetate pen to prevent re-counting. These studies should be performed by an expert on zoology and an assistant researcher. The monitoring should be done by the same team in at least first 3 years in order to have standard evaluation.				
37	1798+567 - 1798+767	Critical Habitat (CH66)	*Myomimus roachi*	**Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. * If the construction works start in March 2015; and if *Myomimus roachi* individuals will be seen, they shall be carried to the appropriate and close areas by specialists according to the methodology. **Post-Construction** * The stored top soil shall be laid again in 3 months. * If *Myomimus roachi* individuals will be seen, they shall be carried to the appropriate and close areas by specialists according to the methodology.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** In order to determine the presence and population of species in the critical habitat, sherman trap technique should be used. The traps are placed around the trunk of old oaks. At least 50 traps should be placed during the study and the duration of the study should be at least 2 trap-days. Traps should be placed just before the sunset and should be taken away just after the sunrise The tails of captured individuals should be painted with acetate pen to prevent re-counting. These studies should be performed by an expert on zoology and an assistant researcher. The monitoring should be done by the same team in at least first 3 years in order to have standard evaluation.	Capturing 1 individual around critival habitat	May	Once in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.
38	1810+871 - 1815+289	Critical Habitat (CH67)	*Phalacrocorax carbo*	**Closed Construction Period: 01 February-30 March** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * The stored top soil shall be laid again in 3 months. * The habitat shall be rehabilitated.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology**	Counting 150 or more individuals in a counting day	February - March	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					The species agglomerate in this area in January-February for wintering.Thus, site observations and counting should be done at the points in February-March for one day. Vantage point survey technique should be used in the observations. The observations should be done for 45 minutes at each point in the period 2 hours after sunrise. Binoculars and telescope should be used during the observations. These studies should be performed by an expert on zoology and an assistant researcher. The following information on the observed individuals should be recorded onto survey form; the aim of area usage, counts, duration of area usage.				n Monitoring Report in 45 days after the completion of all site visits.
			Microcarbo (=Phalacrocorax)	**Closed Construction Period: 01 February-30 March** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * The stored top soil shall be laid again in 3 months. * The habitat shall be rehabilitated.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The species agglomerate in this area in January-March and use the critical habitat for wintering. Thus, site observations and counting should be done at the points in February-March for one day. Vantage point survey technique should be used in the observations. The observations should be done for 45 minutes at each point in the period 2 hours after sunrise. Binoculars and telescope should be used during the observations. These studies should be performed by an expert on zoology and an assistant researcher. The following information on the observed individuals should be recorded onto survey form; the aim of area usage, counts, duration of area usage.	Counting 50 or more individuals in a counting day	February - March	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoratio n Monitoring Report in 45 days after the completion of all site visits.
			Cygnus olor	**Closed Construction Period: 01 February-30 March** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at	Counting 2,000 or more individuals in a counting day	Between January - February	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * The stored top soil shall be laid again in 3 months. * The habitat shall be rehabilitated.	least one of the counting years, the counting should be continued for at least 2 more years. **Bird Monitoring Methodology** The species use the critical habitat for wintering. Thus, site observations and counting should be done at the points in January-February for one day. Vantage point survey technique should be used in the observations. The observations should be done for 45 minutes at each point in the period 2 hours after sunrise. These studies should be performed by an expert on zoology and an assistant researcher. The following information on the observed individuals should be recorded onto survey form; the aim of area usage, counts, duration of area usage.				study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.
			Cygnus cygnus	**Closed Construction Period: 01 February-30 March** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW. **Post-Construction** * The stored top soil shall be laid again in 3 months. * The habitat shall be rehabilitated.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at least one of the counting years, the counting should be continued for at least 2 more years. **Bird Monitoring Methodology** The species use the critical habitat for wintering. Thus, site observations and counting should be done at the points in January-February for one day. Vantage point survey technique should be used in the observations. The observations should be done for 45 minutes at each point in the period 2 hours after sunrise. Binoculars and telescope should be used during the observations. These studies should be performed by an expert on zoology and an assistant researcher. The following information on the observed individuals should be recorded onto survey form; the aim of area usage, counts, duration of area usage.	Counting 2,000 or more individuals in a counting day	Between January - February	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.
			Pelecanus onocrotalus	**Closed Construction Period: 01 February-30 March** **Pre-Construction** * The top soil shall be scraped at a depth of 10-15 cm and shall be stored along one side of the ROW.	**Basic Principles** In order to determine the presence and population of species in the critical habitat, counting of the individuals should be performed in first 3 years successively and then in 5th, 7th and 10th year successively. If the individuals of species are not determined in at	Counting 50 or more individuals in a counting day	Between January - February	Twice in a year	The Interim First Findings in the Monthly Report in which the monitoring

No	Specific Location and KP	Importance of Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievement Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				Post-Construction * The stored top soil shall be laid again in 3 months. * The habitat shall be rehabilitated.	least one of the counting years, the counting should be continued for at least 2 more years. **Monitoring Methodology** The species use the critical habitat for wintering. Thus, site observations and counting should be done at the points in February - March for one day. Vantage point survey technique should be used in the observations. The observations should be done for 45 minutes at each point in the period 2 hours after sunrise. Binoculars and telescope should be used during the observations. These studies should be performed by an expert on zoology and an assistant researcher. The following information on the observed individuals should be recorded onto survey form; the aim of area usage, counts, duration of area usage.				study is conducted and Annual Biorestoration Monitoring Report in 45 days after the completion of all site visits.

APPENDIX B.3 TERRESTRIAL FAUNA MONITORING TABLE

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
1	Kura River (72+666-72+711)	Freshwater Critical Habitats (FCH1)	-	*No activities should be carried out in the spawning periods (end of April-begining of July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of determined aquatic species and their diversity after construction	At the end of July-beginning of August	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna	-	Fish species will be captured once a year (in summer period) by electroshock in shallow regions and by fyke net in deeper regions in order to determine the fish species' population densities in construction region before activities have started, after the relevant data has been obtained captured species will be released again.	There is no significant change in population densities of determined aquatic species in river and their diversity after construction	At the end of July-beginning of August	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
2	Unknown Creek (167+465-167-586)	Freshwater Critical Habitats (FCH2)	-	*No activities should be carried out in the spawning periods (end of April-begining of July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of determined aquatic species and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season by fish species	In breeding period; May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna	-	Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species in river and their diversity after construction	In breeding period; May-July	Once per year	
3	Süngütaşı River (221+192-221+226)	Freshwater Critical Habitats (FCH3)	-	*No activities should be carried out in the spawning periods (end of April-begining of July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in	In breeding period; May-July	Once per year	In 30 days after each survey

