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**REPORT** FINAL C3015707

**Client** GSE (Georgian State Electrosystem)

**Subject** Georgia - Romania Electric and Digital Interconnection Feasibility Study
E&S Scoping Report

**Order** IBRD/ESRFRP/QCBS/05-2021

**Notes** -

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**N. of pages** 426 **N. of pages annexed** 106

**Issue date** 21/11/2023

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Capitale sociale € 8.550.000 interamente versato
C.F. e numero iscrizione Reg. Imprese di Milano 00793580150
P.I. IT00793580150
N. R.E.A. 429222

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## REVISIONS HISTORY

| Revision number | Date | Protocol | List of modifications and/or modified paragraphs |
|---|---|---|---|
| 00 | 20/10/2023 | C3014052 | First Emission (Draft Release) |
| 01 | 21/11/2023 | C3015707 | Final Revision according with GSE and WB comments |

## LIST OF ACRONYMS

| | |
|---|---|
| AA | Appropriate Assessment |
| A.D. | Anno Domini |
| AC | Alternating Current |
| ACCOBAMS | Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area |
| AoI | Area of Interest |
| As | Arsenic |
| BaP | Benzo (a)pyrene |
| B.C. | Before Chist |
| C6H6 | Benzene |
| CaCO3 | Calcium carbonate |
| CAFE | Clean Air For Europe |
| CBD | Convention on Biological Diversity |
| CCH | Cetacean Critical Habitat |
| Cd | Cadmium |
| CEPF | Critical Ecosystem Partnership Fund |
| Cfa | Humid subtropical climate |
| Cfb | Temperate oceanic climate or subtropical highland climate |
| CH | Critical Habitat |
| CH4 | Methane |
| CHA | Critical Habitat Assessment |
| CLV | Cable Laying Vessel |
| CMS | Convention on Migratory Species |
| CO | Carbon monoxide |
| CO2 | Carbon dioxide |
| CR | Critically Endangered |
| DC | Direct Current |

| | |
|---|---|
| DD | Data Deficient |
| EBSA | Ecologically or Biologically Significant Marine Area |
| EC | European Commission |
| EEA | European Environment Agency |
| EEZ | Exclusive Economic Zone |
| EHS | Environment, Health and Safety |
| EHTTA | European Historic and Thermal Towns |
| EHV | Extra High Voltage |
| EMF | Electromagnetic field |
| EN | Endangered |
| END | Environmental Noise Directive |
| ESF | Environmental and Social Framework |
| ESIA | Environmental and Social Impact Assessment |
| ESS | Environmental and Social Standard |
| EU | European Union |
| EUNIS | European Nature Information System |
| GDP | Gross Domestic Product |
| GEBCO | General Bathymetric Chart of the Oceans |
| GFCM | General Fisheries Commission for the Mediterranean |
| GFDRR | Global Facility for Disaster Reduction and Recovery |
| GHSZ | Gas Hydrate Stability Zone |
| GN | Guidance Note |
| H2S2 | Hydrogen sulphide |
| HDD | Horizontal Directional Drilling |
| Hg | Mercury |
| HVDC | High-Voltage Direct Current |
| IBA | Important Bird and Biodiversity Area |
| ICCP | Impressed current cathodic protection |

| | |
|---|---|
| ICT | Information and Communications Technology |
| IEA | International Energy Agency |
| IMMA | Important Marine Mammal Area |
| IRENA | International Renewable Energy Agency |
| ISI | Institute for Scientific Information |
| IT | Information Technology |
| IUCN | International Union for Conservation of Nature |
| KBA | Key Biodiversity Area |
| LC | Least Concern |
| LOA | Length Overall |
| MARPOL | International Convention for the Prevention of Pollution from Ships |
| MBES | Multibeam Echosounder |
| MIND | Mass Impregnated |
| MMO | Mixed Metal Oxide |
| MMO | Marine Mammal Observer |
| MSFD | Marine Strategy Framework Directive |
| MV | Medium-Voltage |
| MVDC | Medium-Voltage Direct Current |
| N2O | Nitrous oxide |
| NEA | National Environmental Agency |
| NGO | Non-Governmental Organization |
| Ni | Nickel |
| NOx | Nitrogen oxides |
| NP | National Park |
| NT | Near Threatened |
| O3 | Ozone |
| OECD | Organisation for Economic Co-operation and Development |
| OFC | Optical Fiber Cable |

