Morava Corridor Motorway Project, Serbia

Supplementary Lenders Information Package
Alternatives Analysis

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Disclaimer

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Acronyms and Abbreviations

AA	Alternatives Analysis
BEJV	Bechtel-ENKA Joint Venture
CHA	Critical Habitat Assessment
CoS	Corridors of Serbia
EHS	Environmental, Health and Safety
EP	Equator Principles
E&S	Environmental and Social
EIA	National Environmental Impact Assessment
ESDD	Environmental and Social Due Diligence
ESIA	Environmental and Social Impact Assessment
GoS	Government of the Republic of Serbia
IESC	Independent Environmental and Social Consultant
IFC	International Finance Corporation
JCWI	Jaroslav Cerni Water Institute
MCMP	Morava Corridor Motorway Project
MCTI	Ministry of Construction, Transport and Infrastructure
MIGA	Multilateral Investment Guarantee Agency
PS	Performance Standards
SLIP	Supplementary Lender Information Package
TBC	The Biodiversity Consultancy
UKEF	UK Export Finance

1 Introduction

1.1 Project Summary

The Morava Corridor Motorway Project (the Project or MCMP), a 112 km dual-carriageway tolled motorway, is planned to be developed by the Government of the Republic of Serbia (GoS). The Project links Preljina to Pojate (in central Serbia) and will be connecting to European Transport Corridors 10 and 11.

The Project is located approximately 200 km south of Belgrade in a low-level flood plain running east/ west along the West Morava River Valley. The Project also includes (i) above ground structures such as interchanges, bridges, culverts, over and under passes; (ii) a telecommunication network (digital corridor) supported by power lines, communication cables and substations to connect the planned mobile phone base stations within the motorway (at rest areas, parking lots, and near traffic loops) as well as manage traffic through various traffic control, monitoring and surveillance, and tolling systems; and (iii) river regulation works intended to protect the Project and surrounding areas from flooding. A total of 18 separate hydrotechnical structures are planned for construction, including 'cut-offs' (straightened, channelised sections of river), revetments and reconstruction of embankments. The total length of cut-offs planned is approximately 32.7 km. In addition, temporary facilities to be constructed as part of the Project comprise quarries and borrow pits, camp sites and storage areas, crushers, concrete batching plants and asphalt plants, and access roads.

GoS is the Project Owner and is represented by the Ministry of Finance with, Corridors of Serbia (CoS), on behalf of the Ministry of Construction, Transport and Infrastructure (MCTI), is the overall overseeing entity throughout the construction and expropriation phases of the Project. Another public institution, Roads of Serbia (RoS), will be the operating party for the Project. Bechtel-ENKA joint venture (BEJV) has been selected as the contractor for the design and construction of the Project.

Three separate Environmental Impact Assessment (EIA) reports have been prepared in 2019 to meet the national requirements of Serbia.

The Lender Group is comprised of JP Morgan, UK Export Finance (UKEF) and the Multilateral Investment Guarantee Agency (MIGA) for the financing of the Project. In order to meet the requirements of the financial loan approval, an Environmental and Social Impact Assessment (ESIA) was prepared by 2U1K supported by various experts and institutions.

1.2 Background

Ramboll UK Limited (Ramboll) was appointed as the Lender Independent Environmental and Social Consultant (IESC) in order to assess the compliance and identify any gaps in the ESIA study against the Lender Group Environmental and Social (E&S) requirements, namely International Finance Corporation (IFC) Performance Standards (PS), IFC Environmental, Health and Safety (EHS) Guidelines, and Equator Principles (EP). Within the scope of Ramboll, an Environmental and Social Due Diligence (ESDD) report has been prepared.

Ramboll identified a number of gaps against the Lender Group requirements, and outlined required actions for both ESIA study and associated; the ESIA study was finalised in November 2020 as per the recommendations of the ESDD report. An additional action required the development of additional studies including the Supplementary Lender Information Pack (SLIP), which comprises of the following five deliverables:

- Alternatives Analysis report for aggregate sourcing and GHG emission reduction;
- Traffic impact assessment for aggregate transport;
- Ecosystem services assessment;
- Cultural heritage assessment; and
- Informed Consultation and Participation for River Regulations and Operational Noise Impacts.

In November 2020 RINA Consulting S.p.A. (RINA) was appointed to undertake the aforementioned tasks under the SLIP.

1.3 Objective

This Report covers the SLIP deliverable for Alternatives Analysis (AA) for aggregate sourcing, unsuitable soil deposit sites and GHG emission reduction and presents the following:

- The alternative sources of aggregate considered by the Project, and confirmation and justification for the proposed quarries and borrow areas to be used by the Project;
- The alternative sites to be used as unsuitable soil deposit areas; and
- Alternative options to reduce Project related GHG emissions during design and operation of the Project and identify approaches that will be implemented by the Project.

As a part of this AA study, an extensive review was undertaken of the National EIA Reports, ESIA Report, technical design reports and drawings, as well as ESDD and other related documents in order to review and assess the identified aggregate sources, borrow pits, and GHG emissions.

We note that information and input from The Biodiversity Consultancy (TBC) has informed our study. Principle data provided by TBC comprises Biodiversity Impact Assessment, Critical Habitat Assessment and associated habitat map ‘kmz’ file overlays, to compliment those provided from 2U1K. Consultation with TBC also informed receptor sensitivity scoring for Critical, Natural and Modified Habitat within our impact assessment methodology.

2 Framework and Applicable Standards

2.1 Scope

The scope of the AA study is to help determine:

- the most suitable alternative sources of aggregate and soil deposit areas, from a technical, environmental, and socio-economic perspective.
- alternative options to reduce Project-related GHG emissions during design and operation of the Project, with GHG emissions assessment based on the review and verification of the previous GHG calculations.

For this study, a comprehensive documentation review was carried out; reviewed documents are presented below in Section 2.2.

The approach of the AA for aggregate sourcing and deposit of unsuitable soils follows the impact assessment methodology applied within the ESIA. It incorporates the same E&S constraints considered within the ESIA and applies these to each of the identified alternatives, with a scoring system applied to rank impacts and thereby compare alternatives. Scoring is based on extent, duration, magnitude and likelihood of the impact as well as the sensitivity of the receptor subject to that impact. The assessment of the selected sites, against the environmental and socio-economic indicators, will be presented in a comparative tabular format.

Mapping will be the part of this study. Each aggregate/depository area will be presented together with the constraints (e.g. habitats, settlements, infrastructure, etc.). 2U1K and TBC data inputs (see 1.3 above) are used for generating the maps. Maps are included as Appendix A.

2.2 Reference Documents

The following documentation and information sources were reviewed for the development of this AA report.

- Morava Corridor Motorway Project Environmental and Social Impact Assessment Report (2U1K, 2020)
- Environmental Impact Assessment Studies - Location conditions for the phase construction of the state road A5 (motorway E-761) Pocah - Preshnija, section Poate - Krusevac, from km 0-229,75 to km 27+600.00, na (CIP Traffic Institute, 2019)
- Preliminary design of the E - 761 Pojate - Preljina section: Adrani - Mrčajevci study on environmental impact assessment (various authors, 2019)
- Preliminary design of the E-761 Pojate - Preljina section: Mrčajevci - Preljina study on environmental impact assessment (various authors, undated)
- Morava Corridor Motorway Project Lender's Technical Advisor Report (Ramboll, 2020)
- Morava Corridor Motorway Project Gap Analysis Report (Ramboll, 2020)
- Regulation of the Zapadna Morava River Within the Infrastructure Corridor of the E-761 Motorway ESIA Basic information and key viewpoints (JCWI, 2020)
- Critical Habitat Assessment, Morava Corridor Motorway Project (TBC, 2020)
- Updated Biodiversity Impact Assessment, Morava Corridor Motorway Project (TBC, 2020)

- Resettlement and Livelihood Restoration Framework for Morava Corridor Motorway Project (2U1K, 2020)
- Kmz, Shapefiles and technical documents for the route alignment, facilities and constraints

2.3 Lender Standards and Requirements

Project financing is based on the below Lender Group standards and requirements:

- All host country environmental, health and safety and social laws and regulations, and all ILO conventions for which The Republic of Serbia is a signatory;
- Equator Principles (2013);
- IFC Performance Standards (2012);
- Relevant World Bank Group EHS Guidelines:
  - General Guidelines (2007) including environmental issues; community health and safety; occupational health and safety; construction and decommissioning;
  - Industry specific guidelines for Infrastructure: Toll Roads (2007) and Construction Materials Extraction (2007); and
- OECD Recommendations on Common Approaches for Officially Supported Export Credits and Environmental and Social Due Diligence (the Common Approaches, 2016).

2.4 National Legislation

Serbian procedure and legislation of relevance to borrow pits, deposit areas, waste management and GHG emissions are summarised as follows:

2.4.1 Water quality

- Law on Water (“Official Gazette of RS”, No. 30/210 as amended with 95/18, including adopted decrees as follows:
  - Surface water quality, groundwater and sediment standards - “Official Gazette of RS”, No. 507/12.
  - Limit values of parameters related to general water conditions, oxygen regime, nutrients, salinity, metals, organic matter, and microbiology - ”Official Gazette of RS”, No. 74/11.
  - Limit values for priority and priority hazardous substances – “Official Gazette of RS” No. 35/11.

