Environmental Impact Assessment

Project Number: 53178-001
May 2019

GEO: East–West Highway (Shorapani–Argveta Section) Improvement Project

Part 7 (Sections B–F)

Prepared by the Roads Department of the Ministry of Regional Development and Infrastructure of Georgia for the Asian Development Bank.

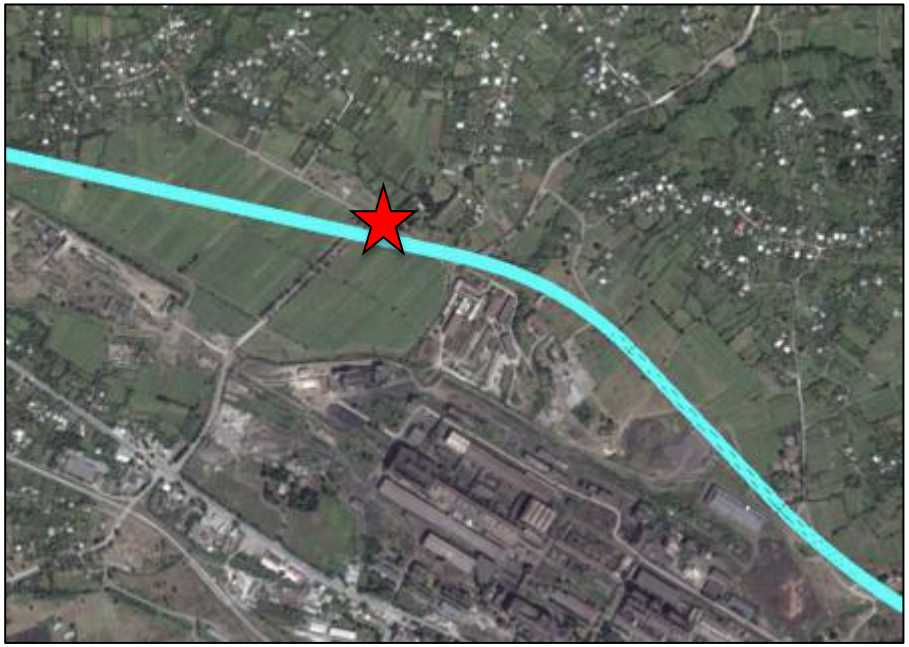
KM4.3 - After the interchange the road enters a tunnel emerging on the south side of the Dzirula river opposite the 'center' of Shoropani. A number of residential properties and apartment blocks are located in this area as well as a school. The photo above is taken from a small pedestrian bridge crossing the Dzirula looking west. The new road will be constructed on the existing road, with further cut into the slopes on the left side of the road required.

KM4.4 - The existing road follows the Dzirula river and the new road will follow almost the same alignment, or just to the south. Some small stalls selling items for tourists can be noted (see photo opposite). Few residential properties will be affected by construction works, although noise may be an issue during the construction and operational phases of the project here. The photo above is taken looking east towards the tunnel portal – TUN 4.0.03-TA/AT (tunnel shown in green on the plan).

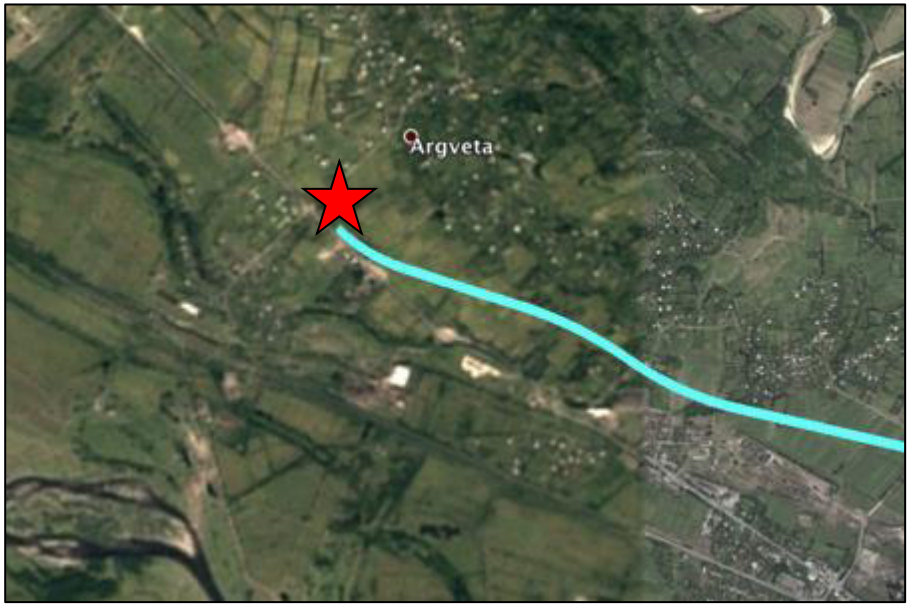
KM6.0 - The road continues west towards Zestaphoni. In this area a few residential buildings can be observed as well as some light industrial and commercial properties. At this point the Kvirila river joins with the Dzirula River. The alignment will then cross the Kvirila river and enter directly into a long tunnel (TUN 4.0.04-AT/TA) bypassing the north east of Zestaphoni. The photo above is taken looking north east from across the Kvirila at the location where the new road will split from the existing pavement.

KM6.3 - The alignment will then cross the Kvirila river and enter directly into a long tunnel (TUN 4.0.04-AT/TA) bypassing the north east of Zestaphoni. The photo above is taken looking south east across the river in the direction of the bridge, almost adjacent to the proposed tunnel portal.

KM9.3 - After existing the tunnel the road traverses a mix of woodland, agricultural land and pastureland avoiding impacts to residential properties. The road then passes through a small residential area to the north of Zestaphoni. A bridge is planned in this location (BRI 4.1.05-TA/AT)



KM11.5 - The road continues west through agricultural land (mostly corn) on the north side of the GAA manganese processing plant. The road may encroach on the GAA property and as such soil samples have been taken in this area to assess if there is any soil contamination from the plant. The road crosses existing local roads and comes very close to a small medical clinic. Low and medium voltage transmission lines and residential gas pipelines are also located in this area. The photo above is taken looking south towards the GAA plant.



KM14.7 - The Project road ends at the junction with the new road (Argveta – Kutaisi) which is currently under construction. The topography of the road is flat in this portion which traverses agricultural land. The existing alignment is located approximately 50 meters to the south of the new road. The photo above is taken looking east from the end point of the road.

B.4 Road Standards and Profiles

161. Geometric design standards have been selected based on traffic flow, road category and relief to ensure safe and unimpeded traffic flow. The road design is based on the Georgian National Standard SST 72: 2009 "Standard on Geometrical and Structural Requirements for the Public Motor Roads of Georgia" and TEM (Trans-European North-South Motorway) Standards. The main technical parameters adopted in the detailed design are as follows:

- Design speed - 100 km/h;
- Number of traffic lanes – 4;
- Width of traffic lane - 3.75 m;
- Width of each carriageway - 7.5 m;
- Width of paved shoulder (emergency lane) - 2.5 m;
- Width of verge – 1.0 m;
- Width of central reserve- 5.0 m;
- Width of paved shoulder at the central reserve - 1.0 m;
- Total width of each paved platform – 11.0 m
- Width of road bed - 27.0 m;
- Carriageway cross-fall on straight sections - 2.5%;
- Minimum radius of horizontal curve - 400 m;
- Maximum longitudinal gradient - 4%;
- Minimum convex curve - 15 000 m;
- Minimum concaved curve - 15 000 m.

162. A minimum radius of horizontal curve 400 m for the design speed 100 km/h is adopted based on Austrian standards and Russian standards (SNiP 2.05.02-85) for mountainous relief. The road axis has been designed separately for two independent right and left lanes. The axis is located on the outer edge of the paved section (1.0 m) of the central reserve: Tbilisi-Argveta direction **TA,** Argveta-Tbilisi direction **AT**.

B.4.1 Cross Sections

163. In all the section of the motorway, the cross section is arranged in two carriageways with two traffic lanes each (2+2 lanes); the carriageways may be divided and independent according to the terrain characteristics. Traffic lanes in this proposal are always 3.75m, to guarantee enhanced and homogeneous safety level across the road.

164. **Cross Section on Embankment and Cuts** – The cross section includes:

- 2.50m wide paved external shoulder (hard shoulder) on the outmost of each carriageway this element may be widened on the internal carriageways, where sight analysis requires widening;
- 1.00m verge on the outmost of the external shoulders, where external safety barrier may be located according to needs;
- 5.00m wide central reserve (median), composed by:
  - 3.00m space for the safety barrier (typically reinforced concrete, dual) and related workspace.
  - 2x1.00m paved internal shoulders (or wider on the external carriageway only, where sight analysis requires widening).

167. The verge may also be 5-10cm above the pavement level, to protect embankment from erosion (should be interrupted every 25m to permit water flow, in dedicated channels with lining on embankments).

Figure 16: Cross Section on Embankment and Cuts

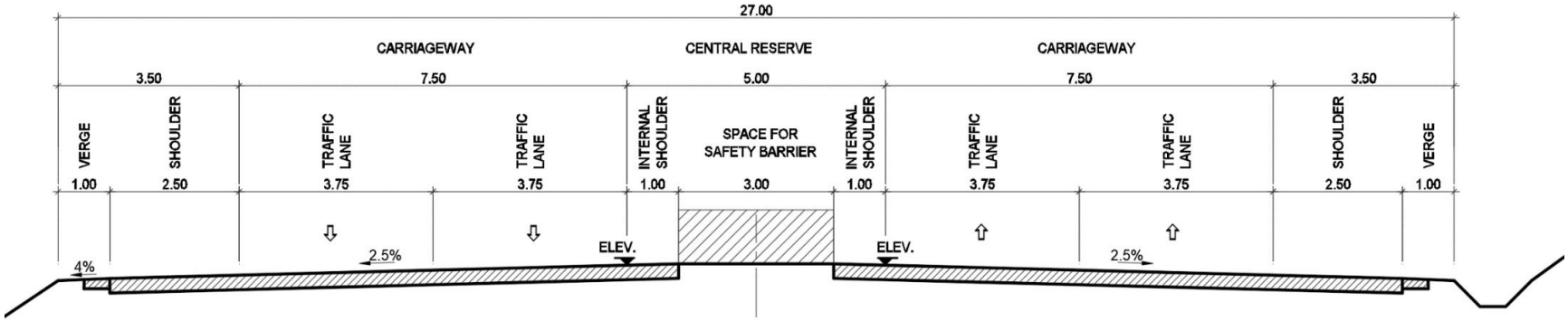


Figure 17: Cross Section on Bridges

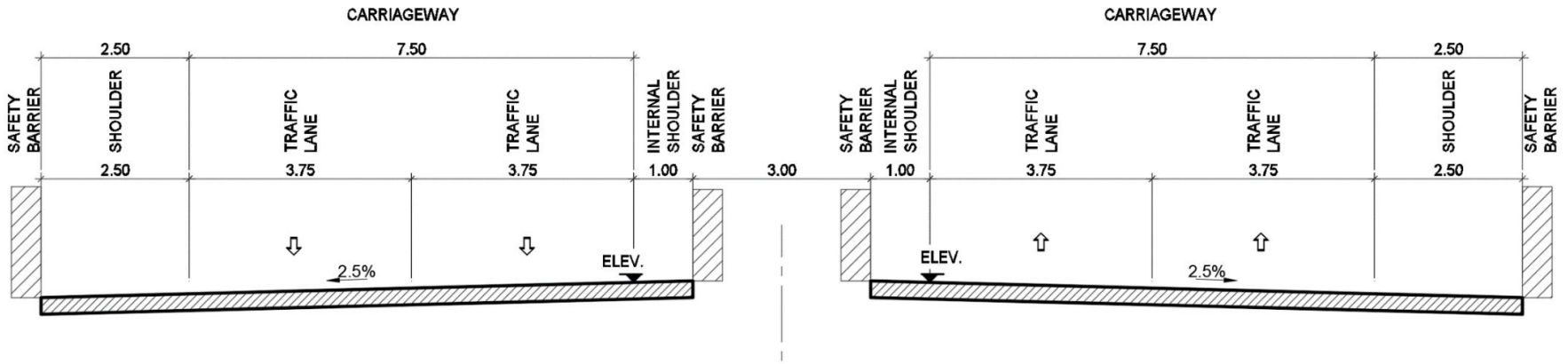
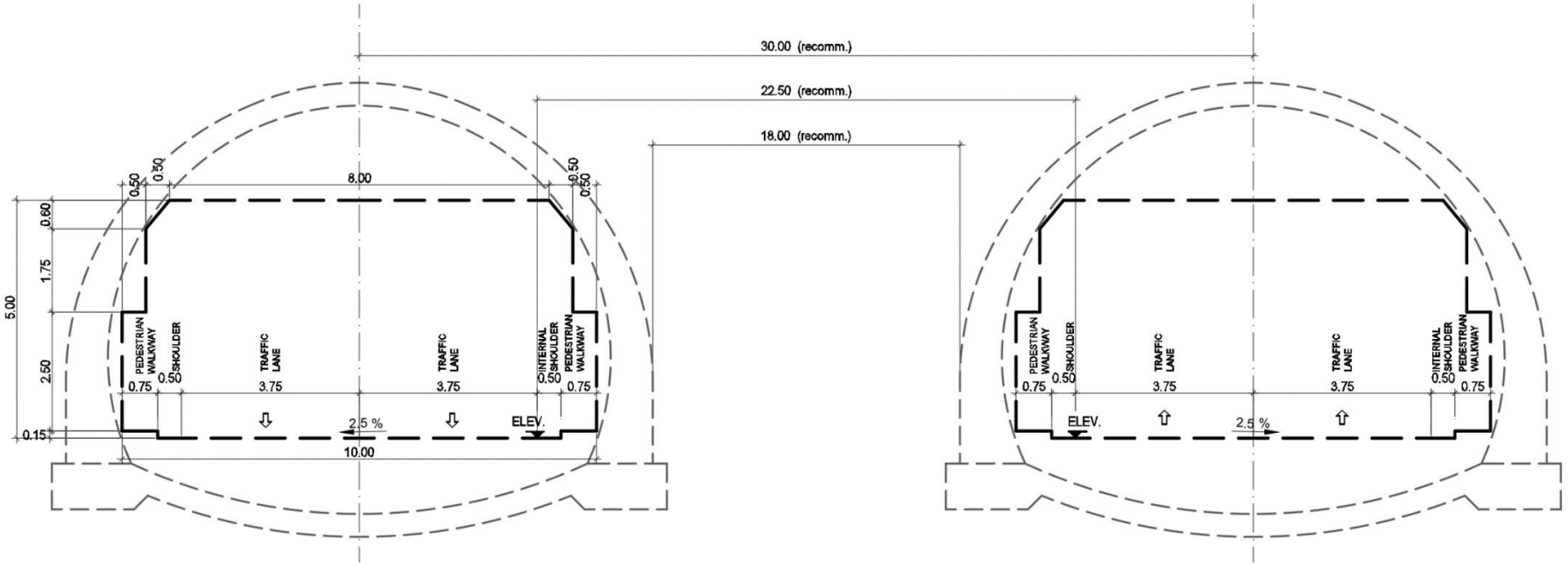


Figure 18: Cross Section in Tunnels



165. **Cross Section on Bridges** - This is a functional cross section, so the structural part is not shown. The minimum width for the paved area is 11.00m (2x3.75+2.50+1.00). Safety barriers (internal and external) shall always be included, positioned outside of the shoulders (no element shall invade the shoulder space) and may be installed according to the manufacturer's specification. Side walkways shall be added, with a minimum clear width of 0.6m. Walkway may be also built with a cantilever metal structure, with external pedestrian parapet.

166. **Cross Section in Tunnels** - This is a functional cross section including the clear area (gabarit), so the structural part is not shown but shall be organized out of the dashed boundary line; the minimum vertical clearance is 5.00m, which is 1m more than the height of the standard trucks. All the structural parts and additional system (lighting, fans, cable ducts, etc.) shall be positioned outside the dashed boundary line. Minimum width for the paved area is 8.50m (2x3.75+2x0.50), pedestrian walkways are 0.75m wide, on both sides. There is no need of widening in the curves, since when the radius is minimum (400 m) the maximum speed allowed is 80 km/h.

B.5 Bridges

167. Five long span bridges and one short span bridge will be constructed during the project works (throughout the report we will refer to five bridges, although from a technical perspective there are ten bridges as the AT lane and TA lane on each 'bridge' are not joined, but are standalone structures). **Table 2** below provides summary details of the bridges and their locations.

Table 2: Bridges

Bridge #	Chainage Start (m)	Chainage finish (m)	Watercourse Type / Name	Bridge length (m)
BRI 4.1.01-AT	1,256	1,846	Dzirula River	589
BRI 4.1.01-TA	1,250	1,890	Dzirula River	640
BRI 4.1.02-AT	2,039	2,980	Dzirula River	941
BRI 4.1.02-TA	2,050	2,930	Dzirula River	880
BRI 4.1.03-AT	3,230	3,485	Borimela River	255
BRI 4.1.03-TA	3,210	3,470	Borimela River	260
BRI 4.1.04-AT	5,862	6,317	Kvirila River	455
BRI 4.1.04-TA	5,853	6,273	Kvirila River	420
BRI 4.1.05-AT	9,044	9,240	None	196
BRI 4.1.05-TA	9,018	9,214	None	196
BRI 4.1.06-AT	7,061	7,101	None	40
BRI 4.1.06-TA	7,031	7,071	none	40
TOTAL				**4,912**

168. The bridges are grouped into the following main typologies:
- Steel-concrete bridges - bridges 1,2,4: maximum span length up to 60 m for bridges 1 and 2 and up to 72 meters for bridges 4-AT and 4-TA.
- Precast concrete bridges – bridges 3 and 5: maximum span up to 34m

169. The following presents a short description of each bridge:
- Bridges 1-TA and 1-AT – Bridges are composed of spans with length 42, 48, 54 and 60 meters. Structural scheme is a continuous deck.
- Bridges 2-TA and 2-AT – Bridges are composed of spans with length 42, 48, 54 and 60 meters. Structural scheme is a continuous deck.

- Bridges 3-TA and 3-AT – Bridges are composed of spans with maximal length 34 meters.
- Bridges 4-TA and 4-AT – Bridges are composed of spans with lengths 48, 54, 60 and 72 meters.
- Bridges 5-TA and 5-AT – Bridges are composed of spans with maximal length 34 meters.

170. Both bridge types have their advantages and disadvantages as follows:
- Precast concrete - In this method a crane moves the precast concrete girder up to the top of substructure. The weakness of this method is the requirement of installation of temporary plant for prefabrication of precast girder and difficulty of span arrangement over 40 m in a span length, but the strength is short construction period due to using crane method and economic efficiency.
- Steel-concrete bridges - will be constructed using staging construction method using temporary steel bent to place the cast-in place concrete of superstructure. The weakness is relatively difficult in construction due to long period of construction to place cast-in-situ concrete of superstructure and requirement of temporary steel bent to support the formwork of concrete.

171. There are two types of pier geometry in elevation, as follows:

Figure 19: For steel-concrete bridges – type 1

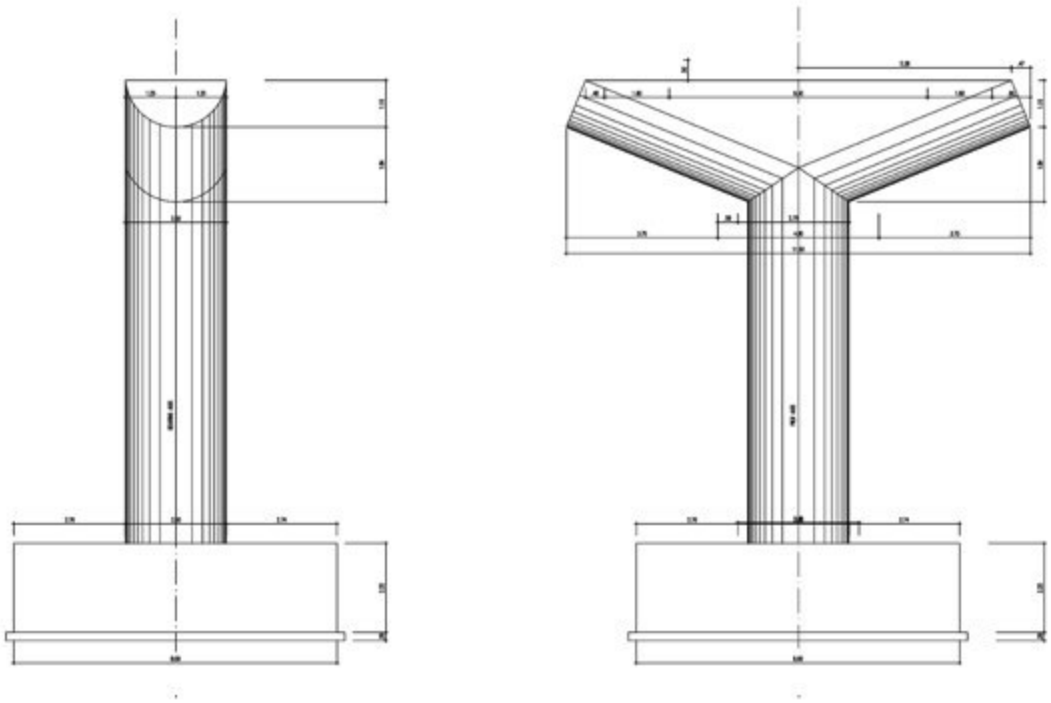
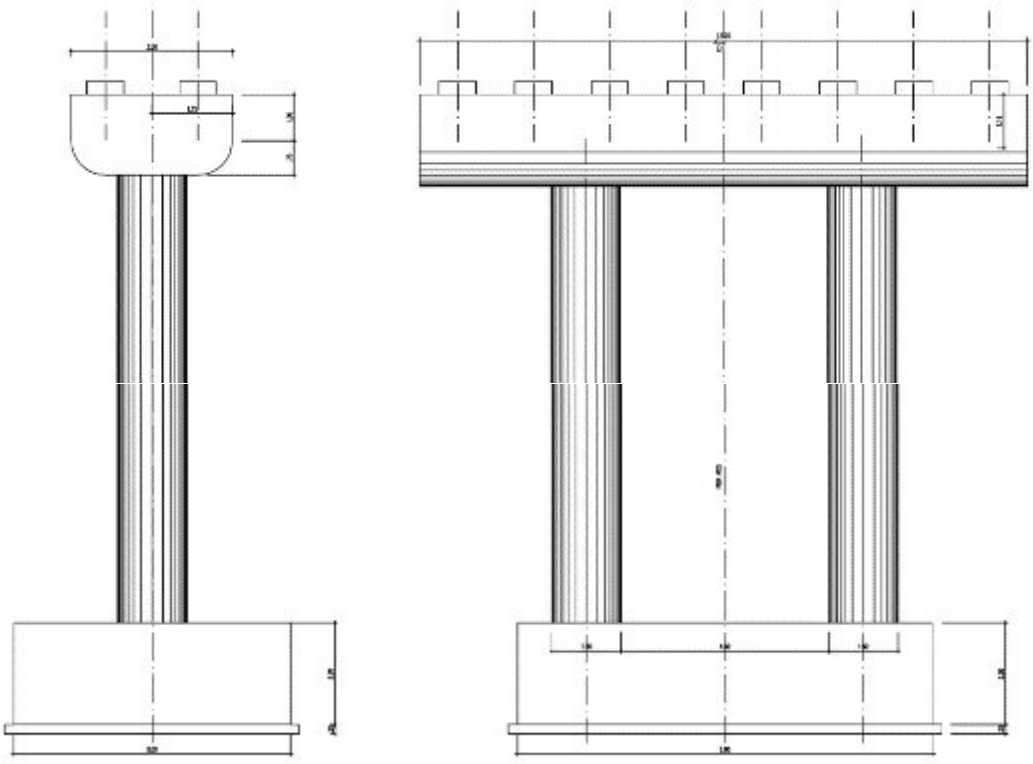
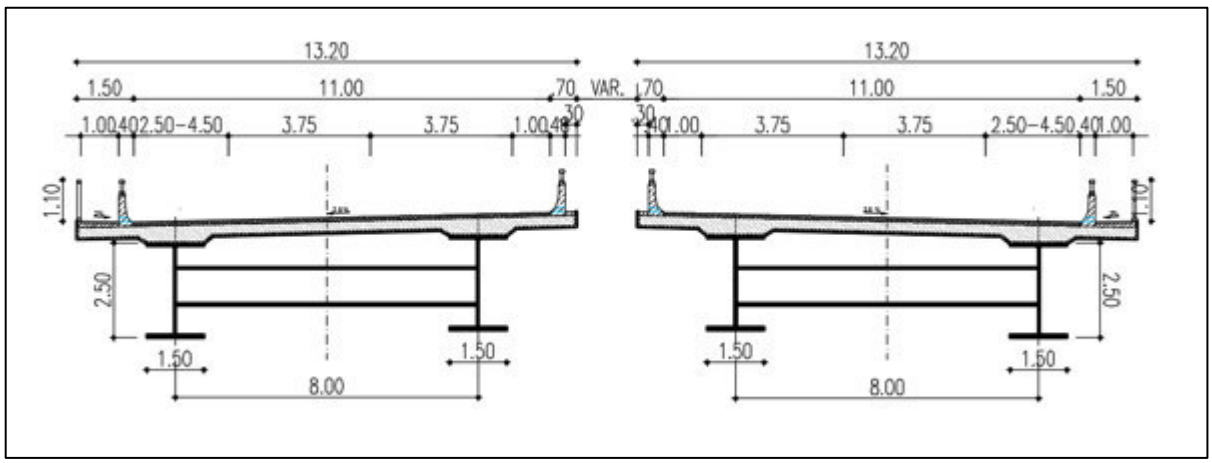


Figure 20: For pre-stressed precast PSC beams bridges – type 2



172. The bridge decks will be two main beams connected by a trasversal beam and with the slab cast on a steel plate, more or less as is shown in **Figure 21** below.

Figure 21: Bridge Cross Section



173. For foundation of substructures, installation of piles will be done through boring using cast-in-place bored pile with reinforced concrete was adopted due to local field condition, environment effect, and supply of materials. This construction method has minor noise and vibration impacts compared to precast driving methods.

B.6 Tunnels

174. In Section F4 six tunnels will be constructed with double tubes with length from 399 m to 1166 m. In this Section, the ground thickness over the tunnel are generally limited and crossed clusters rock shown poor mechanical characteristics.

Table 3:Tunnels in Section F4

Tunnel #	Length (m)	Chainage		Maximum Overburden	Lithology
		Start (m)	End (m)		
TUN 4.0.01-AT	560	165	725	59.85	Medium sound rock
TUN 4.0.01-TA	399	226	625	63.97	
TUN 4.0.02-AT	510	725	1,235	141.49	Medium sound rock
TUN 4.0.02-TA	445	725	1,220	149.23	
TUN 4.0.03-AT	1,165	3,472	4,637	83.51	Medium sound rock
TUN 4.0.03-TA	804	3,490	4,294	86.06	
TUN 4.0.04-AT	715	6,330	7,045	76.76	From moderately weak to medium sound rock
TUN 4.0.04-TA	723	6,300	7,023	74.83	
TUN 4.0.05-AT	1,193	7,137	8,330	59.74	From moderately weak to medium sound rock
TUN 4.0.05-TA	1,152	7,107	8,259	58.81	
TUN 4.0.06-AT	450	9,277	9,727	-	From moderately weak to medium sound rock
TUN 4.0.06-TA	444	9,265	9,709	-	

Table 4: Typical Tunnel Dimensions

Parameter	Value
Width of pavement	7.50 m
Width of sidewalk	0.75 m
Width of Shoulder	0.50 m
Total width of tunnel	10.00 m

175. Ventilation - The primary ventilation for the tunnels having length >1000m (TUN 4005 TA/AT and TUN 4003 AT) will be of the longitudinal type. Ventilations is guaranteed by the use of axial Jet-Fans, having rotor's diameter 1.250mm, stainless steel box, with reversible flow, fire resistant for 2h at 400°C. Moreover, Jet-Fans cables and switching for fan's wiring have the same fire resistance characteristics.

Escape Routes - Escape routes are provided for tunnels which length is >1000m, which in case of fire will allow users to reach the other tube of the tunnel, and from there they will go to the nearest portal. Escape routes are accessible only through specific filter areas with fire doors REI 120 in order to avoid the propagation of the fire or smoke inside bypass and pressurized by ventilation systems.

176. Fire Protection - Tunnels having length >500m are equipped with the fire protection system. Pump stations and the related tanks are installed next to the substations ES3, ES4 and ES5. The electrical plant supply are realized according to standard EN 12845. Fire protection network will supply the 120l/min hydrants located inside the niches of the tunnel next to the SOS every 150m along the slow lane. Next to the portals will be posed 300l/min hydrants above the ground. SOS stations and inside the substations are equipped with fire extinguishers. Fire detection inside the tubes is realized with the heat sensitive cable or double conductor cable with insulation sensitive to temperature, protected by a special outer sheath. This system is added to the smoke detection inlet system, to the opacimeters and to the ccTV plant (obscuration function).

177. SOS Emergency Phone System - Tunnels longer than 300m SOS emergency phone at portals, inside the tunnels (every 150 m) and into pedestrian bypass allow service users to calls for roadside and emergency medical assistance.

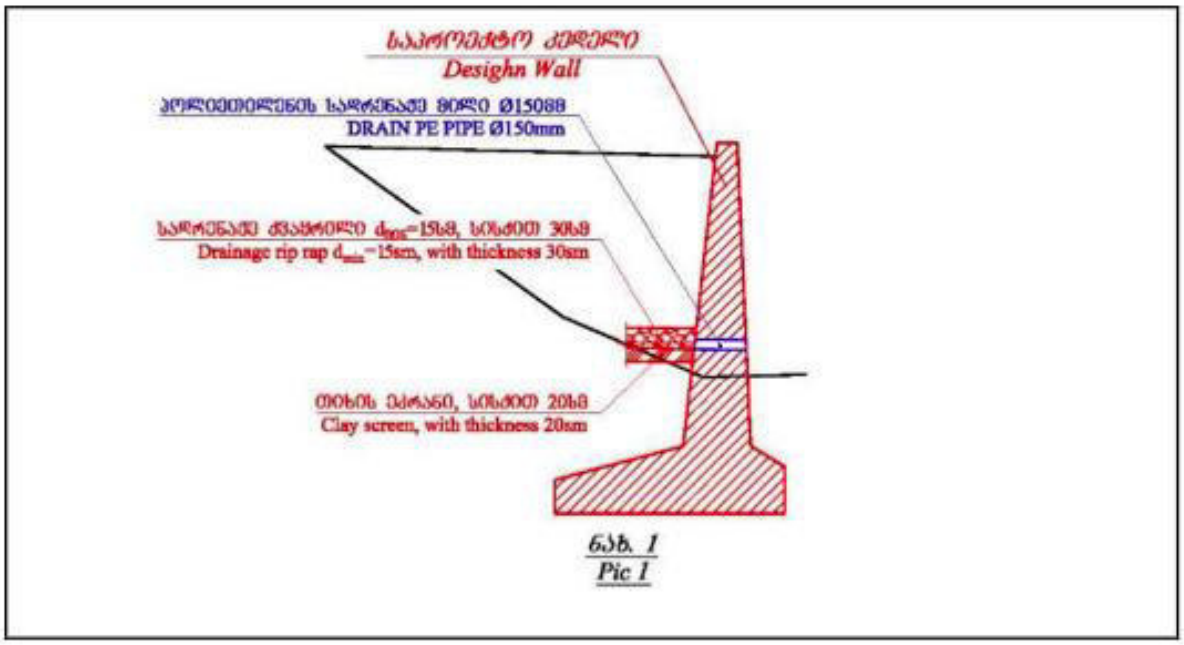
B.7 Retaining Walls

178. To construct the roadbed in the project section concrete retaining walls and reinforced concrete support structures will be required on several sections due to the difficult relief conditions of the project section. Reinforced concrete retaining walls are required at the beginning of the project section from:

- KM 0.00 to KM 0.25
- KM 8.63 to KM 8.71
- KM 8.84 to KM 8.94

179. A reinforced concrete support structure wall is required at Shoropani, on the section of the road from KM 4.36 to KM 4.43.