| | |
|---|---|
| OHL | Overhead Line |
| OHS | Occupational Health and Safety |
| PAH | Polycyclic aromatic hydrocarbon |
| PGA | Peak Ground Acceleration |
| PM | Particulate matter |
| PP | Polypropylene |
| PS | Performance Standard |
| PSHA | Probabilistic Seismic Hazard Analysis |
| PV | Photovoltaic |
| RC | Rim Current |
| RE | Renewable Energy |
| RES | Renewable Energy Source |
| RR | Restricted Range |
| SC | South Caucasus |
| SEE | South-Eastern Europe |
| SEP | Stakeholder Engagement Plan |
| SO2 | Sulphur dioxide |
| SSS | Side Scan Sonar |
| UNCLOS | United Nations Convention on the Law Of the Sea |
| UNEP-WCMC | UN Environment Programme World Conservation Monitoring Centre |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UNICEF | United Nations International Children’s Emergency Fund |
| UNSD | United Nations Statistics Division |
| USSR | Union of Soviet Socialist Republics |
| VSC | Voltage Source Converter |
| VSC HB | Voltage Source Converter Half Bridge |
| VU | Vulnerable |
| WASH | Water, Sanitation and Hygiene |

| | |
|---|---|
| WB | World Bank |
| WHO | World Health Organization |
| WREP | Western Route Export Pipeline |
| XLPE | Cross-linked polyethylene |

# 1 INTRODUCTION

This document constitutes the Scoping of the ESIA for the “Black Sea Submarine Cable” Project (hereinafter Project). The Project’ locations and main project activities are described. Information on the environmental and social background of the areas interested by the Project activities and the legal and regulatory framework the Project shall be compliant with are also reported. A preliminary impact assessment and a stakeholder engagement are included. Plan of studies for the ESIA is proposed. The present document is tightly linked with the Routing and Siting Study (document C3013972, Appendix A) and the Environmental and Social Screening Study (documents C2011431 and C3003434, respectively for Georgia and Romania). Moreover, Project design updates subsequent to the release of the Routing and Siting Study and the Environmental and Social Screening Study are assessed. The document is organized as follow:

- **Chapter 2. Project Description** - it provides information about the Project, the selected Georgian and Romanian project sites, the Project’s components and working schedule;
- **Chapter 3. Methodological Approach** - it describes how the Project’s data have been collected and compiled and the approach used for the preliminary impact assessment;
- **Chapter 4. Legal, Regulatory, and Administrative Framework** - it aims at setting the international and national legislation and standards the Project shall be compliant with;
- **Chapter 5. Alternative Analysis** - in this chapter are considered and evaluated various routes, locations and technologies that can be pursued in the scope of the Project and identifies the best one/s based on environmental, social and technical considerations;
- **Chapter 6. Environmental and Social Baseline -** it provides an overview of the environmental and social features of Georgia and Romania (with particular focus on the area interested by the Project’ activities) and the deep-sea area between the two countries. It also serves at identifying possible sensible receptors and issues related to the Project activities and sets the basis upon which the preliminary impact assessment is performed;
- **Chapter 7. Preliminary Impact Assessment and Risks –** it represents a preliminary impact assessment relative to the Georgian and Romanian onshore and offshore areas interested by the Project activities. Moreover, the risks associated with the Project implementation are shortly discussed;
- **Chapter 8. Stakeholder engagement and consultation undertaken during scoping -** it consists in a preliminary contact with selected stakeholders aimed at providing the communities influenced by the Project activities with access to the relevant Project information and allow them to express their views on Project expectations, risks and concerns;
- **Chapter 9. Plan of Studies for the ESIA -** it sets the methodology for the future ESIA including indications for the field surveys.

# 2 PROJECT DESCRIPTION

The Project “Black Sea Submarine Cable” represents a strategic task and a great opportunity for Georgia, Romania and neighboring countries. The project aims at exporting energy from the South Caucasus Countries (SC) to Romania and South-Eastern Europe (SEE) through a submarine cable which crosses the Black Sea.

Moreover, it will contribute to the development of the renewable energy sector, increase transit opportunities and bilateral trade potential between the EU and the SC.

## 2.1 Project Location

Marine and coastal electrodes, converter stations and terrestrial power lines, namely HVDC cable (ground cable) and HVAC overhead lines (OHL), will be set up in Georgia and Romania. A submarine cable will connect these countries stretching across the Black Sea and passing through the Economic Exclusive Zones of Türkiye and Bulgaria (please refer to chapter 3.1 for more details).

While in Romania it is planned only one 400kV HVAC OHL (from the converter station to the chosen AC substation), in Georgia are expected two 500kV HVAC OHLs: from the Anaklia converter station to Jvari substation, and from the Anaklia converter station to Tskaltubo substation.

Based on the siting/routing analysis presented in the Routing and Siting Study (document C3013972) a preferred land approach has been selected between two alternatives for the Romanian side. Following this selection, a preferred converter station, terrestrial and overhead corridors have been selected among two alternatives (further discussed in chapter 5.2). For Georgia, one land approach area has been selected, but two alternatives for the converter station location are still under evaluation with their relative terrestrial cable alternatives. For the HVAC OHL, three alternatives are still under evaluation for the connection Anaklia-Jvari, while only one route has been defined for the Anaklia-Tskaltubo HVAC OHL connection (discussed in chapter 5.2).