2.4.2 Air Quality

- The Law on Air Protection, adopted in May 2009 (“Official Gazette of RS”, No. 36/09).
- Law on Integrated Environmental Pollution Prevention and Control (“Official Gazette of RS”, No. 13/04)

2.4.3 Climate Change

- Draft Low Carbon Development Strategy with Action Plan (LCDSAP), passed public consultations (January 2020) and is undergoing inter-ministerial consultations before being submitted for adoption. The draft LCDSAP covers the period up to 2030 and a perspective until 2050. It aims to support Serbia in fulfilling its obligations under the Paris Agreement.

- Draft Law on Climate Change, adoption postponed from 2019, to cover Measurement Reporting and Verification (MRV) framework, a GHG emission inventory system and mainstreaming of climate policies.

2.4.4 Soil Quality

- Law on Soil Protection ("Official Gazette of RS", No. 112/15).
- Regulation on the Program for Systematic Monitoring of Soil Quality, Indicators for Evaluation of Soil Degradation and Methodology for Preparation of Remediation Program ("Official Gazette of RS", No.88/10).

2.4.5 Noise

- Law on Environmental Noise ("Official Gazette of RS", No. 88/10).
- Decree on environmental noise indicators, limits values, assessment methods of the noise indicators, the nuisance and the harmful effects ("Official Gazette of RS", No. 75/10).

2.4.6 Waste Management

- Law on Waste Management ("Official Gazette of RS", No. 36/09 and 88/10) The Law is supplemented by 29 by-law documents regulating specific waste management aspects. In 2015 the Law was revised and amended to more precisely transpose certain requirements of the Waste Framework Directive (2008/98/EC).
- Hazardous waste is primarily regulated by the Law on Waste Management ("Official Gazette of RS", no. 36/09 and 88/10) and the Regulation on Categories, Testing and Classification of Waste ("Official Gazette of the RS", No 56/10).

2.4.7 Geology and Seismicity

- Depending on the ground conditions and the seismic characteristics of the region, design and design verification will be carried out according to Eurocode 81.
- Law on Mining and Geological Explorations ("Official Gazette of RS", No. 88/11)

2.4.8 Nature Conservation

- The Law on Nature Conservation ("Official Gazette of RS", No. 9/10) adopted EU Habitats Directive and the Birds Directive. The Decree on Ecological Network ("Official Gazette of RS", No. 102/10) identifies ecological network areas in Serbia and sets the management, financing, monitoring and protection requirements.

Table 1 presents the Serbian legal framework for the protection of habitats and species.

Table 1: Serbian Legal Framework on Habitats and Species

Regulation	Official Gazette No. and date
Regulation on the criteria for separation of habitat types, habitat types, sensitive, vulnerable, rare, and for the protection of	Official Gazette of No. 35 Dated on 2010

Regulation	Official Gazette No. and date
priority habitat types and protection measures for their preservation	
Regulation on cross-border trade and trade in protected species	Last amended on: 2014 Official Gazette No: 6
Regulation on special technical and technological solutions that enable undisturbed and safe communication of wild animals.	Official Gazette of No. 72 Dated on: 2010
Regulation on control of use and trade of wild flora and fauna	Last amended on: 2011 Official Gazette No: 69
Rulebook on cross-border trade and trade in protected species.	Last amended on: 2014 Official Gazette No: 6
Regulation on the proclamation and protection of strictly protected and protected wild species of plants, animals and fungi.	Last amended on: 2016 Official Gazette No: 98

There are a number of National Plans relating to Biodiversity, including the following:

- Biodiversity Strategy of the Republic of Serbia
- National Assessment of Biodiversity information, management and reporting baseline for Serbia
- Monitoring of surface water status in the Republic of Serbia (EU Water Framework Directive).

2.4.9 Assets and Expropriation

- The Law on Foundations of Property Law Relations (“Official Gazette of RS”, No. 6/80, 36/90)
- Law on Planning and Construction (“Official Gazette of the RS, No. 72/09, corr. Official Gazette No. 81/09)
- Law on Non-Contentious Proceedings (“Official Gazette of RS", No. 25/82 and 48/88, amended Official Gazette of the RS No 46/95, 18/05, 85/12, 45/13, 55/14, 6/15 and 106/15)
- Law on State Surveying and Cadastre of Immovable Property (“Official Gazette of RS" No 72/09, amended on 18/10, 65/13 and 15/15)
- The Law on Public Property (“Official Gazette of RS”, No. 95/18)
- Expropriation Law (“Official Gazette RS”, No. 53/95, including changes of 23/01, 20/09, and 55/13)

2.4.10 Cultural Heritage and Archaeology

- Law on the Protection of Cultural Heritage ("Official Gazette of the SRS" No. 28/77)
- Law on Culture (Official Gazette of RS, No. 72/09, 13/16, 30/16, 6/20)
- Law on Cultural Property (Official Gazette of RS, No. 71/94)
- Law on Archive Material and Archive Activities (Official Gazette of RS, No. 6/20).
- Law on Old and Rare Library Material (Official Gazette of RS, No. 52/11)

2.4.11 Stakeholder Engagement

- The Law on Free Access to Information of Public Importance (“Official Gazette of RS”,No. 120/04)
- The Law on the Protector of Citizens (“Official Gazette of RS” No.54/07)

3 Alternatives Assessment of Aggregate Sources and Soil Deposit Areas

The purpose of the ESIA process is to identify impacts and establish the most sustainable practices that will provide the best possible benefit from the project. Therefore, it is important to evaluate the proposed material sources and deposit areas according to their potential impacts and seek viable alternatives.

The assessment methodology applied in this report is based on that used in the ESIA in order to expedite the alternatives assessment in line with the already identified key environmental and social constraints.

The IFC PS1 sets out the requirements for evaluating workable alternative configurations for a project: Projects with irreversible or unprecedented potential significant negative impacts are required to go through comprehensive social and environmental impact assessments. The assessment is required to include examination of technical and financially viable alternatives and documenting the reasons for choosing the specific alternative.

3.1 Project Overview

Pre-feasibility studies for the Project route were initiated in 2007. Initial designs did not consider the West Morava floodplain and therefore further design work was carried out between 2011 and 2013 considering a 100-year return period for the West Morava floodplain. Since then several hydrotechnical measurements and designs have been undertaken. In order to protect nearby settlements, several embankments have been constructed along the West Morava River. The new Motorway designs consider not only the impacts of the floodplain but also enhancement measures of the river in order to protect settlements and the proposed Motorway from potential flood events. According to Project design documents, several flood scenarios have been studied throughout the design stages starting from 2011 until 2020.

Finally, as per the requirements of the construction permit for the Project, final designs and hydrotechnical works have been carried out in 2020, with some of the design works and 2-D flood risk modelling still ongoing.

The Project is a 112 km long dual-carriageway tolled motorway mostly adjacent along the West Morava River. The Project is divided into 3 sectors, as presented in Table 3-1 below, which divides into total of 9 sections (Project detailed alignment together with the associated facilities, are given in Appendix-1). The Motorway will be part of the Trans European Network and will connect Corridor IX to Corridor X. The Project aims to allow safe travel whilst increasing the nation-wide import and export potential, as well as creating economic opportunities in the region. An overview of the route and alignment are presented in Figure 3-1.

Table 3-1: Project Sectors and Lengths

Sector	Sections	Length (km)
Sector 1: Pojate – Kruševac	1-2-3	27.83
Sector 2: Kruševac – Adrani	4-5-6-7	53.89
Sector 3: Adrani – Preljina	8-9	30.66

Figure 3-1: Route Alignment

3.2 Environmental and Social Constraints

Assessment of the Project alternative aggregate sources and soil deposit areas is based on several environmental and social (E&S) topics as defined in the ESIA, which are then used to establish a scoring system for each pre-identified option. Below is a summary of E&S topics / constraints that will be used as the basis for scoring impacts.

Water Quality

Impacts on water quality can be caused by pollution from oil product spills, heavy vehicle spills, improper disposal of waste oils and hydraulic fluids entering nearby surface water sources. Likewise, destabilised soils that erode easily can be washed into surface water resources and can cause siltation and sedimentation that will reduce water quality. Activities at borrow pits and unsuitable soil deposit have the potential to cause such impacts, such as excavation, levelling and general vehicle use.

Air Quality and Climate

During the construction phase, large quantities of soil will be excavated and transported. Excavation and material movement has the potential to generate dust that can be dispersed by the wind, affecting up to hundreds of meters around the excavation or other earth-works area. Significant dust can also be generated by vehicle movement along gravel access roads.

Emissions to air, fumes and dust, from the operation of vehicles and machinery can also cause nuisance to the local environment.