Figure 22: Typical Retaining Wall



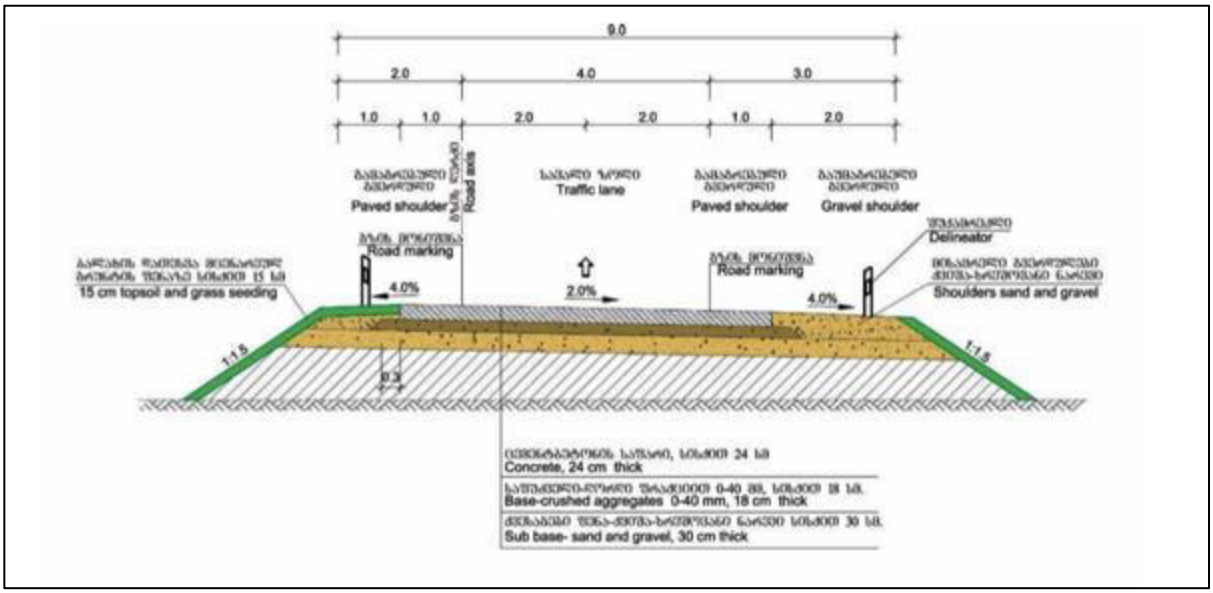
Note: Drain Pipe 150mm / Drainage Rip-rap thickness 30cm / Clay Screen thickness 20cm

B.8 Interchanges

182. There are four interchanges planned in F4 Section. Figure 7, Figure 9, Figure 13 and Figure 14 provide plans of the Project road including all interchanges.

180. The pavement structure for interchanges includes:
- Pavement - cement-concrete, thickness 24 cm.
- Base course - crushed aggregates 0-40 mm, thickness 20 cm.
- Sub-base - sand and gravel mix, thickness 30 cm.

Figure 23: Road Pavement Structure for Interchanges



B.9 Culverts and Underpasses

181. Culverts, cattle passes and underpasses crossing the project motorway are designed in compliance with standard design practices for motorways using box type culverts. Culverts on the Project road ensure uninterrupted discharge of precipitations, water from ravines and water from drain channels. The Project road passes inhabited areas, arable lands, pastures and other rural territory. Thus box section underpasses shall be constructed to pass cattle, pedestrians and vehicles and ensure uninterrupted crossing of the Project road.

182. The following types of culverts will be constructed:
- Underpasses for rural roads, which are construction of cast in situ reinforced concrete structures of closed contours cross sections 6.0x4.5 m - 6 units for passing rural roads is envisaged in the design.
- Cattle passes, which ensure cattle cross the project road. Construction of cast in situ reinforced concrete structures of closed contours cross sections 4.0x2.5 m - 4 units is envisaged in the design.
- Culverts, for which cast in situ reinforced concrete culverts cross section 2.0x2.5 m - 17 units, 4.0x2.5m - 2 units is envisaged in the design to provide water discharge from ravines and canals.

183. Eight underpasses will be constructed using reinforced concrete culverts. The table below indicates their locations.

Table 5: F4 Underpasses

#	Chainage (m)
UND 4.3.01-AT	10,293
UND 4.3.01-TA	10,269
UND 4.3.02-AT	12,770
UND 4.3.02-TA	12,749

#	Chainage (m)
UND 4.3.03-AT	13,222
UND 4.3.03-TA	13,200
UND 4.3.04-AT	13,636
UND 4.3.04-TA	13,614

B.10 Overpasses

184. One overpass will be constructed at km 11+854 with a length of 40 meters.

B.11 Construction Process

185. During the construction phase the following activities will be undertaken:

- **Land Acquisition -** Under the terms of the Loan of the Asian Development Bank (ADB), before the commencement of the construction works at any part of the site, the *Employer* must prepare the Land Acquisition and Resettlement Plan (the LARP), obtain the approval of ADB and then implement the plan and acquire the land.
- **Specific Environmental Management Plan (SEMP)** - Ensure that the SEMP is submitted to the Engineer for review at least 10 days before taking possession of any work site. No access to the site will be allowed until the SEMP is reviewed by the Engineer and approved by the RD / PIU.
- **Site Clearing Works -** The Works include the following site clearing works within or adjacent to the RoW of the Project Road, in accordance with the Drawings or instructions of the Engineer:
  - Clearing and grubbing.
  - Removal and disposal of traffic signs, sign posts and their foundations.
  - Demolition, removal and disposal of existing bridges including foundations, abutments, piers, retaining walls, riverbank and waterway protection works.
  - Demolition, removal and disposal of existing culverts, inlet and outlet structures, headwalls, concrete drains, channel lining, and erosion protection works.
  - Removal of and any other natural or artificial objects within the RoW.
  - Removal and disposal of all vegetation and debris within the designated limits of the Right-of-Way.
- **Relocation of Existing Services -** The Works include the relocation of all services affecting the construction of the Project Road within the Right-of-Way. The services include the following
  - water mains
  - overhead electric supply lines
  - gas pipelines
  - underground telephone cables
  - sewer mains
- **Construction Activities**– The main construction phase aspects are described in detail below.

B.11.1 Bridges

186. The construction of the new bridges includes but is not limited to the following parts of the structures and associated works:
  - Foundations.
  - Substructure including bridge bearings.
  - Superstructure, including construction of expansion and deformation joints and footpaths.

- Deck pavement including hydro isolation, drainage, hand railing, and conduits for services.
- Approach slabs.
- Slope treatments in front and around the abutments.
- Construction and maintenance of traffic detours.
- Scour and erosion protection of the waterway areas and river bank protection upstream and downstream of the bridge crossing, and removal of old foundations and substructure from the waterways.
- All necessary and incidental items required for a complete bridge.
- All new and widened bridges will be designed for the life expectancy of 100 years.
- Oil and grease interceptor tanks.

B.11.2 Tunnels

187. The actual development of the tunnel design follows the principles of ADECO RS [3] method and is summarized in the following table.

Table 6: ADECO Tunneling Method

Phase	ADECO RS
Survey phase	Analysis means first of all researching the medium to be tunneled from a geological and geomechanical point of view, especially by taking into consideration its resistance and deformability.
Diagnosis phase	And later forecasting by means of analytical and numeric instruments, what sort of stress-strain behavior will take place (Expected Deformation Response) when excavating (Categories A, B, C), in the hypothetical lack of stability operations.
Therapy Phase	The composition, in function of the foreseen behavior of the medium during excavation, of typical sections, defining the best type of stabilization operations for the expected operative context as well as phases, cadences, timing of implementation and any possible variability. Control of the Expected Deformation Response may come about by: Defining the type of pre-confinement actions or confinement actions that are necessary to manage and control the Expected Deformation Response of the medium to excavation; Choosing the type of stabilization operations from those available with today's technology, on the base of pre- confinement and confinement actions that each one is capable of guaranteeing; Sizing and verification, by means of mathematical models, of the operations chosen to reach the medium's desired behavior under excavation with the necessary safety coefficient; and Forecast, again using mathematical models, of the medium's stress-strain behavior under excavation when so stabilized.

B.11.3 Culverts

188. Project works include the construction of culverts and underpasses, including inlet and outlet structures and associated works in accordance with the Specification. The scope of the cross drainage works includes:

[3] [3] ADECO is a method of calculation of the tunnels developed in Italy by prof. Lunardi and in the latest years widely spread in Italy and also in Europe. The main principles are described in the general report and the method consists in letting the tunnel develop deformations and thus decrease the stress on the structures (DE.CO.means Deformations Controlled). There is a prevision of utilization of sections of intervention and a system of monitoring of the deformations (topographic, generally) which give informations on the tunnel behaviour. Then there is a report called Guide Lines which for each behavior gives instructions of which section to apply.

- Complete replacement of existing culverts which are old, structurally deficient or undersized;
- Extension of existing culverts which are of adequate design and in good condition;
- Construction of new culverts at locations where no cross drainage structure existed before;
- Cleaning of existing culverts which are partially or completely silted;
- Miscellaneous repair of the existing culvert joints, headwalls, wing walls, and scour and erosion protection works; and
- Construction of new scour protection and channel lining works.

B.11.4 Other Drainage Structures

189. Surface runoff from the carriageway and all other pavements, and any cut and embankment slopes must be discharged through longitudinal drains designed for adequate cross section, bed slopes, invert levels and the outfalls. The Works include construction of the drainage system components in urban and rural areas according to the types, dimensions, classes and material requirements for this work.

B.11.5 Earthworks

190. The Works include the following types of earthworks necessary for the construction of the Project Road and all associated works:

- Removal of topsoil.
- Construction of embankments.
- Construction of subgrade.
- Excavation and removal of the existing pavement materials and the existing road embankment.
- Removal and replacement of unsuitable materials.
- Structural excavation.
- Excavation for the construction of side drainage and cross-drainage works.
- Excavation for the removal and relocation of the existing utilities.
- All backfilling necessary for the construction of bridges, retaining walls or other earth retaining structures, cross drainage structures and associated works, side drains and erosion protection work.
- Preparation of beddings and filters for all structural, cross drainage, side drains or pavement works.
- Excavation, filling or backfilling necessary for the execution of any other incidental works.

191. The following table indicates the approximate earthworks and pavement quantities for the Project Road.

Table 7: Estimated Earthworks for Section F4

Description	Unit	Quantity
Stripping of topsoil	M^3	132,420
Road bed excavation and excavation in cut	M^3	1,250,000
Embankment Construction for roads and associated works up to bridge pay lines	M^3	1,600,000
Subgrade Preparation	M^3	320,00
Preparation of the underlying granular pavement layer	M^3	100,000
Dismantling of existing concrete structures	M^3	2,500
Removal and transportation of existing bituminous pavement	M^3	30,500
Structural excavation for culverts, headwalls & wingwalls	M^3	50,000

Description	Unit	Quantity
and retaining walls		
Granular backfill to culverts, headwalls, wingwalls and bedding for culverts	M^3	35,000

B.11.6 Pavement

192. Two different pavement structures will be used:
- Concrete pavement structure for the motorway and interchanges; and
- Asphalt pavement structure for all Slip Roads and all Minor Roads and bridges.

193. The following shall apply to the motorway, concrete pavement structure, construction category I:
- 28 cm Concrete;
- 30 cm Crushed Aggregate Course;
- 27 cm Granular Base Course;
- 85 cm Total Pavement Construction.

194. The following shall apply to slip roads and minor roads, asphalt pavement structure, construction category III:
- 4cm Asphalt Wearing Course;
- 4cm Asphalt Binding Course;
- 14 cm Asphalt Bearing Course;
- 58 cm Granular Base Course;
- 80 cm Total Pavement Construction.

195. For bridges, following the best practices all around the world and for durability reasons (total waterproofing and protection of the concrete slab), asphalt pavement is envisaged, precisely 11 cm of thickness.

196. Concrete pavements are already constructed on preceding sections of the highway. The pavement designs for the constructed sections were carried out in accordance to the German pavement design standard RStO 01.

197. The proposed pavement structure was designed according to "AASHTO, Guide for Design of Pavement Structures" and according to "RStO 01 the German Guideline for determination of Pavement Structures". Traffic load and other design parameters were evaluated for a 20 year design life cycle. At this stage of the project the pavement design and determination of the layer thicknesses aims at a constant pavement structure along the full length of the road which is suitable for the varying traffic loads.

B.11.7 Removal of Asphalt

198. The Contractor shall remove the existing bituminous pavement layers and stockpile this material at locations that will be specified by the RD and instructed by the Engineer. The asphalt will be re-used, where practical, for access roads and temporary roads, after which it will be re-used for shoulder material.

B.11.8 Construction Equipment

The following table provides indicative lists of the key equipment required in the construction phase (not including tunneling equipment).

Table 8: Key Equipment Section F4

#	Equipment Type and Characteristics	Minimum Number required
1	Bulldozer (>245HP)	4
2	Excavator (>100HP)	12
3	Crushing and screening plant – mobile type at least 150 m3/h including rock material washing machinery	2
4	Concrete Paving Machinery width not less than 9.0 m for 2-layer concrete placing including film-forming machinery	2
5	Small Concrete Paving Machinery width not more than 5.0 m including film-forming machinery	1
6	Front Loader (>135HP)	15
7	Concrete batching plant (>150m3/hr)	2
8	Motor grader (>135HP)	10
9	Vibratory roller (> 13T)	8
10	Tipper truck (10T)	30
11	Tipper truck (16T)	30
12	Mobile concrete carriers (>25T)	25
13	Transit mixer (>6m3)	6

B.11.8 Personnel

199. The construction phase will last approximately 30 months and it is expected that approximately 600 direct employment opportunities will be available during the peak of construction. The breakdown of skills required during the construction phase will be as follows:
    (i) Skilled labour: 58%;
    (ii) Semi-skilled labour: 20%; and
    (iii) Unskilled labour: 22%.

B.12 Source of Materials

B.12.1 Borrow Material

200. Where practical cut will be balanced with fill. An assessment of the volumes of cut and fill are provided in **Section F.8.3** which discusses the management of spoil material. No additional quarries or borrow pits will be needed under this Project.

B.12.2 Concrete Batching and Asphalt

201. Bitumen and bituminous products are not produced locally in Georgia and is mainly imported from Iran, Azerbaijan and Romania. Bituminous products, which are necessary for the project (production and construction) must be imported and comply with European standards.

202. Cement is produced locally by companies such as Saqcementi and Kartuli Cementi in Kaspi (approximately 80 km east of the Project area), other sources of cement may also be found closer to the site.

203. The Contractor will be responsible for ensuring the concrete batching facilities and asphalt plant comply with the conditions outlined in **Section F.8.5**. The Contractor will source concrete and asphalt from existing batching plants or from his own dedicated plant. **Section F.7.4** provides explicit conditions for operating batching plants and asphalt plants and the conditions for sourcing concrete and asphalt from existing plants.

B.12.3 Technical and Potable water

204. Approximately 200 m^3 of technical water will be needed per day during the construction phase and around 15 m^3 of potable water per day. Most technical water will be sourced from the rivers adjacent to the construction sites. Potable water will be sourced from existing water supply pipelines, or will be provided to camps in bottles. The final locations of the extraction points (for both technical and potable water) will require the approval of the Engineer and the RD prior to the start of extraction to ensure that over extraction of water resources does not happen. Potable water will also need to be tested regularly throughout the construction period to ensure it meets the drinking water standards of GoG.

B.13 Camps and Storage Areas

B.13.1 Construction Camps

205. Camp sites will be selected keeping in view the availability of an adequate area for establishing campsites, including parking areas for machinery, stores and workshops, access to communication and local markets, and an appropriate distance from sensitive areas in the vicinity. The final locations of the camps will be selected by the Contractor after the approval from the RD and the Engineer.

206. The area requirement for construction camps will depend upon the workforce deployed and the type and quantity of machinery mobilized. For example, the camps may include rock crushing plant and concrete batching facilities. In view of the area required, it will not be possible to locate campsites within the RoW and the contractors will have to acquire land on lease from private landowners. The construction camp will also have facilities for site offices, workshop and storage yard, and other related facilities including fuel storage.

207. The Contractor will provide the following basic facilities in the construction camps:
- Safe and reliable water supply.
- Hygienic sanitary facilities and sewerage system.
- Treatment facilities for sewerage of toilet and domestic wastes
- Storm water drainage facilities.
- Sickbay and first aid facilities.

208. Detailed criteria for siting of construction camps and establishment of facilities are given in **Section G.7.4**.

B.13.2 Storage Areas

209. Temporary storage areas will be required for certain activities, such as the storage of sand and gravels and construction equipment. These storage areas may range in size

from anything between 50 m^2 to more than a hectare. The precise locations of these temporary facilities is not known at this stage, as such mitigation measures shall be prepared to ensure that these areas are sited in approved locations.

B.14 Road Safety

210. The following elements are provided for traffic control and security on road:
- Road signs and indicators;
- Fences;
- Signal posts;
- Traffic markings;
- Lighting;
- Traffic lights;
- U-turns;
- Ground for short time stops for vehicles;
- Sidewalks;
- Bus stops.

211. The main road safety benefits the project will deliver are the following:
- Reduced risk of vehicles leaving their lane to avoid potholes and surface deformations;
- Improved sight distances;
- Better separation between pedestrians and vehicles; and
- Better night driving conditions due to wider carriageway and improved pavement centerline markings.

212. Some of these advantages could be partially offset by the higher speeds that may lead to accidents, which will be possible after the road improvements.

B.15 Traffic Projections

213. Traffic forecasts for Dzirula and Argveta are presented below by **Figure 24** and **Figure 24.** The figures indicate that traffic volumes are set to more than double over the next 30 years between Dzirula and Argveta.

Figure 24: Forecasted Traffic, Dzirula, 2017 - 2037

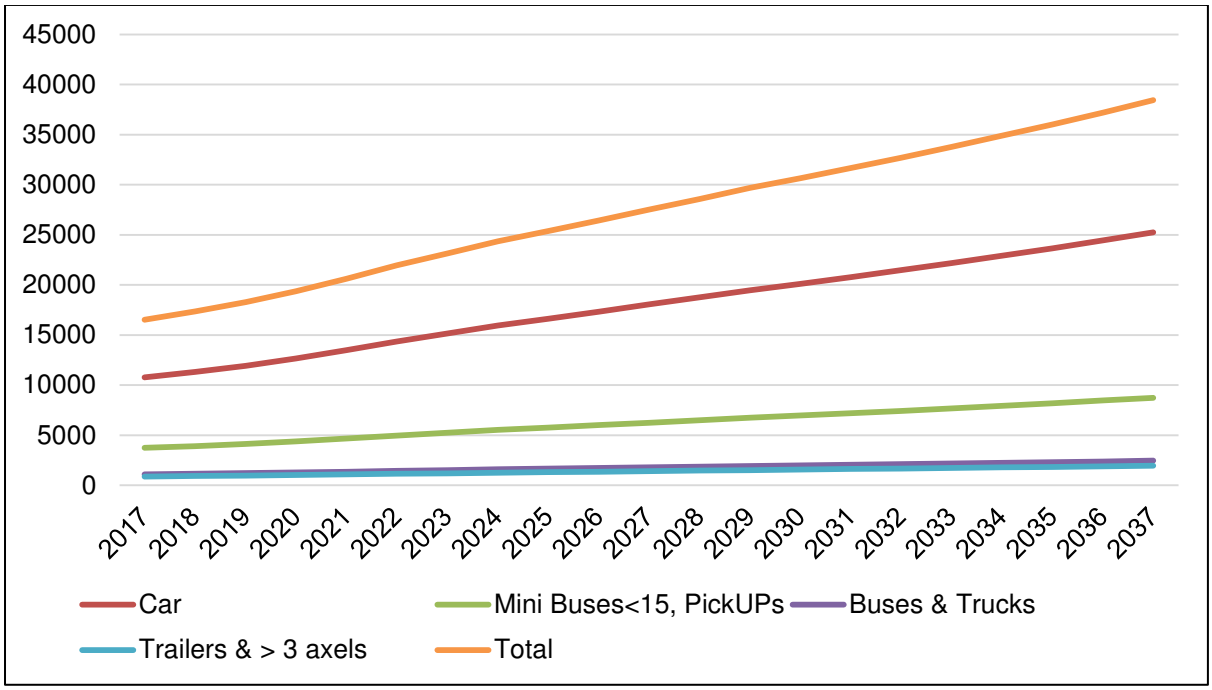
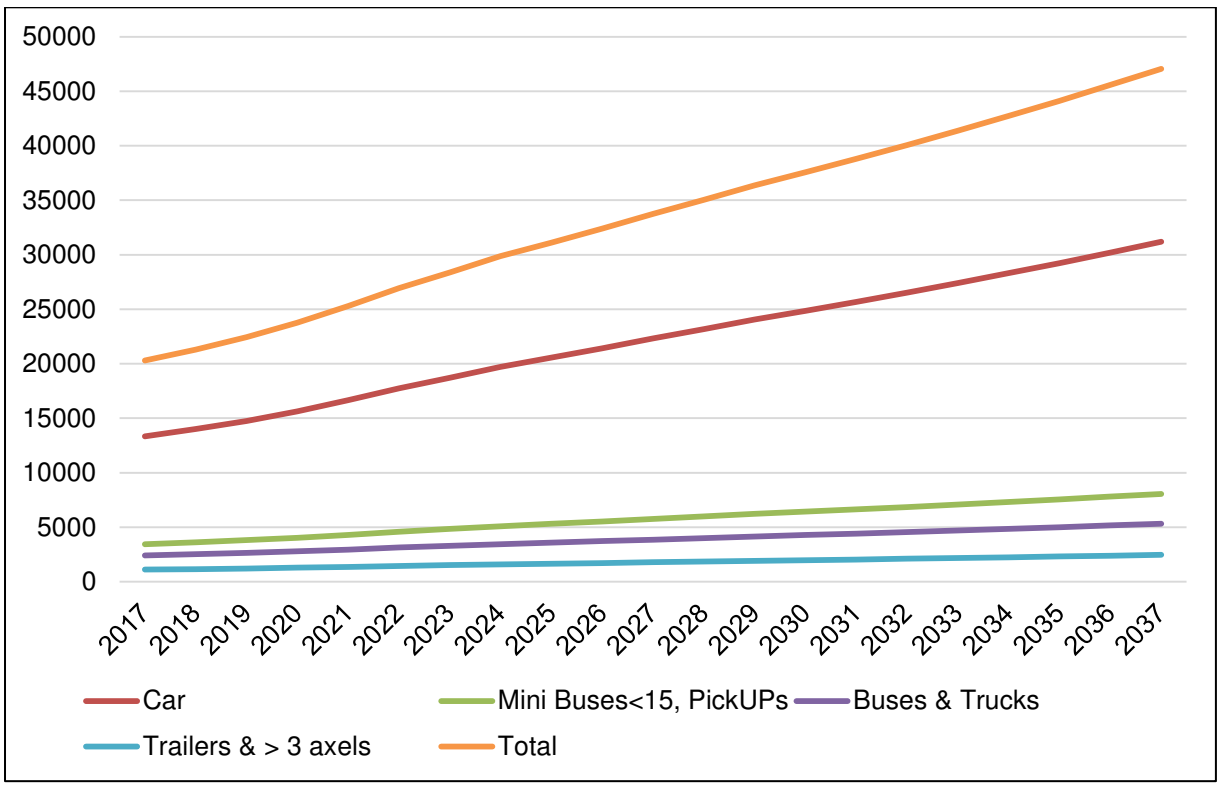


Figure 25: Forecasted Traffic, Argveta (approx. KM 14), 2017 - 2037



C. Alternatives

C.1 General

214. One of the objectives of an EIA is to investigate alternatives to the Project. In relation to a proposed activity "alternatives" means different ways of meeting the general purposes and requirements of the proposed activity. The following section provides an assessment of alternative corridors, alignments, transport modes and technologies, as well as the 'no action' alternative.

C.2 The No Action Alternative

215. The "No Action" Alternative in this instance is defined as a decision not to undertake the proposed construction of the Project Road. The "No Action" Alternative would result in the continued deterioration of the road, bridges and drainage structures along the RoW, thereby impeding the economic development of the Project Area and the Imereti region. All positive benefits would be foregone. The relatively minor, less than significant environmental impacts (such as noise and short-term air quality impacts due to maintenance activities) and inconveniences (such as traffic diversions) would be avoided in the short-run. In the long run, however, the steadily declining state of the roadway would severely hamper economic development in the area. In light of these considerations, the "No Action" Alternative is deemed to be neither prudent nor in the best interest of Georgia or those with an interest in, and attempting to assist restoration of, Georgia's well-being.

C.3 Alternative Road Corridors

216. Given the complex topography of the region and Georgia in general, there are no other feasible alternative corridors that would be able to compete with the existing corridor in terms of travel times. In addition, the Project forms part of the overarching program to upgrade the E-60 motorway which includes many sections that have recently been upgraded or are in the process of upgrading (or detailed design), including the sections of road joining the start and end points of the Project road.

C.4 Alternative Transport Modes

217. As noted above, the Project forms part of a program upgrading the E-60. The Khevi – Argveta section of the E-60 (including section F4) if one of the last remaining sections of the road requiring upgrading. Accordingly, the Project is focusing on the upgrading of the E-60 and will not consider any other transport mode as an alternative.

C.5 Alternative Alignments

Feasibility Study

218. As part of the Projects feasibility study [4] a range of alternative alignments were studied. The F2, F3 and F4 sections were grouped together under the heading of

[4] Feasibility Study for E-60 Highway Section from Zemo Osiarui to Argveta. Pyungwha Engineering Consultants. June 20th 2015.

Section 2BC. Five alternative alignments were proposed for this 2BC section. The key features for each candidate alternative alignment with bidirectional 4 lane road are summarized below by Table 9 and shown in **Figure 26** to **Figure 30**.

Table 9: Key Features of Alternative Alignments with Bidirectional 4 Lanes

Parameter	Alternative Alignment				
	Alt. 2BC-1 (Opt. Blue)	**Alt. 2BC-2 (Opt. Green)**	**Alt. 2BC-3 (Revised Yellow Line)**	**Alt. 2BC-4 (Red)**	**Alt. 2BC-5 (Navy)***
Total Road Length	50.6 km	49.9 km	48.7 km	48.3km	46.5m
Minimum Horizontal Radius	250 m	250 m	450 m	800	1,200m
Maximum gradient	6 % / 7%	6 %	5 %	5 %	4 %
Structure Length - Bridges - Tunnel	3,939 m 9,223 m	4,854 m 11,815 m	9,720 m 15,211 m	11,680m 17,500m	8,140 m 28,680 m
Earthwork - Cut (m^3) - Fill (m^3)	4,878,844 1,978,999	7,999,914 2,251,942	3,556,837 3,017,640	3,128,890 2,152,170	-
Demolishing of buildings	88 buildings	167 buildings	133 buildings	153 buildings	-
Affected forest area (tree cutting)	26.3 ha	43.9 ha	39.3 ha	20.8 ha	-
Length of river interference	2,980 m	1,741 m	n/a	n/a	-
Use of existing road	26,070 m	1,216 m	960m	650 m	-
Length through or nearby villages	12.0 km	16.1 km	9.7 km	9.5 km	-

* Detailed information of Alt. 2BC-5 is not available since Navy Line is conceptual alignment of high speed line. The Consultant has estimated the cost using the plan drawing only.

219. The alternatives were assessed based on a multi-criteria analysis approach (MCA). Alignments Blue, Green and Yellow were assessed from the following criteria:

- Environmental quality and sustainability
    - Impact on landscape
    - Local air quality
    - Noise
    - Impact on biological diversity and ecological integrity

- Socio-economic and financial
    - Impact on agricultural land and opportunities
    - Economic benefits
    - Road construction cost
    - Road maintenance cost
    - Land acquisition and displacement impacts

220. From an environmental view the yellow alignment scored the best, but including all aspects (financial, social, engineering, etc) the blue alignment gained the highest score (see Table 10).