For Georgia, the land approach is located in proximity of Anaklia, while the converter station alternatives are located at approximatively 17 km and 24 km distance from the coastline and will be connected to the land approach through a HVDC underground cable. The HVDC cable route length varies between 17 and 25 km depending upon the converter station location. Similarly, also the length of the Anaklia-Jvari HVAC OHL alternatives varies between 39 and 46 km depending upon the converter station location and their route. The Anaklia-Tskaltubo HVAC OHL involves the connection of the overhead line with only one of the converter station alternatives (the one considered most suitable by GSE) for a total length of 74,5 km. Finally, the Georgian (pond) electrode will be located near the coastline at about 5 km distance southward from the land approach. Two electrode connections are still under evaluation whereby one medium voltage cable connection runs parallel to the coastline (coastal connection) and the other medium voltage cable is placed at a few km distance from the coastline (marine connection, discussed in chapter 5.2).

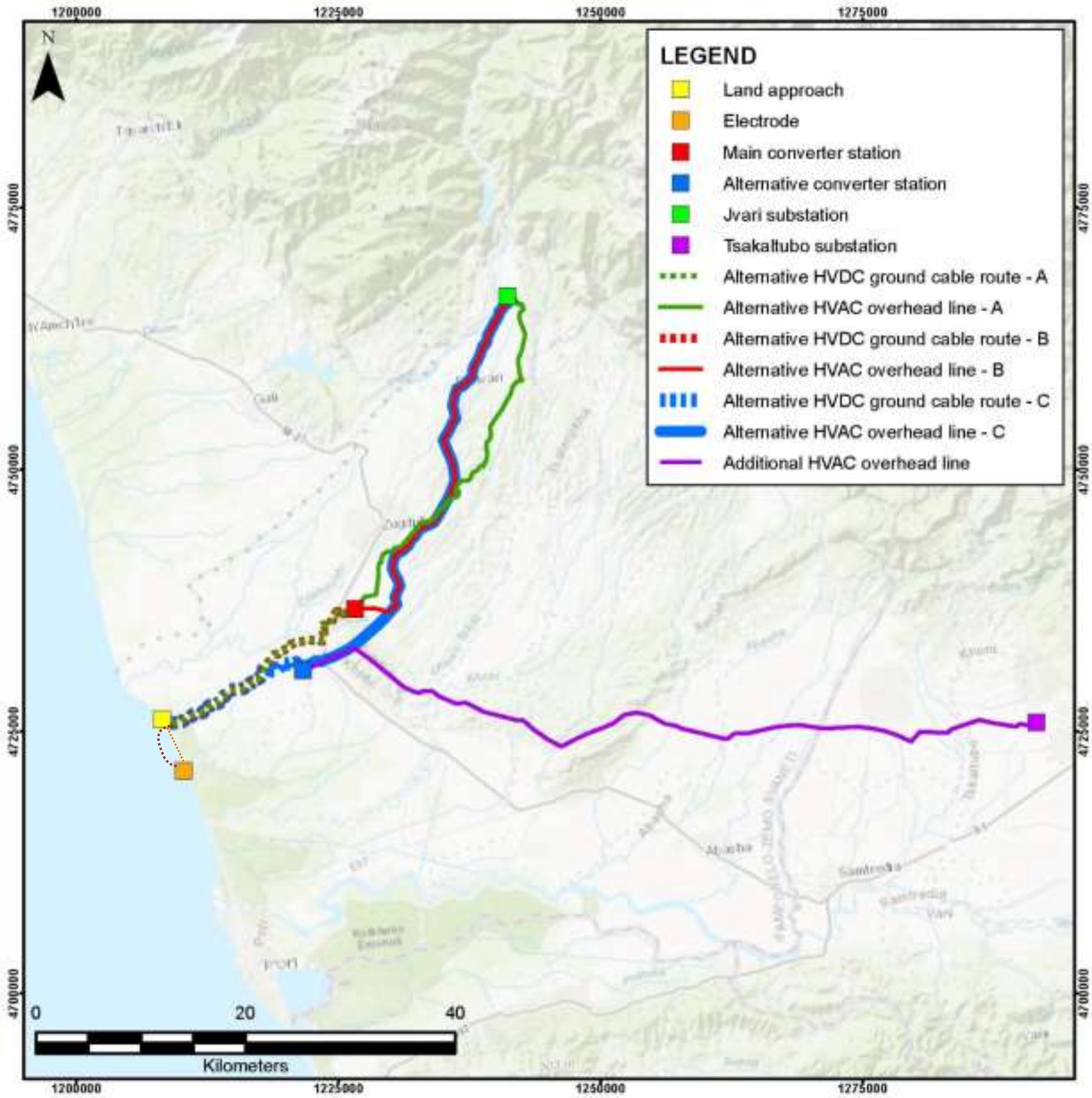



*Figure 2-1 – Locations of the land approach, converter station, terrestrial and overhead transmission lines and connection between the electrode (pond) and the cable at the land approach in Georgia. The dot orange lines represent the alternatives for the electrode connection to the to the landing point of the HVDC cables.*

In Romania, the land approach is located south of Constanta, near the town of Tuzla (south of Eforie south), while the converter station is located at approximatively 18 km distance from the coastline (near the town of Topraizar) and will be connected to the land approach through a HVDC cable. The substation is located at 19 km distance from the converter station and will be connected to the converter station through a 400kV HVAC Overhead Line. Finally, the Romanian (marine) electrode will be located near the coastline at about 7 km distance from the land approach (discussed in chapter 5.2).