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				*Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.		population densities of determined aquatic species and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season by fish species			
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species in river and their diversity after construction	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
4	Kızıllararkı River (270+699-270+715)	Freshwater Critical Habitats (FCH4)	-	*No activities should be carried out in the spawning periods (end of April-begining of July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of determined aquatic species and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season by fish species	In breeding period; May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species in river and their diversity after construction	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
5	Büyükdere River (281+421-281+434)	Freshwater Critical Habitats (FCH5)	-	*No activities should be carried out in the spawning periods (end of April-begining of July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of determined aquatic species and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season by fish species	In breeding period; May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna	-	Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
6	Abıtçayırlığı River (333+917-333+932)	Freshwater Critical Habitats (FCH6)	-	*No activities should be carried out in the spawning periods (end of April-begining of July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of determined aquatic species and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season by fish species	In breeding period; May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	
7	Baş River (355+704-355+733)	Freshwater Critical Habitats (FCH7)	-	*No activities should be carried out in the spawning periods (end of April-begining of July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in	In breeding period; May-July	Once per year	In 30 days after each survey

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				*Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.		population densities of determined aquatic species and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season by fish species			
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	
8	Karasu River (375+027-375+177)	Freshwater Critical Habitats (FCH8)	-	*No activities should be carried out in the spawning periods (end of April-begining of July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of determined aquatic species and their diversity after construction	At the end of July-beginning of August	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in summer period) by electroshock in shallow regions and by fyke net in	There is no significant change in population densities of determined aquatic	At the end of July-beginning of August	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					deeper regions in order to determine the fish species' population densities in construction region before activities have started, after the relevant data has been obtained captured species will be released again.	species and their diversity after construction			
9	Değirmendere River (506+877-506+891)	Freshwater Critical Habitats (FCH9)	-	*No activities should be carried out in the spawning periods (end of April-begining of July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of determined aquatic species and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season by fish species	In breeding period; May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
10	Unknown Creek-Öğütlü Village (510+622-510+634)	Freshwater Critical Habitats (FCH10)	*Oxyneomacheilus kosswigi*	**No activities should be carried out for Salmonid between December-November; for* Oxynemacheilus kosswigi *between May-June in the spawning periods (end of April-begining of July).* **Control sediment release into the river bed.* **Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing.* **Avoid impacts and removal to gravel areas at the crossing.* **Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.*	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *O. kosswigi* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season, especially by *Oxyneomacheilus kosswigi*	In breeding period for *O. kosswigi;* May-July	Once per year	In 30 days after each survey
			Salmo trutta (Syn:Salmo macrostigma)	*No activities should be carried out for Salmonid between December-November; for *Oxynemacheilus kosswigi* between May-June in the spawning periods (end of April-begining of July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *S. trutta* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation	In breeding period for *S. trutta;* November-December	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
						5. Using this area during the breeding season, especially by *S. trutta*			
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured twice a year (in breeding period for Cyprinidae and Balitoridae, May-July; in breeding period for Salmonidae, November-December) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period for Cyprinidae and Balitoridae, May-July; in breeding period for Salmonidae, November-December	2 times per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
11	Hafik (713+204-713+286)	Freshwater Critical Habitats (FCH11)	*Gobio obtusirostris*	*No activities should be carried out in the spawning periods (April-July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *G. obtusirostris* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season, especially by *G. obtusirostris*	In breeding period for *G. obtusirostris*, May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
12	Yıldız River (766+754-766+774)	Freshwater Critical Habitats (FCH12)	-	*No activities should be carried out in the spawning periods (April-July). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of determined aquatic species and their diversity after construction	At the end of July-beginning of August	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	
13	Delice River (986+945-986+432)	Freshwater Critical Habitats (FCH13)	*Cobitis simplicispinna*	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *C. simplicispinna* and their diversity after construction 4. Situation of the	In breeding period for *C. simplicispinna*; May-July	Once per year	In 30 days after each survey

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
						bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season, especially by *C. simplicispinna*			
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	
14	Kılıçözü River (1040+654-1040+663)	Freshwater Critical Habitats (FCH12)	*Cobitis simplicispinna*	*No activities should be carried out in the spawning periods (April-June) *Control sediment release into the river bed. *Manage all construction activities to the maximum extent possible in order to avoid or minimize soil erosion, sedimentation and impacts to aquatic and riparian vegetation at the crossing.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *C. simplicispinna* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season, especially by *C. simplicispinna*	In breeding period for *C. simplicispinna*; May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock,	There is no significant change in population densities of determined aquatic	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
					after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	species and their diversity after construction			
15	Kızılırmak River (1093+394-1093+484)	Freshwater Critical Habitats (FCH15)	-	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of determined aquatic species and their diversity after construction	At the end of July-beginning of August	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in summer period) by electroshock in shallow regions and by fyke net in deeper regions in order to determine the fish species' population densities in construction region before activities have started, after the relevant data has been obtained captured species will be released again.	There is no significant change in population densities of determined aquatic species and their diversity after construction	At the end of July-beginning of August	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
16	Sakarya River (1222+948-1222+983)	Freshwater Critical Habitats (FCH16)	-	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of determined aquatic species and their diversity after construction	At the end of July-beginning of August	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in summer period) by electroshock in shallow regions and by fyke net in deeper regions in order to determine the fish species' population densities in construction region before activities have started, after the relevant data has been obtained captured species will be released again.	There is no significant change in population densities of determined aquatic species and their diversity after construction	At the end of July-beginning of August	Once per year	
17	Seydi Stream (1321+758-1321780)	Freshwater Critical Habitats (FCH17)	*Cobitis simplicispinna*	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *C. simplicispinna* and their diversity after	In breeding period for *C. simplicispinna*; May-July	Once per year	In 30 days after each survey