Table 10: MCA Performance Matrix

ANALYSIS	Optimized BLUE LINE			Optimized GREEN LINE			Revised YELLOW LINE		
	POINTS	WEIGHT	SCORE	POINTS	WEIGHT	SCORE	POINTS	WEIGHT	SCORE
Efficiency of Travel and Accessibility		5	-6		5	3		5	6
Road length	-2	1	-2	0	1	0	1	1	1
Maximum gradient and length of grade with maximum value	-1	1	-1	0	1	0	2	1	2
Vehicle Operating Costs	-1	2	-2	0	2	0	1	2	2
Traffic Efficiency under Construction	-1	1	-1	3	1	3	1	1	1
Environmental Quality + Sustainability		5	2		5	0		5	7
Impact on Landscape	0	1	0	2	1	2	2	1	2
Local Air-Quality	-1	1	-1	0	1	0	1	1	1
Noise	-1	1	-1	-2	1	-2	2	1	2
Impact on Biological Diversity and Ecological Integrity	2	2	4	0	2	0	1	2	2
Socio-Economical and Financial Aspects		50	115		50	55		50	50
Impacts on Agricultural Land and Opportunity	2	5	10	3	5	15	1	5	5
Economic Benefits	1	15	15	0	15	0	1	15	15
Road Construction Cost	4	10	40	3	10	30	2	10	20

ANALYSIS	Optimized BLUE LINE			Optimized GREEN LINE			Revised YELLOW LINE		
	POINTS	WEIGHT	SCORE	POINTS	WEIGHT	SCORE	POINTS	WEIGHT	SCORE
Road Maintenance Cost	2	10	20	2	10	20	1	10	10
Land Acquisition and Displacement Impacts	3	10	30	-1	10	-10	0	10	0
Design and Engineering		40	45		40	-10		40	10
Geotechnical Risks, Impact on the Existing Landslide Areas	1	20	20	-1	20	-20	-1	20	-20
Creation of the New Landslide Risk and the Construction Failure	2	10	20	1	10	10	2	10	20
Use of the Existing Road Infrastructure	2	5	10	0	5	0	1	5	5
Safety	-1	5	-5	0	5	0	1	5	5
OVERALL SCORE	**156**			**48**			**73**		

Figure 26: Alternative Alignment 2BC-1

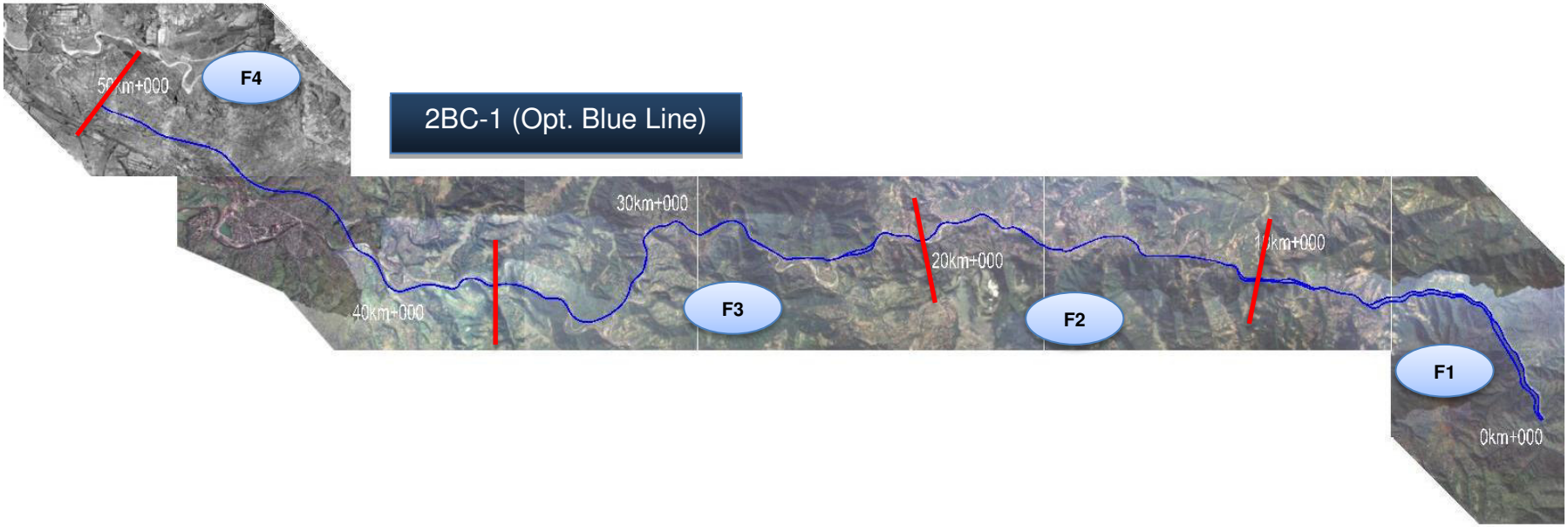


Figure 27: Alternative Alignment 2BC-2

Figure 28: Alternative Alignment 2BC-3

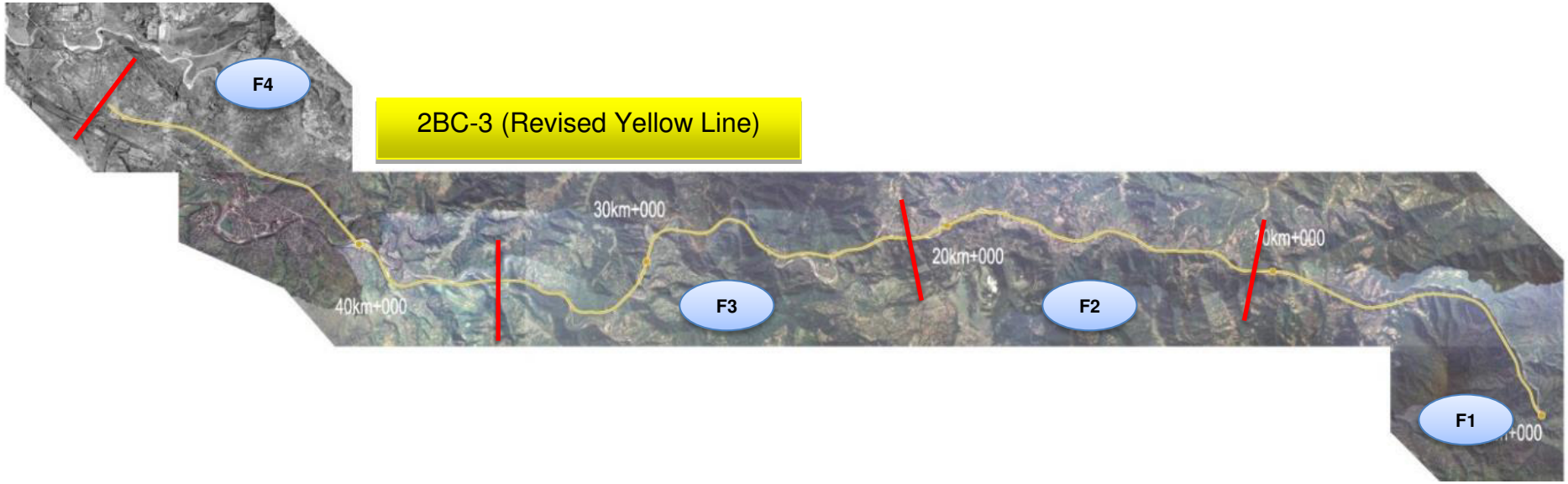


Figure 29: Alternative Alignment 2BC-4

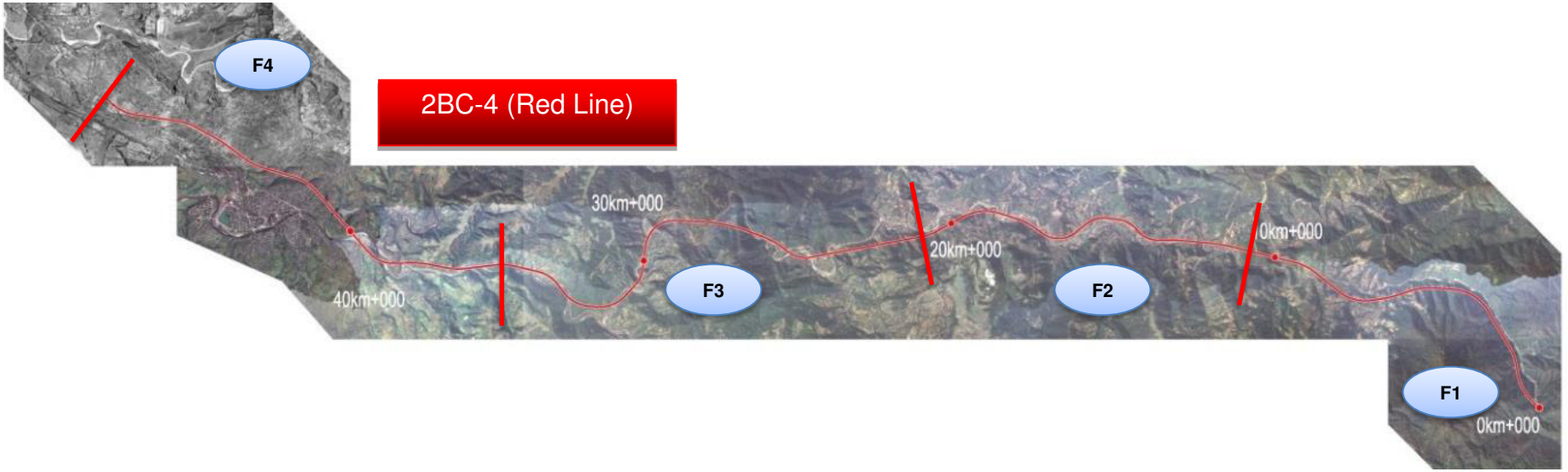
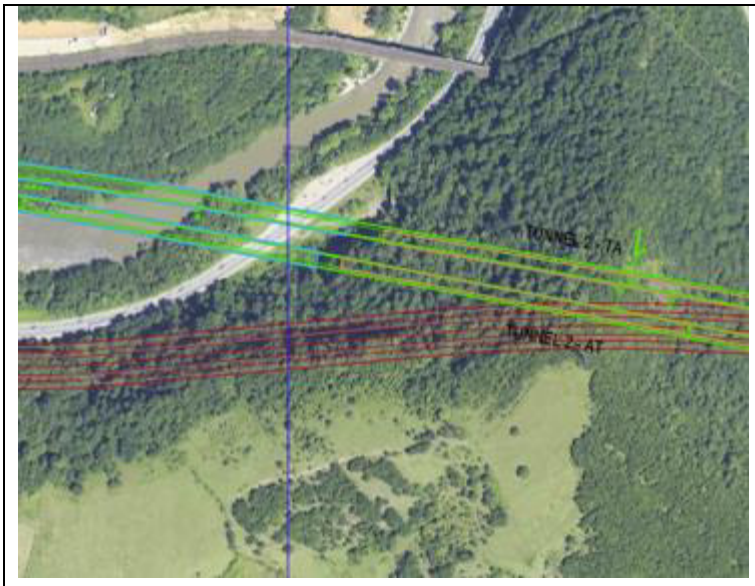
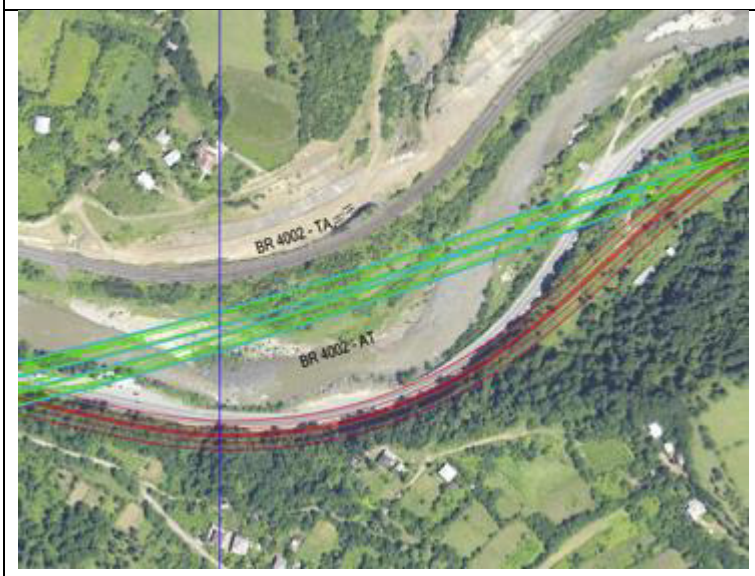
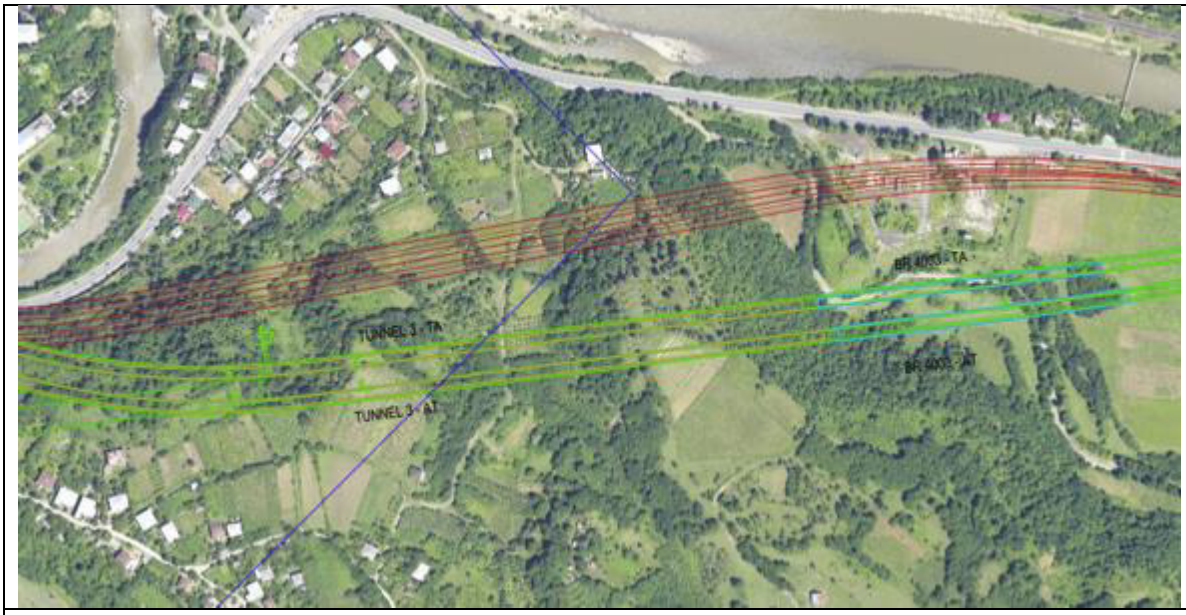


Figure 30: Alternative Alignment 2BC-5

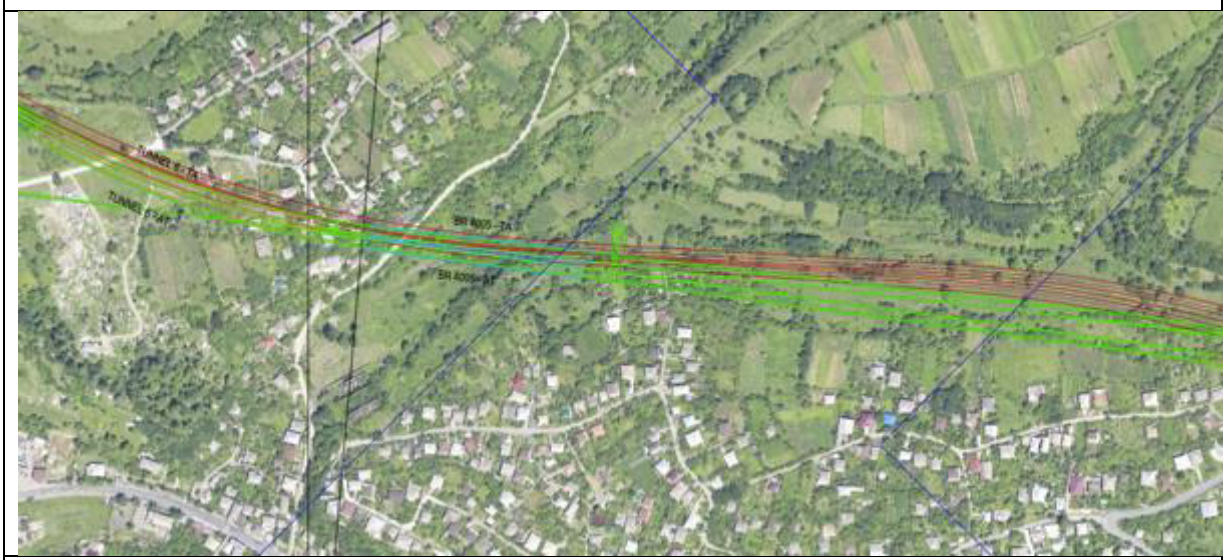
Detailed Design

221. During the detailed design phase a number of factors were taken into account to determine the final alignment, they included the consideration of potential resettlement issues and social aspects such as access and noise. The following figures indicate where alternatives have been adopted in the final alignment.

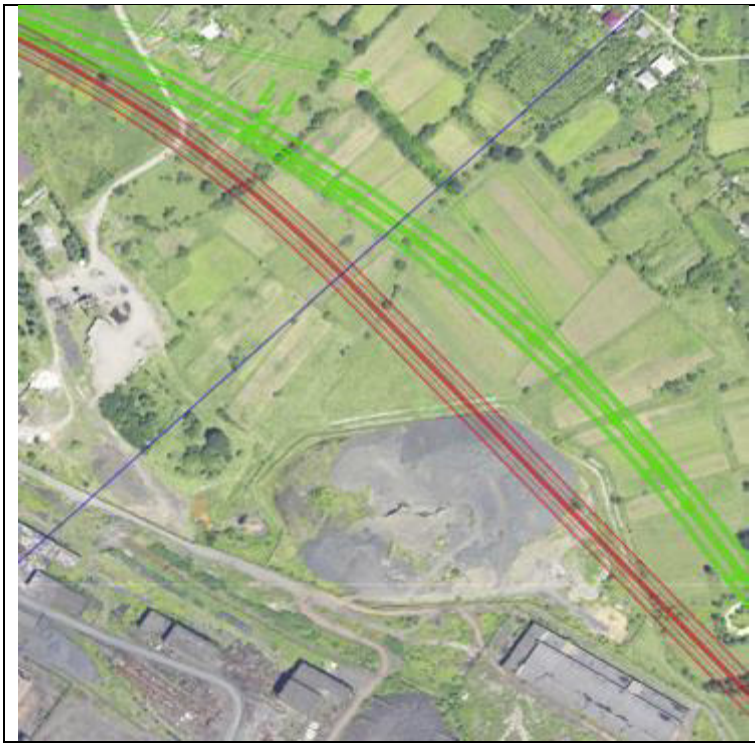
	At Tunnel 2 the tunnel will now exit to the north of the FS alignment (in red) and cross back and forth over the Dzirula river via Bridge 1. The aim of this change was to reduce the amount of cut material that would be required in the southern slope and limit impacts to the existing road.
	Bridge 2 has been adopted based on the same principles as Bridge 1 above, reducing cut and also straightening the alignment thereby avoiding impacts to the existing road.



The alignment in this location is moved a little further south, this is based on engineering requirements rather than any specific environmental or social aspect.



To the north of Zestaphoni the road alignment shifts south slightly, this may have a moderate impact upon residential properties in terms of noise, but not in resettlement. However, the small settlement in the upper left-hand side of the photo will now under passed by a tunnel (Tunnel 6), thereby reducing resettlement impacts in this area.

	The section to the north of the Alloy works has been moved slightly to the north to avoid passing through a large slagheap located within the works boundary. This slagheap probably contains high levels of pollutants and as such moving around this area reduces the need for disposal of hazardous waste.

C.6 Alternative Transport Modes

222. As noted above, the Project forms part of a program upgrading the E-60. The Khevi – Argveta section of the E-60 (including section F3) if one of the last remaining sections of the road requiring upgrading. Accordingly, the Project is focusing on the upgrading of the E-60 and will not consider any other transport mode as an alternative.

C.7 Alternative Pavement Types

223. Only one pavement type was considered for the motorway and interchanges; rigid concrete.[5] The rigid pavement structure is recommended for the following reasons:

- Concrete pavements are already constructed on preceding sections of the E60 Highway. The pavement designs for the already constructed sections were carried out in accordance to the German pavement design standard RStO.
- The high traffic load over the design life with heavy truck traffic requires a high strength to prevent rutting. The concrete pavement has a flexural strength and is less dependent on variations in subgrade strength. Deformation in the subgrade is not transferred to the subsequent layers.
- Along the alignment extreme varying surface temperatures of the pavement are expected from hot summer temperature to freezing in winter. Also contraction and expansion of the concrete slabs have to be considered by expansion joints, the integrity of the concrete is not reduced. Asphalt pavements may become soft in summer leading to rutting and hard and brittle in winter.
- The concrete surface is not damaged by the unavoidable oil and grease leaking from passing vehicles. The life span of a concrete pavement is general higher compared to a flexible pavement and maintenance cost might be also lower as the initial construction costs could be higher.

[5] Asphalt pavement structure will however be used for all Slip Roads, bridges and all Minor Roads and bridges.

- For the actual situation in Georgia with no local bitumen production which requires all bituminous products to be imported, the concrete production from local available sources (gravel and cement) seem to be in more than one respect advantageous.

D. Environmental Laws, Standards and Regulations

D.1 Overview

224. This section of the EIA provides a summary of:
(i) Environmental Legislation of Georgia;
(ii) The Administrative Framework;
(iii) Environmental Regulations and Standards of Georgia;
(iv) National Technical Regulations Relevant to the Project;
(v) Environmental Permitting Procedure;
(vi) Permit and Licenses Required for Off-site Works During Construction;
(vii) International Conventions Relevant to the Project Ratified by Georgia;
(viii) An overview of the ADB and EBRD safeguard policies / performance requirements.

D.2 General

225. Georgian legislation comprises the Constitution, environmental laws, international agreements, subordinate legislation, normative acts, presidential orders and governmental decrees, ministerial orders, instructions and regulations. Along with the national regulations, Georgia is signatory to a number of international conventions, including those related to environmental protection.

226. The Ministry of Environmental Protection and Agriculture (MoEPA) of the Government of Georgia is responsible for regulating the activities that affect the natural environment.

D.3 Environmental & Social Legislation of Georgia

227. A list of Georgia's environmental legislation as it pertains to the proposed project is given in Table 11.

Table 11: List of environmental laws and regulations relevant to the project

Year	Law / Regulation	Consolidated version -Last revision	Code
1994	Law on soil protection	07/12/2017	370.010.000.05.001.000.080
1995	Constitution of Georgia	13/10/2017	010.010.000.01.001.000.116
1996	Law on subsoil	07/12/2017	380.000.000.05.001.000.140
1996	Law on environmental protection	07/12/2017	360.000.000.05.001.000.184
1996	On the system of protected areas	07/12/2017	360.050.000.05.001.000.127
1997	Law on wildlife	07/12/2017	410.000.000.05.001.000.186
1997	Law on water	07/12/2017	400.000.000.05.001.000.253
1999	Law on protection of atmospheric air	07/12/2017	420.000.000.05.001.000.595
1999	Forestry code of Georgia	07/12/2017	390.000.000.05.001.000.599
1999	Law on compensation of damage from hazardous substances	07/12/2017	040.160.050.05.001.000.671
2000	Law on regulation and engineering protection of the sea and river banks	05/05/2011	400.010.010.05.001.000.830
2003	Law on Red List and Red Book of Georgia	07/12/2017	360.060.000.05.001.001.297
2005	Law on licenses and permits	23/12/2017	300.310.000.05.001.001.914

Year	Law / Regulation	Consolidated version -Last revision	Code
2003	Law of Georgia on conservation of soil and restoration-amelioration of soil fertility	07/12/2017	370.010.000.05.001.001.274
2014	Waste code	07/12/2017	360160000.05.001.017608
2017	Environmental Assessment Code	07/12/2017	360160000.05.001.018492

228. Brief summaries of the listed documents are given below:

229. **Constitution of Georgia** states the basic rights of people to live in a healthy environment and obligation to protect it. According to constitution everyone has the right to obtain complete, objective, and timely information about environmental conditions (Article 37 Part 3). It assures that the state shall protect environment and foster sustainable development (Article 37 Part 4). It establishes a legal framework that guarantees public access to information about the condition of the environment (Article 37 Part 5, Article 41 Part 1).

230. **Environmental Assessment Code (EAC).** The Code establishes a legal basis for regulating issues related to projects and strategic documents, which implementation may have significant impact on the environment, human life and health. It regulates the procedures related to environmental impact assessment, strategic environmental assessment, public participation in decision-making, trans boundary environmental impact assessment; defines rights and obligations of the developer, the planning authority, the public and the competent authorities in the course of decision-making envisaged by this Code; describes procedures of issuing Environmental Decision; exemption rules. The law includes two annexes. Annex I list activities subject to EIA, Annex II – lists activities/projects that require screening procedure. Screening is responsibility of MoEPA. Under the EAC construction of international and interstate roads; construction and operation of tunnels and/or bridges on the international and interstate roads belongs to activities subject to EIA. According to the document, the main stages of environmental impact assessment include:

(i) Screening;
(ii) Scoping procedure;
(iii) Preparation of the EIA Report by the developer or the consultant;
(iv) Ensuring public participation;
(v) Examination of the information presented in the EIA Report and any supplementary information provided by the developer to the Ministry as well as assessment of the information received through the public participation and consultation processes;
(vi) Expertise procedure;
(vii) Implementation of transboundary environmental impact assessment procedure (weather appropriate);
(viii) Issuance of Environmental Decision or the decision on refusal to implement the project by the Minister.

231. **Law on Licenses and Permits** regulates legally organized activities posing certain threats to human life/health, and addresses specific state/public interests, including usage of resources, regulates activities requiring licenses/permits, determines types of licenses/permits required, and defines the procedures for issuing, revising and cancelling of licenses and permits. The law is generic and refers to the Environmental Assessment Code for details of environmental permitting (Environmental Decision) procedures.

232. **Law on Environmental Protection** regulates the legal relationship between the bodies of the state authority and the physical persons or legal entities (without distinction-

legal form) in the field of environmental protection and in the use of nature on all Georgia's territory including its territorial waters, airspace, continental shelf and special economic zone. The law defines the principles and norms of legal relations, rights and obligations and responsibilities, awareness raising, education and scientific research in the field of environment, key players and principles of environmental management; describes economical mechanisms and levers; ecological insurance; basics of environmental audit; environmental requirements during privatization; justifies needs of environmental standards and limits (air, water, soil, noise, vibration, fields, radiation) and ecological requirements for production, transportation and storage of goods and food products; ecological requirements applicable to waste; states necessity of environmental impact assessment and related issues (strategic environmental protection and transboundary environment assessment) referring to Environmental Assessment Code; defines general principles of environmental protection; considers different aspects on protection of ecosystems, protected areas, issues of global and regional management, protection of ozone layer, biodiversity, protection of Black Sea and international cooperation aspects. As stated in the law, in order to protect the climate against the global changes, the subject of the business activity is obliged to observe the limits to green-house gas emissions as well as to take measures for mitigating this emission. The emission of the green-house gases is regulated on the basis of integrated control of pollution of environment (Article 51). Besides, the subject of the business activity is obliged to reduce or stop production and use of such chemicals, which are likely to have effects on the ozone, layer of the earth and cause depletion of it (Article 52).

233. The status, of natural resources, study and usage of mineral resources is regulated by the **Law of Georgia on Subsoil**. The law describes rights and obligations of the users (Including re-cultivation after expiration of the license term), duration of the licenses (for energy resources – up to 45 years; for metal ores – up to 40 years; up to 30 years for construction materials and other non-ore mineral resources; ground water and gas (except for the natural gas) – up to 25 years); protection of natural resources and safety requirements; termination of license; state supervision and control over the use of mineral resources; general requirements during mining. With regards to the issues related to the licenses for use of the natural resources the law gives reference to the law on Licenses and Permits, Law on Oil and Gas and related regulations. The law states the need for protection of environment and OHS during operation (mining), including requirements for waste (including waste water) management. According to the law extraction and treatment of mineral resources from deposits both of natural and technogenic origin (soil disposal areas) are subject to state supervision and control.

234. The **Waste Management Code** (2015) provides the legal conditions for implementation of measures aiming at prevention of generation of waste and increased re-use, environmentally-sound treatment of waste (including recycling and extraction of secondary raw materials, energy recovery from waste, as well as safe disposal). The following summarizes the key points of the code.

(i) Article 7 – General waste management requirements

(a) Waste, depending on its type, properties and composition, shall be collected, transported and treated in a manner not impeding its further recovery.
(b) Waste shall be collected, transported and treated in a manner which excludes, to the maximum extent possible, pollution of the environment and risks for human health.
(c) In case of waste pollution caused by waste transport activities, the waste transporter shall be responsible for taking clean up measures.
(d) The producer and holder of waste is obliged to treat their waste
(e) on their own or hand, it over for collection, transport and treatment to persons entitled to carry out such operations in accordance with this Law and legislation of Georgia.

(f) Where waste has been submitted for recovery or disposal, the original producer's and/or holder's responsibility shall remain until recovery or disposal is completed.
(g) Persons who collect and transport waste shall hand it over for treatment to appropriate facilities, holding the relevant permit or registration.
(h) The burning of waste outside permitted incinerators shall be prohibited.

(ii) Article 14 – Company waste management plan

(a) Legal and natural persons that produce more than 200 tons of non-hazardous waste or 1000 tons of inert waste or any amount of hazardous waste annually, shall prepare a company waste management plan.

(iii) Article 15 – Environmental Manager

(a) The persons under Article 14 of this Law shall nominate a suitable person as a company environmental manager.

(iv) Article 17 – General obligations for hazardous waste management

(a) The production, collection and transportation of hazardous waste, as well as its storage and treatment, shall be carried out in conditions providing protection for the environment and human health. It shall be prohibited to:
- discard hazardous waste outside waste collection containers;
- discharge it into the sewerage systems or underground or surface waters, including the sea;
- burn it outside waste incinerators permitted for that purpose;
- treat it outside waste treatment facilities permitted to treat such type of waste.

(v) Article 18 – Special obligations for hazardous waste management

(a) Waste producers that produce more than 2 tons of hazardous waste per year shall
- create and implement a suitable separation and collection system for such waste;
- designate an environmental manager, pursuant to Article 15 of this Law, responsible to make arrangements for the safe management of said waste;
- make arrangements for briefing and training for staff handling hazardous waste.

(b) Until the exact content of waste is unknown, the waste shall be regarded as hazardous.
(c) Hazardous waste for which no appropriate treatment techniques and/or technologies are available in accordance with the requirements of this Law within the territory of Georgia shall be exported for treatment. Until the export is carried out, the waste shall be safely stored at temporary storage facilities.
(d) The Ministry may exceptionally once allow for an extended storage period of up to one year if this is justified and does not harm human health or the environment.
(e) Hazardous waste may only be collected and transported by a natural or legal person after its registration pursuant to this Law.

(vi) Article 29 – Obligations for keeping records and reporting on waste

(a) Records on waste shall be kept and waste reports shall be submitted to the Ministry by natural and legal persons:
- dealing professionally with collection, transport and/or treatment of waste;
- which produced more than more than 2 tones non-hazardous (excluding municipal waste) waste or any amount of hazardous waste per year.

235. **Law on Protection of Atmospheric Air.** The law regulates protection of atmospheric air from man-caused impact. Pollution of atmospheric air is emission of hazardous substances originating from activities which are able to have negative impact on human health and environment. Four types of pollution are considered (Part II, Chapter IV, Article II.2): Pollution of environment with hazardous matter, Radiation pollution of atmospheric

air. Pollution with microorganisms and biologically active matter of microbial origin, Noise, vibration, electromagnetic fields and other physical impact. Maximum permitted limits for concentration of hazardous substances into the atmospheric air are defined for each contaminants and represent maximum concentration of hazardous pollutants, in averaged time span, recurring action of which has not have negative impact on human health and environment. Maximum permitted levels of emission of hazardous matters into the atmospheric air are defined with allowance of prospective of development of the enterprise, physical. Geographical and climatic conditions, dispersion of emitted substances, background concentration of pollutants emitted from other neighboring enterprises, considering inter-location of existing or planned dwellings, sanatoria and recreation zones. In compliance with the law (Clause 28), in order to restrict pollution from the stationary sources6 of hazardous emissions the limits of emissions are to be set. The limit of pollution from the stationary source of emission is permitted quantity (mass) of emitted hazardous matters (Clause 29). Maximum annual emission level means the maximum permitted limit of discharge. This is annual permitted quantity of emission predetermined by technology in conditions of standard permitted capacity of discharge. Annual maximum capacity is defined for each hazardous substance and is calculated so that for each stationary source of emission cumulative emission from all registered sources of discharge does not exceed relevant maximum permitted value. Discharge of hazardous emissions from the stationary sources of emission without approved limits of discharge is forbidden. The standards of emissions (Clause 30) are to be worked out by the enterprise itself. According to the law (Clause 38) the enterprise is responsible for conducting self-monitoring which includes measurement of emission (evaluation), recording/registration and accounting. Emission which has not been recorded in self-monitoring record is considered illegal. As mentioned in the Clause 51 results of the monitoring and information on pollution of the air with hazardous substances is transparent and accessible for the public.