In both cases (i.e., Georgia and Romania) the electrodes will be connected to the converter stations via a section of subsea cable plus a section of terrestrial cable, in the latter the cable will use the same route of the HVDC cables.

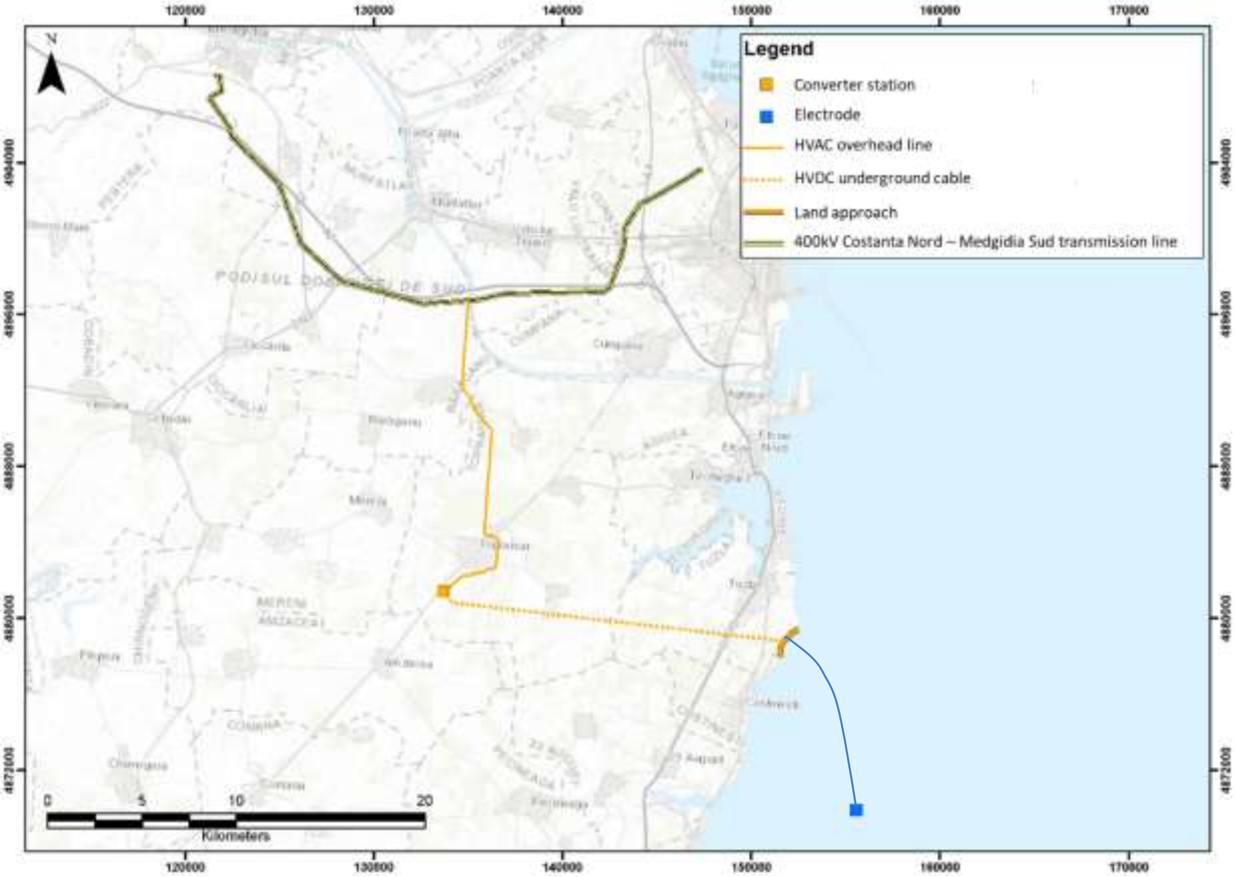



*Figure 2-2 – Locations of the land approach, converter station, terrestrial and overhead transmission lines and electrode in Romania.*

As above reported, these two countries will be connected through a submarine cable about 1,100 km long which crosses the Black Sea between Georgia and Romania. The cable will pass through the Economic Exclusive Zones of Türkiye and Bulgaria but it will avoid their national water borders (discussed in chapter 5.2).

Beside the power HVDC interconnection, the Project also foresees a telecommunication link (OFC, Optical Fiber Cable) that will be installed in the same corridor of the submarine HVDC power cables. For what concern the terrestrial line and OFC equipment the solution is still under evaluation.