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
				minimize downstream sedimentation.		construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season, especially by *C. simplicispinna*			
			Gobio obtusirostris	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *G. obtusirostris* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season, especially by *G. obtusirostris*	In breeding period for *G. obtusirostris*; May-July	Once per year	
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
18	Seydi Creek (1329+399-1329+429)	Freshwater Critical Habitats (FCH18)	*Cobitis simplicispinna*	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *C. simplicispinna* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season, especially by *C. simplicispinna*	In breeding period for *C. simplicispinna*; May-July	Once per year	In 30 days after each survey
			Gobio obtusirostris	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *G. obtusirostris* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding	In breeding period for *G. obtusirostris*; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
						season, especially by *G. obtusirostris*			
			Chondrostoma angoranse	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *C. angoranse* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season, especially by *C. angoranse*	In breeding period for *C. angoranse*; May-July	Once per year	
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
19	Tributary of Uludere (1375+754 - 1375+770)	Freshwater Critical Habitats (FCH19)	*Gobio obtusirostris*	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *G. obtusirostris* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area, especially *G. obtusirostris* during the breeding season	In breeding period for *G. obtusirostris*; May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
20	Tributary of Kocasu Stream-Soğucak (1467+963 - 1468+019)	Freshwater Critical Habitats (FCH20)	*Oxyneomacheilus simavica*	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Manage all construction activities to the maximum extent possible in order to avoid or minimize soil erosion, sedimentation and impacts to aquatic and riparian vegetation at the crossing.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *O. simavica* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season especially by *O. simavica*	In breeding period for *O. simavica*; May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	

<table>
<tr><th rowspan="2">No</th><th rowspan="2">Spesific Location and KP</th><th rowspan="2">İmportance of the Area</th><th rowspan="2">SCC Species</th><th rowspan="2">Mitigation Measures</th><th rowspan="2">Monitoring Methodology After Biorestoration</th><th rowspan="2">Achievemnt Criteria</th><th colspan="3">Monitoring</th></tr>
<tr><th>Monitoring Period</th><th>Frequency</th><th>Reporting</th></tr>
<tr><td rowspan="2">21</td><td rowspan="2">Aliova Stream (1562+671 - 1562+704)</td><td rowspan="2">Freshwater Critical Habitats (FCH21)</td><td>Oxyneomacheilus simavica</td><td>*No activities should be carried out in the spawning periods (April-June).
*Control sediment release into the river bed.
*Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing.
*Avoid impacts and removal to gravel areas at the crossing.
*Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.</td><td>1. Habitat Control (Comparison of situations before and after construction period)
2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)</td><td>1. Situation of the habitat is similar to previous situation
2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction
3. There is no significant change in population densities of O. simavica and their diversity after construction
4. Situation of the bottom structure is similar and/or close to previous situation
5. Using this area during the breeding season especially by O. simavica</td><td>In breeding period for O. simavica; May-July</td><td>Once per year</td><td rowspan="2">In 30 days after each survey</td></tr>
<tr><td>Distribution of Individuals of Freshwater Fauna</td><td></td><td>Fish species will be captured once a year (in breeding season) by electroshock in shallow regions and by fyke net in deeper regions in order to determine the fish species' population densities in construction region before activities have started, after the relevant data has been obtained captured species will be released again.</td><td>There is no significant change in population densities of determined aquatic species and their diversity after construction</td><td>In breeding period; May-July</td><td>Once per year</td></tr>
</table>

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
22	Sarp Creek (1574+842 - 1574+862)	Freshwater Critical Habitats (FCH22)	*Cobitis fahirae*	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Manage all construction activities to the maximum extent possible in order to avoid or minimize soil erosion, sedimentation and impacts to aquatic and riparian vegetation at the crossing.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *C. fahirae* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season especially by *C. fahirae*	In breeding period for *C. fahirae*; May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding period, May-July) by electroshock, after the relevant data (species and individual numbers) has been obtained captured species will be released again after construction period	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	
23	Simav Stream (1599+266 - 1599+339)	Freshwater Critical Habitats (FCH23)	*Oxyneomacheilus simavica*	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Manage all construction activities to the maximum extent possible in order to avoid or minimize soil erosion, sedimentation and impacts to aquatic and riparian vegetation at the crossing.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no	In breeding period for *O. simavica*; May-July	Once per year	In 30 days after each survey

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
						significant change in population densities of *O. simavica* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season especially by *O. simavica*			
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding season) by electroshock in shallow regions and by fyke net in deeper regions in order to determine the fish species' population densities in construction region before activities have started, after the relevant data has been obtained captured species will be released again.	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	
24	Mürvetler Stream (1614+378 - 1614+403)	Freshwater Critical Habitats (FCH24)	*Oxyneomacheilus simavica*	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *O. simavica, C. fahirae* and *C. puncticulata* and their diversity after construction 4. Situation of the	In breeding period for *O. simavica*, *C. fahirae* and *C. puncticulata*; May-July	Once per year	In 30 days after each survey

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
			Cobitis puncticulata	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.		bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season especially by *O. simavica*, *C. fahirae* and *C. puncticulata*			
			Cobitis fahirae	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.					
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding season) by electroshock in shallow regions and by fyke net in deeper regions in order to determine the fish species' population densities in construction region before activities have started, after the relevant data has been obtained captured species will be released again.	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
25	Manyas-Kocacay Stream (1622+338 - 1622+397)	Freshwater Critical Habitats (FCH25)	*Cobitis puncticulata*	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Manage all construction activities to the maximum extent possible in order to avoid or minimize soil erosion, sedimentation and impacts to aquatic and riparian vegetation at the crossing.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *C. fahirae* and *C. puncticulata* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season especially by *C. fahirae* and *C. puncticulata*	In breeding period for *C. fahirae* and *C. puncticulat a*; May-July	Once per year	In 30 days after each survey
			Cobitis fahirae	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Manage all construction activities to the maximum extent possible in order to avoid or minimize soil erosion, sedimentation and impacts to aquatic and riparian vegetation at the crossing.					
			Distribution of Individuals of Freshwater Fauna	.	Fish species will be captured once a year (in breeding season) by electroshock in shallow regions and by fyke net in deeper regions in order to determine the fish species' population densities in construction region before activities have started, after the relevant data has been obtained captured species will be released again.	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
26	Gönen Stream (1661+511 - 1661+561)	Freshwater Critical Habitats (FCH26)	*Anguilla anguilla*	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *A. anguilla* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season especially by *A. anguilla*	In breeding period for *A. anguilla*; May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna	.	Fish species will be captured once a year (in breeding season) by electroshock in shallow regions and by fyke net in deeper regions in order to determine the fish species' population densities in construction region before activities have started, after the relevant data has been obtained captured species will be released again.	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	