A comprehensive modelling study was carried out for the ESIA study, considering all activities during the construction and operation phases, with each phase assessed separately.

Noise and Vibration

During the excavation, quarry operations and unsuitable soil transportation, machinery operation will generate noise which can cause disturbance in the surrounding environment. The noise levels of heavy machinery and vehicles vary widely and depends on the level of the activity.

Geology and Soil

Soil pollution can be caused by accidental release of pollutants, such as spills from the asphalt plant operations, mismanagement of petroleum products (i.e. oil and fuel leaks and poor handling of waste oils, hydraulic fluids, toxic and empty oil containers).

During the construction phase, certain activities, such as site set-up, stock preparation, quarries, construction of access roads, and drainage excavations can impact soil. Soil compaction due to the movement of machinery and plant vehicles will cause physical impacts on the soil quality. Furthermore, use of imported soils to a region/area can lead to changes in habitat due to soil characteristics.

Terrestrial and Freshwater Ecology

Earthwork and quarry activities can affect habitats, even irreversibly. Project ESIA study and Biodiversity Impact Assessment and Critical Habitat Assessment (TBC, 2020) present various habitat characteristics along the Project route, as well as the related facilities. Terrestrial and freshwater ecology constraints of the AA study area are evaluated based on the outputs of the aforementioned assessments.

Sensitivity of each receptor at the subject aggregate/deposit area is scored according to its natural, modified or critical habitat status.

Dust generation from access roads and harmful emissions from trucks when transporting laterite, stone aggregates, concrete, lime, petroleum products and other chemicals can also negatively impact biodiversity and cause a reduction of habitat quality.

Archaeological and Cultural Resources

The ESIA study presents the locations of various identified archaeological sites and identified those areas which are to be considered as constraints when assessing the aggregate sources and deposit areas. The distance between cultural heritage areas and Project related facilities/deposit areas is an area of concern due to fact that those areas might be fall in the 50 m strip, which might result in potential chance find.

It should be noted that due to their location outside the Project AoI for ESIA, archaeological data has not been incorporated into our assessment of two sites, namely the latest proposed disused borrow pit unsuitable soil deposit area, (4km west of the road corridor) and the quarry at Plana (12km to the north).

Visual Landscape and Land Use

The generation of dust during earthworks and transportation, including clearing land for soil / topsoil stockpiles, as well as access roads and construction can disrupt the natural landscape and visual amenity of the area. Excavations and topsoil stripping in natural areas can also significantly change

the local landscape features. Therefore, visual landscape and land-use are considered within the AA study of the aggregate sources and soil deposits. Results of the detailed site surveys and assessments with regards to landscape and visual impacts are presented in ESIA, CHA and BIA reports and these are used as the basis for this AA study.

Infrastructure

Public roads, gas / water networks can be affected by access roads or activities within the aggregate source or depository areas. According to technical drawings, site assessments have already been undertaken at the identified aggregate sources and soil deposit areas. Impact rating of the alternatives will be evaluated according to the potential disruption on infrastructure services.

Resettlement and Land Acquisition

Expropriation of land is one of the key impacts and constraints throughout the route alignment of the Project. Temporary and permanent displacements have been identified in the ESIA report and borrow / quarry areas were also identified as having potential impact due to displacement. Therefore, resettlement and land acquisition will also be assessed within the impact ranking of the AA study.

3.3 Methodology

The alternatives were evaluated using a methodology that transforms qualitative assessments into a quantitative ranking and provides a final score that presents the overall impact allowing a comparison of each alternative option.

The 9 different constraints, as discussed in Section 3.2, were each analysed in order to identify and assess potential impacts; an impact rank is assigned to each constraint.

The scoring is provided for the initial potential impact of each considered source without considering mitigation measures to reduce such impacts, and is used to compare the site options. Project ESIA has already identified several mitigation measures for each impact source. Therefore, mitigation measures of each aggregate/depository area related impacts are excluded during the risk scoring of this AA study. However, certain recommendations are given in the last Chapter of this document in order to have a view of overall measures.

Project ESIA Chapter 6.2 presents the impact assessment methodology. The same methodology was followed using a final 5x5 standard risk matrix evaluated for each E&S constraint. Then, average impact score for each aggregate source or soil deposit area was found in order to evaluate the overall standing and to enable comparison of each site. It is noted that the impact assessments for each of the nine parameters are weighted the same in calculating the average impact, and so no parameters are considered in the analysis to be more important than others.

The E&S constraints related impacts (IA) are identified with multiplication of the Significance Criteria (SC) with the Likelihood of the impact. The significance criteria are the severity of the impact comprising 4 elements which are: Extent (E), Duration (D), Magnitude (M), and Receptor sensitivity (R).

$$SC = \frac{(E + D + M + R)}{4} \quad (1)$$

$$IA = SC \times L \quad (2)$$

Each above criterion is identified with its own scoring, given in ESIA Table-4 and Table-5, as summarised in below Table 3-2.

Table 3-2: Impact Criteria Assumptions

Aspect	Score	Definition
Extent (E)	1	Project Site: (i.e. limited to the area applicable to the specific activity)
	2	Municipality (i.e. the area within 5 km of the site),
	3	District (i.e. extends between 5 and 15 km from the site
	4	Regional: (i.e. extends beyond 50 km from the site)
	5	National: potential impacts that expected to create changes at national level.
Duration (D)	1	Immediate (<1 year)
	2	Short term (1-5 years),
	3	Medium term (6-15 years),
	4	Long term (the impact will cease after the operational life span of the project)
	5	Permanent (no mitigation measure of natural process will reduce the impact after construction).
Magnitude (M)	1	Minor: where the impact affects the social and physical environment in such a way that cultural, social and environmental functions and processes are not affected.
	2	Low: where the impact affects cultural, social and environmental functions and processes are slightly affected.
	3	Moderate: where the affected cultural, social and environmental functions are altered and processes continue in
	4	High: where cultural, social or environmental functions or processes are altered to the extent that it will temporarily cease.
	5	Very high: where natural, cultural, social or environmental functions or processes are altered to the extent that it will permanently cease.

Aspect	Score	Definition
Receptor Sensitivity (R)	1	Low: Local community and/or environment is fully equipped/has the tools to manage changes of life quality.
	3	Medium: Local community and/or environment is partially equipped/has the tools to manage changes of life quality.
	5	High: Sensitive local community and/or environment not equipped or prepared to cope with social and environmental impacts such as changes of life quality.
Likelihood (L)	1	Improbable (the possibility of the impact materializing is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%)
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%)
	3	Medium probability (the impact may occur; >50% and <75%)
	4	High probability (it is most likely that the impact will occur- > 75% probability)
	5	Definite (the impact will occur)
Impact Assessment (IA)	1 < IA < 8	Low
	9 < IA < 16	Medium
	IA ≥ 17	High

After calculating the score for each constraint, the general average of the risk scores determined for each constraint is calculated for each proposed alternative site, providing final Low-Medium-High risk levels to match the 5x5 matrix scoring numbers (from 1 to 25). An example is given in the table below.

Table 3-3: Final Impact Scoring Option-1

Name	KP	Sector	Constraint Impact Risk Scores (IA)									Average Impact
			IA1	IA2	IA3	IA4	IA5	IA6	IA7	IA8	IA9	$\bar{x}$IA
BP1	4+000	1	6	4	10	4	8	6	4	4	8	**6**

In addition to calculation of an average impact score for each alternative site, our methodology allows for a high impact rating calculated for a single key parameter to be carried over to the final impact rating. This will ensure that an area can be excluded/rejected from the alternatives due to a potential high-risk constraint, even in a scenario where the risks of other constraints are found to be low. Therefore, a final average score which may be in the low or medium range, will still be highlighted as high impact (and coloured red in the assessment table), where the individual high impact score is considered to be a “show-stopper” for a particular site.

The example below shows how a high score in the key risk factor of receptor sensitivity for Terrestrial and Freshwater Ecology (due to the site's location in Natural Habitat) resulting in a "red-flag" for overall average impact, despite the overall average impact score being low.

Table 3-4: Example of key red-flag impact

Name	KP	Sector	Terrestrial and freshwater Ecology							Average Impact
			E	D	M	R	SC	L	IA	$\bar{X}$IA
BP1	4+000	1	2	3	3	5	3	5	16	6

3.4 Alternatives Assessment of aggregate sources and soil deposit areas.

Along the Project route, total of 46 borrow pits and 6 quarries were assessed under the AA study. In addition a total of 174 unsuitable soil deposit sites were assessed. These include 38 unsuitable sites originally identified for deposit of unsuitable soils, as well as an additional 136 disused wetland sites now being considered for use as unsuitable soil deposit sites. During the assessment, environmental and social constraints were considered in terms of overall impact rating of each borrow pit, quarry and unsuitable soil site.

Topsoil depth of the sites is assumed to be identified hence, topsoil would be stripped to its full depth in order to preserve its physical status to be used for reclamation or reinstatement purposes at the area presenting the similar topsoil content. Comparison of each borrow pit, quarry are given in Table 3-6 to Table 3-11, with discussion and recommendations presented in Section 5.