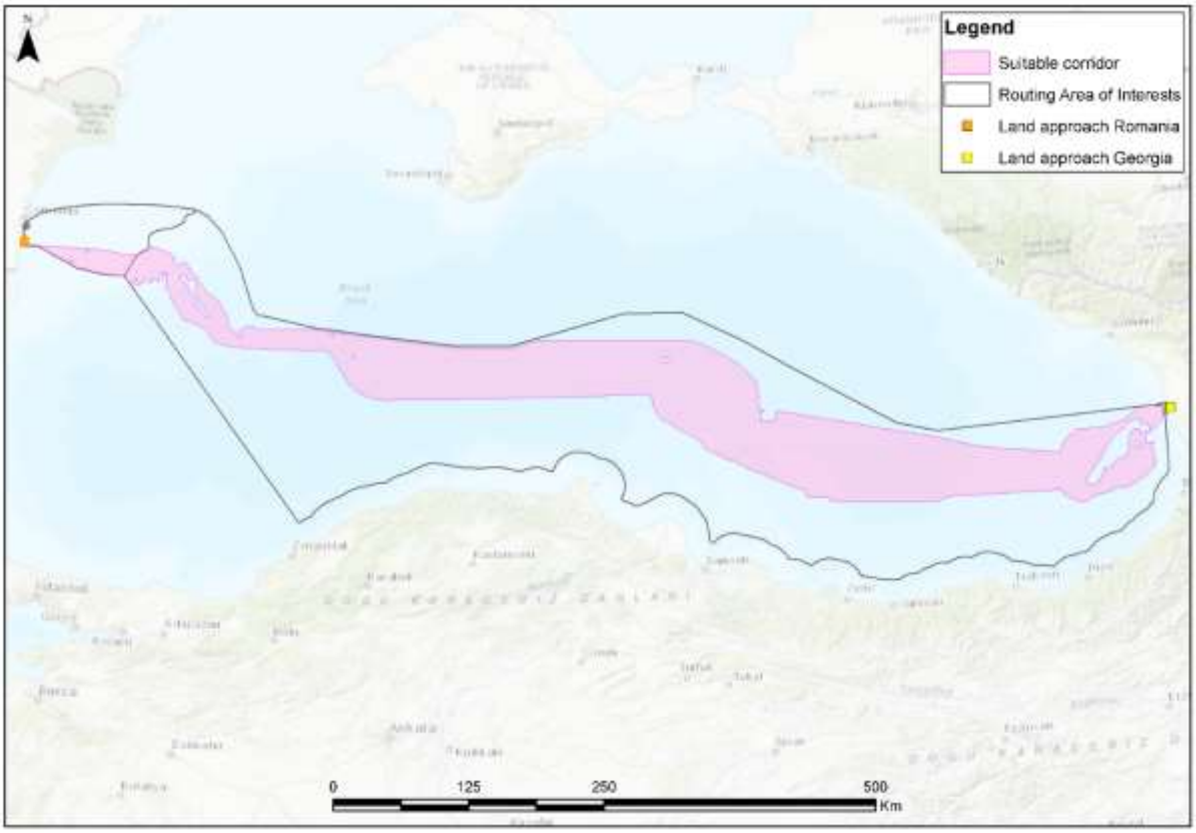



*Figure 2-3 – Submarine cable route across the Black Sea and Georgian and Romanian land approach.*

## 2.2 Main Project Components

The nominal voltage of the DC link will be ±525 kV. The nominal power will be in between 1,000 MW and 1,500MW, since 1,500 MW is the technological limit for a two-cables link for high-water depth with 525 kV nominal voltage.

The Project components are:

- HVDC (high voltage direct current) and OFC (Optical Fibre Cable) submarine cables in the Black Sea;
- Marine and Pond Electrodes which are located in Romania and Georgia, respectively;
- One converter station within the territories of Georgia and one in Romania;
- MV (Medium Voltage) cable lines (partially offshore and partially terrestrial) for connecting the electrodes to the converter station in each country;
- Terrestrial HVDC transmission cable lines to connect the submarine cables to the converter station; and
- HVAC (high voltage alternate current) overhead transmission lines (OHL) in Georgia and Romania to connect the new DC link to the national transmission networks of Georgia and Romania. While in Romania there will be only one OHL (from the converter station to the chosen substation), in Georgia

are expected two OHLs (from the Anaklia converter station to Jvari substation, and from the Anaklia converter station to Tskaltubo substation).

### *2.2.1 HVDC (high voltage direct current) and OFC (optical fibre cable) Submarine Cables*

The **submarine HVDC** link will consist of two HVDC parallel cables: one for each DC polarity, as part of a bipolar configuration. The neutral bus for DC current return via sea electrodes is under consideration; this solution (bipolar with electrodes) is surely preferable from the performance point of view in terms of availability and reliability of the service in respect to a 'Rigid solution'. The two solutions in terms of HVDC layout are represented in Figure 2-4.