No	Spesific Location and KP	İmportance of the Area	SCC Species	Mitigation Measures	Monitoring Methodology After Biorestoration	Achievemnt Criteria	Monitoring		
							Monitoring Period	Frequency	Reporting
27	Biga Stream (1699+822 - 1699+876)	Freshwater Critical Habitats (FCH27)	*Cobitis fahirae*	*No activities should be carried out in the spawning periods (April-June). *Control sediment release into the river bed. *Minimize construction activities to avoid or minimize soil erosion, sedimentation and impacts to riparian vegetation at the crossing. *Avoid impacts and removal to gravel areas at the crossing. *Install silt screens and sediment traps prior to initiating construction crossing activities and maintain the screens and traps during the crossing to prevent or minimize downstream sedimentation.	1. Habitat Control (Comparison of situations before and after construction period) 2. The presence of bentic and fish species of aquatic species (Comparison of situations before and after construction period)	1. Situation of the habitat is similar to previous situation 2. Situation of coastal region which contain riparian vegetation is similar and/or close to previous conditions after construction 3. There is no significant change in population densities of *C. fahirae* and their diversity after construction 4. Situation of the bottom structure is similar and/or close to previous situation 5. Using this area during the breeding season especially by *C. fahirae*	In breeding period for *C. fahirae*; May-July	Once per year	In 30 days after each survey
			Distribution of Individuals of Freshwater Fauna		Fish species will be captured once a year (in breeding season) by electroshock in shallow regions and by fyke net in deeper regions in order to determine the fish species' population densities in construction region before activities have started, after the relevant data has been obtained captured species will be released again.	There is no significant change in population densities of determined aquatic species and their diversity after construction	In breeding period; May-July	Once per year	

APPENDIX C.1 SAMPLE SITE SELECTION METHODOLOGY

ESTIMATION OF SAMPLE NUMBER AND SAMPLE LOCATION FOR SPECIES COMPOSITION ASSESSMENT

1.0 PURPOSE

The Vegetation Cover and Species Diversity procedure is based on a random stratified sampling process where a pre-determined number of sampling locations are randomly selected from within defined strata that in turn comprise the project area. This Appendix describes the approach used to define these strata and select random locations for sampling.

The resulting sampling locations will be permanent, i.e. they will be used repeatedly throughout the monitoring programme to measure vegetation cover and species diversity.

2.0 METHODOLOGY

The number of sampling points will be determined according to the following methodology:

1. Assigning scores to each habitat based on:
   - Relative variability;
   - Sensitivity; and
   - Relative length.
2. Computing the weighted overall score for each habitat type
3. Distributing the total number of samples deemed feasible within a sampling period into the selected habitats

2.1 Assigning Scores

2.1.1 Relative Variability Score

The exact variability among species composition within each stratum is not known, and therefore a relative variability value was determined for each habitat type using professional judgment and pre-construction survey data, and scored as follows:

Score	1	2	3
Relative Variability	Low Variability	Medium Variability	High Variability

2.1.2 Sensitivity Score

Each habitat will be assigned a sensitivity score. This score will be computed as an average of sub-scores assigned to each habitat on:

1. Species richness
2. Naturalness and level of modification
3. Human disturbance
4. Rarity and geographical location of habitat
5. Vegetation regrowth potential

The following scoring system will then be applied:

Score	3	2	1
Species richness	High species richness noted or likely to occur. Endemic or threatened species included in the Georgian Red Data Book and/or IUCN Red List recorded or likely to be present	Medium species diversity. Few rare or threatened species	Very low species diversity and almost no threatened species that may be affected
Naturalness and level of modification	Natural or slightly modified habitats	Moderately modified habitats e.g. those which can still support characteristic species assemblages	Heavily modified habitats
Human disturbance	Very little or no human disturbance	Little human disturbance	High human disturbance (heavy grazing, forest felling, etc.)
Rarity and geographical location of habitat	Rare or endangered habitat in the country or region.	Not so common habitat in the region	Common habitat. Areas near human settlements
Vegetation Regrowth potential	Very insufficient water and organic matter. Thus low germination rate and very difficult for the germinated plant to complete its life cycle.	Suitable climatic conditions but top soil deficient of enough organic matter. Difficult for vegetation reproductive material to colonize the area	Suitable climatic conditions, good top soil and easy for seeds to arrive to the area, or the top soil contains easily reproducing vegetation material

FOR EXAMPLE: for Pinus Brutia Habitat Type, the Sensitivity Score is calculated as follows:

1.	Species richness Score:	2
2.	Naturalness and level of modification Score:	3
3.	Human Disturbance Score:	2
4.	Rarity and geographical location of habitat Score:	1
5.	Vegetation Regrowth Potential Score:	2

Average Sensitivity Score for Pinus Brutia Forest Habitat Type (2+3+2+1+2)/5 = **2**

2.1.3 Relative Length Score

Although an estimated variability score will be factored into the sensitivity score, relative length will also be considered important when distributing the sampling points to different habitats. The scoring is as follows:

Score	1	2	3
Habitat Length	1-10 km	10-100 km	Over 100 km

2.1.4 Calculating the Weighted Overall Score

It is considered that the relative variability is far more important in determining sample size than relative length which in turn is more important than sensitivity. This is reflected by the following weighting factors:

Weighting	0.7	0.1	0.2
Scores Types	Relative Variability	Sensitivity	Relative Length

EXAMPLE:
the weighted overall score for *Pinus brutia* Forest would be:
Relative variability Score: 2
Sensitivity Score: 2
Relative Length Score: 2
(0.7*2) + (0.1*2) + (0.2*2) = 1.4 + 0.2 + 0.4 = **2.0**

2.1.5 Calculating number of samples per habitat

The number of samples per habitat will be calculated as follows:

n_1 = number of sample points for habitat 1
WS = Weighted Score
N = Total number of sample points along the pipeline

$$n_1 = \frac{WS \times N}{\Sigma WS}$$

EXAMPLE:
for *Pinus brutia*

$$n_{PB} = \frac{2 \times 110}{42.68} = 5$$

i.e., there will be 5 sampling locations for *Pinus brutia* habitat.

2.2 Selection of Sampling Locations on the ROW

The approach stratifies the sampling area twice: once into separate habitat types (as described above), and the second time into sub-strata that reflect local issues. Three distinct strata were defined within each habitat:

1. CHs

2. Steep Slopes
3. Other areas

A sampling point will be chosen randomly for each of the sub-strata. This will be done by specifying the starting and ending KPs of the sub-stratum to a random number generator, and asking the software to choose a random KP number as a sampling point e.g., GraphPad software [http://graphpad.com/quickcalcs/random N1.cfm](http://graphpad.com/quickcalcs/random_N1.cfm)

> EXAMPLE:
> for Non-riverine woodland with Betula, Populus tremula or Sorbus aucuparia habitat, CH3 runs between KPs 20+977 to 23+277
> In the Generate Integers option, the range is specified as:
> From: 20977 to 23277
> And the software is run.
> An integer like 21547 will appear on the results screen which equates to a sampling point at KP 21+547 for CH3 under the woodland with Betula, Populus tremula or Sorbus aucuparia.