In order to ensure transparency in how assessment scores have been allocated, the following clarifications are included in relation to each of the nine parameters assessed:

Water Quality

The extent and likelihood of impacts varies according to the proximity of the sites to water bodies / river.

Air Quality and climate

Likelihood of impact varies according to proximity of sites to sensitive receptors, principally residential areas and properties.

Noise and Vibration

Likelihood of impact varies according to proximity of sites to sensitive receptors, principally residential areas and properties.

Geology and Soil

Likelihood of impact varies according to proximity of sites to water course, in consideration of potential erosion of disturbed soil.

Terrestrial and Freshwater Ecology

Extent of impact varies with proximity of sites to river course, which may receive wind-blown or rain-washed materials from the site area from where they may impact on aquatic ecology.

Receptor sensitivity varies according to whether the site occupies an area of Natural Habitat according to habitat classification by The Biodiversity Consultancy (TBC). According to scoring methodology prescribed by TBC, sites occupying Natural Habitat (including Critical Habitat) are allocated a score of 5, while Modified Habitat is allocated a score of 1.

As discussed in Section 3.3 above, a score of 5 for Receptor Sensitivity under this parameter (due to location in Natural Habitat) raises a "red-flag" for the site, which is carried over to the final "Average Impact" column of the assessment tables (Table 3-9 to Table 3-11), regardless of the overall average impact score. This has been implemented to reflect the requirement to avoid development on Natural Habitat, in favour of development on alternative Modified Habitat area.

For this parameter, additional to the colour coding applied to High, Medium and Low impacts, as described in Section 3.3 above, the following colour coding has been applied in Table 3-9 to Table 3-11 for ease of reference to highlight categories of wetland unsuitable soil deposit sites discussed in Section 5:

Table 5: Key: Additional colour coding for wetland unsuitable soil deposit sites

Wetland with disused water bodies identified as Modified Habitat
Meanders to be cut off for river regulation that are designated for infill for structural / flood risk purposes.

Archaeological and Cultural Resources

Impact likelihood varies with proximity to archaeological areas.

We note that the archaeological element of impact assessment has been omitted for the Plana quarry and the new disused borrow pit location (4km to the west of the road corridor) due to absence of archaeological data at these locations.

Visual Landscape and Land Use

Impact likelihood varies according to proximity of visual and landscape receptors, principally residential properties.

Infrastructure

Impact likelihood varies according to proximity of built-up areas, where it is considered that traffic associated with the sites may impact on local traffic.

Resettlement and Land Acquisition

Impact likelihood varies according to location of sites on agricultural fields (high score) or areas of forest or disused borrow pits (low score).

RINA

Table 3-6: Borrow Pits Alternatives

Name	KP	Sector	Water Quality							Air Quality and Climate							Noise and Vibration							Geology and Soil							Terrestrial and Freshwater Ecology							Archaeological and Cultural Resources							Visual Landscape and Land Use							Infrastructure							Resettlement and Land Acquisition							Average Impact
			E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	x̄IA
101	7+500	1	2	2	3	3	3	3	8	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
2	9+500	1	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	2	6	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
3	10+500	1	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
6	19+000	1	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	3	3	2	4	9	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
7	21+500	1	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	2	6	1	2	3	3	2	4	9	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
107	23+750	1	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	2	6	1	2	2	3	2	4	8	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
8	29+000	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	3	3	2	4	9	1	2	3	1	2	2	4	1	4	3	3	3	4	11	9
8 -1	33+000	2	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
9	37+500	2	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
9 -1	38+500	2	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
10	42+000	2	2	2	3	3	3	3	8	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	4	10	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
10 -1	43+000	2	2	2	3	3	3	2	5	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
10 -2	43+000	2	2	2	3	3	3	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
10 -3	43+500	2	2	2	3	3	3	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
10-4	47+000	2	2	2	3	3	3	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
10-5	47+000	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
11	48+000	2	2	2	3	3	3	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
11-1	50+500	2	2	2	3	3	3	2	5	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	3	8	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
12	54+400	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
13	57+700	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	5	4	5	18	1	5	2	3	3	2	6	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	9
14	60+500	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
15-1	64+000	2	2	2	3	3	3	3	8	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
15	65+000	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
16	66+800	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	2	6	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
16-1	69+600	2	2	2	3	3	3	2	5	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	3	3	3	4	12	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
17	72+500	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
19	77+000	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	2	3	3	4	10	8
21	78+300	2	2	2	3	3	3	3	8	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
22	78+700	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
23	80+200	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
24-1	79+500	2	2	2	3	3	3	2	5	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
24-2	81+300	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
25	83+000	3	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	2	3	3	4	10	8
26-1	84+500	3	2	2	3	3	3	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
26-2	86+300	3	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	4	10	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	2	3	3	4	10	7
27	87+500	3	2	2	3	3	3	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	2	6	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
27-1	89+500	3	2	2	3	3	3	2	5	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	3	8	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
27-2	91+000	3	2	2	3	3	3	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
28	92+000	3	2	2	3	3	3	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
28-1	93+500	3	2	2	3	3	3	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
29-1	95+000	3	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	4	10	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
31	98+500	3	2	2	3	3	3	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	5	3	5	16	1	5	2	3	3	2	6	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
31-1	100+700	3	2	2	3	3	3	2	5	2	2	2	3	2	2	5	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	5	3	5	16	1	5	2	3	3	2	6	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
31-2	102+000	3	2	2	3	3	3	2	5	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	3	8	1	3	4	5	3	5	16	1	5	3	3	3	3	9	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
32	103+500	3	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	4	10	2	3	4	5	4	5	18	1	5	2	3	3	2	6	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	9
34	106+200	3	2	2	3	3	3	2	5	2	2	2	3	2	3	7	2	2	2	3	2	4	9	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	3	3	2	3	7	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7

Table 3-7: Quarries Alternatives

Name	KP	Sector	Water Quality							Air Quality and Climate							Noise and Vibration						
			E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA
Q1	15+500	1	3	2	2	3	3	3	8	2	2	3	3	3	4	10	2	2	4	1	2	4	9
Q2	25+500	1	3	2	2	3	3	4	10	2	2	3	3	3	4	10	2	2	4	3	3	4	11
Q3	53+500	2	3	2	2	3	3	4	10	2	2	3	3	3	4	10	2	2	4	3	3	4	11
Q4	54+500	2	3	2	2	3	3	4	10	2	2	3	3	3	4	10	2	2	4	3	3	4	11
Q5	75+000	2	3	2	2	3	3	3	8	2	2	3	3	3	4	10	2	2	4	3	3	4	11
Plana	n/a		3	2	2	3	3	3	8	2	2	3	3	3	4	10	2	2	4	3	3	4	11

Name	Geology and Soil							Terrestrial and Freshwater Ecology							Archaeological and Cultural Resources						
	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA
Q1	1	4	3	3	3	4	11	2	4	4	5	4	5	19	1	5	2	3	3	1	3
Q2	1	4	3	3	3	4	11	2	4	3	5	4	5	18	1	5	2	3	3	1	3
Q3	1	4	3	3	3	4	11	2	4	3	5	4	5	18	1	5	2	3	3	1	3
Q4	1	4	3	3	3	4	11	2	4	3	5	4	5	18	1	5	2	3	3	1	3
Q5	1	4	3	3	3	4	11	2	4	4	5	4	5	19	1	5	2	3	3	1	3
Plana	1	4	3	3	3	4	11	2	4	4	5	4	5	19							

Name	Visual Landscape and Land Use							Infrastructure							Resettlement and Land Acquisition							Average Impact
	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	x̄IA
Q1	1	4	3	3	3	4	11	1	2	2	1	2	2	3	1	4	4	1	3	1	3	8
Q2	2	4	3	3	3	4	12	2	4	4	3	3	3	10	2	4	4	3	3	4	13	11
Q3	2	4	3	3	3	4	12	1	2	2	1	2	2	3	1	4	4	1	3	1	3	9
Q4	2	4	3	3	3	4	12	2	4	4	3	3	3	10	2	4	4	3	3	4	13	11
Q5	1	4	3	3	3	4	11	1	2	2	1	2	2	3	1	4	4	1	3	1	3	9
Plana	2	4	3	3	3	4	12	1	2	2	1	2	2	3	1	4	4	1	3	1	3	9