236. **Law on Water** regulates water use, defines rights and obligations of water users, sets out the types of licenses for the use of water, the rules and conditions of their issuance, considers conditions of suspension, withdrawal and deprivation of license, regulates water flows. The law states liability of all natural and legal persons to prevent pollution of catchment basins, water reservoirs, snow and ice covers, glaciers, permanent snow cover with industrial, household and other wastes and emissions which may cause deterioration of the underground water quality; prohibits piling of industrial and household wastes near the public water headwork's and in their sanitation zones, bans construction of facilities and implementation of any other activity which may cause water pollution; sets requirements for forest use within water protection zones. The state management of water protection and use is exercised through accounting, monitoring, licensing, control and supervision.

- State monitoring of water is implemented by the Legal Entity under Public Law – the National Environmental Agency under MoEPA. By virtue of the law when locating/designing/constructing/commissioning of a new or reconstructed enterprise, or other facility, as well as in introducing of new technological process capable to affect the state of water, the rational water use is to be secured. At the same time, attention is to be paid to the measures ensuring due accounting of water abstracted from and returned to water bodies; protection of water from contamination, pollution-and depletion; avoidance of the unfavorable water impact; restriction of land flooding up to minimum necessary level, protection of land from silting, swamping or drying up; as well as environmental protection and landscape preservation.

[6] Stationary source of pollution of the atmospheric air is stationary device or construction with a special emission unit. Any stationary device or construction which, proceeded from its technological peculiarities, is not fitted with sputtering device is also considered as a stationary source of emission.

- Under the law required is purification, up to the fixed standard, of the waste water discharged in a water body. In order to protect the quality of water resources, the law requests creation of sanitary protection zone that consists of three belts, each having a special regime. The procedure fixing the water quality standards, the maximum permissible rates of emission of harmful substances (including microorganisms) into ambience, the water abstraction quotas and the temporary rates (limits) of emission of harmful substances (including microorganisms) into water is defined by the Law of Georgia on the Environmental Protection.
- Georgian legislation may provide liability for other violations of law in the water protection and use sphere. Water users shall compensate for damages caused by violation of the law on Water in the amount and under procedure established by legislation of Georgia. Under the Article 17 (Protection of natural resources of the Black Sea) anadromous fish species (fish species seasonally migrating upstream of a river against the current) within the rivers of Georgia shall be protected by creation of conditions necessary for their reproduction, through conservation of the habitat, determination of procedures for regulating the fishing industry, determination of a total permissible amount of catching these species within the territorial waters, and within and outside special economic zones of Georgia, also through implementation of other measures defined by the legislation of Georgia. Article 20 (River water protection zone) defines protection zone of a river shall be its adjacent territory, where a special regime is established to protect water resources from pollution, littering, fouling, and depletion. This zone may include its dry bed, adjacent terraces, natural elevated and steep riversides, as well as gullies directly adjacent to riversides. The width of a river water protection zone shall be measured in meters from the edge of a riverbed to both sides under the following procedure:
    - 10 meters – in the case of a river up to 25 kilometers long,
    - 20 meters – in the case of a river up to 50 kilometers long,
    - 30 meters – in the case of a river up to 75 kilometers long,
    - 50 meters – in the case of a river over 75 kilometers long.
- Within this zone, prohibited activities are to: a) construct, expand or reconstruct functioning enterprises, except for cases directly determined by law; b) spray, by air atomization, perennial plants, sown crops and forest lands with toxic chemicals; c) keep, collect or place toxic chemicals and mineral fertilizers, as well as any other wastes as defined in the legislation of Georgia. It is requested that hydraulic structures located within a water protection zone shall be normally equipped with appropriate technical facilities to completely exclude the possibility of river pollution and littering.

237. **Law on Wildlife.** The law regulates wildlife protection and use including hunting and fishing. The main goal of the law is to ensure protection and restoration of wildlife, its habitats, preservation and sustainability of species diversity and genetic resources, creation of conditions for sustainable development, considering the interests of present and future generation; legal ensuring of wildlife protection (including in-situ and ex-situ conservation, translocation and reproduction of wildlife) and state-based provision of use of wildlife objects. In addition to this law, Georgian legislation on the wildlife is based on the Constitution of Georgia, Georgia's international agreements and treaties, laws on Environmental Protection and on the System of Protected Areas, law of Georgia on Wildlife and law of Georgia on the "Red List" and "Red Book". It is one of the main goals of the Environmental Protection Law to support the preservation of biodiversity of the country, the preservation of rare, endemic and endangered species, the protection of the marine environment, and the maintenance of the ecological balance (Art. 3.1 (d)). The Law contains regulations on both wild animals and plants which are threatened by extinction and those which are not. Two main legal acts regulating the issues of species protection in Georgia.

238. **Law on Red List and Red Book** which gives the legal definitions of Red List and Red Book (relevant recommendations and methodological issues) of endangered species of Georgia. The Red List structure was also legally defined, as well as the relevant procedures for including species in the Red List, procedures for revising, and updating of it. The Law also regulates issues related to planning and financial matters connected with the protection, taking of, rehabilitation and conservation of endangered species. The Red List of Georgia was approved by Order of President of Georgia No. 303 (2006), later – by the Resolution of the Georgian Government No. 190, dated 20-Feb-14. The law defines special cases when removal of individuals of the Georgian Red List species from their habitats is allowed. Decisions are made by the Government of Georgia.

239. **Forestry Code** regulates relations and state policy in the area of forestry management, use and protection. The code specifies all activities, which may be carried out in Forestry Fund. It allows only those activities, which are related to forest resource protection or use such as timber logging, collection of non-timber resources, use of area for agriculture or recreation, establishment of hunting farms, etc. State forestry fund may be used for a special purpose in urgent cases. Decisions are made by the Government of Georgia.

240. **Law on Soil Protection.** The law provides the policy requirements and principles of the protection and preservation of fertility soil resources against negative impacts. Soil protection is the state problem since correct and rational use of all types of soil, including barren soil, saline soils, swamped soil, alkali soil and aqueous soil are the main reserve of dynamic development of agriculture and of the national economy as a whole. The purpose of the present Law is to establish the rights and the duties of landholders, landowners and the state in the field of soil protect. The law defines soil protection measures and methods and prohibits certain activities, e.g. use of fertile soil for non-agricultural purposes; implementation of non-agricultural activity without topsoil removal and conservation; any activity, which results in deterioration of soil properties, etc. In addition to this law soil protection issues are regulated by order #2-277 (25.11.2005) of the Minister of Agriculture on approving Recommendations for Complex Measures for Soil Protection from the Erosion.

241. **Law of on Conservation of Soil and Restoration-Amelioration of Soil Fertility** is to ensure conservation and improvement of soil in the territory of Georgia, define the legal principles, measures, limitations and prohibitions to that end; soil conservation and fertility restoration improvement measures. It prohibits unregulated grazing, removal of windbreaks, application of non-registered fertilizers or other substances, soil contamination and any activity, which results in deterioration of soil properties and facilitates desertification, swamping, salinization, etc. Businesses that use soil or conduct activities upon soil that have the potential to negatively impact soil conservation are required to follow the Law and related normative documents and regulations, including Order #113 (27.05.2005) of the Minister of Environment and Natural Resources' Protection on affirming regulation on "Removal, Storage, Use and Re-cultivation of the Fertile Soil Layer" and 2) Resolution of the GoG #424 (31.12.2013) on affirming technical regulations on "Removal, Storage, Use and Re-cultivation of the Fertile Soil Layer". These documents consider issues of land resources protection and rational use and issues related to removal, storage, use and re-cultivation of the fertile soil layer during different activates. According to the regulation, restoration of degraded soil fertility must be implemented using re-cultivation (technical and biological) methods.

242. **Law on System of Protected Areas**. Forms a legal basis for planning, establishment and maintenance and assignment of categories of protected areas, described funding issues for each category. It specifies ownership forms of land and other natural resources in protected areas, allowed and prohibited activities.

243. **Law on Regulation and Engineering Protection of Seacoast and Riverbanks of Georgia** provides general principles and requirements for protection of coastal areas and riverbanks from negative environmental impacts.

244. **Law on Compensation for Damage Caused By Hazardous Substances** Includes principles and procedures for compensating the negative impacts caused by discharge of hazardous substances into environment.

245. **The Georgian Red List and Red Book** – The Red List of Georgia was adopted in 2006 based on work conducted by the Commission of Georgian Scientific Academy working in Endangered Species and updated in 2014. It now includes some 56 plant and 139 animal species, including 33 mammals, 35 birds, 11 reptiles, 2 amphibians, and 11 fish (including all sturgeon). Of these, 20 plant and 43 animal species are categorized as critically endangered (CR) or endangered (EN)7, and 4 mammals may be extinct.

246. The "Red Book" of critically endangered species includes information on the status, habitat, home range, quantity, reproduction areas and conditions, protection measures and risk factors for species listed in the Red List. In terms of plants, some 275 species of vascular plants are considered endemic to Georgia, of which approximately 60% (152 species) are considered endangered, although there is insufficient information form them all to be included in the Red List[8]. Further details on Red List species within the Project area are included within **Section F**.

247. Laws and regulations related to social aspects and land ownership applicable to the project are presented in Table 12**.**

Table 12: List of social and land ownership related laws relevant to the project

Year	Law / Regulation	Last revision	Code
1996	Law on agricultural land ownership	16/06/2017	370.030.000.05.001.000.132
1997	Civil code of Georgia	23/12/2017	040.000.000.05.001.000.223
1997	Law on compensation of land substitute costs and damages due to allocating agricultural land for non-agricultural purposes	25/12/2014	370.020.000.05.001.000.244
1999	Law on rules for expropriation of property for public needs	06/09/2013	020.060.040.05.001.000.670
2005	Law of Georgia on Spatial Development and Basis for City-building	25/07/2017	330.090.000.05.001.001.845
2007	Law on cultural heritage	07/12/2017	450.030.000.05.001.002.815
2007	Law on public health	07/12/2017	470.000.000.05.001.002.920
2010	Law on state property	07/12/2017	040.110.030.05.01.004.174
2010	Labor Code	04/05/2017	270000000.04.001.016012
2015	Law on Development of High-mountain Areas	05/07/2018	010110020.05.001.017881

248. Brief summaries of the listed documents are given below.

249. **Civil Code** regulates contractual relations, describes the rights and responsibilities of natural and legal persons, defines the penalties in the case of violations of the requirements set out in the document. The Civil Code differentiates between movable and immovable property and provides rules for acquiring title over property, as well as any proprietary or obligatory rights thereto. This piece of legislation must be taken into account when entering into contracts in Georgia.

[7] 44 vertebrate species are also included in the IUCN Red List as CR, EN or VU – see later
[8] https://www.cbd.int/doc/world/ge/ge-nr-05-en.pdf

250. **Labor Code** regulates employment relations, unless such relations are otherwise regulated by international treaties that have been implemented in Georgia. Employers are obliged to comply with requirements and clauses of the document for the purpose of ensuring that the rights of employees are protected.

251. **Law on Public** Health regulates legal relations for ensuring a safe environment for human health. It indicates quality norms of for air, soil and water pollution and restrictions related to ionized radiation, noise and vibration. The limits must be complied with. Section 7 of the law is dedicated to safety of technological processes.

252. **Law on Compensation of Land Substitute Costs and Damages due to Allocating Agricultural Land for Non-agricultural Purposes** defines compensation amounts, required at the time of allocation, use or disposal of agricultural land parcel for non-agricultural purpose; the payment procedure and the procedure for changing the agricultural land category, including payment of losses to landowners or land users, as a result of restricting their rights or reducing the quality of their land.

253. **Law on Agricultural Land Ownership.** Objective of the law is to ensure improvement of the structure of agricultural land based on rational use of resources, avoidance of splitting and unsustainable use of the land plots. The law defined the rules for acquisition and selling the land, participation of the state in agricultural land related relations. The law deals with land ownership issues, restrictions of land alienation in case of co-ownership, sets priority of the state in buying out the agricultural land plots.

254. **Law on rules for expropriation of property for public needs** outlines respective procedures and conditions for expropriation of private property as well as procedures for compensation payment for expropriated property or the transfer of other property with the same market value.

255. **Law on State Property** regulates relationships on state property management and transfer for use by others, defines special requirements and procedures for transfers. The Ministry of Economy and Sustainable Development is the state authority in charge of the property.

256. **Law on Labor Safety** defined general requirements and preventive measures related to safety on worksites; avoidance of existing and potential hazards, accidents/incidents and professional diseases; training, awareness raising, communication and consultations with equal involvement/participation of employees. The law regulates rights, obligations and responsibilities of state institutions, employers, employees and employees' representatives in providing safe and healthy environment. The law applies to dangerous, hazardous, heavy and works with/in dangerous working conditions. The list of high risk works is defined by the government in consultations with social partnership.

257. **Law on cultural heritage** sets out procedures for protection of cultural heritage and permitting arrangements for archaeological investigations.

258. **Law on Spatial Development and Basis for City-building** regulates the spatial development and the process of city-building, including the development of the accommodations, settlements and infrastructure regarding the requirements of the cultural heritage and environmental policies. In this field, the law defines the rights and obligations of the state authorities, physical and legal entities, principles of spatial development and city-building, its priorities, goals and tasks, as well as the form and the role of the spatial-territorial planning and planning documents in terms of the development of the territorial development of Georgia.

259. **Law on Development of High-mountain Areas**. The policy implemented by the State towards high mountainous regions is part of the regional development policy of the country and is aimed at ensuring the equal socio-economic development of the entire territory of Georgia and at solving the social and economic problems of persons living in high mountainous regions. The aim of this Law is to determine the benefits of encouraging the social and economic progress of high mountainous regions as guaranteed by the Constitution of Georgia; such benefits ensure the well-being of persons living in high mountainous regions, raise living standards, promote employment and improve social and economic conditions. Regardless of their altitudes, the status of high mountainous settlement has been granted to settlements located within the following historic and geographic areas: Khevi, Mtiuleti, Pankisi Gorge, mountainous Adjara, Gudamakari Valley, Pshav-Khevsureti, Tusheti, Upper Svaneti, Kvemo Svaneti (lower Svaneti), Lechkhumi and Racha.

260. The State shall ensure the establishment of the following social benefits in high mountainous settlements:

- a monthly bonus to the state pension being at least 20% of the state pension set for permanent residents of high mountainous settlements who have reached the retirement age and receive the monthly state pension as a social benefit, according to the amount of the state pension defined by the law of Georgia on the state budget of Georgia for the relevant year. The procedures and conditions for issuing the said supplement shall be determined by ordinance of the Government of Georgia. The permanent residents of high mountainous settlements who are the recipients of the social package determined by the Government of Georgia shall receive the monthly supplement in the amount of 20% of the social package provided to them.
- medical personnel employed at medical institutions, which are under State management and where the State is an equity partner, located in high mountainous settlements, whose work is paid from the state budget, shall receive a monthly bonus in accordance with rules determined by ordinance of the Government of Georgia: b.a) doctors shall receive a bonus in the amount of the state pension; b.b) for nurses – in the amount of the pension;
- the implementation of relevant measures during the winter period (from 15 October of the relevant year through to 15 April of the following year) in order to facilitate the provision of heating for permanent residents of high mountainous settlements;
- compensation of 50% of monthly charges for electricity consumed by users (residential customers) in high mountainous settlements, but not more than the charge for 100 kWh of consumed electricity;
- a contribution of monthly cash assistance, in accordance with procedures determined by ordinance of the Government of Georgia, being at least GEL 100 throughout the period of one year after the entry into force of this Law, for the birth of the first child and the second child, where one of the parents of the child is a permanent resident of a high mountainous settlement, and for the third child and every following child, a contribution of monthly cash assistance of at least GEL 200 throughout the period of 2 years after the entry into force of this Law;
- the provision of a bonus being not less than 35% of the basic remuneration of a teacher in accordance with procedures established by the Ministry of Education and Science of Georgia to a teacher in a legal entity under public law -an institution of general education located in a high mountainous settlement and established by the Ministry of Education and Science of Georgia; the payment of a bonus being not less than 35% of the remuneration of teachers in accordance with procedures established by the Ministry of Education and Science of Georgia to a teacher in an institution of vocational education located in a high mountainous settlement and established by the Ministry of Education and Science of Georgia. In order to provide financial assistance to coaches employed in the sports sector and to promote the development of sports in

high mountainous settlements, the government of Georgia shall develop and approve a relevant state program.

- the provision of an increased number of vouchers to the pupils of public schools, multi-sectoral public schools, and to students of institutions of vocational education located in high mountainous settlements. The terms and conditions for issuing the said vouchers shall be determined by ordinance of the Government of Georgia.
- the provision of a bonus of not less than 50% of the remuneration of a teacher in accordance with the procedures and conditions established by the Ministry of Education and Science of Georgia, or the head of the administrative body implementing this program, to a teacher who is a participant of a relevant program as defined by the Ministry of Education and Science of Georgia and/or the administrative body within under its authority, and who is employed within this program at an institution of general education located in a high mountainous settlement. The bonus provided for by this sub-paragraph shall not be given to a person entitled to the benefit provided for by paragraph 2(f).

261. According to the law, a natural person shall be granted the status of permanent resident of a high mountainous settlement if he/she meets the following criteria: a) he/she must be a citizen of Georgia; b) he/she must be registered in a high mountainous settlement; c) he/she must actually live in a high mountainous settlement for an aggregate 9 months or more than 9 months during each calendar year.

262. Permanent residents of high mountainous settlements shall enjoy tax privileges established by the Tax Code of Georgia in relation to income tax and property tax. Business entities which, in accordance with the legislation of Georgia, have been granted the status of high mountainous settlement enterprise shall be exempt from taxes under the terms and rules defined by the Tax Code of Georgia. The administrative body with power to grant to business entities the status of high mountainous settlement enterprise, and the terms and conditions of granting, terminating and suspending the status of high mountainous settlement enterprise, shall be determined by the rules for granting, terminating and suspending the status of high mountainous settlement enterprise, which shall be approved by ordinance of the Government of Georgia.

263. **The Constitutional Agreement between the State of Georgia and the Apostolic Autocephalous Orthodox Church** (2002) regulates the relationship between the state and the Church. Its provisions (art. 7, 8 and 9) have a major impact on the management of cultural heritage in the country. By this agreement all the religious buildings and related structures on the territory of the country, in use or without function, standing or in ruins, together with their parcels and also all the immovable ecclesiastic treasures protected in museums and archives are handed down in the ownership of the Church of Georgia (art.7 and 8). The MoCMP must agree with the Church of Georgia in the process of adopting protection zones, rules and methodologies, planning and approving rehabilitation projects or scientific research of movable and immovable religious monuments. Together with the state, the Church is responsible for maintenance and care of the monuments in its ownership (art.7 and 9). The property of the Church is exempt from the state taxes (art. 5). According to the Concordat the church is the owner of the majority of immovable listed properties in the country, most of which, at the same time, are living heritage sites, with the religious function being restored and enhanced after the fall of Soviet regime. Because of this special circumstance, the specific rules for maintenance and exploitation of these properties need to be elaborated.

D.4 Action Plans and Strategies

D.4.1 National Biodiversity Strategy and Action Plan

264. The Georgian National Biodiversity Strategy and Action Plan (NBSAP) was adopted in 2005 and updated in 2014. It sets out the goals, objectives and policies for the protection and conservation of biodiversity in Georgia. The initial NBSAP included nine strategic goals to help ensure that Georgia "will be a country where biological diversity is sustained and rehabilitated within a political, social and economic context that favors the wise use of natural resources and adequate benefit sharing" by aiming to:

- Develop a protected areas system to ensure conservation and sustainable use of biological resources.
- Maintain and restore Georgia's habitats, species and genetic diversity through ex-situ and inter-situ conservation measures, and sustainable use of biological resources.
- Conserve Georgian agrobiodiversity through ensuring its sustainable use and by promoting of ex-situ and in-situ conservation measures.
- Promote sustainable hunting and fishing through adequate planning, restoration and protection of key biological resource.
- Develop a biodiversity monitoring system and an active and integrated biodiversity database to ensure sustainable use and conservation of biological resources.
- Protect both the human population and biodiversity from potential threats from genetically modified organisms (biotechnology), through strengthening the law and increasing public involvement in decision making.
- Raise public awareness of biodiversity issues and to encourage public participation in the decision-making process.
- Ensure appropriate financial and economic programs are in place in order to support effective conservation of biodiversity, and to ensure the delivery of the BSAP.
- Further improve national legislation (and associated institutions) relating to biodiversity conservation, through the creation of new, and elaboration of existing laws and regulations, and through ensuring harmonization to international legal responsibilities.

265. The first 10-year period did not see all of these fully implemented but did see a number of key achievements including:

- Development of the system of protected areas.
- Preparation of the National Red List of Georgia based on international criteria and categories.
- Development of conservation management plans for endangered species and groups of species and launching of their implementation.
- Initiation of the national biodiversity monitoring system.
- Ex-situ and/or on-farm conservation of several endemic and endangered plant species and crops.
- Launching of the Georgian biodiversity clearing house mechanism.

266. The 2014 update to the NBSAP (for the period of 2014-2020) has adopted a more holistic, cross-cutting and ecosystem-based approach and also goes further in terms of formulating a comprehensive policy and defining national priorities. It envisions that by 2030 Georgia *"will be a country with population living in harmony with nature, biodiversity will be commonly valued, biological resources – conserved and wisely used. This will provide natural continuity of ecosystem processes, healthy environment and benefits essential for all people*``.

267. It includes a situational analysis, strategic approaches and actions in five new areas including Inland water ecosystems, Forest ecosystems, Natural grasslands and Cross-

cutting issues and governance. It also seeks to strengthen cross-sectorial cooperation and partnerships amongst key stakeholders [9] (including ministries, private sector, NGOs, Universities and media) and includes 21 national goals for protection of biodiversity, which are in line with key strategic targets of the Convention on Biodiversity and Aichi Targets[10]. These include actions to:

- Address the underlying causes of biodiversity loss through integration of biodiversity issues into governmental activities and public life.
- Reduce the direct pressures on biodiversity and promote sustainable use of biological resources.
- Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity.
- Enhance the benefits to all from biodiversity and ecosystem services.
- Enhance implementation of biodiversity strategy through participatory planning, knowledge management and capacity building.

268. A primary goal of the NBSAP to help support national obligations under the EU Association Agreement and facilitate harmonization with EU environmental policy. It is especially important in promoting legislative changes, protection of global and European significance habitats and species and establishment of the "Emerald Network", and enhancement of the country's involvement in the regional process of sustainable forestry, such as "European forests" and reconciliation of the Georgian forestry policy, legislation and standards with EU requirements

D.4.2 Related Plans

269. In addition to the NBSAP there are a number of other key National Plans of relevance to biodiversity and conservation as outlined below.

Table 13: Other National Plans

Document	Relevance
National Environmental Action Plan (NEAP 2012)	Outlines overall approach to environmental protection. Includes specific chapters on both biodiversity and protected areas and forests and forestry. The NBSAP includes detailed actions for achieving NEAP goals and objectives such as: • Rehabilitation, protection and conservation of viable populations and habitats of selected endangered species; • Improvement of effectiveness of hunting and fishery management to ensure sustainable use of fauna resources; • Development of an effective protected areas network; • Improvement of the effectiveness of the Protected Areas management through the capacity building of its administration and introduction of financial sustainability mechanisms; • Creation of proper data bases for biodiversity conservation and sustainable management of biological resources by developing the relevant national biomonitoring system; • Development of background for establishment of a sustainable forestry system; • Mitigation of unsustainable and illegal forest use (logging); • Mitigation of eutrophication.
National	Aimed at establishment of a system of sustainable forest management to ensure:

[9] The process was coordinated by a supervision committee under the direction of MoEPA with representation from organisations including WWF (Caucasus Program Office), IUCN (Caucasus Cooperation Centre) and National NGOs such as NACRES, and GreenAlternative as well as Ilia State University:

[10] https://www.cbd.int/doc/world/ge/ge-nr-05-en.pdf

Document	Relevance
Forest Strategy	• protection of biological diversity; • effective use of the economic potential of forests considering their ecological value; • public participation in forest management related issues; • fair distribution of derived benefits; • Priority is to be given to meeting the needs of the local population, and everybody's principally free access to forest resources. Restoration of degraded forests and afforestation are also identified as priority areas.
Rural – Agricultural Development Strategy (2015-2020)	Promotes long term agricultural development but includes preservation of biodiversity as a key aim, as well as strengthening cooperation with MoEPA and associated agencies of neighboring countries. Relevant activities include: • Introduction of "good agricultural practices ", which will promote mitigation of environmental pollution through optimal application of chemical fertilizers and substances; • Refinement of agrarian ecosystem and natural grassland management systems; • Introduction of the system for biofarm establishment, encouragement, sustainable management and certification. • Special emphasis is placed on preservation of agrarian biodiversity and endemic species and it includes actions around: • creation of an effectively manageable genetic bank; • detailed inventory and restoration of local species and forms; • informing farmers and other stakeholders of agrarian biodiversity and endemic species.
Kazbegi Development Strategy (2016-2020)	Developed by Kazbegi Local Action Group (LAG Kazbegi). This Strategy has been developed within the frames of the Project "Kazbegi Local Action Group ". The Project is implemented by the international NGO "People in Need" (PIN), within the European Neighborhood Program for Agriculture and Rural Development (ENPARD). The Project is being implemented together with the partners of "People in Need": Biological Farming Association "Elkana" and the National Network of Local Action Groups (NNLAG) of the Czech Republic. The Project envisages introduction of LEADER[11] methodology in Kazbegi municipality, in order to facilitate rural development.
Dusheti municipality socio economic development plan	The plan was elaborated through active cooperation with local authorizes. The plan contains detailed information on socio-economic state and development prospects of the municipality.
Road Safety Strategy (2016).[12]	The strategy sets out the key directions recommended by international organizations and global experts for successful and sustainable long-term road safety management in Georgia. The need for the strategy has been conditioned by rising level of registered motor vehicle and necessity to allow Georgia to achieve substantially improved results and sustained success in its road safety activity. The strategy describes national capacity building and shared responsibility for road safety in the state. Developed through capacity review and in consultation with the key governmental partners and road safety stakeholders, the Strategy sets a new long-term vision and goal for road safety in Georgia, stresses benefits of long-term investment in road safety, mentions measures and targets to address the key road safety problems.

D.5 Administrative Framework

[11] "Liaison Entre Actions de Développement de l'Économique Rurale", which means "Links between the rural economy and development actions"

[12] National Centre for Disease Control, Georgia, 2016 (http://www.ncdc.ge/Handlers/GetFile.ashx?ID=6164d012-744c-4077-bdc8-7943b43fe1f7)

270. **Ministry of Environment Protection and Agriculture (MoEPA)** – In December 2017, MoEPA had its responsibilities split between the ministries of agriculture and economy, with the latter also taking over the Ministry of Energy.

271. MoEPA is responsible for all environmental protection issues and agriculture in Georgia. The responsibilities of the Ministry as the competent authority are: a) to intermit, limit, or stop any activity having or likely to have adverse impact on the environment, b) to carry our screening of planned development, c) to implement scoping, d) to issue environmental decision for project subject to EIA procedure (ref. Environmental Assessment Code), c) to control the execution of mitigation measures by the developer, d) to organize public meetings and discussion of an estimation of influence on environment and prepares the documentation (the project of the order of the minister) to let out the permission to influence to environment.

272. **Ministry of Economy and Sustainable Development (MoESD)** – MoESD is responsible for carrying out the review of technical documentation (including conclusion of independent experts) and issuing Permits on Construction for projects, as well as for supervision over constructing activities and for arranging Acceptance Commission after completion of construction. State supervision of construction and compliance monitoring is provided by the Main Architecture and Construction Inspection (MACI), which is operating under the Ministry of Economy and Sustainable Development of Georgia. Following to reorganization of MoEPA and the Ministry of Energy the MoESD took over the functions of the latter, as well as part of the main functions of MoEPA (viz. licensing activity). The MoESD is a responsible institution for developing and administrating Local Market Information System (LMIS). The LMIS information providers include: Ministry of Economy and Sustainable Development of Georgia, Enterprise Georgia, Georgia's Innovation and Technology Agency, National Agency of State Property, National Statistics Office of Georgia, Ministry of Education and Science of Georgia, Education Management Information System, National Center for Educational Quality Enhancement, Ministry of Environment Protection and Agriculture of Georgia, Agricultural Projects' Management Agency and Ministry of Labor, Health and Social Affairs of Georgia.

273. **Ministry of Regional Development and Infrastructure and the Roads Department** – The Roads Department (RD) of the Ministry of Regional Development and Infrastructure (MRDI) is responsible for elaboration of policy and strategic plans related to developing motor roads, management of road and traffic related issues and construction, rehabilitation, reconstruction and maintenance of the roads of public use of international and national significance, utilizing funds from the state budget, lawns, grants and other financial sources. Thus, the RD is responsible for the procurement of design and EIA studies, as well as works on construction and rehabilitation of roads and is responsible for ensuring compliance with the Georgian legislation and environmental and social requirements of the relevant donor organizations. Control of implementation of the Environmental Management Plan (EMP) is direct responsibility of the Roads Department. Within the RD there is Environmental Division dealing with the environmental issues. This division is supposed to review the EIAs and EMPs related to the Roads Department projects and perform monitoring of compliance of the contractor's performance with the approved EMPs, EIAs, environmental standards and other environmental commitments of the contractor.

274. **The Ministry of Culture, Monument Protection and Sports** – responsible on supervision of the construction activities in order to protect archaeological heritage. In case if construction is to be carried out in a historic sites or zones of cultural heritage, consent of the Ministry of Culture, Monument Protection and Sport is also required for issuing construction permit.

275. The "National Service for the Foodstuffs Safety, Veterinary and Plant Protection" of the Ministry of Environmental Protection and Agriculture – responsible for implementation of complex sanitary protection measures in case of identification burial sites during earthworks. Information about suspicious burial sites should be delivered to the "National Service for the Foodstuffs Safety, Veterinary and Plant Protection" of MoEPA by the Construction Contactor (field environmental officer) and RD field officer.

276. **Ministry of Labor, Health and Social Affairs (MoLHSA),** together with other ministries, institutions and social partnerships defines the state policy on labor safety; supports awareness raising and training sessions, develops proposals and recommendations related on labor safety programs. MoLHSA is represented in Trilateral Commission of Social Partnership together with the Ministry of Justice (MoJ), MoESD, MoRDI and Ministry of Education and Sport (MoES). MoLHSA defines the scope, qualification requirements, condition and rules for accreditation of labor safety officers; elaborates incident evidence gathering and keeping procedures as well as reporting rules and terms; together with Social Partnership acts and mediator in collective labor disputes, monitors implementation of OHS conventions, recommendations and agreements, develops reports on the subject, ensures cooperation with ILO and other international and governmental institutions, carried out labor market studies and analysis.

277. **Service for the Protection of Labor Safety Regulations** under the MoLHSA monitors and implements supervision over compliance with the labor safety rules, investigates incidents and professional deceases cases and registration.