If there are more than one CHs in the same Habitat Type, then the starting KP of the first one and the finishing KP of the last one must be given as from and to range. The first random number that falls within any of the CHs will be our sampling point.

> EXAMPLE:
> For Habitat A, there is CH B from KP 1 to 5 and CH C from KP 10 to 15. To find the sampling location the software is provided with a range of from 1 to 15 and asked for a range of results.
> If the software comes up with numbers such as:
> 6; 9; 7; 4; 14 etc…, the first number that falls into our CH KPs, which is 4, is chosen. So the sampling location will be at KP 4.

If a Habitat Type has more than 4 allocated sampling locations, then the remaining sampling locations will be chosen following the below random numbers table from 1 to 4, starting from Row 1.

Random Numbers Table from 1 to 4

Row #	**For Habitat Type 1**	**For Habitat Type 2**	**For Habitat Type 3**	**For Habitat Type 4**	**For Habitat Type 5**	**For Habitat Type 6**	**Etc…**
Sample Point 5	1	3	1	4	4	2	2
Sample Point 6	4	4	3	4	3	3	3
Sample Point 7	3	2	1	3	4	2	3
Sample Point 8	1	4	3	1	1	4	4
Sample Point 9	4	1	3	1	4	4	2

For example, if there are 8 points to sample, according to the above table, sample points would be chosen as follows:

Sampling Point #	**Stratum Chosen within a Habitat Type**
1	1. CH
2	3. Steep Slope
3	4. Other areas
4	1. CH
5	3. Steep Slope
6	1. CH
7	4. Other areas

If the sampling point falls in a location such as the middle of a river or the middle of a road where sampling is physically impossible, then the sampling will be done at the predetermined KP+10m. Should the this new sampling point fall outside the intended habitat type, then the alternative sampling point will be the predetermined KP -10m.

2.3 Off-ROW Sample Size and locations

There are four different off-ROW area types. These are:

1. Access Roads;
2. Aggregates: Burrow Pits, Quarries;
3. Pipe Storage Areas; and
4. Camp sites/ yards.

The sample size for each of the above mentioned area types should be determined according to:

1. The total number of samplings that can be performed; and
2. The relative surface area each of the area types occupy.

The samples taken from these locations will be in addition to the ones taken for the habitat types along the ROW.

Once the sample size is determined, the sample locations will again be chosen randomly.

The length of the access roads will be added end to end and the sampling points from those access roads will be selected randomly. The sampling procedure will be similar to that of the ROW.

APPENDIX C.2: SITE RECORDS

SITE ASSESSMENT PROFORMA

Location: Country……………………….. KP…………………. Elevation…………………………..

GPS co-ordinates: Transect Start ……. ……. …….…… ………..….End………….. ………………….

Transect Number……………..Bearing (from Quadrat):………..…..............................Aspect…………

Habitat……………………. ………………………….…..Erosion class………... ………………………..

Slope (degrees)……………..…………………….. Run-on/off……………………………………………

Micro-topography: none……………..…few……………..….common …………..…..abundant…………..

Surface drainage: poor……………..…moderate……………..….good …………..…..very good…………..

Landscape Setting (ESA, IBA etc)…………………………………………………………………………..

Evidence of grazing or other forms of disturbance………………………………………………………...

………..

Operator…..……………………….……..Date…………………………….Time………………………..

GPS Coordinates (includes example of required information and format):

Requirement	Example		Site data
Coordinate System	UTM		
Zone	37		
Datum	European Datum 1950 (ED50)		
Coordinates	X (Start)	264550	
	Y (Start)	4150156	
	X (End)	264555	
	Y (End)	4150202	

Transect ID: Quadrat Measurement:
Species Diversity (SD) / Vegetation Cover (VC):

	General	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
Photo ID:									
Distance from Starting point (m)									
Vegetation Cover		Off RoW			On RoW[1]				
Percent cover									

Species	Sp. ID#[2]	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8

[1] Input the median value for each range (0-10%: 5, 11-20%: 15, 21-30%, 25, etc). Refer to Appendix C for visual guide.
[2] To be completed after all the field data collection is complete.

Species	Sp. ID#[2]	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8

Total species recorded:…….. # of Species Off RoW:…………# of Species on RoW:……….

Total species occurring both off and on the RoW:……………..

% species occurring off and on the RoW: ……………………..

Photographic Numbering Format

The following numbering format shall be used for all photos of transects and quadrats. The number shall be recorded on the whiteboard which in turn shall be placed in the foreground of the field of view of each photograph.

NNN	A or NA	AAAAAA	NNNNN
1	2	3	4

(Where A is a letter and N is a numeral)

1. Transect number
2. Quadrat number (**A**ll), Q1, Q2, Q3, Q4, Q5, Q6, Q7, Q8
3. Date of recording (Day, Month, Year)
4. Unique Sequence Number

Example: 001-Q4-050917-001.jpg

Transect #1, Quadrat 4, 5 of September 2017, photo 00001.

The GIS Team shall responsible for providing links from geographical locations of transect points to relevant folders.

APPENDIX C.3 SITE ASSESSMENT CHECKLIST

Pre-Field Checklist (after application of Appendix A)

- Verify that chosen site is within the habitat required (potential discrepancy between habitat mapping and alignment sheets)
- Merge transect co-ordinates with GIS-based map, and upload to GPS
- Verify that the chosen site is accessible using existing access roads and "on-foot" approach to sampling point.
- Check pre-construction survey records (where they exist) and note pre-disturbed conditions, especially vegetation cover
- Pack Equipment as per the Equipment List