Table 3-8: Unsuitable Soil Deposit Areas– original sites

Name	KP	Sector	Water Quality							Air Quality and Climate							Noise and Vibration							Geology and Soil							Terrestrial and Freshwater Ecology							Archaeological and Cultural Resources							Visual Landscape and Land Use							Infrastructure							Resettlement and Land Acquisition							Average Impact
			E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	$\bar{x}$IA
WA101	500	1	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	2	6	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA1	3+000	1	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	3	3	3	3	8	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA2	7+000	1	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA3	8+500	1	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA3-1	12+000	1	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	4	10	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
WA3-2	12+000	1	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	4	10	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
WA4	13+000	1	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA5	19+000	1	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	3	3	3	3	8	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA102	24+500	1	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	3	3	3	3	8	1	3	4	1		5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	2	3	3	4	10	6
WA6	27+000	1	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA7	34+000	2	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA8	40+500	2	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA9	45+500	2	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA9-1	48+500	2	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA10	53+500	2	2	2	3	3	3	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA11	57+000	2	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	5	3	5	16	1	5	2	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
WA12	60+500	2	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA13	62+500	2	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA14	66+000	2	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	3	3	3	3	9	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA15	72+500	2	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA16	79+000	2	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA17	80+500	2	2	2	3	3	3	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA18	81+500	2	1	2	3	3	2	2	5	2	2	2	3	2	4	9	2	2	2	3	2	4	9	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	4	8	1	2	3	1	2	3	5	1	4	3	3	3	4	11	8
WA19	81+000	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	4	10	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA20	82+500	3	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA21	87+000	3	2	2	3	3	3	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA22	89+500	3	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA23	91+000	3	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA23-1	91+000	3	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA24	94+500	3	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA24-1	94+500	3	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA25	94+000	3	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA26	98+000	2	2	2	3	3	3	3	8	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA27	101+000	3	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	3	3	3	3	9	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA27-1	104+000	3	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
WA28	104+500	3	1	2	3	3	2	2	5	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA28-1	105+000	3	1	2	3	3	2	2	5	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	3	3	3	4	10	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	3	3	4	11	6
WA29	108+000	3	1	2	3	3	2	2	5	2	2	2	3	2	4	9	2	2	2	3	2	4	9	1	3	3	3	3	3	8	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	4	8	1	2	3	1	2	3	5	1	4	3	3	3	4	11	8

Table 3-9: Unsuitable Soil Deposit Sites – Abandoned wetlands (1)

Name	KP	Sector	Water Quality							Air Quality and Climate							Noise and Vibration							Geology and Soil							Terrestrial and Freshwater Ecology							Archaeological and Cultural Resources							Visual Landscape and Land Use							Infrastructure							Resettlement and Land Acquisition							Average Impact
			E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	ΣIA
1101	4+500	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1102	5+500	1	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1103	5+500	1	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1104	6+500	1	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1105	11+000	1	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	2	6	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1105a	11+500	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1106	11+300	1	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1107	11+500	1	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1108a	15+850	1	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	2	6	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1108	16+000	1	2	2	3	3	3	4	10	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1109	17+500	1	2	2	3	3	3	4	10	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	3	3	3	3	9	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1110	18+200	1	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1111	18+300	1	2	2	3	3	3	4	10	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1112	18+600	1	2	2	3	3	3	4	10	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1113	18+600	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	3	7	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1114	18+800	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1115	19+000	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1116	19+500	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1117	19+600	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1118	19+600	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1119	19+600	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1120	20+800	1	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	2	6	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1121	20+900	1	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	3	5	1	4	3	1	2	1	2	6
1122	21+100	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1123	21+200	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	3	7	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1124	23+000	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1125	27+000	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1126	27+500	1	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1201	28+100	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1202	30+100	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1205	35+000	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1206	36+100	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1207	36+200	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1208	36+500	2	2	2	3	3	3	4	10	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1209	37+900	2	2	2	3	3	3	4	10	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1210	42+100	2	2	2	3	3	3	4	10	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1211	42+200	2	2	2	3	3	3	4	10	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1212	43+100	2	2	2	3	3	3	4	10	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1213	43+200	2	2	2	3	3	3	4	10	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1214	43+600	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1215	43+800	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1216	46+900	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1217	48+000	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1218	48+200	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1219	53+100	2	2	2	3	3	3	4	10	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	3	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1220	53+400	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6

Table 3-10: Unsuitable Soil Deposit Sites – Abandoned wetlands (2)

Name	KP	Sector	Water Quality							Air Quality and Climate							Noise and Vibration							Geology and Soil							Terrestrial and Freshwater Ecology							Archaeological and Cultural Resources							Visual Landscape and Land Use							Infrastructure							Resettlement and Land Acquisition							Average Impact
			E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	□IA
1221	53+600	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1222	55+300	2	2	2	3	3	3	4	10	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1223	56+300	2	2	2	3	3	3	4	10	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1224	57+400	2	2	2	3	3	3	4	10	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1225	57+600	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1226	57+650	2	2	2	3	3	3	4	10	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1227	57+700	2	2	2	3	3	3	4	10	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1228	60+500	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1229	60+600	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1230	60+750	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1231	60+900	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	3	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1232	60+950	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1233	60+950	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	3	5	1	4	3	1	2	1	2	6
1234	60+950	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1235	61+000	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1236	61+100	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1237	64+300	2	2	2	3	3	3	4	10	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1238	64+700	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1239	64+800	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1240	64+800	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1241	64+900	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1242	64+900	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1243	65+300	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1244	65+500	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	3	3	3	3	9	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1245	65+600	2	2	2	3	3	3	4	10	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	3	3	3	3	9	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1246	69+800	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	3	3	3	2	6	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1247	70+200	2	2	2	3	3	3	4	10	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1248	70+400	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1249	70+650	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1250	70+800	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1251	71+100	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1252	76+000	2	2	2	4	3	3	5	14	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1253	76+600	2	2	2	4	3	3	5	14	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1254	76+600	2	2	2	4	3	3	5	14	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1255	77+100	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1265	77+100	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
1256	77+200	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1266	77+400	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
1257	78+000	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1258	78+300	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1259	79+200	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1260	79+500	2	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	3	3	2	2	5	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1267	79+500	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
1261	79+850	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1262	80+700	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1263	80+050	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1264	80+300	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	1	2	2	4	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1301	80+250	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6

Table 3-11: Unsuitable Soil Deposit Sites – Abandoned wetlands (3)

Name	KP	Sector	Water Quality							Air Quality and Climate							Noise and Vibration							Geology and Soil							Terrestrial and Freshwater Ecology							Archaeological and Cultural Resources							Visual Landscape and Land Use							Infrastructure							Resettlement and Land Acquisition							Average Impact
			E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	E	D	M	R	SC	L	IA	ΣIA
1268	81+000	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
1303	81+100	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1304	81+350	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1305	81+350	2	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1335	82+000	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1306	82+200	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1307	83+100	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	2	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	3	5	1	4	3	1	2	1	2	7
1336	83+300	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1308	83+500	3	2	2	3	3	3	4	10	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1309	83+600	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1310	83+650	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1311	83+900	3	1	2	3	3	2	4	9	2	2	2	3	2	4	9	2	2	2	3	2	4	9	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	4	8	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1312	83+900	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1313	84+000	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	1	3	5	13	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1314	84+100	3	2	2	3	3	3	4	10	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1315	84+500	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1316	84+600	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1317	84+700	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	1	2	2	4	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1318	85+100	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1337	86+000	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
1319	87+000	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1321	87+400	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	5
1322	87+500	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	2	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1323	87+600	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1324	87+600	3	1	2	3	3	2	3	7	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	3	7	1	3	4	1	2	5	11	2	5	2	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	3	8	7
1325	87+600	3	1	2	3	3	2	3	7	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	3	7	1	3	4	1	2	5	11	2	5	2	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	3	8	7
1338	88+700	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1339	90+200	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
1340	90+700	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	1	2	5	11	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	7
1341	91+800	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	3	3	4	11	8
1326	92+500	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1342	94+700	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1342a	94+700	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1327	95+500	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1328	96+000	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1329	96+400	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1330	96+800	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	1	3	4	5	3	5	16	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1343	97+200	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3		3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1344	98+000	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1331	99+500	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1332	101+000	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	2	6	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
1333	102+500	3	1	2	3	3	2	4	9	2	2	2	3	2	3	7	2	2	2	3	2	3	7	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	2	6	1	2	2	3	2	3	6	1	2	3	1	2	2	4	1	4	3	1	2	1	2	7
1334	104+000	3	1	2	3	3	2	4	9	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	3	2	2	5	2	3	4	5	4	5	18	1	5	2	3	3	1	3	1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6
New Loc.	n/a		1	2	3	3	2	3	7	2	2	2	3	2	2	5	2	2	2	3	2	2	5	1	3	2	1	2	2	4	1	3	4	5	3	5	16								1	2	2	3	2	2	4	1	2	3	1	2	2	4	1	4	3	1	2	1	2	6

3.5 Application of Alternatives Analysis to Site Selection

Our overall recommendations for applying the assessment scores presented in Table 3-6 to Table 3-11 above to the selection of borrow pit, quarry and unsuitable soil deposit sites is presented in the steps below:

1. Firstly we recommend that sites highlighted with red-flag impacts are excluded from further consideration for development (these comprise only sites located on Natural Habitat in our analysis).
2. Of the remaining sites (I.e those located on Modified Habitat) we recommend for each of the 3 types of site (borrow pit, quarry and unsuitable soil deposit area) that those sites with the lowest average impact score are selected initially for development.
3. Once the relevant data is available, the total volume of material available from initially selected borrow pits and quarries and the capacity available in selected unsuitable soil deposit areas should be compared against the project requirements for material and unsuitable soil disposal during construction.
4. Should there be a shortfall in available material / unsuitable soil deposit capacity in the initially selected lowest impact sites, those sites identified as having the second lowest impact scores should then be included for consideration for development.
5. This process should be continued, including sites with incrementally higher average impact scores until sufficient volumes of materials and unsuitable soil capacity for project construction are achieved to meet construction targets.
6. Where the above methodology would result in the need to select particular sites from a number of alternatives with the same overall impact score, we would recommend applying the recommendations from our Greenhouse Gas Alternatives Analysis (I.e giving preference to sites closer to the construction area and to ensuring an even distribution of sites along the length of the construction corridor) in order to reduce emissions from traffic travelling to and from the materials and unsuitable soil deposit areas.