278. **Trilateral Commission of Social Partnership (TCSP).** Parties to the Partnership are the government of Georgia, employers' associations and employees' associations. The term of office of the TCSP members is 1 year. Each member has 6 members in the commission. Objective of the TCSP is improvement of labor safety through supporting dialogue between the GoG, employers and employees.

D.6 Environmental Regulations and Standards

279. Georgia has a large set of specific standards that refer to emission, effluent, and noise standards, as well as standard to handle and dispose specific wastes ranging from sewage to hazardous wastes. The following summarizes these laws and standards along with IFC and EU standards.

D.6.1 Ambient Air Quality Standards

280. Maximum permissible concentrations (MPC) for air born pollutants are set by Technical regulations – Ambient air quality standards (approved by GoG decree 383, dates 27July, 2018, see Table 14. This project will also ensure compliance with IFC guideline values [13] (not interim targets) and EU air quality standards as these values are, in some instances, more stringent than the national standards, the most stringent standards are highlighted in green and will be applied.

Table 14: Ambient Air Quality Standards

Parameter	Averaging Period	National limits (µg/m^3)	IFC/WHO (µg/m^3)	EU (µg/m^3) / Permitted Exceedences Per Year
Sulfur Dioxide	24 hour	125	20	125 / 24

1. [13] The IFC guidelines are based on World Health Organization (WHO). Air Quality Guidelines Global Update, 2005.

Parameter	Averaging Period	National limits (µg/m^3)	IFC/WHO (µg/m^3)	EU (µg/m^3) / Permitted Exceedences Per Year
(SO_2)	1 hour	350		350 / 3
	10 mins		500	
Nitrogen Dioxide (NO_2)	1 hour	200	200	200 / 18
	1 year	40	40	40 / n/a
PM2.5	1 hour		25	
	1 year	25	10	25 / n/a
PM10	1 hour		50	
	24 hours	50		50 / 35
	1 year	40	20	40 / n/a
Carbon Monoxide (CO)	Maximum daily 8 hour mean			1000 / n/a

D.6.2 Surface Water Quality Standards

281. Water quality requirements depend on category of water body (ref. Technical regulations of protection of surface water from pollution, approved by decree #425 of the government of Georgia, 31/12/2013). The categories are: a) household water use, b) domestic water use and c) fisheries. The latter, in its turn, splits in highest, first and second categories.

Table 15: Water quality requirements by water use category

	Water use category			
	Household water use	**Recreational water use[14]**	**Fisheries**	
			Highest and first	**Second**
	Increase not higher that listed below is allowed			
Suspended solids	0.25mg/l	0.75 mg/l	0.25mg/l	0.75 mg/l
	For rivers with natural content of suspended solids 30mg/l, around 5% increase is allowed			
	If waste water contains suspended particles with deposition rate above 0.2mm/sec discharge in water reservoirs is not allowed. Discharge of effluents containing suspended particles with deposition rate above 0.4mm/sec is prohibited.			
Floating matter	Patches and films of oil, petroleum products, fats must not be detectable			
Colour	Must not be visible in water column		Water must not have unusual color	
	20cm	10cm	-	
Odor, taste	Water must not have odor and taste of higher than 1 unit intensity		Water must not result in unusual odor and taste in fish	
	After chlorination of other treatment	Without treatment	-	
Temperature	After discharge of waste water, temperature in water reservoir must not exceed by more than 5% compared to the natural value		For water bodies where cold water lowing fish is found (*Acipenseridae, Coregonidae*) maximum allowable temperatures in summer and winter are 20C and 5C respectively, for other water bodies 28C (in summer), 8C (in	

[14] According to the Technical regulations for protection of surface water from pollution three categories of water use are set:
1. სასმელ–სამეურნეო (хозяйственно-питьевое, literally drinking- domestic) which is generally translated as household water use. This category refers to water bodies for drinking and domestic water use
2. სამეურნეო–საყოფაცხოვრებო (хозяйственно-бытовое, domestic) which is genrally translated as domestic water use. This category includes surface water bodies used for recreation
3. water for fisheries (which is split in two - a) highest, first and b_ second category)
According to these clasification household water includes water for drinking.

	Water use category			
	Household water use	**Recreational water use[14]**	**Fisheries**	
			Highest and first	**Second**
			winter)	
pH	Must be in 6.5-8.5 interval			
Water mineralization	<1000mg/l, Incl. chlorides – 350mg/l; sulphates – 500mg/l	To comply with requirement given in section related to taste (see above)	In accordance with taxation	
Dissolved oxygen	Must not be lower than			
	4mg/l	4mg/l	6mg/l	6mg/l
Biological oxygen demand	At 20C must not exceed			
	3mg/l	6mg/l	3mg/l	6mg/l
Chemical oxygen demand	Must not exceed			
	15 mg/l	30 mg/l	-	-
Chemical substances	Must not exceed maximum permissible limits			
Pathogens	Must be free for pathogens, including viable helmint eggs, tenia oncosperes and viable cysts of pathogen organisms			
Toxicity	-	-	At the point of discharge and control section of the river toxic impact must not be observed.	

282. In addition to the above, the IFC provides guidelines values for effluent discharge to water courses. The following table provides these values with which the Project shall comply, for example relating to water discharge from construction camps.

Table 16: Indicative Values for Treated Sanitary Sewage Discharges

283.	Pollutant	284.	Unit	285.	Guideline Value
286.	pH	287.	pH	288.	6-9
289.	BOD	290.	Mg/l	291.	30
292.	COD	293.	Mg/l	294.	125
295.	Total Nitrogen	296.	Mg/l	297.	10
298.	Total Phosphorus	299.	Mg/l	300.	2
301.	Oil and Grease	302.	Mg/l	303.	10
304.	Total Suspended Solids	305.	Mg/l	306.	50
307.	Total Coliform Bacteria	308.	MPN[A] / 100 ml	309.	400

310. A – MPN = Most Probable Number

D.6.3 Groundwater Quality Standards

311. Groundwater quality standards are not set under Georgian law. Drinking water quality standards are commonly used instead as assessment criteria for groundwater. Quality of drinking water is determined by the Technical Regulations for Drinking Water (approved by order №58 of the government of Georgia, (15.01.2014).

Table 17: Drinking water quality criteria

Parameter	Units	Value
Odor	Unit	2
Taste	Unit	2
Color	Grad	15
Turbidity	Turbidity units (formazine) or mg/l (kaolin)	3.5 or 2
Metals and Miscellaneous		

Parameter	Units	Value
Boron, B	mg/kg	0.5
Arsenic, As	mg/kg	0.01
Cadmium, Cd	mg/kg	0.003
Copper, Cu	mg/kg	2
Mercury, Hg	mg/kg	0.006
Nickel, Ni	mg/kg	0.07
Lead, Pb	mg/kg	0.01
Selenium, Se	mg/kg	0.01
Zinc, Zn	mg/kg	3
Total Petroleum Hydrocarbons, TPH	mg/kg	0.1
Cyanide	mg/kg	0.07
Sulphates	mg/kg	250
Chloride	mg/kg	250
pH	pH value	6-9
Sodium, Na	mg/kg	200
Microbiological characteristics		
Thermotolerant coliforms	Bacteria in 100cm^3	not allowed
Total; coliforms	Bacteria in 100cm^3	not allowed
Mesophylic aerobes and facultative anaerobes	Colony forming units in 1cm^3	< 50
Colifagues	Negative colonies in 100m^3	not allowed
Sulphitereducing clostridia	Spores in 20cm^3	not allowed
Lamblias and cysts	Cysts in 50dm	not allowed

D.6.4 Noise Standards

312. Admissible noise standards of the IFC and Georgian national standards for residential areas are similar. The national standards for noise are set according to the Technical regulation – Acoustic noise limits for rooms/premises in residential houses and public establishments (Document #300160070.10.003.020107, Date 15/08/2017) see Table 18.

313. For IFC noise impacts should not exceed the levels presented in Table 19 or result in a maximum increase in background levels of 3 dB at the nearest receptor location off site. This project will comply with both IFC Guidelines and Georgian Standards. Note that Georgian standards refer to the allowable limits indoors, not at the building façade.

Table 18: Georgian Standards for Noise Levels

Purpose/use of area and premises	Allowable limits (dBA)		
	L_{day}		23:00 – 08:00 L_{night}, Night
	08:00 – 19:00, Day	Evening 19:00-23:00	
Educational facilities and library halls	35	35	35
Medical facilities/chambers of medical institutions	40	40	40
Living quarters and dormitories	35	30	30
Hospital chambers	35	30	30
Hotel/motel rooms	40	35	35
Trading halls and reception facilities	55	55	55
Restaurant, bar, I halls	50	50	50
Theatre/concert halls and sacred premises	30	30	30
Sport halls and pools	55	55	55
Small offices (≤100m^3) – working rooms and premises	40	40	40

Purpose/use of area and premises	**Allowable limits (dBA)**		
	L_{day}		**23:00 – 08:00 L_{night}, Night**
	08:00 – 19:00, Day	Evening 19:00-23:00	
without office equipment			
Small offices (≤100m^3) – working rooms and premises without office equipment	40	40	40
Conference halls /meeting rooms	35	35	35
Areas bordering with houses residential, medical establishments, social service and children facilities (<6 storey buildings)	50	45	40
Areas bordering with houses residential, medical establishments, social service and children facilities (>6 storey buildings)	55	50	45
The areas bordering with hotels, trade, service, sport and public organizations	60	55	50

Note:
1. in case noise generated by indoor or outdoor sources is impulse or tonal, the limit must be 5dBA les than indicated in the table.
2. Acoustic noise limits given above are set for routine operation conditions of the 'space', i.e. windows and door are closed (exception – built-in ventilation canals), ventilation, air conditioning, lighting (in case available) are on; functional (baseline) noise (such as music, speech) not considered.

Table 19: IFC Noise Level Guidelines

Receptor	**One-hour L_{aeq} (dBA)**	
	Daytime 07.00-22.00	**Night-time 22.00 – 07.00**
Residential; institutional; educational	55	45
Industrial; commercial	70	70

314. For workplace noise the following IFC standards are applicable.

Table 20: IFC Work Environment Noise limits

Type of Work, workplace	**IFC General EHS Guidelines**
Heavy Industry (no demand for oral communication)	85 Equivalent level Laeq,8h
Light industry (decreasing demand for oral communication)	50-65 Equivalent level Laeq,8h

D.6.5 Vibration Standards

315. The Georgian Standards for vibration are designed for human comfort. These are shown in Table 21. Note that no Georgian standards for building damage exist.

Table 21: Georgian General Admissible Vibration Values in Residential Houses, Hospitals and Rest Houses, Sanitary Norms 2001

Average Geometric Frequencies of Octave Zones (Hz)	**Allowable Values X0,Y0, Z0**			
	Vibro-acceleration		Vibro-speed	
	m/sec^2	dB	m/sec 10^{-4}	dB
2	4.0	72	3.2	76

Average Geometric Frequencies of Octave Zones (Hz)	**Allowable Values X0,Y0, Z0**			
	Vibro-acceleration		Vibro-speed	
	m/sec^2	dB	$m/sec\ 10^{-4}$	dB
4	4.5	73	1.8	71
8	5.6	75	1.1	67
16	11.0	81	1.1	67
31.5	22.0	87	1.1	67
63	45.0	93	1.1	67
Corrected and equivalent corrected values and their levels	4.0	72	1.1	67

Note: It is allowable to exceed vibration normative values during daytime by 5 dB during daytime In this table of inconstant vibrations, a correction for the allowable level values is 10dB, while the absolute values are multiplied by 0.32. The allowable levels of vibration for hospitals and rest houses have to be reduced by 3dB.

316. The German Standard DIN 4150-3 – Vibration in Buildings – Part 3: Effects on structures provides short term and long-term limits [15] for vibration at the foundation for various structures (see Table 22). This standard is considered international best practice and will be followed as part of the Project.

Table 22: Guideline Values for Vibration Velocity to be Used When Evaluating the Effects of Short-term and Long-term Vibration on Structures

Group	**Type of structure**	**Guideline Values for Velocity (mm/s)**				
		Short-term				Long-term
		At foundation			Uppermost Floor	Uppermost Floor
		Less than 10 Hz	10 Hz to 50 Hz	50 to 100 Hz	All frequencies	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	10
2	Residential dwellings and buildings of similar design and/or use	317.5 318. (105 dB) [16]	5 to 15	15 to 20	15	5 (105 dB)
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	319.3 320. (100.5 dB)	2 to 8	8 to 10	8	2.5 (99.0 dB)

Source: DIN 4150-3, Structural Vibration, Part 3: Effect of vibration on structures

321. DIN 4150-3 notes that "experience has shown that if these values are complied with, damage that reduces the serviceability of the building will not occur. If damage nevertheless occurs, it is to be assumed that other causes are responsible. Exceeding the value in the table does not necessarily lead to damage".

2. [15] short-term vibrations are defined as those that do not occur often enough to cause structural fatigue and do not produce resonance in the structure being evaluated and long-term vibrations are all the other types of vibration.

[16] The formula for conversion from mm/s to dB can be found in **Appendix V** – Vibration Assessment

D.6.6 Soil Quality

322. Soil quality is currently assessed by Methodological Guides on Assessment of Level of Chemical Pollution of Soil (MG 2.1.7.004-02). However, these limits will soon be replaced as Georgia harmonizes its regulations with the EU and moves away from the outdated standards prepared while part of the Soviet Union. The national standards for soil quality are given in **Table 23** along with the limits proposed by MoEPA and the Ministry of Labor, Health and Social Affairs.

Table 23: Soil screening values

Compound	Units	Current Limit	Proposed Limit
Metals and Miscellaneous			
Arsenic, As	mg/kg	2	30
Cadmium, Cd	mg/kg	2*	0.5** – 1.0***
Copper, Cu	mg/kg	3-132*	60**-100***
Mercury, Hg	mg/kg	2.1	
Nickel, Ni	mg/kg	4-80*	60**- 80***
Lead, Pb	mg/kg	32-130*	100** - 140***
Zinc, Zn	mg/kg	23-220*	130** - 200***
Total Petroleum Hydrocarbons	mg/kg	1000	-
Cyanide	mg/kg	0,2	-
Volatile Organic Compounds			
Benzene	mg/kg	0.3	0.05
Toluene	mg/kg	0.3	-
Total xylenes	mg/kg	0.3	0.05
Semi Volatile Compounds			
Benzo(a)pyrene	mg/kg	0.02-0.2	0.1
Isopropylbenzene	mg/kg	0.5	-
Pesticides			
Atrazine	mg/kg	0.01-0.5	-
Lindane	mg/kg	0.1	-
DDT (and its metabolite)	mg/kg	0.1	0.075

* Note: Sodium and neutral (clay and clayey) pH >5.5 – No screening value available, ** Light Soils, ***Other Soils

D.7 National Technical Regulations Relevant to the Project

323. Technical (national) regulations applicable to the road project in Georgia include:
(i) Law on Roads (310.090.000.05.001.000.089, last amended in 2013);
(ii) Construction norms and regulations 2.05.03-84 – Design of bridges, viaducts, overpasses and pipes;
(iii) Construction norms and regulations 2.05.02-85 – Motor roads (regulate traffic safety, environmental issues, set forth main technical and traffic operation norms, crossings and intersections, paving aspects, etc.)

324. According to these documents:
(i) International and national importance roads should be built bypassing the settlements. Access roads to the settlements should be provided. To allow modernization, the distance between the residential area (settlement) and the edge of the carriageway must be not less than 200m, distance to agricultural land – 50m. If because of technical or economical purposes the road is to cross the settlement, minimum distance to the residential area

must be 50m, in case noise barriers are provided – 25m. For local roads minimum distance to residential area must be 50m, distance from agricultural land – 25m.

(ii) To protect residential area from noise and emission impact, 10m wide green barrier must be arranged;

(iii) Along with technical and economic aspects environmental impacts must be considered during design and construction;

(iv) Prior to arrangement of temporary infrastructure and preparation of road embankment, topsoil must be removed and stockpiled until subsequent use for re-cultivation after completion of construction and removal of all temporary facilities;

(v) Roads along the rivers, lakes and reservoirs must be built with consideration of protection zone boundaries for the surface water bodies.

D.8 Environmental Permitting Procedures

325. Environmental permitting procedure is defined in the Environmental Assessment Code. According to the national regulations (Environmental Assessment Code), the main stages of EIA include:

- scoping procedure;
- preparation of an EIA report by the proponent or consultant;
- public participation;
- assessment of information (EIA report, if necessary- additional information, information obtained during public participation and consultations with competent administrative bodies) by the Ministry;
- expert examination of information/reports;
- implementation of a transboundary environmental impact assessment procedure – if necessary;
- issuance of environmental decision or making decision refusing implementation of the project.

326. The application procedure for obtaining authorization from environmental authorities required for implementation of the planned development, including Environmental and Social Impact Assessment coordination, timeframes for information disclosure and public review for this project follows Procedure described below:

Table 24. Procedure Applicable to the Project – Scoping

Step	Action	Comment	Timeframe
1	Scoping application and scoping report (hard copy and digital) is developed and submitted to the Ministry	A scoping report shall include: • a brief description of the planned activity, especially general information on: • location of the planned activity, with indication of GIS coordinates (along with the shp file); • physical characteristics of the planned activity (capacity, scale, production process, the amount of products to be manufactured); • any alternatives to the planned activity, and the place of its implementation; • general information on the potential environmental impact and its types which will be examined in the EIA	Day 0

Step	Action	Comment	Timeframe
		process, including: • information on the potential impact (if any) in protected areas; • information on the potential transboundary impact (if any); • information on the potential impact of the implementation of the planned activity on human health, the social environment, cultural property and other objects of cultural heritage; 3. information on basic/exploratory research to be carried out and on the methods necessary to prepare an EIA report; 4. plan for deposit processing (including a Recultivation project) drafted in accordance with the requirements established by the legislation of Georgia, where relevant; 5. general information on the measures which will be taken into account for preventing, reducing and/or mitigating significant adverse effects on the environment.	
2	The Ministry posts scoping application and the scoping report on its official website and on the notice board of the executive body and/or representative body of a respective municipality, and upon request, makes printed or electronic copies available	The Ministry shall be responsible for organizing and holding public reviews. Accordingly, it shall ensure the reimbursement of the costs associated with organizing public reviews, including the publication of information on holding public reviews. Public reviews shall be led, and the minutes of public reviews shall be drafted, by a representative of the Ministry.	Within 3 days after a scoping application has been registered
3	The Ministry organizes a public review of the scoping report. Information on the public review shall be published in advance	The meeting shall be held in the building of the appropriate administrative body located closest to the location of the planned activity or in the territory adjacent to the building; or if it is planned to carry out the activity within the administrative boundaries of a self-governing city, public reviews shall be held in the building of the appropriate administrative body determined by the Ministry or in the territory adjacent to the building. Public reviews shall be open and any member of the public.	• not later than 10 days before the public review • Not earlier than the 10th day and not later than the 15th day after the placement of the scoping application
4	Feedback from stakeholders		Within 15 days after the placement of the screening application
5	The Ministry reviews the scoping application and the scoping report and issues a scoping opinion	When issuing the scoping opinion, the Ministry shall ensure a review of the opinions and comments submitted by the stakeholders and, if there are appropriate grounds, take them into	Not earlier than the 26th day and not later than 30th day after the scoping application has been registered

Step	Action	Comment	Timeframe
		account. The scoping opinion shall determine a list of studies required and information to be obtained and examined for preparing an EIA report. When issuing scoping opinions, the guideline document on Environmental Impact Assessment may be used.	
6	The Ministry posts scoping opinion and/or the decision refusing the carrying out of the activity placed on its official website and on the notice board of the executive body and/or representative body of a respective municipality, and upon request, shall make printed copies available		Within 5 days after completion of the scoping procedure

Note: If the project is expected to have transboundary impact relevant clauses of the Code must apply.

327. The scoping opinion issued by the Ministry shall be mandatory for a person carrying out activities in the preparation of an EIA report.

Table 25. Procedure Applicable to the Project – EIA

Step	Action	Comment	Timeframe
1	Written application is submitted by developer the Ministry.	The application submitted by the developer shall be accompanied with the following documents and/or data: a. EIA report; b. Projects on estimation of the limits for emission of harmful substances into the atmospheric air and for the injection of polluting substances into the surface waters together with the waste waters. c. Notification about a confidential part of a submitted application, if applicable; d. Copy of the document evidencing payment of the fee (500 GEL) in accordance with the existing legislation. e. Electronic copy of above mentioned documents.	Day 0
2	Ministry ensures publication of submitted application and attached documents on its official website as well as on the notice board of the relevant local authorities and/or representative bodies and upon request, provides paper copies of above mentioned documentation.	The Developer is entitled to request the Environmental Decision on several activities through a single application, if the activities are significantly interconnected.	Within 3 days after submission of the application
3	Minister sets up the Expert Commission		within 5 days after registration of the application
4	Expert commission prepares		within 40 days

Step	Action	Comment	Timeframe
	and submits the expertise conclusion on the EIA report to the Ministry		
5	Ministry takes decision on the finding of a deficiency in application		within 15 days after registration of the application
6	Feedback from stakeholders		within 40 days after the publication of the application
7	Publication of announcement on the public hearing	The announcement on public hearing shall include the information on: a. The content and brief description of the issue to be discussed, format of the discussion; b. The time, place and rules of the public hearing; c. The web address where the respective application, the EIA report and any other information relevant to decision-making will be available as well as indication about the opportunity of accessing the paper copies of these documents during the public hearing.	No less than 20 days prior to organizing the public hearing
8	Public hearing	The Ministry is responsible for organizing and conducting the public hearing. It is chaired and protocoled by a representative of the Ministry. The public hearing is organized in the closest appropriate administrative building to the site of the planned project or within its vicinity. If the project is planned to be implemented within the administrative borders of a self-governing community, the public hearing is organized in the closest appropriate administrative building to the site of the project or within its vicinity and if the project is planned to be implemented within the administrative borders of a self-governing city, the public hearing is organized in the appropriate administrative building determined by the Ministry, or within its vicinity. The public hearing is open to the public and any person has a right to participate in it.	No earlier than 25th day and no later than 30th day after the publication of the application
9	Prior to issuance of the Environmental Decision or the decision on the refusal to implement the project, the Ministry ensures involvement of the Ministry of Culture and Monument Protection of Georgia, within its competence, in the administrative procedures as other public authority, under the rule envisaged by Article 84 of General Administrative Code of Georgia.		
10	The Minister issues individual administrative legal act on issuance of the Environmental Decision or the decision on the refusal to implement the project		no less than 51 and no more than 55 days after registration of the application

Step	Action	Comment	Timeframe
11	Ministry ensures publication of the EIA report, the Expertise Conclusion, the Environmental Decision or the legal act on the refusal to implement the project and the results of public participation on its official website as well as on the notice board of the relevant local authorities and/or representative bodies and upon request, provides paper copies of abovementioned documentation		within 5 days after issuing the Environmental Decision or the legal act on the refusal to implement the project

328. If, within 2 years after the scoping opinion has been approved, the proponent fails to obtain an environmental decision in accordance with the procedures provided for by the Environmental Assessment Code, the individual administrative act of the Minister approving the scoping opinion shall be declared as invalid.

D.9 Licenses, Permits, and Approvals

329. The Project will also be required to obtain a number of permits and consents, of which the main permits and the implementing national legislation are described in Table 26. The Law on Licenses and Permits governs the issue of all permits and consents. Subject to satisfaction of application requirements, all the permits are issued within 30 days from application submission.

Table 26: Permits Register

Permit Required Activity	Permit Title	Issuing Authority	Implementing Law	Responsible Party for Obtaining License
Pre-construction				
Construction activities	Project design approval Construction Permit	MoESD	Law on Licenses and Permits; Government Resolution N57 "On Terms and Conditions of issuance of Construction Permit"	RD
Construction activities	Environmental Decision	MoEPA	Law on Environmental Protection Environmental Assessment Code	RD
Construction activities	Cultural Heritage Clearance	National Agency of Cultural Heritage (NEA)	Law "On Cultural Heritage" Law on Licenses and Permits; Government Resolution N57 "On Terms and Conditions of issuance of Construction Permit"	RD
Construction activities	Geological-engineering conclusion	NEA	Government Resolution N57 "On Terms and Conditions of issuance of Construction Permit"; Order N7 of the Minister of Environment Protection Law on Licenses and Permits	RD
Construction				
Tree felling in state forest lands for ROW and	Forest use agreement	MoEPA	Law No.2124 on Forestry Code of Georgia; Resolution No.242 of Government of Georgia on Approval of Rules for Forest Use;	Contractor

permanent facilities			Resolution No.132 of Government of Georgia on Approval of Regulations on Rules and Conditions of Issuance of Forest Usage License	
Tree felling in state forest lands for Temporary Facilities	Forest Use Agreement	MoEPA- NEA	Resolution No.242 of Government of Georgia on Approval of Rules for Forest Use (last revision 02/02/2018); Order N10/61 of the Chairman of State Department of Forestry" On Approval of the Special Cutting and its Rule" - Resolution #132 of the government of Georgia (consolidated version 16/05/2015) On Approval of Regulations on the Rules and Conditions of Issuing Forest Use Licenses Order #10/61 of the Head of the State Department of Forestry of Georgia	Contractor
Construction or upgrade of access roads	Approval of construction or upgrade activities	MoRDI; local municipalities	Government Resolution N57 "On Terms and Conditions of issuance of Construction Permit"	Contractor
Transportation of oversized and overweight cargo	Transportation permit	Ministry of Internal Affairs	Joint Order N956/1-1/746 of the Minister of Internal Affairs and Minister of Economic Development; Law "On Road Transport"; Law "On Road Traffic"	Contractor
Spoil disposal	Spoil disposal approval – Environmental Decision	MoEPA	Law "On Subsoils", May 8, 2012 Environmental Assessment Code. 2017	Contractor
Running own quarry (in case contractor decides to) *	License for abstraction of inert material.	MoESD	Georgia on Licenses and Permits aw on Fees for the use of natural resources	Contractor
Running asphalt plant**	Environmental Decision	MoEPA	Environmental Assessment Code. 2017	Contractor
Import of explosives	Permit to import explosives	Ministry of Internal Affairs	Tax Code of Georgia; Decree of the Government of Georgia N420; Law "On Control of Technical Hazard"; Order N 1-1/2502 of the Minister of Economy and Sustainable Development	Contractor
Use of explosives	Permit to use explosives	MoESD	Tax Code of Georgia; Decree of the Government of Georgia N420; Law "On Control of Technical Hazard"; Order N 1-1/2502 of the Minister of Economy and Sustainable Development	Contractor
Right on land	Project's registered rights to land	MoESD, Court	Law on procedures for expropriation of property for pressing social needs (Document code: 020.060.040.05.001.000.670, last	RD

			revision: 06/09/2013)	
		National Agency of Public Registry of Ministry of Justice	Civil Code (Document code: 040.000.000.05.001.000.223, last revision 23/12/2017)	
	Approval of the topsoil storage	Local administration, land owners	Law on subsoil (last revision 07/12/2017. Document code:380.000.000.05.001.000.140)	

Note: Purchase of material from already existing licensed quarries is preferable. In this case a copy of the license and agreement with the quarry operator must be provided. If contractor already has permit for operation of the asphalt unit – a copy of permit (Environmental decision) must be provided.

330. If waste water is to be discharge into the surface water body, the Contractor will be obliged to calculate the limits of discharge into the waterbody. The limits are to be approved by the MoEPA. The quality of waste water should ensure compliance of recipient surface water quality (in the section located in 1km upstream the point of use) with the limits set in the Annex 1 and 2 to the Technical regulation for protection of water from pollution. To protect the surface water quality, for each point of discharge maximum permissible discharge limits must be defined separately. The document (limits of discharge) must set the discharge limits to ensure compliance of recipient water body with the quality standard.

331. For sewage the following parameters are generally considered – suspended solids, BOD, COD, total N and total P, pH, coliforms.

332. For other ('industrial') discharge the list of parameters generally includes – suspended solids, BOD, TPH, pH. The set of components depends on the type of potential pollutants.

D.10 Construction Permits

333. The Law on Licenses and Permits defines protocols for the issue, amendment and withdrawal of permits. For projects such as this, a construction permit is needed.

334. Construction permit – a different hierarchical permit which, proceeding from the economic interests of permit seekers, is divided into three mutually-dependent but in terms of administrative procedure independent stages: I stage – establishment of urban planning conditions; II stage – endorsement of architectural-construction design; III stage – issuance of construction permit. The rules and principles defined by this law for permit issuance shall apply to these stages.

335. The responsible authority (the Road Department) must obtain the following approvals before it gets approval from the Ministry of Economy and Sustainable Development:
- Geological conclusions to be issued by National Environmental Agency;
- Cultural heritage clearance to be issued by National Agency of Cultural Heritage;
- Environmental Decision issued by MoEPA;
- Project design approval to be issued by MoESD; and
- Project's registered rights to land.

D.11 State Forest Fund

336. According to The Resolution No.242 of Government of Georgia on Approval of Rules for Forest Use, Article 27_1 State forest land (or State Forest Fund (SFF)) may be used for the purposes of construction of motorways, as well as for other activities which are deemed as special use of forest lands. Article 27 states that if the activity that is deemed as special use of forest land and is subject to Ecological Expertise then the Client (in this

case the RD) is obliged to apply to remove all trees identified in the affected SFF area from the SFF register or "de-list" them before they can be cut. The decision to de-list trees and plants from the State Forest Fund of Georgia is issued by the National Forest Agency excepting the vegetation species protected by the Red List of Georgia. A decision to de-list trees and plants from the Red List of Georgia is made by MoEPA. The client must apply to the MoEPA in writing regarding the presence of the Red-Listed species in the project area.

D.12 International Conventions and Agreements

337. Important international environmental treaties that have been signed by Georgia and may have relevance to the Project are listed in Table 27.