Task	Confirmation
• Locate relevant KP marker (as per random number selection process) using GPS	
• Identify boundary of disturbed/undisturbed areas	
• ROW: Determine which side the off-ROW quadrats will be located (taking account of disturbance, habitat representativeness, access, etc). • If habitats either side of ROW very different, sample both using longer transect and more quadrats	
• ROW: Place transect tape perpendicular to ROW (for forest areas place tape parallel to the ROW). Short end to be 1-2 m off ROW, long end ~20m off ROW. • Off ROW site: Place the transect East-West (unless physically constrained).	
• Install permanent markers at both ends of the transect tape. (Avoid metal stakes where these have been used to anchor jute matting).	
• Record GPS co-ordinates of start and end point of transect tape, including datum and projection information • Record compass bearing of transect	
• Collect baseline environmental data (as per form – Appendix B)	
• Determine quadrat size • Determine quadrat interval – on ROW/disturbed area - off ROW/undisturbed area. This will depend on the width of the ROW/area of site/habitat	
• Place quadrats, avoiding running/vehicle tracks if present. • In forest areas delineate off ROW quadrats with red and white tape to enable quadrats to be visible in the photos	
• Record the location (defined by centre point) of each quadrat as a distance (in meters) from the start point of transect (ROW: always the off ROW quadrat farthest from the ROW. In forest areas, Q1 shall be on the positive end of the transect, as per KP sequence)	
• Photograph a) the transect and b) each individual quadrat, having recorded the photo ID on a whiteboard and located the whiteboard in the foreground of each field of view	

• Record plant species in all quadrats (starting with quadrat 1, off ROW/undisturbed site)	
• Record vegetation cover in all quadrats, using 10% intervals (or Braun Blanquet in special circumstances)	
• Record deviations from procedure	
• Remove all field equipment and any discarded objects from site	

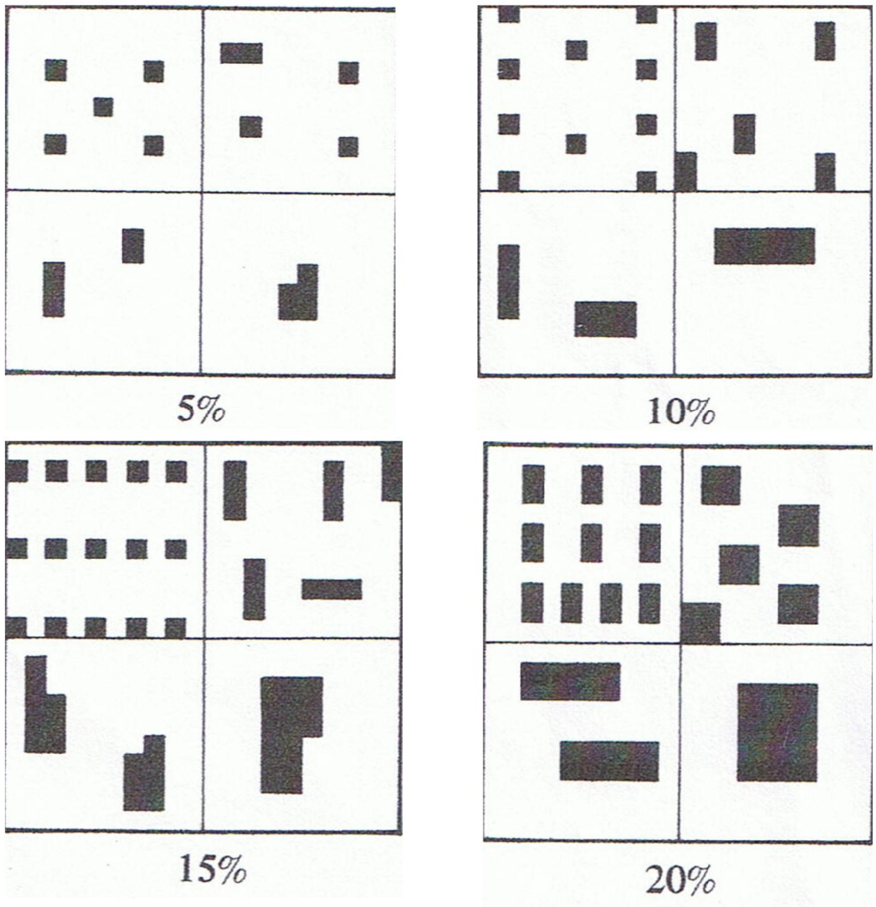
Field Checklist: Second and Subsequent Sampling Rounds

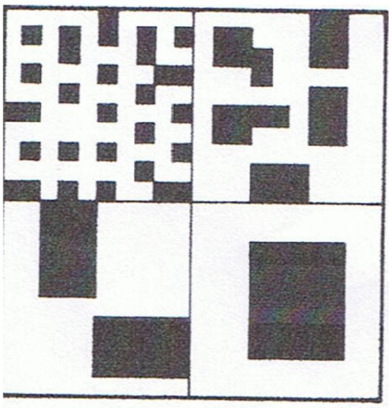
Task	Confirmation
• Relocate beginning and end of transect using GPS/metal detector/ field markers	
• Lay out transect tape	
• Relocate quadrat sites and lay out quadrats	
• Collect baseline environmental data (as per form – Appendix B)	
• Photograph a) the transect and b) each individual quadrat, having recorded photo ID on whiteboard and located the whiteboard in the foreground of each field of view	
• Record plant species in all quadrats (starting with quadrat 1, off ROW/undisturbed area)	
• Record vegetation cover on ROW/disturbed area (where appropriate)	
• Record vegetation cover off ROW/undisturbed area (if on ROW is <70%)	
• Record deviations from procedure	
• Remove all field equipment and any discarded objects from site	

APPENDIX C.4 ESTIMATING PERCENT COVER

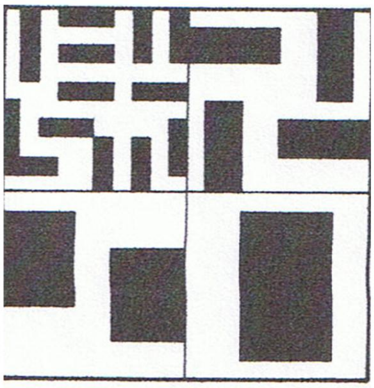
Visual Guide to Estimating Percentage Cover

(Each quarter of the square contains the same amount of black but the arrangement is varied)