In both schemes the two HVDC cables (one for each pole, + and -) are the same, but in case a cable is out of service (for a failure or for maintenance) the power flow is still possible even if halved for bipolar with electrodes, while it is zero (no power transmission) for rigid bipolar scheme. Furthermore, the bipolar scheme with neutral grounding electrodes allows the transmission of half power (monopolar) in the initial stage of the Project, awaiting the second cable construction, installation and commissioning. For this reason, the solution with the electrodes is considered as the preferred one.

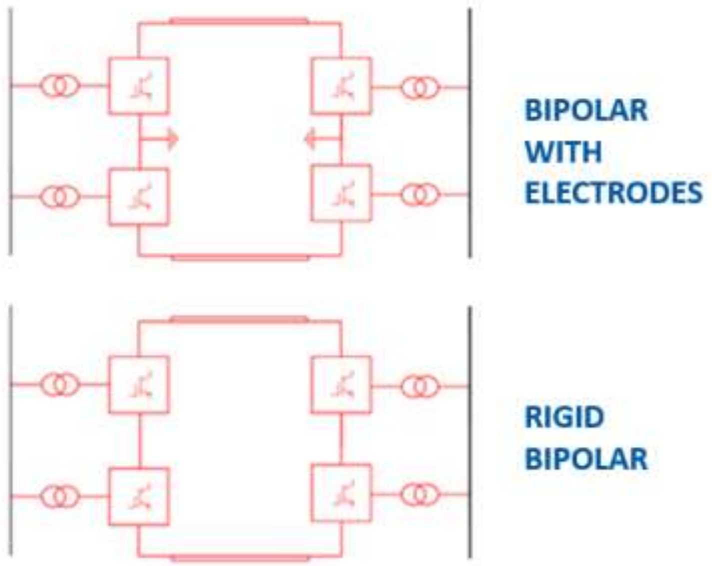



*Figure 2-4 –Schemes for the HVDC link.*

The submarine cable represents the challenging component of the project since it is **more than 1,100 km long**, longer than any other power cable presently in the World, reaching deep waters for most part of the route (around 2,200 m depth). Presently, no submarine power cable has been laid at such depth. The Figure 2-5 below shows the profile of the preliminary cable route (depth and length are in different scale for illustrative reasons). The marine survey will provide a more detailed view about the obstacles and the difficulties to be overcome.

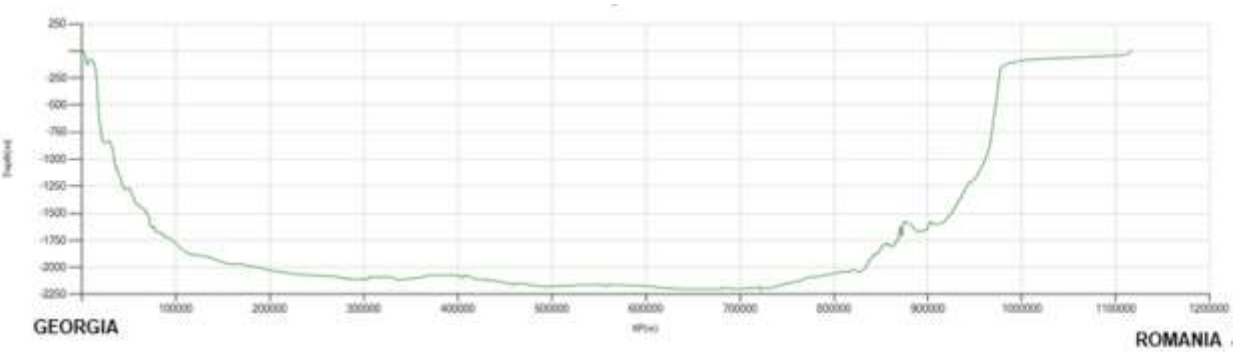



*Figure 2-5 – Preliminary seabed profile of route corridor (abscissa 0 corresponds to Georgian coast).*

**OFC** (with a stand-alone solution) **has less limitations** in respect to HVDC cables and extremely long OFC exist, crossing the oceans at high depths. These long OFC systems are named “repeteated” systems since there are amplifier installed along the cable fed by the terminal stations; these are necessary to compensate the attenuation suffered by the optical signal through the cable length.

**In shallow waters** (up to 100 - 150 m water depth), the **cables shall be buried** for protection purpose against anchoring or trawling activities, while at higher depth the cable is simply laid on the seabed. Different methods can be used for the cable burial depending on sediment characteristics, such as:

- Hydrojetting. It is used on poorly cohesive bottoms such as sand, clay and silt. It uses high-pressure water jet to dig the trench and bury the cable;
- Trenching. It involves the mechanical excavation of the trench using a ‘trenching’ machine and it is mainly used on hard soil seabed; or
- Ploughing. It is generally used when the burying depth is greater than 2 m and it is not substrate dependent.

When the type of seabed or the qualitative characteristics of the sediment do not permit the use of the above-described methods, the protection of the cable can be realized by using concrete mattress, placing protective rocks close to the cable or using tubular protection (plastic or cast iron). The chosen method can be defined only when data about seabed features are available; indeed, the so-called “Burial Assessment Study” is typically performed after the marine investing actions.