Table 27: International Agreements and Treaties

Date	Title	Status in Georgia	Date
Natural environment			
1961	International Convention for The Protection of New Varieties of Plants	Entry into force	2008
1971	Ramsar Convention on Wetlands of International Importance Especially as Wildfowl Habitat	Entry into force	1997
1973	Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	Entry into force	1996
1991	Agreement on The Conservation of Populations of European Bats	Entry into force	2002
1995	Agreement on The Conservation of African-Eurasian Migratory Water birds	Entry into force	2001
1997	International Plant Protection Convention (1997 Revised Text)	Entry into force	2007
1983	Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (CMS)	Entry into force	2000
1992	Rio Convention on Biological Diversity	Entry into force	1994
2000	Cartagena Protocol on Biosafety to the Convention on Biological Diversity	Entry into force	2009
2000	European Landscape Convention	Entry into force	2011
2008	Convention on the Conservation of European Wildlife and Natural Habitats (Bern)	Entry into force	2010
2010	European Landscape Convention	Entry into force	2011
Environmental pollution, waste			
1997	Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management	Entry into force	2009
1998	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	Entry into force	2007
1989	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	Entry into force	1995
2001	Stockholm Convention on Persistent Organic Pollutants	Entry into force	2007
Climate			
1994	UN Framework Convention on Climate Change (UNFCCC)	Entry into force	1994
1985	Vienna Convention for the Protection of the Ozone Layer	Entry into force	1996
1987	Montreal Protocol on Substances that Deplete the Ozone Layer, (and its London, Copenhagen, Montreal and Beijing Amendments	Entry into force	1996

Date	Title	Status in Georgia	Date
	2000 and 2011)		
1997	Kyoto Protocol to UNFCCC	Entry into force	2005
1999	Geneva Convention on Long- Range Transboundary Air Pollution	Entry into force	1999
Cultural heritage			
1954	European Cultural Convention	Entry into force	1997
1972	Paris Convention Concerning the Protection of the World Cultural and Natural Heritage	Entry into force	1992
1982	European Convention on the Protection of the Archaeological Heritage	Entry into force	2000
1985	Convention for the Protection of the Architectural Heritage of Europe	Entry into force	2000
2005	Council of Europe Framework Convention on the Value of Cultural Heritage for Society (Faro convention)	Entry into force	2011
Public participation and information accessibility			
1998	Aarhus Convention on Access to Information, Public Participation in Decision- Making and Access to Justice in Environmental Matters	Ratified	2000
Labor issues			
1930	Forced Labor Convention	Entry into force	1993
1936	Holidays with Pay Convention	Entry into force	1993
1949	Freedom of Association and Protection of the Right to Organize Convention	Entry into force	1999
1948	Right to Organize and Collective Bargaining Convention	Entry into force	1993
1950	European Convention for the Protection of Human Rights and Fundamental Freedoms	Entry into force	1999
1951	Equal Remuneration Convention	Entry into force	1993
1957	Abolition of Forced Labor Convention	Entry into force	1996
1958	Discrimination (Employment and Occupation) Convention	Entry into force	1993
1962	ILO Social Policy (Basic Aims and Standards) Convention	Entry into force	1997
1964	Employment Policy Convention (Geneva)	Entry into force	1993
1973	Geneva Convention concerning Minimum Age for Admission to Employment	Entry into force	1996
1975	Human Resources Development Convention	Entry into force	1993
1978	Labor Relations (Public Service) Convention	Entry into force	2003
1997	Employment Service Convention	Entry into force	2002
1997	Private Employment Agencies Convention	Entry into force	2002
1999	Worst Forms of Child Labor Convention	Entry into force	2002

D.12.1 Regional Cooperation

338. Georgia has worked with its neighboring countries to create an "Ecoregion Conservation Plan for the Caucasus" (2006, updated 2012), in line with the Aichi biodiversity goals. This identifies 56 regional hot-spots and 60 regional corridors to be prioritized for conservation [17] and also proposed specific actions to be taken with regards to establishment of a protected area network, enhancement of transboundary connectivity, restoration of degraded ecosystems, harmonization of policies and legislation, coordination of scientific researches and monitoring activities, environmental education and raising awareness. A "Regional Biodiversity Council" facilitates coordination of activities at the Ecoregion level.

339. In addition, the Transboundary Joint Secretariat in South Caucasus (TJS) assists Environmental Ministries/Protected Area Management Structures of Georgia, Azerbaijan and Armenia in strengthening regional cooperation and development and harmonization of the nature conservation sector. The TJS was founded in 2007, under the Ecoregional program "Sustainable Management of Biodiversity, South Caucasus", and contributes to development of tools for sustainable funding of policy and strategic documents and protected areas.

D.13 Asian Development Bank Safeguard Policies 2009

340. The ADB has three safeguard policies that seek to avoid, minimize or mitigate adverse environmental impacts and social costs to third parties, or vulnerable groups as a result of development projects. [18]

Safeguard Requirements 1: Environment

The objectives are to ensure the environmental soundness and sustainability of projects, and to support the integration of environmental considerations into the project decision-making process. Environmental safeguards are triggered if a project is likely to have potential environmental risks and impacts. Eleven 'Policy Principles' have been adopted as part of the SPS, including:

(i) Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks. (***The Project is classified as a Category A project*).**

(ii) Conduct an environmental assessment for each proposed project to identify potential direct, indirect, cumulative, and induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical cultural resources in the context of the project's area of influence. Assess potential transboundary and global impacts, including climate change. Use strategic environmental assessment where appropriate. (***The EIA herewith provides the environmental assessment for the Project, including an assessment of climate change. Transboundary impacts are not applicable***).

(iii) Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also consider the no project alternative. (***Alternatives have been considered, including the 'no project' alternative in Section C – Alternatives***).

(iv) Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts by means of environmental planning and management. Prepare an environmental management plan (EMP) that includes the

[17] http://d2ouvy59p0dg6k.cloudfront.net/downloads/ecp_2012.pdf
[18] ADB. 2009. Safeguard Policy Statement, Manila

proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators. Key considerations for EMP preparation include mitigation of potential adverse impacts to the level of no significant harm to third parties, and the polluter pays principle. (***An EMP has been prepared for the Project and is outlined in detail in Appendix A – Environmental Management Plans and Institutional Requirements***).

(v) Carry out meaningful consultation with affected people and facilitate their informed participation. Ensure women's participation in consultation. Involve stakeholders, including affected people and concerned nongovernment organizations, early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to environmental assessment. Establish a grievance redress mechanism to receive and facilitate resolution of the affected people's concerns and grievances regarding the project's environmental performance. (***Consultations were held to discuss environmental issues, the findings of the consultations (and a description of the Project grievance redress mechanism) are presented in Section H – Public Consultation, Information Disclosure & Grievance Mechanism***).

(vi) Disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. Disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders. (***This EIA and its EMP will be disclosed on the ADB and RD web-sites***).

(vii) Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports. (***The EIA and its EMP outline a plan to monitor the implementation of the EMP and the institutional responsibilities for monitoring and reporting throughout the Project lifecycle: Section G – EMP Institutional Responsibilities****).*

(viii) Do not implement project activities in areas of critical habitats, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary approach to the use, development, and management of renewable natural resources. (***The project is not expected to trigger Critical Habitat for any of the site designations in the area or habitats present along the proposed project route. It is also not expected to trigger critical habitat criteria for any of the notable species that have the potential to be present within the Project area).***

(ix) Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phase-outs. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides. When

host country regulations differ from these levels and measures, the borrower/client will achieve whichever is more stringent. (***The EIA and its EMP outline specific mitigation and management measures to prevent and control pollution: Section G – Environmental Management Plans and Institutional Requirements. Section D – Legal Framework, identifies the most stringent regulations. No pesticides will be used during the lifecycle of the Project***).

(x) Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities. (***The EIA and its EMP outline the requirement for specific health and safety plans and emergency response plans: Section G – Environmental Management Plans and Institutional Requirements*).**

(xi) Conserve physical cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during environmental assessment. Provide for the use of "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered during project implementation. (***The EIA herewith has identified all physical cultural heritage within the Project area and prepared mitigation measures to avoid damaging or destroying them. Chance finds are discussed in Section G – Physical and Cultural Resources and a sample chance finds procedure is provided in Appendix E***).

Safeguard Requirements 2: Involuntary Resettlement.

341. The objectives are to avoid involuntary resettlement wherever possible; to minimize involuntary resettlement by exploring project and design alternatives; to enhance, or at least restore, the livelihoods of all displaced persons in real terms relative to pre-project levels; and to improve the standards of living of the displaced poor and other vulnerable groups. The safeguard requirements underscore the requirements for undertaking the social impact assessment and resettlement planning process, preparing social impact assessment reports and resettlement planning documents, exploring negotiated land acquisition, disclosing information and engaging in consultations, establishing a grievance mechanism, and resettlement monitoring and reporting.

342. The involuntary resettlement requirements apply to full or partial, permanent or temporary physical displacement (relocation, loss of residential land, or loss of shelter) and economic displacement (loss of land, assets, access to assets, income sources, or means of livelihoods) resulting from (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas. Resettlement is considered involuntary when displaced individuals or communities do not have the right to refuse land acquisition that results in displacement. A land acquisition and resettlement plan (LARP) has been prepared for the Project to ensure compliance with the safeguard on Involuntary Resettlement. (***A LARP is currently being prepared for the Project according to the requirements of ADB*)**

Safeguard Requirements 3: Indigenous Peoples.

343. The objective is to design and implement projects in a way that fosters full respect for Indigenous Peoples' identity, dignity, human rights, livelihood systems, and cultural uniqueness as defined by the Indigenous Peoples themselves so that they (i) receive culturally appropriate social and economic benefits, (ii) do not suffer adverse impacts as a result of projects, and (iii) can participate actively in projects that affect them. (***The Project does not involve impacts to Indigenous Peoples and therefore no further actions relating to this safeguard are required***).

D.14 Comparison of ADB, EBRD and National Requirements

344. The environmental assessment of the Project will need to satisfy the requirement of both the GoG and ADB. A harmonized safeguard framework is developed for conducting EIA study of the Project. The framework is given below.

Table 28: Comparison of ADB and GoG Legislation Requirements

Aspect	ADB	GoG	Harmonized Framework
Environmental and Social Policy and Regulations	ADB's SPS (2009) sets out the policy objectives, scope and triggers, and principles for three key safeguard requirement areas: • Environmental safeguards, • Involuntary resettlement safeguards, and Indigenous people's safeguards	Environmental assessment and permitting procedure in Georgia are set out in the Environmental Assessment Code.	The Project shall comply with Lender's and national requirements.
Screening	Project screening and categorization at the earliest stage of project Four categories are defined Category A, B, C, FI. Rapid Environmental Assessment (REA) Checklist is used for categorization.	Project screening is done at early stage of the project. Environmental Assessment Code provides list of A and B category activities. For category B project need of EIA is defined based on the scoping procedure by MoEPA.	The Project is Categorized as Category A.
Alternatives	Examination of financially and technically feasible alternatives to the project location, design, technology and components, their potential environmental and social impacts. Consider no project alternative.	Alternative assessments are to be carried out for the project location and design.	Assessment of alternatives will include the location and design, and also no project alternative.
EIA Report	For Category A projects EIA (that includes EMP describing mitigation and monitoring issues) is obligatory. For Category B projects – initial environmental examination (IEE) is required to determine whether or not significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report. Guidelines and the outline of an EIA report are provided in SPS (2009).	EIA report is required for Annex 1 listed projects. For Annex 2 project need of EIA is decided based on the scoping procedure. The content of the EIA report is structured so to cover requirements indicated in the Environmental Assessment Code. The EMP is a part of the EIA document.	The EIA and EMP reports will follow the table of contents proposed by ADB SPS (2009). The report for obtaining Environmental Decision from the MoEPA will consider national regulatory requirements
Public Consultations and public meetings	Carry out meaningful consultation with affected people and facilitate their informed participation. Involving stakeholders, project- affected people and concerned NGOs early in the project preparation and ensure that their views and concerns are made known and	Publication of information in national and regional mass-media. Arrange two public meetings – one at the scoping stage, another not later that at 55th date from submission of the draft EIA report to MoEPA. All	Consultations will be carried out with the stakeholders, directly and in-directly affected people, NGOs throughout the

Aspect	ADB	GoG	Harmonized Framework
	understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address environmental assessment- related issues. Minimum two consultations are required. Presence of ADB representative at official meetings with stakeholders is obligatory.	stakeholders are invited for the meetings. One two one meetings and consultations with stakeholders during EIA process. Consultation not later than 60 days from the date of publication.	project cycle and consider their views in project design and safeguard plan. Questions and concerns raised during public consultations held will be considered and addressed in the EIA.
Public Disclosure	Draft EIA will be published in ADB website for 120 days before Project approval by the Board.	The scoping document is available for public review for 45 days before public consultations.	Draft EIA report (English and Georgian) will be published in ADB, EBRD and Roads Department Websites. The copies of the draft EIA report will be made available with the municipal offices.

E. Baseline Data Collection Methodology

E.1 General

345. Background data and information was obtained from reputable published and unpublished sources, e.g., on: climate, topography, geology and soils, natural resources, flora and fauna, agriculture, and socio-economic data.

346. Several site inspections were conducted by the International Environmental Specialist during 2017 and 2018. The project area was reviewed and areas of potential environmental significance assessed carefully.

347. In addition, several surveys were undertaken to collect additional baseline data by a Local Consulting Firm (LCF) specializing in environmental and social studies. They include:

(i) Instrumental Noise and Vibration Monitoring.
(ii) Instrumental Air Quality Monitoring.
(iii) Instrumental Water Quality Surveys.
(iv) Flora and Fauna Surveys.
(v) Physical and Cultural Resources Surveys.
(vi) Socio-economic Surveys.

348. Formal discussions were held with a number of stakeholders (see **Section I**) in order to identify any specific areas of interest, or concern that needed to be surveyed or identified as part of the baseline collection phase.

E.2 Detailed Methodology

349. The following section outlines the detailed methodology followed for the collection of data.

E.2.1 Geology

350. Methodology for collection of baseline data – Geological maps were collected and geological information from the FS reviewed and incorporated into the report. Discussions with the Detailed Design Consultants Geotechnical specialist were also undertaken to discuss the geological conditions within the Project area based on information collected during the detailed design phase.

351. Sources of Data:

(i) Detailed Design Consultant.

E.2.2 Topography

352. Methodology for collection of baseline data – The topography of the project area was assessed using Google Earth and Topographical maps.

353. Sources of Data:

(i) Detailed Design Consultant – Site plans and profiles.

(ii) Google Earth.

E.2.3 Soils

354. Methodology for collection of baseline data – Soils maps were collected and soils information from the FS reviewed. Other relevant EIAs were reviewed to determine the status of roadside contamination on the E-60.

355. Sources of Data:
(i) Detailed Design Consultant.
(ii) Feasibility Study for E-60 Highway Section from Zemo Osiarui to Argveta.
(iii) Environmental and Social Impact Assessment of Works for the Improvement of Chumateleti-Khevi Section of E-60 Highway (Section F1).

E.2.4 Climate and Climate Change

356. Methodology for collection of baseline data – Meteorological data, including atmospheric pressure, air temperature, relative humidity, precipitation, wind speed and direction, were collected from secondary sources. Recently completed climate change reports were collected and reviewed.

357. Sources of Data:
(i) Climate Risk and Vulnerability Assessment and Independent Proof Check. ADB April 2018.
(ii) Second Regional Development Project, Imereti Regional Development Program, Imereti Tourism Development Strategy. Strategic Environmental, Cultural, Historical and Social Assessment. World Bank, 2014.
(iii) Office of the Deputy Prime Minister (2005). Planning Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England. Annex1: Dust.
(iv) Meteoblue: https://www.meteoblue.com.

E.2.5 Air Quality

358. Methodology for collection of baseline data – Instrumental air quality monitoring was undertaken at six locations within the Project area during March 2018 to determine baseline conditions. NO_2, SO_2, CO, PM10, PM2.5 and Total Dust were monitored four times (30 minute averaging period) over a 24 hour period. The following equipment was used:
(i) Carbon monoxide meter (China), range 0-100ppm
(ii) Dust measuring unit CW-HAT 200, range 0-500 µg/m3
(iii) Air analyser, TESTO-350 (Germany), range: CO (0-10 000 ppm); NO (0-4 000 ppm); NO2 (0-500 ppm); SO2 (0-5 000 ppm).

359. Site visits were also undertaken to assess if there were any other point sources of air pollution within the Project corridor.

360. Reference Documents:
(i) IFC (2007). Environmental, Health and Safety Guidelines. General EHS Guidelines: Environmental. Air Emissions and Ambient Air. April 2007.

E.2.6 Hydrology

361. Methodology for collection of baseline data – Maps and locations of surface water courses were reviewed and discussions with the Detailed Design Consultant undertaken.

362. Instrumental monitoring of surface water quality was undertaken at thirteen locations in March 2018 to determine baseline conditions in the Project area, specifically in the areas close to the bridge sites. Parameters monitored included pH, electrical conductivity (EC), turbidity, BOD, COD, dissolved oxygen (DO), Temperature, Total suspended solids (TSS), Total Coliform Bacteria, Oil and Grease, Total Phosphorus, Total Nitrogen, Total Ammonium, Petroleum Hydrocarbons, Total Residual Chlorine, Total Zinc, Magnesium, Dissolved Copper. Groundwater samples were also taken from two sites in March 2018.

363. The protocol for the surface water monitoring was as follows:
    (i) Water sampling for chemical analysis was done in line with requirements of the technical regulation of the Sanitary rules on water sampling, approved by the Governmental decree #26 (dated January 3, 2014).
    (ii) Sampling protocol was filled in on the sampling site. Samples marked.
    (iii) The samples were stored in secure location to preclude conditions which could alter the properties of the sample or lead to its contamination/loss.
    (iv) Samples were in custody sealed during storage and/or transportation and kept in the custody of the sampler until the samples were relinquished to another party.
    (v) The samples were delivered to the lab within 24 hours from sampling. Prior to delivery to the lab the samples were kept in portable refrigerator.

364. Containers:
    (i) Samples were collected in 1 litre PET bottles.
    (ii) For TPH amber glass bottles were used.
    (iii) BOD samples were collected in 300ml bottles.
    (iv) 1 litre sterile bottle was used for the sample intended for microbiological examination.

365. In addition to the samples for offsite analysis, parameters such as temperature, dissolved oxygen, pH, important for fish wellbeing were measured on the spot.

366. Sources of Baseline Data:
    (i) Second Regional Development Project, Imereti Regional Development Program, Imereti Tourism Development Strategy. Strategic Environmental, Cultural, Historical and Social Assessment. World Bank, 2014

E.2.7 Natural Hazards

367. Methodology for collection of baseline data – The FS was reviewed to determine areas where flood events occur. In addition, consultations with the Detailed Design Consultants geotechnical specialist was undertaken to determine areas where natural hazards exist, such as landslides.

E.2.8 Biodiversity

368. Methodology for collection of baseline data – Works included desk top data gathering and field works for verification of available information and additional data gathering. Field surveys were carried out on August 8-9, 2017; September 22-23, 2017 and 1-2 March 2018. In addition to that results of the field survey in the area of interest implemented for feasibility stage of the project (April 2015).

369. **Flora** - Following to desk top data gathering and analysis site 4 site visit have been carried out. Collection of the floristic data on the study area included covered two components: 1) collection of the data on the vegetation diversity in the study area and 2) field sampling of the vegetation of the study corridor(s) for obtaining precise empirical data. For identification of the plant species was used determinats and checklists of the flora of Georgia (Ketzkhoveli & Gagnidze, 1971-2011; Czerepanov, 1995; Gagnidze, 2005). Information on the species distribution in the local habitats was obtained from the primary and secondary sources of information (Ketzkhoveli, 1960; Doluchanov, 2010, Akhalkatsi, Tarkhnishvili, 2012; Nakhutsrishvili, 2013, survey reports carried out by the team in the region under other assignments). Validity of the taxonomic statuses of the identified plant taxa was verified using the widely accessible plant taxonomic database "The Plant List" (The Plant List Vers. 1, 2010). Threat categories for the identified plant taxa were determined according the categories and criteria of International Union for Conservation of Nature (IUCN) guidelines (IUCN, 2003) and The Red List of Georgia (2006). Particular attention was paid to identification of any protected species in the project impact area. (Note: inventory of the trees diameter >8cm and <8cm is in process)

370. For the vegetation study 1x1m, 5x5m, 10x10m, 25x25m sampling plots were selected depending on the type of vegetation (forest, shrubs, wetland area, meadow) and the size of the area.

371. Plots were sampled in every type of existing habitat. Along with identification of diversity individual coverage scale in the total projecting coverage was determined. Braun-Blanquet cover-abundance scale was used for assessment.

372. Biodiversity - Following desk top data gathering and analysis four site visits have been carried out. The surveys were carried out in August 8-9, 2017; September 22-23, 2017; March 1-2, 2018 and April 22-23, 2018. The aim of the study was to identify of animal species within the study area; to reveal significant habitats for inhabitant species; to determine possible impact on animal biodiversity on construction and operation phases and to develop impact mitigation measures. Species, protected under Georgian legislation and international treaties (included in the Red List and species having other conservation status), species bearing special significance for local population have been paid particular attention to.

373. Walkover method has been used during the survey, along the species on transect, all observed species were visually recorded and identified. In addition with registration of the physical presence - traces, excrements, holes, burrows, feathers, fur, etc. were registered.

374. The surveyed corridor width was ranging from 50 to 2500m depending on location and potential species available. The surveys were carried out in different periods of the day. The peak activity periods (such as April for squirrels; end of March (peak of activity, reproduction period, from mid March until mid June) - for herps) were taken into account while survey planning.

375. The species composition of birds was determined by voice if it was not possible to observe them visually.

376. Reptiles and amphibians were studied in transects, shelters and water bodies – checked. The fact that activity of the reptiles depends on weather was taken into account. Keeping in mind that the species start to 'appear' end of March (Peak of activity is from mid March until mid June which is the reproduction period. In July and August they can be registered only in the morning and late evening when it is not too hot.)

377. Recording of adult phase of large invertebrates (butterflies, bugs, dragonflies, bees, grasshoppers, spiders, mollusks) was visually carried out on transects. Research methodology comprises the following activities: catching and identification of insects; turning over the stones and soil layer; checking of plants and plant residues; photographing; shaking off the insects on an awning and checking pond bottom - sieving.

378. **Aquatic fauna -** In addition to the desk top work the ichthyofauna study, undertaken in April 2018 included:
    (i) Visual audits for identification of habitats suitable for fish species expected to be found in the stream (geomorphology of the substrate, general hydrological data, hypsometry, landform, landscape-visual features);
    (ii) Field surveys:
        (a) Control catches with cast net, trammel net and kick net,
        (b) Determination of length, weight, gender, maturity stage, fattening coefficient, meristic and plastic characteristics, digestive tract content;
        (c) Collection of scales for identification of age, growth and growth rate;
        (d) Study of food base - hydroflora and hydrofauna; identification of macroinvertebrates and insects used for feeding, assessment of periphyton composition. Registration of perythytone and invertebrates within the wetted perimeter of the stream. Examination of stoned in the riverbed/wetted perimeter;
        (e) On-site measurements - determination of suspended solids; dissolved oxygen (using filed tester Oxi 330i); water and air temperature; pH;
    (iii) Interview of the local population and amateur fishermen with at least 5-10 years of fishing experience); and
    (iv) Laboratory processing of the obtained material (identification of age, growth and growth rate based on scales collected during the field survey (Note catch and release principle was complied with).

379. A survey of state forest fund areas was also undertaken, and an inventory of species prepared along with a shape file of the state forest fund within the Project corridor.

380. Sources of Baseline Data:
    (i) See **Appendix M**.

E.2.9 Protected Areas and IBAs

381. Methodology for collection of baseline data – Maps and data relating to Important Bird Areas (IBAs) and protected areas were collected and reviewed.

382. Sources of Data:
    (i) Birdlife International - http://datazone.birdlife.org/site/mapsearch)
    (ii) Protected Plant - https://www.protectedplanet.net/borjomi-strict-nature-reserve
    (iii) Agency of Protected Areas of Georgia - http://apa.gov.ge/en/

E.2.10 Socio-economic conditions

383. Methodology for collection of baseline data – A review of existing data, including information provided by GEOSTAT as well as the information collected as part of the social surveys provided by the Detailed Design Consultants social specialists. Data on traffic accidents was also reviewed.

384. Sources of Data:
   (i) http://www.geostat.ge/
   (ii) Draft Land Acquisition and Resettlement Plan, Section F2 of Khevi-Ubisa-Shorapani-Argveta section (E60 Highway), April 2018
   (iii) Feasibility Study for E-60 Highway Section from Zemo Osiarui to Argveta
   (iv) Environmental and Social Impact Assessment of Works for the Improvement of Chumateleti-Khevi Section of E-60 Highway (Section F1).

E.2.11 Infrastructure

385. Methodology for collection of baseline data – The existing infrastructure in the Project area was identified during site visits and in consultation with the Detailed Design Consultant.

E.2.12 Land Use

386. Methodology for collection of baseline data – A review of the land uses was undertaken based on existing maps of the project area, satellite images, aerial photos and site visits.

E.2.13 Waste Management

387. Methodology for collection of baseline data – A review of the existing waste management situation in the region was undertaken and local waste management facilities were identified.

E.2.14 Health and Educational Facilities

388. Methodology for collection of baseline data – Site visits identified the health and educational facilities within the Project area. This was confirmed by a web-based search.

389. Sources of Data:
   (i) Ministry of Education and Sciences Georgia - http://www.mes.gov.ge/
   (ii) Ministry of Health Georgia - http://cloud.moh.gov.ge

E.2.15 Cultural Resources

390. Methodology for collection of baseline data – Existing data was reviewed and a site walkover was undertaken during March 2018 to determine what PCR was present within the Project area.

391. Sources of Data:
   (i) Second Regional Development Project, Imereti Regional Development Program, Imereti Tourism Development Strategy. Strategic Environmental, Cultural, Historical and Social Assessment. World Bank, 2014

E.2.16 Noise and Vibration

392. Methodology for collection of baseline data – Baseline noise monitoring has been undertaken at 13 residential properties within the Project corridor. The monitoring activities were undertaken over a period of two weeks during April and May 2018. Hourly logging of data over a 24 hour period was undertaken 3m from the façade of each residential property facing the existing road alignment. Monitors were placed 1.5m from the ground. Weather conditions were recorded, including wind speed.

393. Additional ambient noise monitoring was undertaken at 5 locations in order to calibrate the updated noise model. The results of the monitoring can be found in **Appendix I**.

394. Sources and Reference Documents:
   (i) IFC (2007). Environmental, Health and Safety Guidelines. General EHS Guidelines: Environmental. Noise. April 2007.

E.3 EIA Project Area

395. The potential impacts of the Project on its surrounding physical and biological environments include air and water quality impacts, noise generation, land transformation and changes to soil. These are expected to reduce with the increased distance from the Project facilities, affecting more the areas located closer, up to one kilometer, to the Project alignment. For this, a study area of one kilometer around the site was delineated, to assess the baseline conditions in the areas likely to be affected by the Project due to its proximity to the Project site. This is referred to as the Study Area in this report. The Study Area selected for the EIA includes sensitive receptors [19] that are most likely to be impacted by the Project's development activities.

3. [19] Sensitive receptors include, but are not limited to, residential areas, schools, places of worship, wetlands, and habitats. These are areas which are more susceptible to the adverse effects of an anthropogenic activity such as noise, air emissions, traffic influx, and privacy issues

F. Description of the Environment

396. This section of the report discusses the existing environmental and social conditions within the Project area under the following headings:

- Physical Resources (air quality, hydrology, topography, etc.);
- Ecological Resources (flora, fauna, protected areas);
- Economic Resources (infrastructure, land use, etc.);
- Social and Cultural Resources (health, education, noise, cultural resources, etc.)

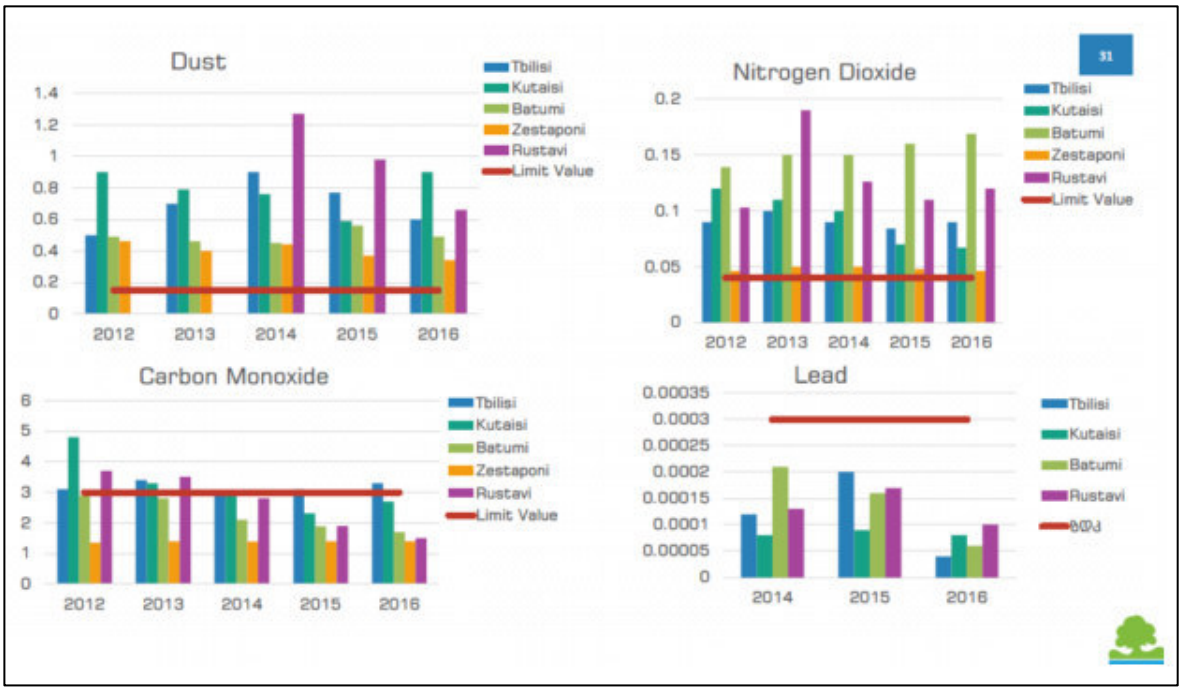
F.1 Physical Resources

F.1.1 Air quality

Regional Context

397. The National Environmental Agency has recently published air quality statistics for five cities in Georgia. Of particular relevance to the Project is the data from Zestaphoni. **Figure 31** indicates that in general Zestaphoni is the least polluted city of those monitored. However, ambient levels of dust and NO_2 currently exceed the national limits in Zestaphoni but levels of CO and Lead are well below the limits.

Figure 31: Ambient Air Quality Data



Site Observations

398. Within the Project area the main sources of air emissions are from transport, including vehicles on the existing E-60, and large-scale industrial facilities including the GAA manganese processing plant which is located almost adjacent to the southern boundary of the Project road between KM 11 and KM 12.

399. The main environmental issue concerning the GAA involves the lack of modern and efficient filters to reduce and control air emissions, in particular manganese dioxide emissions. **Figure 32** illustrates high levels of emissions from GAA smoke stacks during a site visit in July 2017. An emissions reduction program is being implemented by the plant in order to meet the existing environmental regulations. However, according to the UN Environmental Performance Review ambient air quality monitoring in Zestaphoni indicated that manganese concentration in air exceeded the MAC. Concentrations were 2.5 to 4-fold higher than the MAC, varying from 4.04 μg/m^3 MnO_2 at 500 m distance from the plant to 2.5 μg/m^3 MnO_2 at 300 m distance from the plant. Manganese concentrations in dust collected in residential houses or in the hospital at Zestaphoni are characterized by higher levels compared with the Tbilisi control sample.

400. In addition, it is assumed that some rural households cook with wood burning stoves and they may also use wood for household heating. This can also generate emissions to air although they are not anticipated to be significant given the fact that the population within the Project corridor is quite limited.

Figure 32: Visible Air Emissions from GAA Plant, 2017 (taken from boundary of the Project road around KM 11.1)

Sensitive Receptors

401. The Project road passes close to a number of residential properties and sensitive receptors around Zestaphoni and Shoropani. Those within 200 meters have been mapped and are included as part of the air quality assessment provided in **Section G** of this EIA.

Baseline Ambient Air Quality

402. Air quality monitoring was carried out at nine different locations during August, 2017 to characterize the current air quality within the Study Area.