We have reformatted the data in Table 3-6 to Table 3-11 to exclude high impact sites and re-order the remaining sites preferentially in order of impact score, for ease of application of the above methodology; the reformatted tables are shown in Appendix B.

3.6 Overview of analysis

The impact analysis conducted on all proposed potential borrow pit, quarry and unsuitable soil deposit sites against the nine environmental and social parameters described in Section 3.2 above, has generated an average impact value for each site that allows a comparison of the alternative sites in terms of their overall environmental and social impacts.

Potential impact values under the scoring methodology applied range from a lowest possible score of 1 to a highest score of 25. Our results show average impacts scores ranging from 5 to 11, with the large majority of the alternative sites within the 6 to 8 range, with the exception of the five quarry sites, where scores are at the higher end of the overall range. We consider that none of the proposed alternative sites would meet a threshold score to cause them to be rejected on the basis of their overall average impact.

However, we have also considered in our analysis individual impacts that, regardless of the overall average impact score for a particular site, result in a recommendation to exclude a site from further consideration for development. Specifically, we have highlighted Natural Habitats as red as we recommend avoidance of these areas in the first instance; where their use is unavoidable due to unavailability of alternative sites on Modified Habitat, any areas of Natural Habitat removed will need to be included in Project Biodiversity Offsetting Program. It is noted that where proposed sites are located partially on Natural Habitat, recommendation may include reduction of the layout of the site to ensure the area(s) of Natural Habitat are avoided.

We note that all 6 proposed quarry sites are located on Natural Habitat and we would therefore recommend in the first instance that alternative quarry sites are identified on areas of Modified Habitat for extraction of the materials needed for road construction. However, should alternative sites be unavailable, as discussed further in Section 5.2 below, we would recommend biodiversity survey undertaken of each individual proposed quarry site to determine existing biodiversity value as well as opportunities on each site for post-development rehabilitation and ecological enhancement; this will enable informed prioritisation of the selection of most appropriate quarry site(s). The biodiversity surveys should also inform the incorporation of any selected sites into the Project Biodiversity Offsetting Program. They may also identify preferential areas within each proposed site that may avoid the most significant ecological impacts on the larger area.

None of the quarry sites are located in areas of Critical Natural Habitat.

A summary of the impact scores for the proposed sites are shown in the tables below:

Table 12: Borrow Pits Average Impact Score Summary

Average Impact Score	Number of alternative sites (Total 46 sites)
6	8
7	16
8	19
9	3
Sites recommended for exclusion or reduction as a result of location on Natural Habitat)	15

Table 13: Quarries Average Impact Score Summary

Average Impact Score	Number of alternative sites (Total 6 sites)
8	1
9	3
11	2
Sites recommended for exclusion (as a result of location on Natural Habitat)	6

Table 14: Unsuitable Soil Deposit Areas (original) Average Impact Score Summary

Average Impact Score	Number of alternative sites (Total 38 sites)
6	13
7	20
8	5
Sites recommended for exclusion or reduction (as a result of location on Natural Habitat)	5

Table 15: Abandoned Wetland Unsuitable Soil Deposit Areas Average Impact Score Summary

Average Impact Score	Number of alternative sites (Total 138 sites)
5	12
6	88
7	32
8	6
Sites recommended for exclusion or reduction (as a result of location on Natural Habitat)	105

Conclusions and recommendations following from our analysis of alternative sites is presented in Chapter 5 below.

4 Alternatives Assessment of Greenhouse Gas Emissions

According to Principle 2 of the Equator Principles 1, an alternative analysis (to determine less GHG-intensive options) is required for projects emitting more than 100,000 tonnes of CO2 equivalent annually within combined Scopes 1 and 2 of the three scope process under the Greenhouse Gas Protocol. Scope 1, 2 and 3 are defined as follows:

- Scope 1 covers the direct emissions from sources used or controlled by the Contractor.
- Scope 2 emissions include indirect emissions from electric power taken from the grid;
- Scope 3 emissions include emissions from sources that are neither owned nor directly controlled by the construction company but related to the project activities.

The ESIA has calculated projected Scope 1 and 2 emissions as 97,000 tCO2 per year for the construction phase, including construction machinery and transport-hauling of construction materials and about 30,000 tCO2 per year for the operation phase, and are thus below the threshold limit of 100,000 tCO2. The ESIA also highlights that the calculated annual emissions during construction are based on draft-stage design information and the overall averages are based on 4 years construction phase and that during construction of the Project, a year-by-year evaluation of emissions may exceed the 100,000 tCO2 threshold value in the peak construction periods in particular. Therefore, a further update and breakdown of the GHG emission calculations will be warranted once further design details and project schedule are confirmed. We recommend ensuring that the design details included in updated GHG assessments include the final selection of locations for borrow pits, quarries and unsuitable soil deposit sites informed by the Alternatives Analysis in Section 3 of this report.

4.1 GHG Sources (Construction and Operation)

Sources of GHG as described in the ESIA and included in the GHG emissions calculations for the project are presented in Table 17 and Table 18 below. The tables include a summary of the methodology and assumptions used for calculation of emissions from the various sources.

Table 16: Major GHG Emissions sources during Construction

Scope	Project Activity	Methodology / assumptions	Emissions (CO_2)
Scope 1	Road and River Regulation construction		
	• Construction machinery- (including generators, project-related vehicles, etc.) • Asphalt and concrete production • Transport-hauling of bulk construction materials.	ROADEO “Road Emissions Optimization: A toolkit for greenhouse gas emissions mitigation in road construction and rehabilitation”.	381,270

Scope	Project Activity	Methodology / assumptions	Emissions (CO_2)
Scope 2	Grid electricity use		
	Worker Accommodation Camps (approximate 3000 workers in 3 camps)	• Consumption avg 500 • kWh/person • 4 years construction period • Grid emission factor for Serbia is 1.099 tCO2/MWh8	6,594
Scope 3	Other indirect GHG emissions		
	Transport of bitumen	• 300 t/day; • Travel distance 500 km (Pancheva Refinery) • Emission factor 0.280 kg/km	1,725
	Transport of cement	• 250 t/day; • Travel distance 250 km (nearest cement producers) • Emission factor 0.280 kg/km - diesel9	670
Total			390,259

Table 17: Major GHG Emissions sources during Operation

Scope	Project Activity	Methodology / assumptions	Emissions (CO_2)
Scope 1	Road maintenance		
	Road maintenance	5% of construction GHG	26,534
Scope 2	Grid electricity use		
	Lightning of cross roads	• Approximately 1,000 lamps for 12 crossroads • 200 W Lamps • 60% efficiency • Grid emission factor for Serbia is 1.099 tCO2/MWh	4,398

Scope	Project Activity	Methodology / assumptions	Emissions (CO_2)
Scope 3	Other indirect emissions		
	Increase in traffic	• Estimated maximum daily traffic increase between the years 2018 to 2045 is approximately 11,000, which corresponds to 400 vehicle/day/year. • Appr. 90% personal cars • Appr. 10% light and heavy vehicles • 0.240 kg CO2/km - gasoline • 0.280 kg CO2/km – diesel	3,989
Total			34,919

GHG emissions associated with borrow pits, quarries and unsuitable soil deposit sites fall under Scope 1 of construction activities.

4.2 Verification of the ESIA GHG Emissions

For estimation of GHG emissions during project construction, ROADEO ("Road Emissions Optimization: A toolkit for greenhouse gas emissions mitigation in road construction and rehabilitation") software was applied by ESIA consultants 21UK. ROADEO is a Microsoft Excel based Emission optimisation toolkit, recognised by the World Bank, developed as part of an effort to assess the reduction of GHG emissions in the road construction industry. We consider this to be an industry standard toolkit and appropriate for the assessment of Scope 1 GHG emissions for construction phase of the Project.