A burial depth of about 1 - 1.5 m is typically used depending on the fishing activity and the sediment typology of the chosen area. Normally this is sufficient for protecting the cable against most fishing gears and lighter anchors while a deeper burial depth should be anticipated if the area is characterized by a high risk of ship’s anchor dropping. Special equipment should be used in such cases, and it is recommended to make a risk and cost assessment before choosing a burial depth greater than 3 m. Cable protection in landing area could be critical due to coastal erosion and to variability conditions in the transition between land and sea during the life of the infrastructure.

Considering the organization of the operation there are **two** principal **methods** of **cable installation and burial:**

- Simultaneous lay and burial: as an example, the method can be used with cable plough equipment where the cable passes through the plough as it is towed along the seabed and is laid and buried in one operation.

- Post lay burial: this method foresees the surface lay of cable which may be laid into a pre-cut trench, or post lay buried by plough, jetting or trenching machines. Pre lay trenching may be an option for some projects located, for example, in areas characterized by rocky seabed.

At this stage of the Project, the method to be applied is not yet defined.

The two different solutions used to protect cable at the landing area are: the Open-cut trench method and the Conduit pipe (i.e., Horizontal Directional Drilling). The first one is suitable for beaches that can be excavated, where the transition is quite smooth and there is no risk of coast erosion.

Large, dedicated vessels (Cable Laying Vessel) shall be used for **cable laying**. During the cable landing the support of some small vessel is required. Typical installation (laying) speed of a power cable is around 10 km/days, but it can vary depending on the sea and seabed conditions; time for jointing also needs to be considered.

Two different types of insulation can be adopted for HVDC cables: MIND type (Mass Impregnated) or extruded type (XLPE). The first one is realized with kraft paper impregnated with high viscosity compound (no leakage in case of damage), the second is based on Polyethylene. Due to the characteristics of the Project, such as envisaged high-water depth (approx. 2,200 m) and voltage level (525 kV), the MIND technology is currently considered the most adequate one.

Typical construction of submarine MIND and XLPE cable is reported in the Figure 2-6, below.

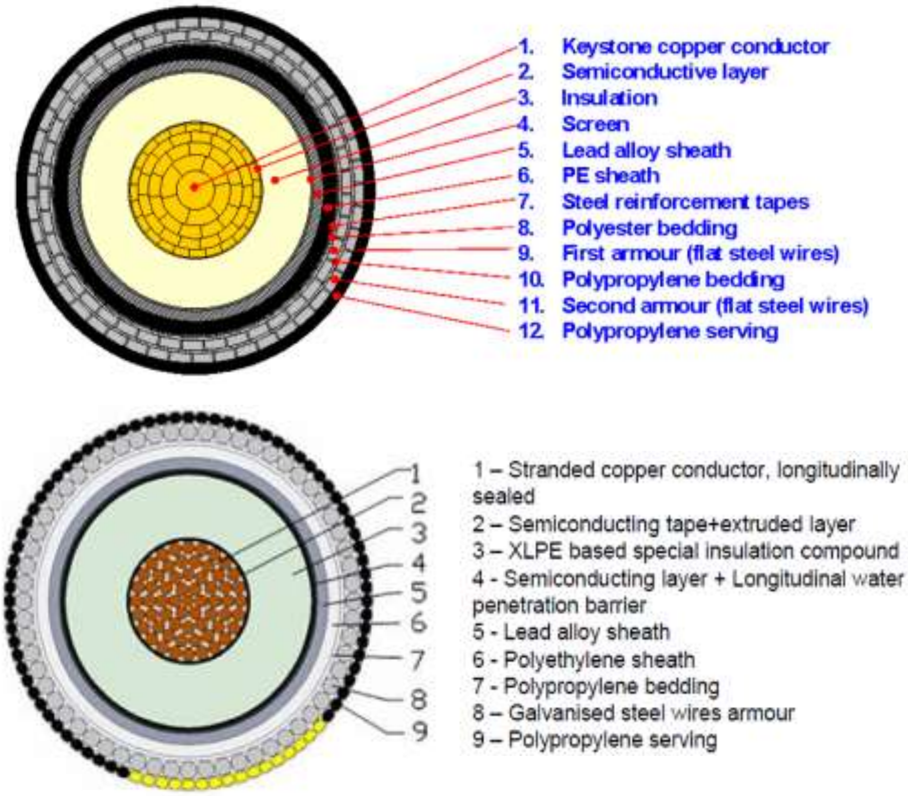



*Figure 2-6 – Typical cross section of HVDC submarine cable (MI and XLPE).*

However, the cable cross sections above reported are purely indicative since the detailed design and construction of cable has to be defined at engineering stage. Different conductor materials and cross-section can be use.