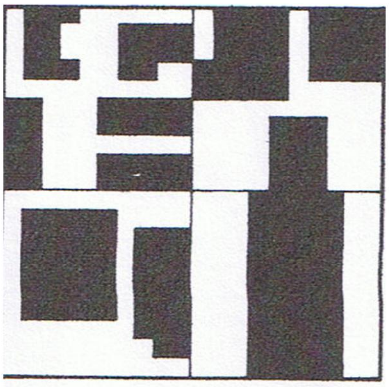




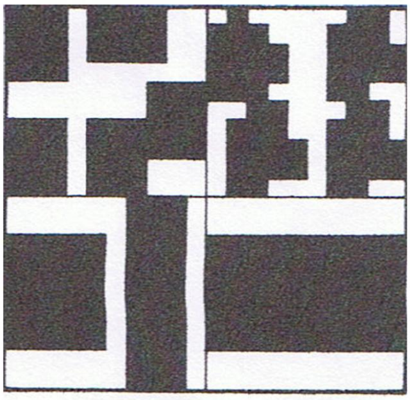
30%



40%



50%

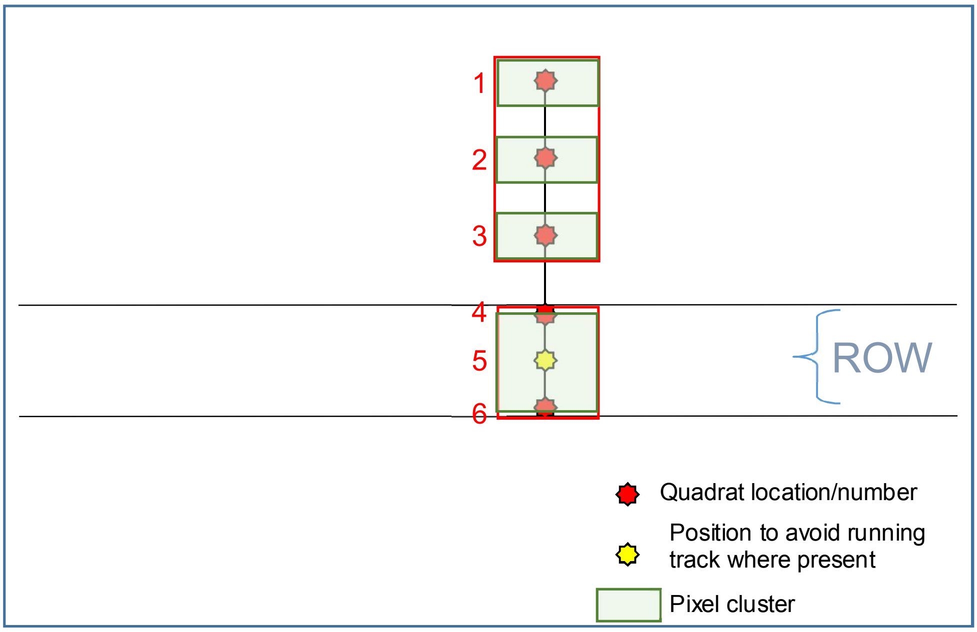


60%

APPENDIX C.5 CALCULATION OF NDVI VALUES

At each transect, an average NDVI value shall be calculated for a cluster of pixels, located to coincide with the transects and quadrats, as shown schematically in below figure. The number and size of the clusters will necessarily vary, depending on the source of the satellite data[1], the width of the ROW, and the presence, location and width of the ROW running track, where these have not been removed for reasons of security.

Location of Pixel Clusters with respect to Transects and Quadrats



The field and NDVI data shall then be used to complete the below table.

Raw Vegetation Cover Data

Transect Number	X (Independent variable)	Y (Dependent variable)	X_1 (Independent variable)	Y_1 (Dependent variable)
	Average VC (off ROW)	Average NDVI (off ROW)	Average VC (on ROW)	Average NDVI (on ROW)[1]
1				
2				
50				

A series of statistical procedures and tests shall then be performed to determine the correlation between the field measurements of vegetation cover and NDVI values and subsequently, vegetation cover values. These can be performed using Excel.

[1] For instance SPOT MSS pixels are 10m x 10m whereas QuickBird is 2.44 x 2.44 and IKONOS 3.2 x 3.2m

Initially the statistical analyses shall be performed on the X and Y values, then the X_1 and Y_1 values and finally the combined data set X, X_1 and Y, Y_1, as the results and therefore the margins of error or confidence limits are likely to vary, and these variations will need to be taken into account when interpreting the results.

Bivariate scatter plot

Objective: Confirm (or otherwise) the hypothesised positive, generally linear relationship between vegetation cover and NDVI values.

Using the data in above table a bivariate scatter plot shall be derived, with percent ground cover the independent variable (x) and NDVI being the dependent variable (y). This scatter plot will provide a graphical expression of the relationship of the two variables and hence the degree of linearity. It will also help to identify any outliers[2]. If the scatter plot indicates a non-linear relationship, then a multiple regression will need to be considered.

Correlation coefficient, r

Objective: Determine the strength and significance of the relationship between vegetation cover and NDVI values

In order to determine the degree to which a linear model describes the relationship between two variables the *Pearson Product-Moment Correlation Coefficient* (*r*), or correlation coefficient, shall be calculated. An *r* value of -1.00 represents a perfect <u>negative correlation</u>, a value of +1.00 represents a perfect <u>positive correlation</u> and a value of 0.00 represents a lack of correlation.

From this the significance of the relationship shall be determined, expressed as the deviation of *r* from zero, by evaluating the ratio r/(S.E. of r) and equating this to t with (N-2) degrees of freedom.

The result shall then be used to test the null hypothesis described above.

<u>Normalization</u>

Objective: Normalization of NDVI values derived from different satellite images.

NDVI values are influenced by the spectral boundaries of the bands used to derive the index (typically bands 3 and 4). The wavelengths of the bands vary slightly from satellite to satellite and therefore it is necessary to normalise the data sets before comparing NDVI values. Geoeye data was selected as the based data set and SPOT and Ikonos images normalised accordingly, using the following equations:

- SPOT NDVI to QuickBird NDVI: y = 0.8642*x + 0.1762 (x: spot; y: quickbird)
- Ikonos NDVI to SPOT NDVI: y = 0.9008*x + 0.0447 (x: ikonos; y: spot)
- Ikonos NDVI to QuickBird NDVI: y = 0.8642*(0.9008*x + 0.0447) + 0.1762 (x: ikonos; y: quickbird)
- Geo Eye NDVI to Spot NDVI: y = 0.9508*x + 0.0447 (x: Geoeye; y: Spot)

Regression analysis

[2] Because of the way in which the regression line is determined (especially the fact that it is based on minimizing not the sum of simple distances but the sum of *squares of distances* of data points from the line), outliers have a profound influence on the slope of the regression line and consequently on the value of the correlation coefficient. A single outlier is capable of considerably changing the slope of the regression line and, consequently, the value of the correlation. The smaller the sample size, the greater the effect of the outlier

Objective: Determine equivalent NDVI values for vegetation cover intervals (0-10%, 11-20%, etc).