Subsequent to calculations included in ESIA, 2U1K have provided calculations of emissions associated with the total annual estimated number of vehicles using the motorway during its operational phase, the results of which are summarised in below:

Table 18: Emissions from vehicles during operation

Year	2021	2043
Average Vehicle per Day	8106	15010
Average Number of Diesel Engine Vehicles	7295	13509
Average Number of Gasoline Engine Vehicles	811	1501
CO2 Emissions/Annum (Diesel) tCO2/Year	71573	132537

CO2 Emissions/Annum (Gasoline) tCO2/Year	9278	17181
Total CO2 Emissions (tCO2/Year)	**80851**	**149717**

In summary, it is anticipated that vehicles using the Project motorway road are expected to emit 149,717 tCO2e, which is approximately an increase of 3,989 tCO2 each year over the amount that would be experienced without the Project.

We consider that appropriate assumptions have now been made for calculations of GHG emission for all elements associated with Project construction and operation.

4.3 Recommendations for GHG Emissions Mitigation

RINA are in agreement with the recommended mitigation measures set out in section 6.4.3.3 of the ESIA, many of which are of relevance to borrow pits, quarries and unsuitable soil deposit sites; these are summarised as follows:

- Minimization of unnecessary earthworks and minimization of travel distances, using excess materials at the same location for different requirements of the project. For example, stripped top-soil will be used for arrangement of the road bunkers and the use of excess materials at borrow areas for site arrangements and backfilling.
- The use of adequate construction equipment. This involves not only thick pavement layers (paving machine, compactor) but also earthworks (grader, compactor)
- The mobilization of qualified workforce (with appropriate training in efficient use of resources, minimising emissions from vehicles and machinery.)
- The proper management of material production and laying (avoiding unnecessary stops during laying operations)
- The selection of adequate materials (to avoid deformation and rutting under traffic load)
- Minimization fuel use and use of more efficient engines end equipment.
- Minimise indirect GHG emission associated with equipment and structures used for the road safety share, by incorporating the following measures:
  - Limit the construction of safety barriers to the strict minimum required for safety purposes
  - Limit the use of steel and concrete barriers where possible through adequate and safe design or to replace with wood barriers when traffic volumes and loads are low enough.
- Properly assess the traffic load which the pavement will have to bear during its life. This includes an adequate assessment of overloading, which in turn may result in stronger (thicker) pavement structures than in the absence of overloading. The expected benefit is to avoid premature failure and reconstruction, which will be ineffective in terms of GHG emissions.
- Assess the potential use of recycled materials. This technique can also be considered for the operation of the motorway, in particular, during maintenance of the road.
  - Cement concrete pavements can be recycled in place by breaking the existing concrete and overlaying it with a new asphalt or cement concrete surface. Alternatively, the existing concrete may be broken up, removed and crushed into aggregate sizes at the mixing plant and used as recycled concrete with additional cement.
  - Reclaimed Asphalt Pavements (RAP) can be recycled:
- Design of the Motorway embankments and drainage system needs to be suitable for the potentially more intense (though less frequent) rainfalls;

- Measures should be reviewed periodically by the Project Operator as part of the environmental management system to promote water conservation at the Service Areas (eg recycling/re-use of any car-wash waters, rainfall recovery/re- use for onsite irrigation).

In addition to those measures listed above, RINA would recommend incorporating the following criteria into the selection process of preferred borrow pit, quarry and unsuitable soil deposit sites from those proposed and analysed in Section 3 of this report, with the aim of further minimising GHG emission during the construction phase:

- Preferential selection of borrow pit, quarry and unsuitable soil deposit sites closer to the road, to avoid longer journeys for vehicles carrying construction / unsuitable soil.
- Selection of borrow pit, quarry and unsuitable soil deposit sites evenly distributed along the route of the motorway, to ensure that journey distances between any one point along the construction corridor and the closest borrow pit, quarry or unsuitable soil deposit site is minimised.

4.4 Alternative Options to Reduce GHG Emissions

"No project" alternative scenario was considered in the Cost Benefit Analysis (CBA) within the Project Feasibility Study by the Traffic Institute CIP, 2018. The CBA incorporated vehicle emissions, including CO2 calculations, which were quantified and expressed in monetary terms for the analysis; the CBA indicated favourably towards development of the Project over the "no project" option.

The Feasibility Study discusses the detailed design features of the road, informed by technical considerations and traffic flow analysis. Below is presented alternative design options to reduce Project related GHG emissions during design, construction and operation of the Project which will be incorporated in the motorway detailed design and relevant plans:

- Minimising need for barriers through road design (e.g ensuring bends in road not sufficiently sharp to require barriers). According to the World Bank's '*Greenhouse Gas Emissions Mitigation in Road Construction and Rehabilitation*' ROADEO Toolkit User Manual (Appendix A – Alternative Practices Data Sheets), construction of safety barriers is responsible for a up to 25% of GHG emissions in a road project; significant GHG reductions can therefore be achieved through minimising their use.
- Reduce energy consumption of road lighting through i) restricting installation only where necessary for road safety ii) using LED lighting where possible.
- Install renewable energy sources for electricity supply at service stations, such as roof mounted solar panels. Ensure services are equipped with adequate electric vehicle charging points to meet future demand.
- Install equipment that will facilitate traffic management measures, such as electronic variable speed limit signs along road length, to reduce traffic jams and congestion and associated emissions.
- Incorporation of explosives as part excavation method of hard soils. World Bank's '*Greenhouse Gas Emissions Mitigation in Road Construction and Rehabilitation*' ROADEO Toolkit User Manual (Appendix A – Alternative Practices Data Sheets) indicates that use of explosives for excavation produces less GHG than mechanical-only excavation.

5 Conclusions and Recommendations

While the steps described in Section 3.5 above provide a general guide to the application of our quantified alternatives analysis presented in the tables in Section 3.4, the subsections below provide more detailed discussion and recommendations for the specific site categories.

As a general note, for some proposed borrow pit and unsuitable soil deposit sites, habitat mapping indicates areas on the sites' outer edges to be within Natural Habitat; where it is clear from satellite imagery that these areas represent border vegetation (hedgerows and tree lines) around currently cultivated fields to be used as borrow pits or soil deposit areas, a receptor sensitivity score of 1 has been allocated. This is in alignment with the developer's stated methodology of avoiding disturbance of treelines and hedgerows bordering fields proposed for extraction or deposition of materials. Similarly, the developer intends to leave hedgerows and treelines intact that may run between fields of the same borrow pit or soil deposit site; these sites have also been scored 1 for receptor sensitivity given that only areas of modified habitat will be used. We note a proviso that appropriate management measures should be employed to ensure that Natural Habitat hedgerows and treelines are left undisturbed through development of appropriate biodiversity management procedures / plan for these sites.

It is also noted that a number of borrow pit sites (28, 28-1, 29-1, 31, 31-1, 31-2, 32) and three unsuitable soil deposit areas (WA1, WA11, WA5) that are shown by habitat mapping to be located on Natural Habitat appear through satellite imagery (Google Earth) to wholly occupy currently cultivated farmland. These sites have been allocated receptor sensitivity 5 in our assessment following habitat data provided, and are recommended for exclusion from development. However, should insufficient borrow pits or soil deposit areas be available on Modified Habitat to meet Project requirements, these sites may be re-examined by a qualified ecologist to confirm their status; if their habitat status were revised, they would also be available for development as Modified Habitat.

5.1 Borrow Pits.

31 of the 46 potential borrow pit sites have impacts assessed as low or medium for all parameters and do not require development on Natural Habitat. For these sites we recommend the application of incremental site selection based overall average impact value calculated for each site, as described in Section 3.5 above. We recommend the application of mitigation measures as described in Chapter 8 of the Project ESIA and consider application of these measures will ensure medium impacts will be reduced to within acceptable levels..

For a number of the proposed borrow pit sites habitat sensitivity data provided shows a significant area of Natural Habitat within each site, resulting in a habitat sensitivity score of 5. For these sites, we recommend either rejection from further consideration as borrow pits, or alternatively revision of the proposed borrow pit boundary so that areas of Natural Habitat are avoided. Below is provided a list of numbered borrow pit sites which are located partially on Natural Habitat, but with some areas of Modified Habitat that could be used for material extraction provided the adjacent areas of Natural Habitat remain undisturbed:

8, 10, 10-1, 15, 27-1, 27-2, 31-2.

For the recommended reduced site layout for these sites, we refer to Appendix A, which shows maps of all borrow pit sites with areas of Natural Habitat also shown; revised layout area should be informed by the boundaries of Natural Habitat within each site.

Should the developer be unable to find adequate Modified Habitat for Borrow Pit site selection, following the mitigation hierarchy, and require the use of Natural Habitat on these sites, these areas should be incorporated into the Project Biodiversity Offset Program, to ensure 'No Net Loss' of biodiversity.

5.2 Quarries

All six potential quarry sites are located in areas of Natural Habitat. Following IFC PS6 mitigation hierarchy, the use of these areas as quarries should be avoided unless "*no other viable alternatives within the region exist for development of the project on modified habitat*...".

Borrow pits are the main sources for supply of fill and concrete aggregate of the Project, with motorway fill material and a portion of concrete aggregates provided from borrow pits rather than rock quarries. The Project aims to minimize environmental and social impact as much as possible through minimizing necessity to use rock quarries. Although material for the borrow pits are useful for concrete aggregates, alluvial deposits from the borrow pits are not technically suitable for asphalt aggregates and river regulation. Therefore, a minimum amount of aggregate will need to be produced from rock material quarries. As such, the purpose of the use of quarries is the supply of technically suitable material for the Project.