403. The pollutants selected for evaluation are based on the expected emissions from the Project activities and the level of risk to human health posed by these pollutants. They include:

- Total Suspended Particulates (TSP), or Dust;

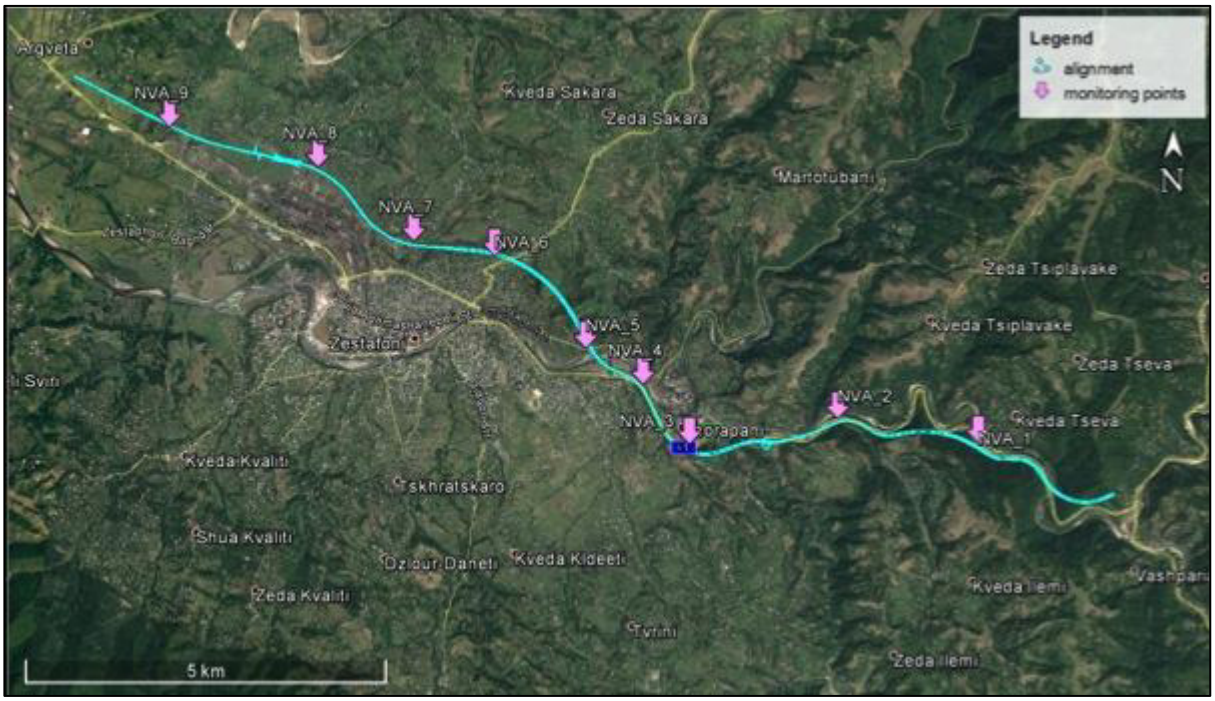
- Carbon Monoxide (CO);
- Nitrogen Dioxide (NO_2);
- Sulfur Dioxide (SO_2); and
- Particulate Matter (PM_{10} and $PM_{2.5}$)

404. A description of sampling locations and the rationale of selection is given in **Table 29**. The locations of the sampling points are indicated by **Figure 33.** The ambient air quality data was compared against applicable IFC and Georgian Standards.

Table 29: Ambient Air Quality Monitoring Locations

Sample ID	Coordinates	Approximate Location	Rationale for Site Selection
AQ01	42 ° 05'31.75"N / 43° 07'47.68"E	KM0.0	Start of F4, opposite a small cluster of residential properties.
AQ02	42 ° 05'42.77"N / 43° 06'23.19"E	KM2.2	Adjacent to a roadside restaurant. Site of embankment cutting.
AQ03	42 ° 05'31.72"N / 43° 04'53.87"E	KM4.3	Shoropani residential area, location of a school and exit of Tunnel 3.
AQ04	42 ° 05'58.49"N / 43° 04'26.10"E	KM5.5	Adjacent to residential properties.
AQ05	42 ° 06'14.75"N / 43° 03'51.79"E	KM6.3	At the portal to Tunnel 4.
N06	42 ° 06'56.22"N / 43° 02'57.23"E	KM8.3	Close to the portal to Tunnel 5 adjacent to residential properties.
AQ07	42 ° 07'02.90"N / 43° 02'08.61"E	KM9.5	Residential area at the portal to Tunnel 6 and at the end of Bridge 4.
AQ08	42 ° 07'36.01"N / 43° 01'11.19"E	KM11.0	North of the GAA facility and south of a residential cluster.
AQ09	42 ° 07'54.20"N / 42° 59'41.87"E	KM13.4	Adjacent to a small cluster of residential properties.

Figure 33: Ambient Air Quality Monitoring Locations



405. The results of the ambient air quality monitoring are provided in **Table 30**. The results, which provide a 'snapshot' of the air quality in the Project area on this particular day of the year show that in all instances the parameters monitored were below national, and where applicable, IFC standards with the exception of sampling locations NVA-1 and NVA-2 adjacent to the existing road. The most noticeable factor was the higher levels of PM recorded at the first four monitoring stations which are adjacent to the existing road. This suggests that these levels PM_{10} and $PM_{2.5}$ are attributable to vehicle movements on the existing road.

406. It is noted that air quality can vary due to a range of parameters that are different on given days and periods of the year. Even following IFC averaging periods we would still only reveal a 'snapshot' of one day during the year which would not give a clear understanding of air quality in the Project area throughout the year. Accordingly, national standards were followed for baseline data collection.

407. As noted above, there are no major point sources of air emissions within the Project corridor and the only major emissions of air quality result from vehicle traffic on the E-60. **Section G** of this report provides an air quality model for the new alignment, and this model clearly shows that the Project will not have significant impacts on air quality.

Table 30: Ambient Air Quality Monitoring Results

#	Time	Wind speed, m/s	Wind direction	CO, µg/m3	NO_2, µg/m3	SO_2, µg/m3	PM_{10}, µg/m3	$PM_{2.5}$, µg/m3	TSP, µg/m3	Comment
NVA-1										
1	12:30 -13:50	1.3	W	<1000	376	<500	28	26	<100	Edge of the E-60 highway
2	19:30-19:50	1.4	W	<1000	<200	<500	91	61	200	
3	01:30 -01:50	1.0	W	<1000	<200	<500	18	15	<100	
4	06:55–07:15	1.0	W	<1000	<200	<500	10	9	<100	
NVA-2										
1	13:00-13:20	2.0	SW	<1000	550	<500	48	32	120	14.9m from the centerline of E-60 highway
2	18:50-19:10	1.6	SW	<1000	376	<500	72	39	170	
3	01:00 -01:20	1.0	SW	<1000	<200	<500	18	15	<100	
4	06:50-07:10	1.0	SW	<1000	<200	<500	10	9	<100	
NVA-3										
1	10:30 -10:50	2,0	SW	<1000	<200	<500	12	9	<100	Next to internal road in Shorapani
2	18:20-18:40	1.6	SW	<1000	<200	<500	29	21	<100	
3	00:30-00:50	1.2	SW	<1000	<200	<500	10	7	<100	
4	06:20 -06:40	1.0	SW	<1000	<200	<500	5	4	<100	
NVA-4										
1	12:00-12:20	2.0	W	<1000	<200	<500	36	24	110	15.2m from the centerline of E-60 highway
2	17:50-18:10	1.2	W	<1000	<200	<500	35	25	120	
3	24:00-24:20	1.1	W	<1000	<200	<500	11	8	<100	
4	05:50-06:10	1.0	W	<1000	<200	<500	<1.0	<1.0	<100	
NVA-5										
1	10:00 -10:20	1.6	NW	<1000	<200	<500	5	4	<100	Next to the local road
2	17:20-17:40	1.2	NW	<1000	<200	<500	25	16	<100	
3	23:30-23:50	1.1	NW	<1000	<200	<500	<1.0	<1.0	<100	
4	05:20-06:40	1.0	NW	<1000	<200	<500	<1.0	<1.0	<100	
NVA-6										
1	09:10-09:30	1.0	SW	<1000	<200	<500	<1.0	<1.0	<100	87.5m from the centerline of Gomi-Sachkhere-Chiatura-Zestaphoni road, in about 30m from the street - Zestaphoni
2	16:40-17:00	1.0	SW	<1000	<200	<500	16	11	<100	
3	23:10-23:30	1.2	SW	<1000	<200	<500	<1.0	<1.0	<100	

#	Time	Wind speed, m/s	Wind direction	CO, µg/m3	NO_2, µg/m3	SO_2, µg/m3	PM_{10}, µg/m3	$PM_{2.5}$, µg/m3	TSP, µg/m3	Comment
4	04:10-04:30	1.0	SW	<1000	<200	<500	<1.0	<1.0	<100	
NVA-7										
1	08:30-08:50	1.5	NW	<1000	<200	<500	9	6	<100	Next to existing internal road – Kvemo Sakara
2	16:10-16:30	1.1	NW	<1000	<200	<500	16	12	<100	
3	22:50-23:10	1.0	NW	<1000	<200	<500	<1.0	<1.0	<100	
4	04:10-04:30	1.1	NW	<1000	<200	<500	<1.0	<1.0	<100	
NVA-8										
1	07:30-07:50	2.2	S	<1000	<200	<500	12	8	<100	Next to existing internal road – Kvemo Sakara
2	15:30-15:50	1.1	S	<1000	<200	<500	26	19	<100	
3	22:30-22:50	1.1	S	<1000	<200	<500	<1.0	<1.0	<100	
4	03:30-03:50	1.3	S	<1000	<200	<500	<1.0	<1.0	<100	
NVA-9										
1	07:00-07:20	2.0	SW	<1000	<200	<500	17	15	<100	Next to existing internal road – Argveta
2	15:00-15:20	1.1	SW	<1000	<200	<500	21	10	<100	
3	22:10-22:30	1.0	SW	<1000	<200	<500	16	10	<100	
4	03:00-03:20	1.2	SW	<1000	<200	<500	<1.0	<1.0	<100	
	MPC/guideline values/limits		**Aver.period**	**CO, µg/m3**	**NO_2, µg/m3**	**SO_2, µg/m3**	**PM10, µg/m3**	**PM 2.5, µg/m3**	**TSP, µg/m3**	**Comment**
1	National limit – max. permissible one time (volley) concentration (MPC), µg/m^3		24 h	3000	40	50	n/a	n/a	150	One time (volley) maximum permissible concentration is the maximum concentration of hazardous substance determined in 20-30 minute interval based on one-time (volley) concentrations (ref. Technical Regulation – On approval of technical regulations for calculating threshold limit values of emission of harmful substances into the ambient air", approved by governmental decree #408, Document code: 300160070.10.003.017622). The measured values are in line with 30min aver.period values – see text in red.
			30 min	5000	200	500	n/a	n/a	500	
2	IFC/WHO (updated 2016) – guideline value, µg/m3		1 year	n/a	40	50	20	10	n/a	
			8h	10000	n/a	n/a	n/a	n/a	n/a	
			24 h	n/a	n/a	20	50	25	120	
			1h	30000	200	n/a	n/a	n/a	n/a	
			30 min	60000	n/a	n/a	n/a	n/a	n/a	
			10 min	100000	n/a	500	n/a	n/a	n/a	
3	EU limit, µg/m3		1 year	n/a	40	n/a	40	25	n/a	
			8h	10000	n/a	n/a	n/a	n/a	n/a	
			24 h	n/a	n/a	125	n/a	n/a	n/a	
			1h	n/a	200	350	n/a	n/a	n/a	

F.1.2 Climate

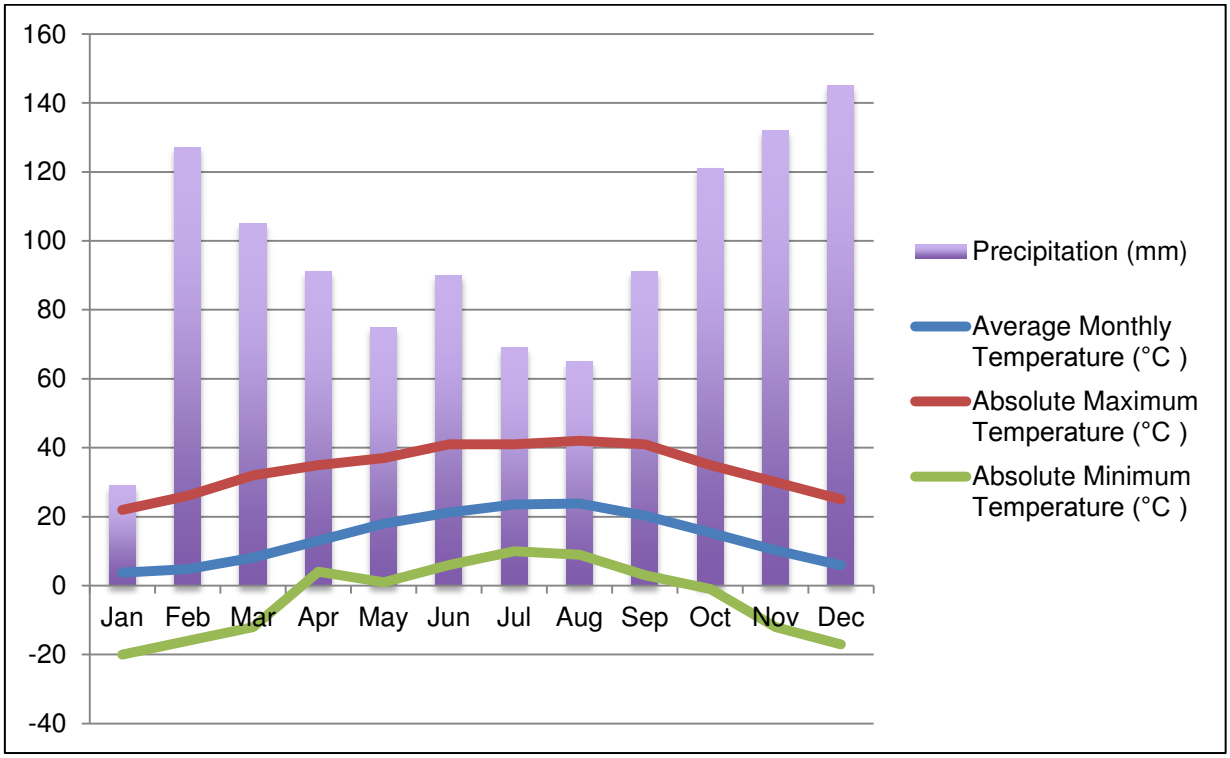
408. Due to the peculiar geographical position of Georgia between the Black and Caspian seas and the presence of powerful natural climatologic in the North of the Main Caucasus Range, and also owing to the large range of elevations above sea level, the climate of Georgia varies quite widely for a small country. Climates of all types, ranging from subtropical, characteristic of the coastal zone of the Black sea, to the Arctic, prevailing in the most mountainous region of the Caucasus range can be found.

409. According to technical document GOST 16350-80 the Project road is located in district II9, which is characterized by a temperate warm climate with mild winters.

Precipitation & Temperature

410. Annual precipitation in Zestaphoni is around 1,200 mm. Rainfall is highest in the Winter, Autumn and Spring, although rainfall can still be observed during the hotter summer months (see **Figure 34**)

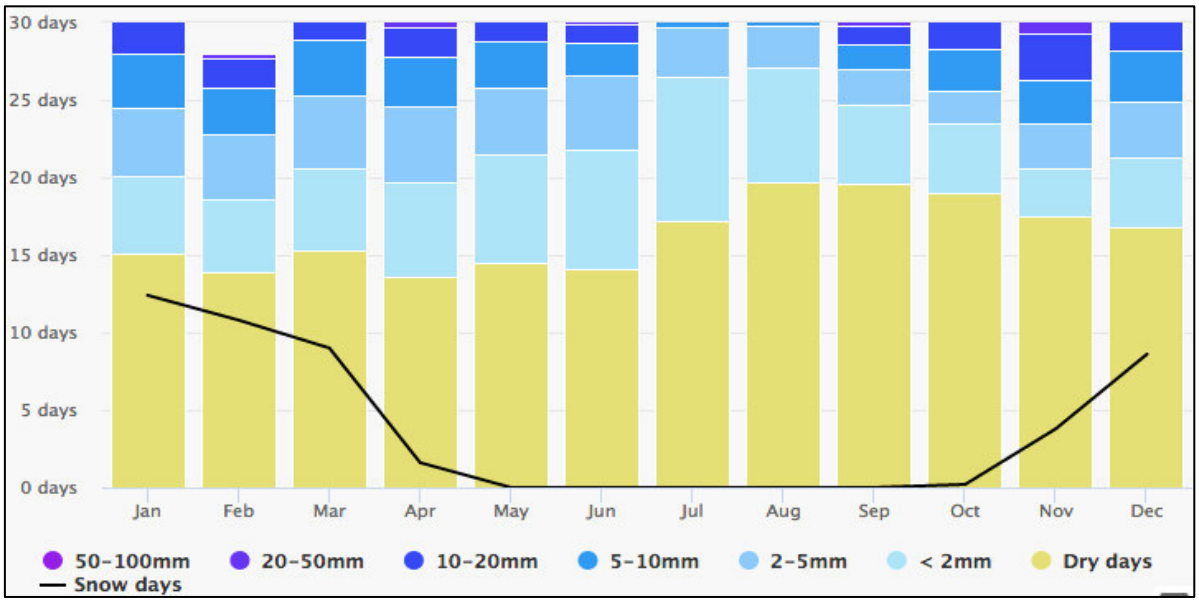
Figure 34: Temperature and Precipitation (mm), Zestaphoni



411. >0.2 mm/day are considered sufficient to effectively suppress wind-blown dust emissions[20] [21]. **Figure 35** details the number of days showing >0.2 mm/day rainfall. On average each year, around ten such days occur between November and June and rarely in the months of July to August.

4. [20] IFC (2007). Environmental, Health and Safety Guidelines. General EHS Guidelines: Environmental. Air Emissions and Ambient Air. April 2007.
5. [21] Office of the Deputy Prime Minister (2005). *Planning Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England. Annex1: Dust*.

Figure 35: Precipitation Levels (mm), Zestaphoni



412. Snow cover is not formed every year, as winter precipitation often falls as rain. The average duration of snow cover is an average of 6-20 days. Snowstorm in the mountains to the north of Zestaphoni are possible from November to April. The average total duration of snowstorms per year is 8 hours. Average per year number of days with Blizzard is three, maximum – ten. Most often blizzards occur in the winter months, in which the average duration of snowstorms per day snowstorm is 2.7 hours.

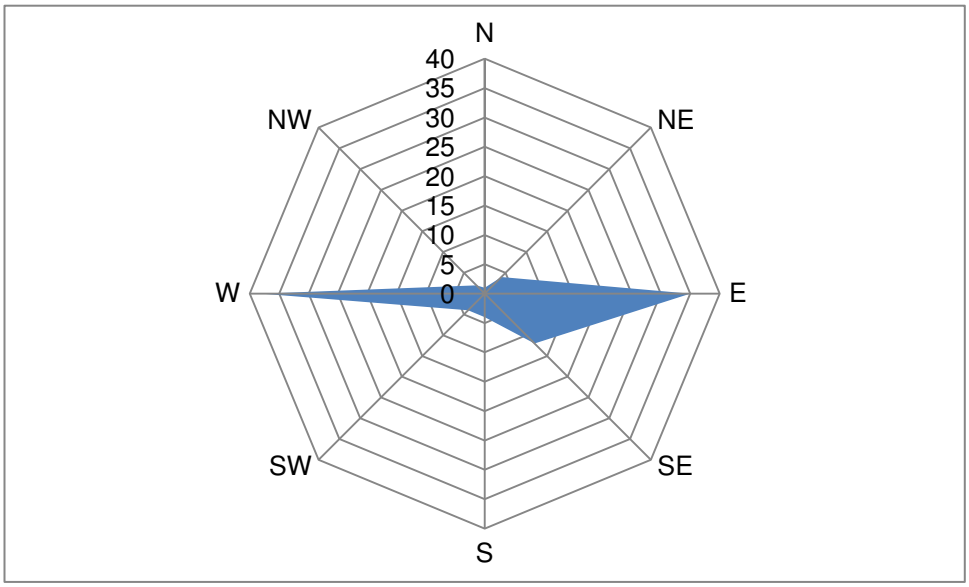
413. 310. Thunderstorms occur in all months of the year. The maximum number of days with thunderstorms refers to June (6 days), and the average duration of thunderstorms in the afternoon with thunderstorm is 1.5 hours and the maximum continuous – 12.3 hours.

414. **Figure 34** illustrates the monthly temperature for Zestaphoni which ranges on average, from 5 °C in the winter months to around 25 °C in the summer. Absolute maximum and minimum temperatures show that it is possible for the temperatures to reach as low as 20 °C and more than 40 °C in the summer.

Prevailing Winds

415. Wind strength, direction and frequency is shown in **Figure 36.** The wind rose illustrates that the dominant wind direction is from the east. However, strong winds from the west are also experienced quite frequently.

Figure 36: Wind Rose, Zestaphoni



F.1.2.3 Climate Change

General

416. Georgia is a mountainous country with diverse physical geography and climates, has a history of natural disasters, making the nation particularly susceptible to global environmental changes.

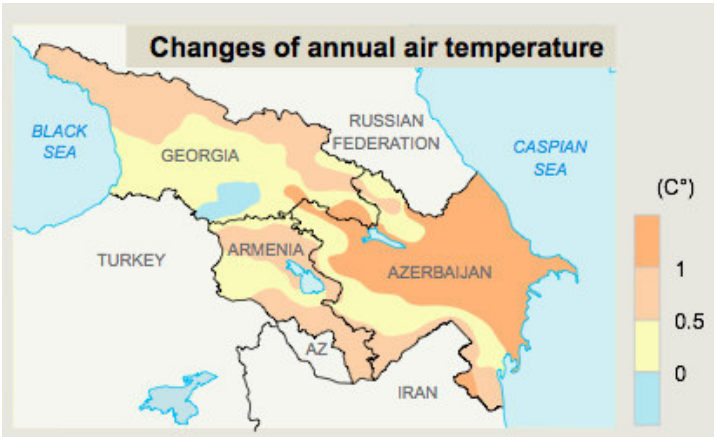


Figure 37: Change of Annual Air Temperature in Georgia (1936-2005)

Source - Climate Change in the South Caucuses. Zoï Environment Network, 2011

417. Climate trends observed since the 1960s include:
- Increased temperatures in the west by 0.3°C, and by 0.4°–0.5°C in the east (see **Figure 37).**
- Increase in the number of hot days, particularly in the lowlands. Number of dangerously hot days in Tbilisi increased 14 days (1986–2010).
- Increased precipitation in the west (the mountain areas of Svaneti and Adjara. Both saw increases of 14%); decreased precipitation along the Likhi Ridge and to the east.
- Decrease in glacier mass by 30 %.
- Increased number of extreme events such as extreme precipitation, which cause
- landslides, mudflows and droughts; as well as more frequent floods in the west.

418. Projected climate changes include:
- Increased average annual temperatures by 0.8°–1.4°C by 2050 and 2.2°–3.8°C toward 2100; greatest increase in northwest mountains.

- Precipitation data less certain, but general increase expected up to 2050, and potential decreases of up to 24 % by 2100 (However, other data provided seems to seems to indicate that there will be a general decrease in precipitation, see Figure 39).
- Increase in the number of hot days (which may double in some mountain areas) and more frequent heat waves June – August.[22]
- Decrease in both days and nights with frost.
- Complete loss of Georgia's 637 glaciers projected by 2160 due to higher temperatures.

Figure 38: Forecasted changes of annual air temperature in the Georgia

Figure 39: Forecasted changes of annual precipitation in Georgia

Source - Climate Change in the South Caucuses. Zoï Environment Network, 2011

419. No site specific data has been found relating to climate change. However, given the general overview above it can be assumed that there will be an increase in average annual temperatures of between 1 and 1.5 °C over the next 30 years and that precipitation will decrease. The number of hot days may increase, and as such, consideration of suitable pavement types shall be given.

Greenhouse Gases (GHGs)

420. According to the World Resources Institute Climate Analysis Indicators Tool (WRI CAIT), Georgia's 2011 GHG profile was dominated by emissions from the energy sector, which accounted for 71% (7.5 $MtCO_2e$) of Georgia's total emissions. Land-use change and forestry (LUCF) was the second most significant sector. Of the 7.5 $MtCO_2e$ % of emissions from the energy sector approximately 2 of the 7.5 $MtCO_2e$ was attributable to the transport sector (resulting from purchases of large, inefficient, aging used cars, as well as economic growth and improved living conditions overall. From 2001-2009, the number of vehicles doubled, and the number of buses and minibuses tripled.[23] In 2013 emissions data compiled by the World Resources Institute (WRI) indicated that Georgia produced around 14 $MtCO_2e$ or 0.0003% of global GHG emissions. 2 $MtCO_2e$ represents 0.00004% of global GHG emissions.

F.1.3 Topography

421. The Project area is located to the west of the Likhi Range which connects the Greater and Lesser Caucus Mountains. The Project corridor is set within a landscape of mountains, rolling hills and valley plain (see **Figure 42** for a Topographical Map of the Project area). The existing road is located within the bottom of the river valley and as such elevation only

[22] Climate Risk Profile – Georgia. USAID, 2015
[23] Greenhouse Gas Emissions in Georgia. USAID, July, 2016

varies between 200 and 170 meters above sea level. **Figure 40** and **Figure 41** illustrate the mountainous / rolling landscape in the first and middle portion of the road.

Figure 40: Topography of the Road Corridor (existing road can be observed to the left of the valley)

Figure 41: Topography looking over Shoropani towards Zestaphoni

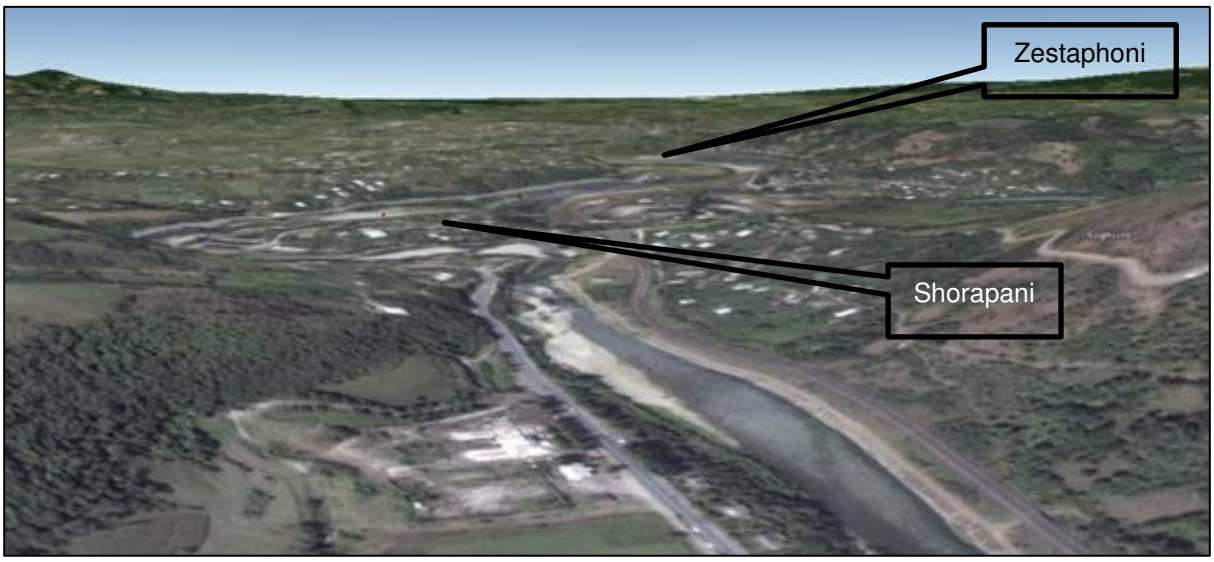
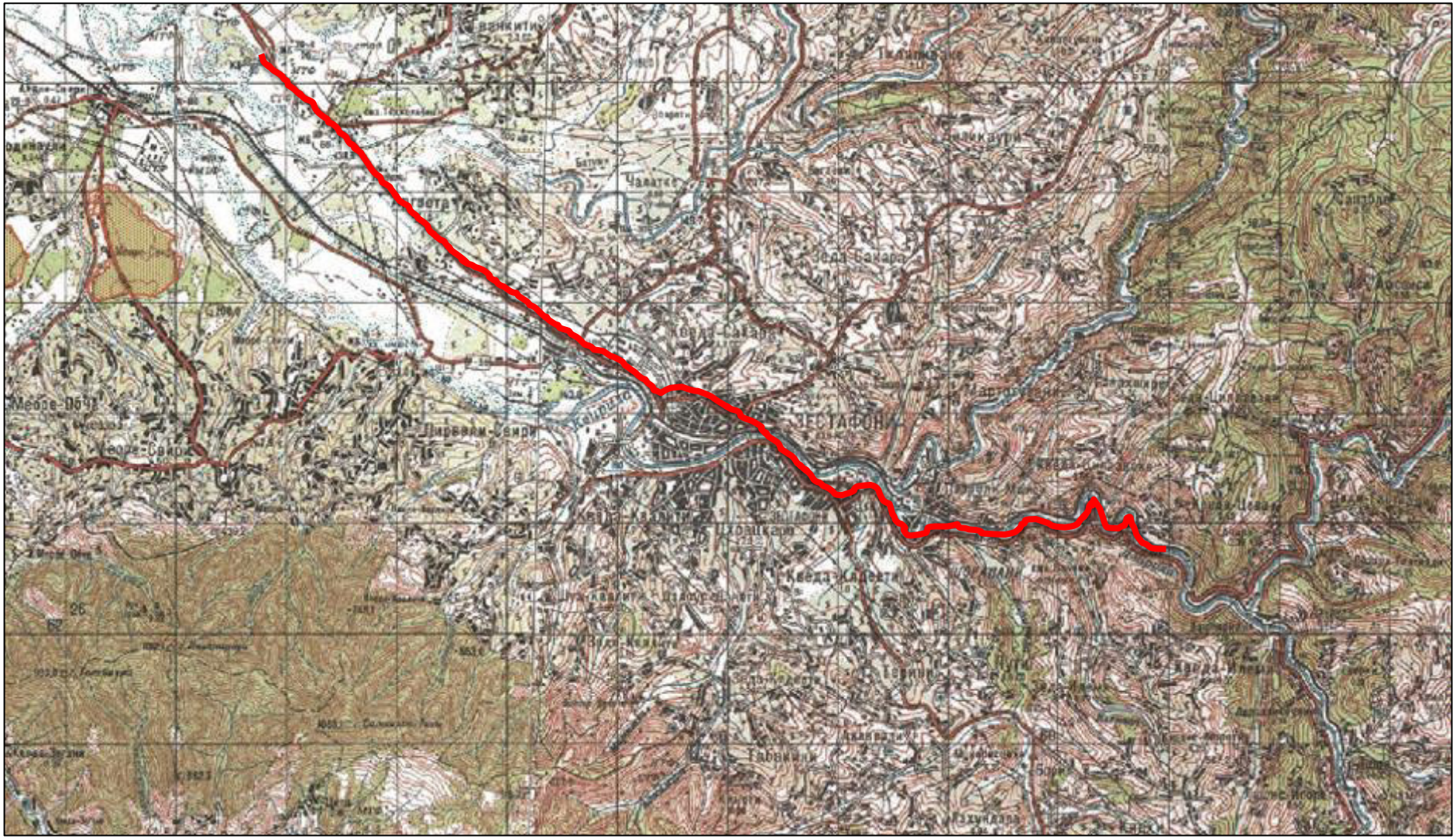


Figure 42: Topography of the Project Area with Existing Road



F.1.4 Natural Hazards

Regional Context

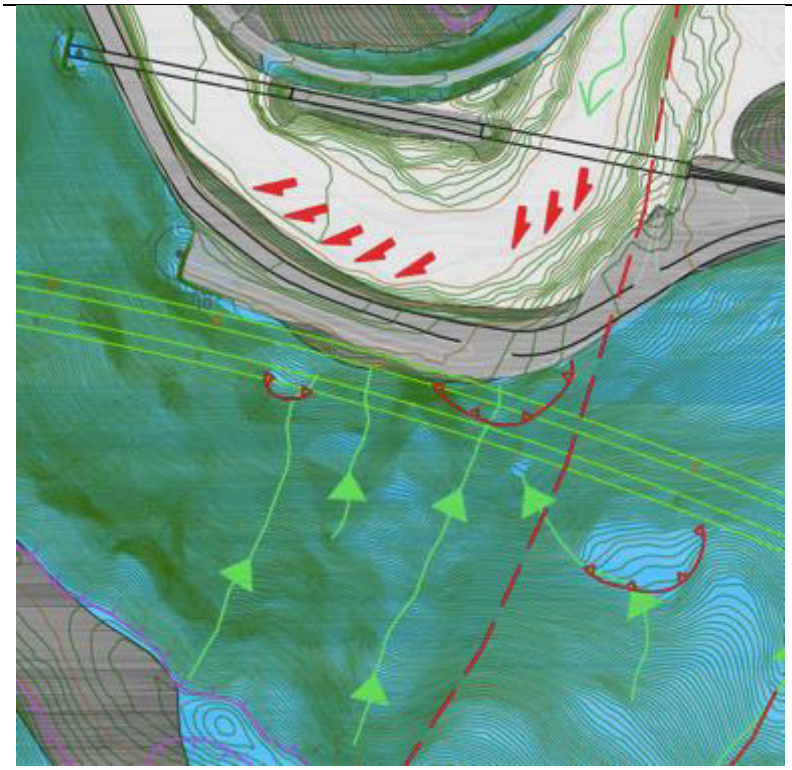
422. Georgia is one of the more complex mountainous regions living through the development of natural disasters, in which multi-spectral natural hazards are distinguished by their high recurrence rates and negative consequences for the population and infrastructure, as well as high rates of land resource losses and economic damage. Among the different types of natural disasters that periodically cause significant damage to the country's economy and often cause human casualties, the most relevant to the Project are landslides.