The goal of a *Linear Least-squares Regression*[3], is to fit a line of best fit through the points displayed on the scatter plot (i.e., the data recorded in Table 5.3), such that squared deviations of the observed points from the line are minimized. This line is represented by:

$$Y=a+b*X$$

i.e., the Y variable can be expressed in terms of a constant (a) and a slope (b) times the X variable. The constant is also referred to as the intercept, and the slope as the regression coefficient or B coefficient.

This will allow NDVI values to be calibrated against field measurements of vegetation cover, i.e, for a given NDVI value, a corresponding vegetation cover (Y) value can be determined via the derived regression equation.

Coefficient of determination, R^2

Objective: Calculate the extent to which the percentage of variation in Y is associated with variation in X.

The squared correlation coefficient (R^2) is the proportion of variance in Y that can be accounted for by knowing X. Conversely, it is the proportion of variance in X that can be accounted for by knowing Y (Box 1). The advantage of R^2 is that, when multiplied by 100, it indicates the percentage of variation in *Y* associated with variation in *X*. Thus, for example, when $r = 0.71$ about 50% ($R^2 = 0.504$) of the variation in Y is due to the variation in *X*.

Once the NDVI data have been calibrated using field data, a set of maps shall be generated using the project GIS. These maps shall depict vegetation cover at 10 % intervals.

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[3] As the name implies, a linear regression, assumes that the relationship between variables is linear. In practice this assumption can virtually never be confirmed; fortunately, multiple regression procedures are not greatly affected by minor deviations from this assumption. However, as a rule it is prudent to *always* look at bivariate scatterplot of the variables of interest, as advocated above.

BOX 1: Interpreting R^2 and Assessing Significance

The regression line expresses the best prediction of the dependent variable (Y), given the independent variables (X). However, in reality, very little is (if ever) perfectly predictable, and usually there is substantial variation of the observed points around the fitted regression line (as in the scatterplots). The deviation of a particular point from the regression line (its predicted value) is called the residual value.

The smaller the variability of the residual values around the regression line relative to the overall variability, the better the prediction. For example, if there is no relationship between the X and Y variables, then the ratio of the residual variability of the Y variable to the original variance is equal to 1.0. If X and Y are perfectly related then there is no residual variance and the ratio of variance would be 0.0. In most cases, the ratio would fall somewhere between these extremes, that is, between 0.0 and 1.0. 1.0 minus this ratio is referred to as R-square or the coefficient of determination. This value is immediately interpretable in the following manner. If we have an R-square of 0.4 then we know that the variability of the Y values around the regression line is 1-0.4 times the original variance; in other words we have explained 40% of the original variability, and are left with 60% residual variability. Ideally, we would like to explain most if not all of the original variability. The R-square value is an indicator of how well the model fits the data (e.g., an R-square close to 1.0 indicates that we have accounted for almost all of the variability with the variables specified in the model).

In the above example, is 40% of the explained variance between two variables enough to consider the relation significant? The answer is "it depends."

Significance depends mostly on the sample size. In very large samples, even very small relations between variables will be significant, whereas in very small samples even very large relations cannot be considered reliable (significant). Thus, in order to determine the level of statistical significance, we need a function that represents the relationship between "magnitude" and "significance" of relations between two variables, depending on the sample size. The function we need would tell us exactly "how likely it is to obtain a relation of a given magnitude (or larger) from a sample of a given size, assuming that there is no such relation between those variables in the population." In other words, that function would give us the significance (p) level, and it would tell us the probability of error involved in rejecting the idea that the relation in question does not exist in the population. This "alternative" hypothesis (that there is no relation in the population) is usually called the null hypothesis.

APPENDIX D TERRESTRIAL FAUNA SURVEY FORMS

Form 1: Fauna (Mammal) Survey Form

Date:…………………………………………… Beginning Time:……………………… Ending Time:…………………………… Critical habitat no:……………………..

Transect beginning UTM/ ending UTM : ……………………………………… Location:………………………………………………………………………………

Height: ……………….. ………………….. No and place on Transect:……………………………………………………...........

Vegetation Cover %: ……………………………………………Plant diversity %:…………………………………………………… Other: ……………………………………………

No	**Detected taxons (Species)**	**Observed Individual Number**	**Detection Medium**	***Recording method**	***Capturing method**	**Dispersion distance (m)**	**Note**
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
Team leader:		**Potential risks:**					
Team members:							

* Recording and capturing method: 1. Observation 2. Trace and sign 3. Phototrap 4. Alive trap 5. Questionnaire

Form 2: Fauna (Bird) Survey Form

Critical Habitat No						
Location/Coordinate						
Observation point or place in transect						
Weather Condition			Observers			
Cloudy			Observation Date			
Rainy			Beginning Time			
Clear			Ending Time			
Sunny			Temperature			
Observed Species						
Species	Number	Flying height	Arrival direction	Going Direction	Activity	Observation Period

Form 3: Fauna (Amphibian-Reptiles) Survey Form

Date:…………………………………………… Beginning Time:……………………… Ending Time:…………………………… Critical habitat no:………………………

Transect beginning UTM/ending UTM : …………………………..……….. Location:……………………………………………………………………… ……

Height: ……………………………………………………………………………. No and place in transect:………………………………………………………..……

Vegetation Cover %: …………………………………………… Plant Diversity %:…………………………………………….. Other: ……………………………………………

No	Detected taxons (Species)	Number of observed individuals	*Detection medium	**Recording method	***Capturing method	Dispersion distance (m)	Note
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
Team leader:		**Potential dangers:**					
Team members:							

* Detection medium: 1. Under rock 2. On the soil 3. Tree body 4.On the stone and rock 5. Waterside 6. Inside water

** Recording method: 1. Observation 2. Sample 3. Trace and sign 4. Questionnaire

*** Capturing method: 1. Manual 2. Digger 3. Stick

Form 4: Fauna (Terrestrial Invertebrates) Survey Form

Date:……………………………………………… Beginning time:……………………… Ending time:………………………… Critical Habitat No:

The location of critical habitat:

Transect no ……… UTM: Beginning: E N Height:

Ending: E N

Beginning time: Ending time: Initial temperature: ˚C Final temperature: ˚C Sun %: Wind:

Vegetation cover %: Plant diversity %: Nutrition plant:

Detected taxons (Species)	Observed adult individuals/number of larvae	*Detection medium	**Recording method	***Capturing method	Nutrition plant	Note

Team leader:	**Potential dangers:**
Team members:	

* Detection medium: 1. Under stone and rock 2. On the soil 3. Tree body 4. Waterside 5. On the flower 6. Droppings

** Recording method: 1. Observation 2. Sampling

*** Capturing method: 1. Manual 2. Atrap 3. Aspirator