Currently, the Project is looking for alternative quarries within the dynamics of the work in case previously identified quarries do not fulfil Project requirement. The search for new alternative sites for quarries will take a number of factors into consideration, including:

- technical specification requirements;
- legal requirements;
- financial aspects;
- environmental and social aspects;
- transport distances;
- capacity;
- operational aspects;
- traffic impact on local roads;

The Project alternative plans currently incorporate alternative quarries on modified habitat, with quarry investigations on-ongoing, although finalised information on this is as yet unavailable. For further steps, the Project will continue to assess each location on a case by case basis prior to use following the AA methodology presented in this report, ensuring that selected sites will meet not only technical requirements but also PS6 requirements.

In case any quarry assessed within this alternatives analysis as on Natural Habitat that is taken forward, it should be incorporated into the Project Biodiversity Offset Program, to ensure 'No Net Loss' of biodiversity. Prior to proceeding with development of quarries on Natural Habitat, we would recommend preferential selection informed by biodiversity survey of the sites, under criteria aligned with international lender standards, as described in Section 3.6 above and a Biodiversity

Management Plan (BMP) developed to ensure removal and disturbance of Natural Habitat is kept to a minimum..

With respect to other parameters applied to our analysis, the majority of quarry sites are predicted to have a number of medium level impacts. Dependent on their location, quarries by their nature frequently incur significant impact on their surrounding environment, particularly in relation to visual and landscape, noise and vibration and air quality. For the five sites assessed, we do not consider these impacts to be unduly high, and are to some extent mitigable through the application of appropriate mitigation and management measures as detailed in Chapter 8 of the Project ESIA.

If the Plana quarry site is further considered for development, we recommend archaeology survey is undertaken to identify any archaeological sites that may be impact as a result of quarrying in the area.

5.2.1 Unsuitable Soil Deposit Areas

The 38 sites originally identified for potential use as unsuitable soil deposit areas are assessed as having predominantly low level impacts across most parameters, with the exception of Ecology and Resettlement and Land Acquisition. Five of the sites are located, at least partially, on Natural Habitat. As with borrow pit areas, where Natural Habitat occupies part of the site, remaining areas of Modified Habitat may be suitable for disposal of unsuitable soils; sites where areas of Natural Habitat may be removed to form a smaller site layout are listed as follows:

1, 3-1, 3-2, 5

Having excluded areas of Natural Habitat, we recommend the application of incremental site selection for these unsuitable soil deposit alternatives based overall average impact value calculated for each site, as described in Section 3.5 above.

Any of the unsuitable soil deposit areas selected should be incorporated into the Resettlement Action Plan (RAP) and Resettlement and Livelihood Restoration Framework (RLRF) developed for the Project.

5.2.2 Abandoned Borrow Pit / Wetland Soil Deposit Sites

Additional to the initial unsuitable soil deposit areas proposed for the Project, 138 disused borrow pit / wetland areas have been assessed as part of our alternatives analysis. We understand these have been proposed in order to avoid the requirements for land acquisition associated with the originally proposed unsuitable soil deposit sites (see Section 5.2.1 above) While the overall average predicted impact for all of these sites is low, many are located in areas of Natural Habitat, comprising both terrestrial vegetation and water bodies, and as a result, these sites have been allocated re-flag status following our assessment methodology.

Our general recommendation for the proposed wetland unsuitable soil deposit sites is that where they are located on Natural Habitat, they should be rejected in favour of those located on modified habitat. Recommendations for unsuitable soil deposit areas located on area of both Natural Habitat and Modified Habitat follow those applied to borrow pit and other unsuitable soil deposit areas in

reducing the site layout area to avoid Natural Habitat as shown in the relevant maps in Appendix A. For the abandoned borrow pit soil deposit sites, the list of sites that can be reduced to avoid Natural Habitat is as follows:

1101, 1113, 1121, 1124, 1125, 1201, 1249, 1250, 1265, 1267, 1268, 1314, 1337, 1339*, 1341*, 1332. (*these sites contain areas of Critical Natural Habitat, for which careful avoidance measures should be applied through BMP if neighbouring areas of Modified Habitat are developed)

For sites located on Modified Habitat we recommend incremental site selection based on overall average impact value calculated for each site, as described in Section 3.5.

The paragraphs below provide more detailed considerations and approaches to be applied to specific wetland sites:

River meanders

A proportion of the wetland alternatives proposed as unsuitable soil deposit sites are river meanders that will be cut off as part of river regulation. Meanders are proposed as unsuitable soil deposit sites only in cases where the meanders have already been identified for backfilling to ensure the integrity of the road structure.

All of these sites are located on Natural Habitat, as part of the river ecosystem, however justification for cut-off is based on the location of a number of meanders close to the motorway route and the associated instability of the river route in these areas, particularly in Sector 3 of the road route. Based on historical irregular changes in the course of these meanders, it is predicted that similar future changes would affect the stability of the motorway during its lifetime. As some flow will be maintained in the cut-off meanders through partially retained connectivity to the main river course, some erosion along the banks may persist to a limited degree over time.

Where possible, cut-off meanders will be left with their water surface open, however to ensure the integrity of the road structure, backfill of a number of the cut-off meanders is required. The decision-making process for backfilling of meanders applied is as follows:

The meander will be backfilled in the following cases:

- When meanders are a result only of local deviation so that the length of the existing flow route is similar to the projected length of the average, with a difference of the order of 10%;
- When the route of the river intersects with the route of the highway in the meandering zone (or the meander is located within 50 m from the trunk leg of the highway); then the bearing layer for the trunk of the highway is formed on the part of the old riverbed, which is therefore filled with material.

The following aspects are taken into account when determining technical solutions for backfilling:

- Minimization of the effects of the highway on the environment in the given conditions of the highway project, both locally and in the wider area;
- Minimal backfilling meander in the goal of maximum conservation aquatic ecosystem (provided protection of the highway from high waters is ensured);
- Maximizing the use of locally available materials when building a highway."

Based on the above criteria, 16 locations along the motorway route have been identified for meander backfilling, and therefore included in our alternatives analysis as proposed unsuitable soil deposit areas; these sites have been highlighted green in the Terrestrial and Freshwater Ecology section of our quantified alternatives analysis in Table 3-9, Table 3-10 and Table 3-11)

It is important to note that soils from only the most benign sources should be deposited in cut off meander areas and rigorous chemical testing of the unsuitable spoil deposited in these areas will be essential, given the continued hydrological connectivity of such areas to the river and potential for leaching of pollutants into the aquatic system.

It is noted that the Project has plans for rehabilitation of the new sections of river that are being recreated, and the meanders that are being cut off for flood protection that are not being backfilled will also provide habitat for biodiversity (although will be a loss of main stem river habitat) and suitable fish spawning areas. Rehabilitation, restoration and new habitat creation will be accounted for in the updated Biodiversity Residual Impact Assessment prepared by TBC, when the plans are fully finalized.

Disused borrow pit water bodies

Many of the water bodies within proposed unsuitable soil deposit sites have formed on previously disturbed land (borrow pits), however it is considered that many of these sites will have become "naturalised ponds" over time since their disuse, and the majority are classified as Natural Habitat under TBC's habitat classification mapping. 2U1K have identified a number of these ponds and surrounding areas during on-site survey where naturalisation is not complete due to their location within areas still subject to material extraction or otherwise Modified Habitat. For the purposes of our assessment, these areas are considered Modified Habitat and scored 1 for receptor sensitivity despite appearing as Natural Habitat in maps provided in Appendix A. It is noted that, for ease of reference, these sites have been highlighted blue in the Terrestrial and Freshwater Ecology section of our quantified alternatives analysis in Table 3-9, Table 3-10 and Table 3-11).

Disused ponds are assumed to have become naturalised where they are separated from mineral extraction or agricultural activities and are largely surrounded by Natural Habitat terrestrial vegetation; these sites have accordingly received a receptor sensitivity score of 5, in alignment with TBC's habitat mapping. Should further on-site habitat verification by aquatic / biodiversity specialist determine any of the additional disused borrow pit sites not to have become naturalised, we consider it appropriate to consider them as Modified Habitat and therefore suitable for use as soil deposit areas under the proviso that any surrounding areas of terrestrial Natural Habitat is left undisturbed.

The disused borrow pit most recently proposed for unsuitable soil deposit area, 4km to the west of the road corridor, should be subject to archaeological survey, as current data does not extend this far from the road.

Mitigation

Should it not be possible, following the mitigation hierarchy, to reach the target unsuitable soil deposit capacity using areas of Modified Habitat alone, the developer may choose to move forward with the unsuitable soil deposit sites located on Natural Habitat, in which case all impacted areas of Natural Habitat should be included in the Project Biodiversity Offsetting Programme.

Appendices

A. Maps

B. Data formatted for site selection

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