423. Almost all morphological-climatic zones in Georgia, starting with the sea coastline up to the high altitude mountain alpine-nival zone, have experienced damage to different extents. Over 50,000 landslides of different sizes and over 3,000 mudflow-transforming watercourses (rivers, canyons) have been identified in the country, as well as hundreds of kilometers of eroded riverbanks and coastline. Up to 70% of the territory and around 63% of the population are permanently at risk of natural disasters of different intensities.

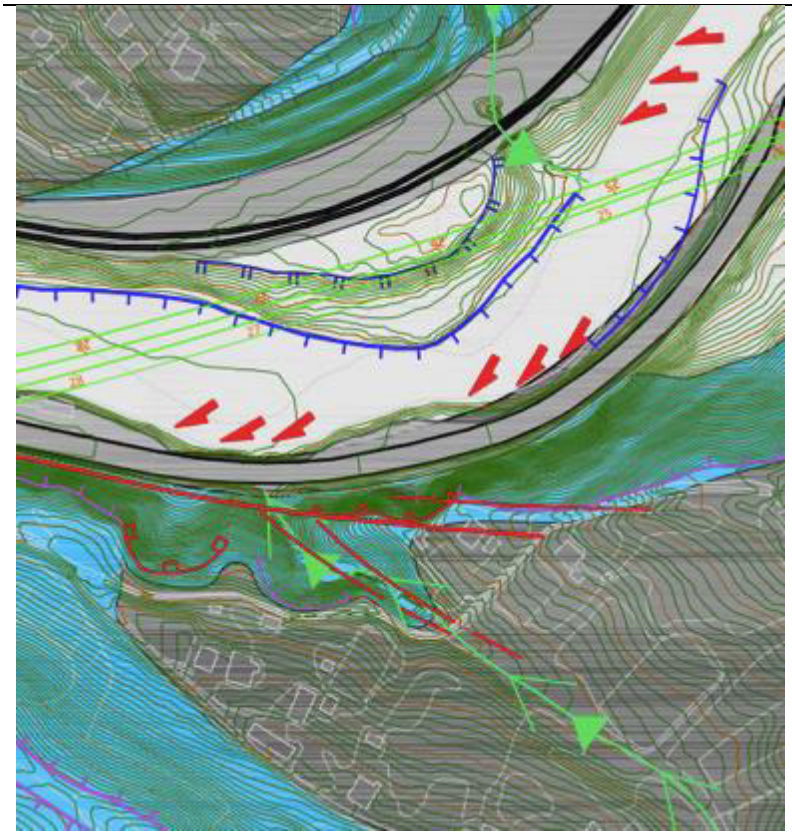
Landslides

424. Within the Project area a few areas prone to landslides have been identified. **Figure 43** provides the locations of the landslides.

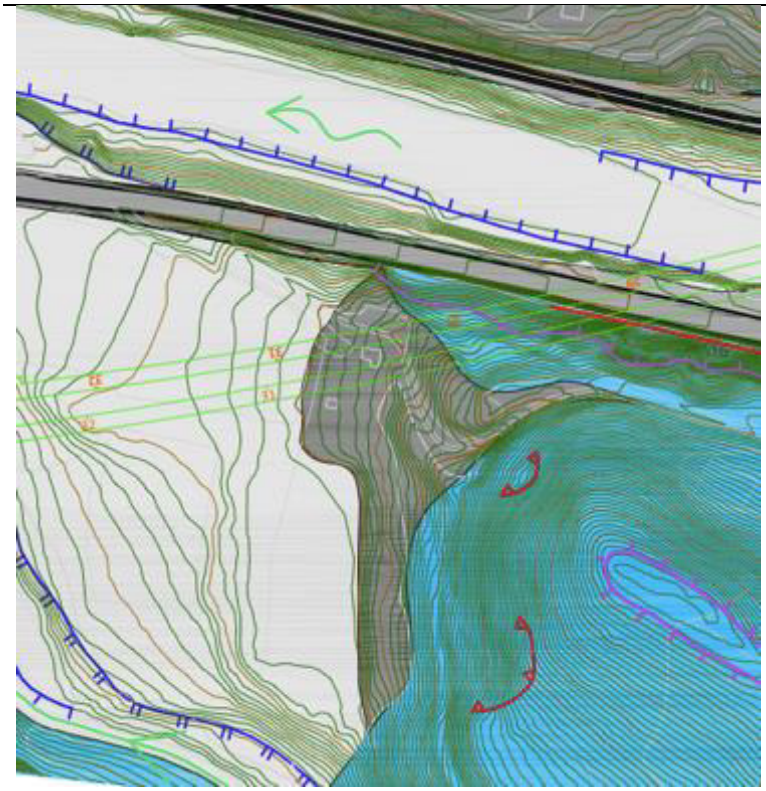
Figure 43: Landslide Locations Within the Project Area



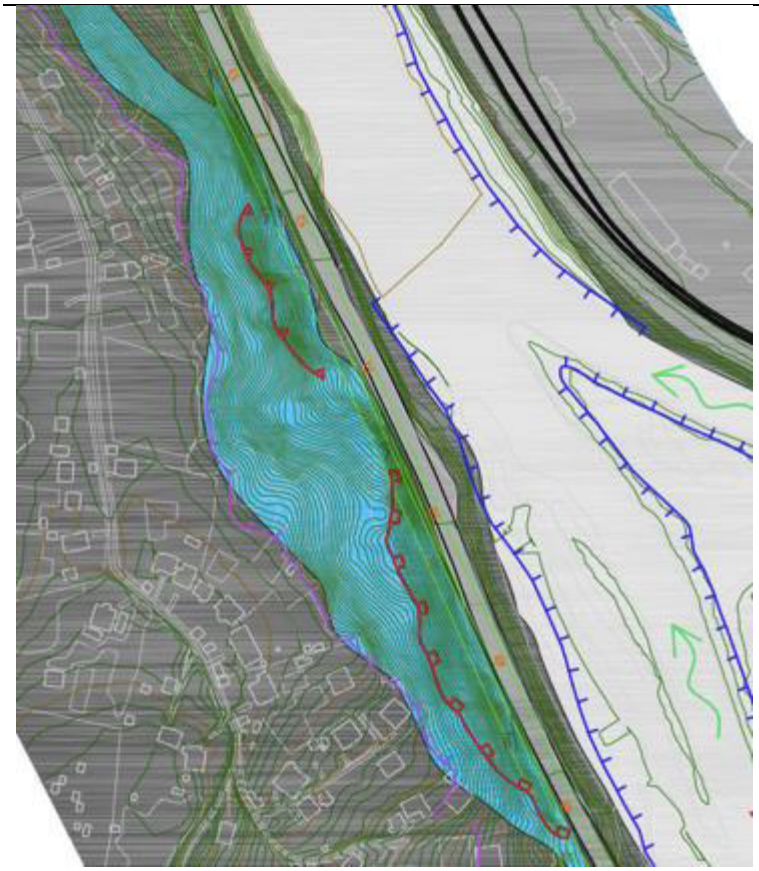
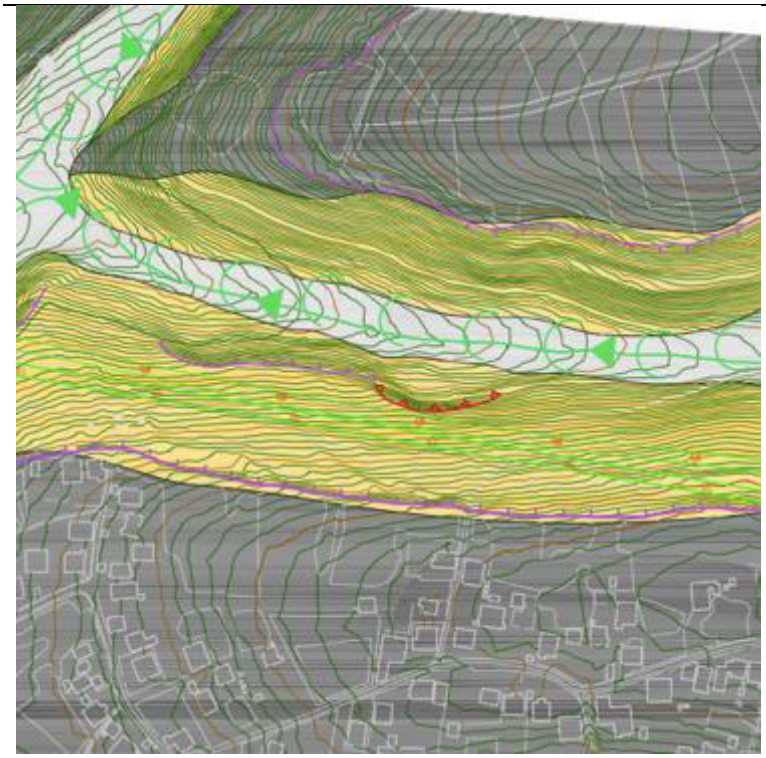
KM 0.6 – Located above a tunnel.

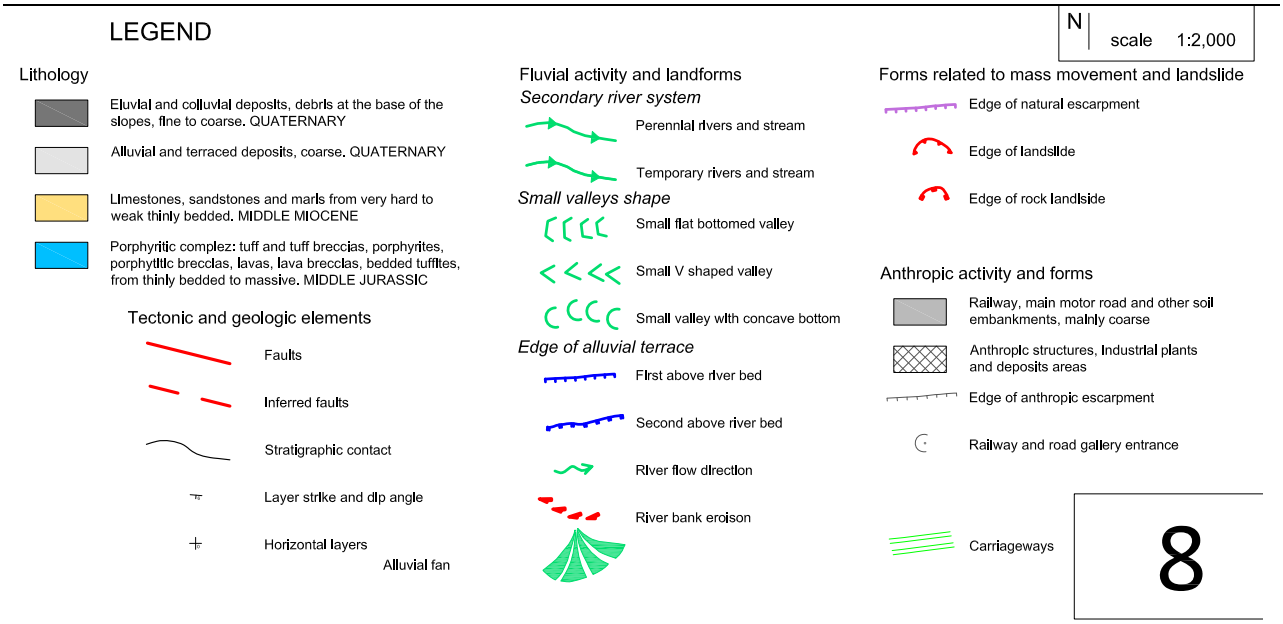


KM 2.8 – This landslide area is located above the existing road which the new alignment bypasses to the north.



KM 3.1 – Located above a cut slope on a steep embankment.

	**Between KM 4.8 and 5.2** – located immediately above the new alignment.
	**KM 8.7** – located immediate to the north of the new alignment.

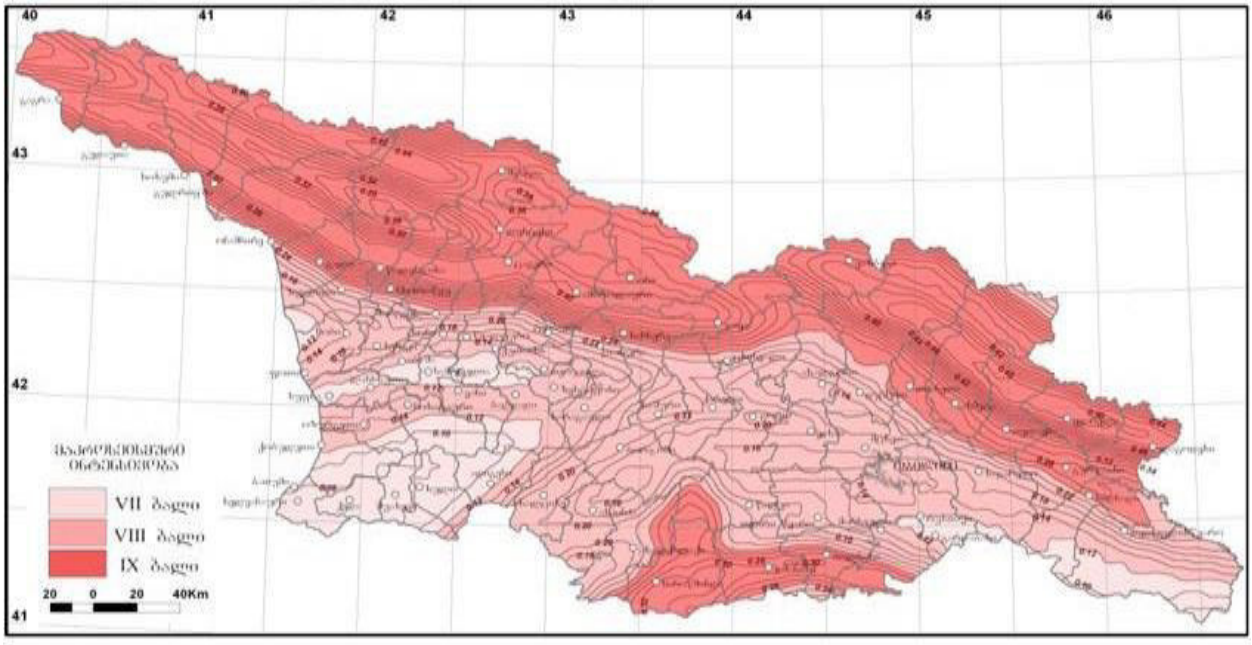


425. Generally, the landslides do not affect the project alignment, except for the mass movements identified above around KM 0.6 affecting TUN 4.0.01-TA/AT and its eastern and western portals.

Seismicity

426. According to the Seismic Hazard Map of Building Norms and Rules effective in Georgia "Earthquake-resisting construction (SSM III, 21.10.2009 N 128, article 1477) PN 01.01-09)", the study area is located in the 8-point earthquake zone (MSK 64 scale) with the dimensionless coefficient of seismicity (A) equaling 0.16 (village Khevi) under the same document. **Figure 44** illustrates the seismic conditions in Georgia.

Figure 44: Seismicity Map of Georgia (MSK Scale)



F.1.5 Hydrology

F.1.5.1 Surface Water

Regional Context

427. In Georgia there are 26,060 rivers and stream with a total length of 60,000 km. They belong both to the Caspian and Black Sea basins. 25,075 (99.4%) of the rivers are small (less than 25km length), with total length of 54,768 km. More than 18,109 (70%) of the rivers belong to the Black Sea basin, and 7,951 (30%) belong to the Caspian Sea basin. **Figure 45** illustrates the division on the Caspian and Black Sea basins.

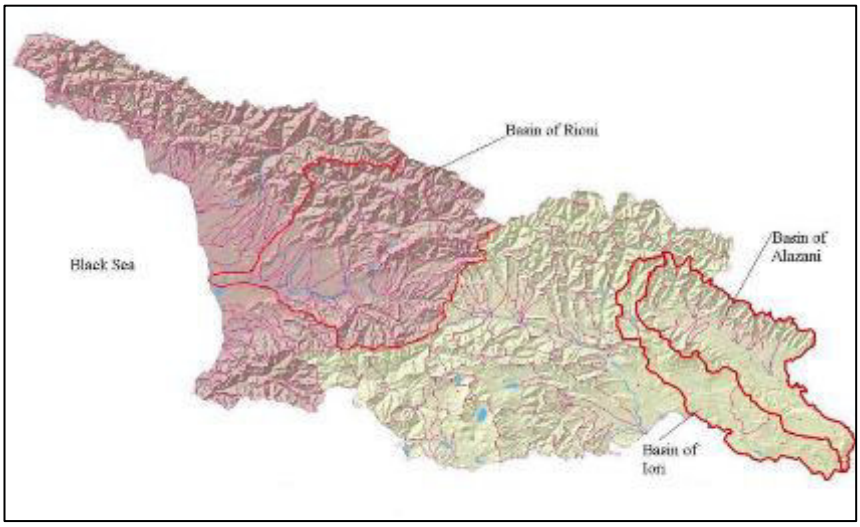


Figure 45: Rioni Sub-basin

428. The Project road is located within the Black Sea basin in the Rioni sub-basin. The Rioni sub-basin dominates western Georgia and has a total catchment area of 13,400 km^2, which is approximately 20% of the whole Georgian territory.

Local Context

429. Two main rivers can be found within the Project area, the Kvirila and the Dzirula. The confluence of the two rivers is in Shoropani adjacent to the Project road at Km 5.0, see **Figure 46**.

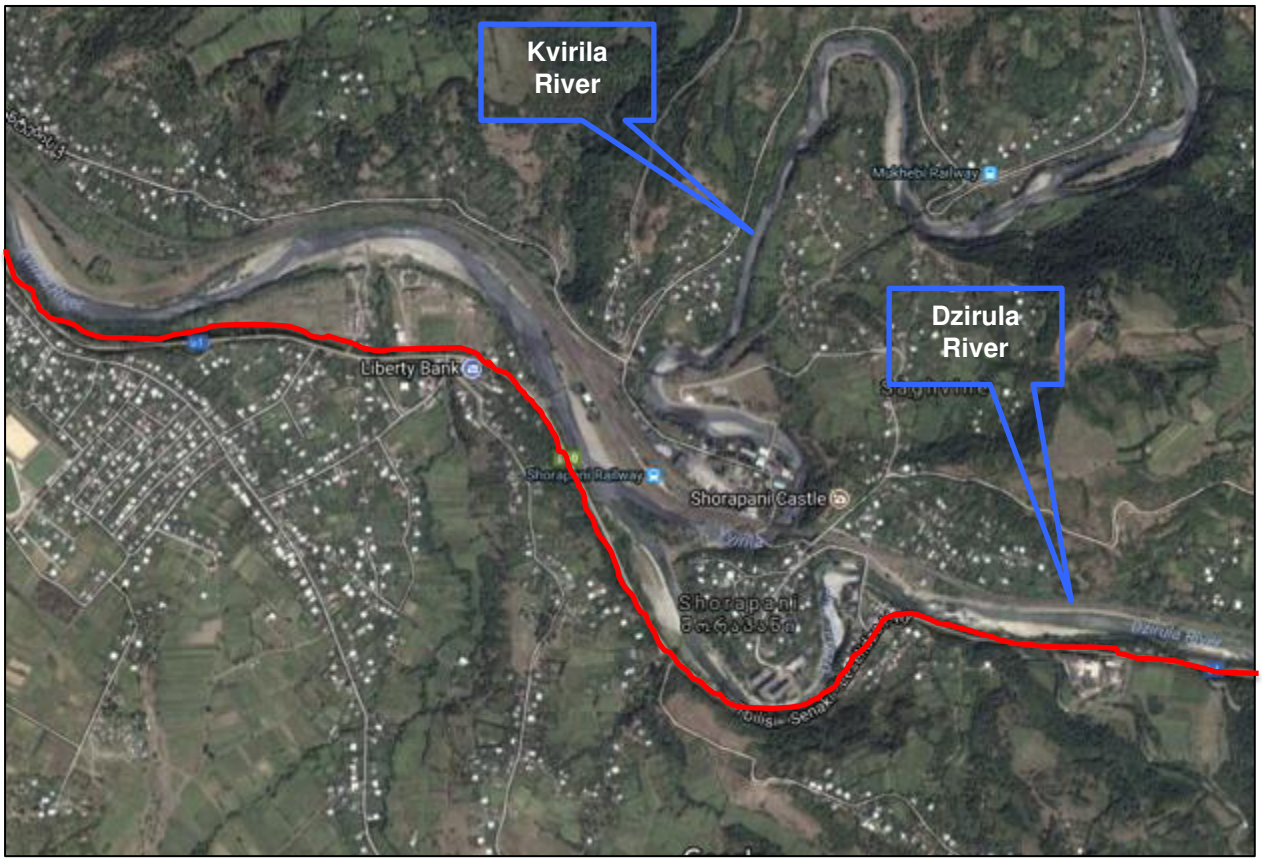
430. **Kvirila** - The river Kvirila heads from Ertso basin on the southern slope of Racha Ridge. It flows out of Ertso Lake at 1,711 m altitude and into Vartsikhe water reservoir. Before the water reservoir was created, it flowed into the river Rioni from its left bank. The length of the river is 140 km, its total fall is 1628 m, its mean slope is 11,6‰, the area of the rivers basin is 3,598 km^2 and the mean height of the basin is 790m. The river comprises 2,906 tributaries of different ranges with the total length of 5,254 km.

431. The upper part of the basin is located on the southern slope of Racha ridge and western slope of the Likhi range, its middle course is located over Kartli-Imereti crystal massif, while the lower reaches flow across Kolkheti Plain. The upper part of the basin is characterized by deep gorges and gullies typical to the mountainous region. There are milder relief forms spread over the crystal massif, and the river flows out across Kolkheti Plain past Zestaphoni.

432. The upper part of the Kvirila basin is structured with the Upper and Middle Jurassic limestones, marls, sandstones, porphyries and slates. The Upper and Middle Miocene clays, marls, sandstones and conglomerates dominate in the middle part. The Upper and Middle Jurassic rocks are spread in the environs of Zestaphoni, and there are Cretaceous limestones, marls and sandstones spread over the same location and past it. The part of the middle course of the basin and surface of its lower course is mostly covered with the

Quaternary deposits, which are partially presented by alluvial and fluvio-glacial deposits. Alluvial and alluvial-prolluvial deposits are also in bulk. The humus calcareous soils are spread over Racha ridge. A great part of the basin is occupied by brown forest soils, and zheltozem dominate on Kolkheti Plain. The percentage of forest land in the basin is over 50%.

Figure 46: Dzirula and Kvirila Rivers



433. The river is fed with rain (45,0%), snow (31,8%) and underground (23,2%) waters. The water regime of the river is characterized by spring floods, autumn-and-winter freshets and summer unstable low- water periods. Floods mainly start at the beginning of March, reaching their maximum at the end of April or at the beginning of May and are over at the end of June. The course of floods is frequently disturbed by the freshets caused by rains. The freshets caused by rains are quite frequent even during the summer low-water periods. Particularly intense freshets are observed in autumn as a result of continuous rains. Such cases take place 4 or 5 times annually and last from 2 to 15 days. The level of the autumn freshets in the lower reaches of the river exceed that of spring floods, with their annual maximums more frequently fixed in autumn. In winter, the river has unstable levels due to rainfalls and warming. 24.3% of the annual flow flows in spring, 24.4% flows in summer, 22.1% flows in autumn and 29.2% of the annual flow flows in winter.

434. **Dzirula** - The river Dzirula heads at 1,252 m above sea level where several brooks merge on the western slopes of Likhi Range and flow into the river Kvirila from its left bank. The length of the river is 89 km, its total fall is 1,052 m and the area of its catch basin is 1,270 km^2.

435. The river comprises 1,386 tributaries with the total length of 1,677 km. The major tributaries are the Dumala (34 km), Chkherimela (39 km) and Khelmosula (16 km).

Figure 47: Dzirula River, KM 4.4, June 2017

436. The river basin is located on Imereti Plateau and is bordered by Likhi Range from east and south-east and by the river Kvirila basin from north and north-west. The river basin is well developed in the lower zone due to the confluence with the river Chkherimela. The relief of the river basin within the limits of the Likhi Range is strongly dissected with deep gorges of the river tributaries. The geology of the river basin is represented by granites, gneisses, limestones and sandstones. The soil cover of the basin is represented by loamy soils, and the vegetation cover in almost all basin is presented as a dense hardwood forest.

437. The river gorge is winding and mostly V-shaped. The width of the gorge bed varies from 20-25 m to 300-350 m. The slopes of the river gorge merge with the slopes of the adjacent ridges. The river has terraces only in its middle and lower reaches. The width of the terraces varies from 50 to 400 m; their height is from 2-3 m to 7-8 m. The river floodplain is weakly developed.

438. The river bed is moderately winding and mostly non-branched. The bed in the upper reaches is stony giving the current a mountainous character. The width of the current varies from 10 to 30 m, its depth is 0,5-1,8 m, and its speed is within the limits of 0,8 and 1,5 m/sec.

439. The river is mostly fed with snow and rain waters. Its water regime is characterized by spring flood often accelerated by freshets caused by rains, non-stable low-water periods in summer and freshets in autumn and winter caused by rains and rapid air warming. The yearly distribution of the river flow is extremely uneven. On average, 48% of the annual flow flows in spring, 9-12% flows in summer and autumn and 30% flows in winter. Short icy events mostly as icy edges are fixed only at the river mouths.

440. Other small tributaries within the are include the Borimela River (which the Project road crosses at KM 3.5), and the Ajamura and Samanishvilisghele rivers, both of which located on the south bank of the Kvirila river more than 1.3 km from the Project road.

Table 31: Average monthly discharges of the Kvirila and Dzirula Rivers

River	Station	Catchment (km^2)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dzirula	Tseva	1190	21.6	33.5	54.0	58.2	29.8	19.4	13.5	9.59	8.93	16.0	20.1	25.9
Kvirila	Zestaphoni	2490	45.3	70.6	10.4	12.6	83.0	55.7	35.3	26.5	23.6	39.2	45.6	53.7

Table 32: Peak Discharges of the Kvirila and Dzirula Rivers

River	Station	Catchment (km^2)	Reoccurrence Year					
			1000	100	50	20	10	5
Dzirula	Tseva	1190	965	670	575	455	380	315
Kvirila	Zestaphoni	2490	2130	1430	1245	1000	850	695

Surface Water Quality

441. Water quality monitoring has been undertaken previously on the Kvirila river due to the presence of mining activities near the town of Chiatura which is approximately 28 kilometers north east of Zestaphoni. One of the world's richest manganese (Mn) deposits and largest Mn mining areas lies in the foothills of the Caucasus Mountains, near the city of Chiatura. The monitoring revealed that the Kvirila River is contaminated with Mn and Fe. Total Mn levels were almost 15 times the MAC downstream of the discharge from the Central Keeping Facility (CKF, which is the main ore processing facility). Concentrations of total Mn were 2–12 times the MAC in Darkveti, Shuqruti, and Rgani streams, and total Fe values were 8–55 times the MAC in these tributaries. The primary sources of Mn and Fe in the Kvirila River are the untreated industrial wastewater discharged from the CKF, tailings and waste rock associated with the Mn ore disposed of on the Kvirila River floodplain, and the main tributaries (primarily Darkveti and Shuqruti streams). The monitoring report concluded that use of the Kvirila River before and after the CKF, for drinking, economic, cultural, and household purposes should be prohibited. Based on Mn concentrations, these areas are extremely highly polluted water, according to Georgian regulations.[24]

442. To further assess the status of water quality in the Project area, including the Kvirila and Dzirula rivers monitoring was undertaken in September, 2017. A total of two surface water samples were collected and analyzed to determine the baseline water quality levels. **Table 33** describes the sample locations and rationale for their selection. The sampling locations are mapped in **Figure 48**.

Table 33: Surface Water Quality Monitoring Locations

Sample ID	Coordinates	Rationale for Site Selection
SW01	42 ° 05'37.36"N / 43° 06'09.45"E	At location of Bridge BRI 4.1.01-AT/TA, Dzirula River

[24] Effects of Manganese Mining on Water Quality in the Caucasus Mountains, Republic of Georgia. Caruso, et al. Mine Water Environ. 2011