### 2.2.2 Marine and Pond Electrodes

In the scope of the Project, two electrodes are necessary:

- one electrode in Romania of sea type (typically installed on the seabed a few kilometers offshore in water depth less than 30- m); and
- one electrode in Georgia of pond type (shoreline electrode installed in artificial lagoons).

The proposed types of sea electrode are discussed below.

- **Marine electrodes - Romania**

  The electrode should be preferentially designed as an electrode array, that will be installed at about 7 km from the shoreline. Basically, two technologies are viable: use as active parts of MMO (Mixed Metal Oxide) coated titanium modules in direct contact with sea water, or use of graphite/high silicon iron bars, which can be inserted inside a protective box where coke may be present. The function of coke is to reduce corrosion rate of the active parts (the conduction mechanism between active part and coke is electronic, so no corrosion is involved; conduction between coke and water is ionic, but coke surface is ample, so its self-corrosion is slow); it also helps to have more uniform electric field in the immediate nearby. If no coke is inserted, the box has just the function of secluding the high field areas close to the active parts, thus isolating the cable form the external environment. The electrodes are laid and “unrolled” on the seabed (Figure 2-7) on coated titanium mesh. The surface of one module is around 20 m$^2$. Normally some tenths of modules are needed.

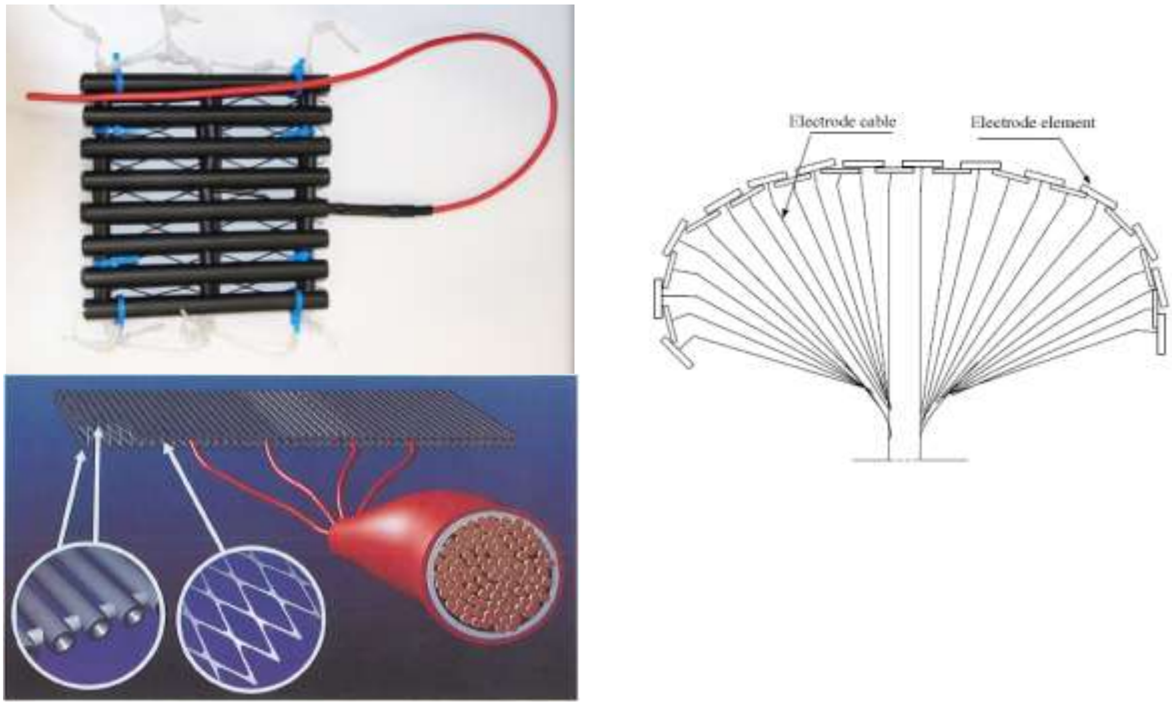



*Figure 2-7 – Example of ‘carpet’ sea electrode type on the left side and example of the Modules’ connection on the right side.*

- **Bar (pond) electrodes – Georgia**

The bar electrodes are typically bar shaped and present unprotected active parts. The individual sub-electrodes are either attached to the harbor wall or hung from a pontoon within the lagoon (Figure 2-8). The area of the pond can vary between 15,000 and 25,000 m$^2$, depending upon the final design and includes the surface for electrode.

Different materials could be used for electrode elements depending on the type of operation (e.g., cathodic, anodic or bidirectional). The main materials that could constitute the sea electrode are listed below:

- Coated titanium meshed (anodes/reversible);

Bars made of:

- Magnetite ($Fe_3O_4$) (very brittle, not recommended);
- Platinized titanium /MMO coated Titanium;
- High silicon iron (14%), commercial name Durichlor 51;
- Graphite (excellent to build reversible electrodes).

The first two materials should be preferentially used as anode only, and as cathode just over very limited time intervals. High silicon iron should preferentially be inserted in a coke bed.

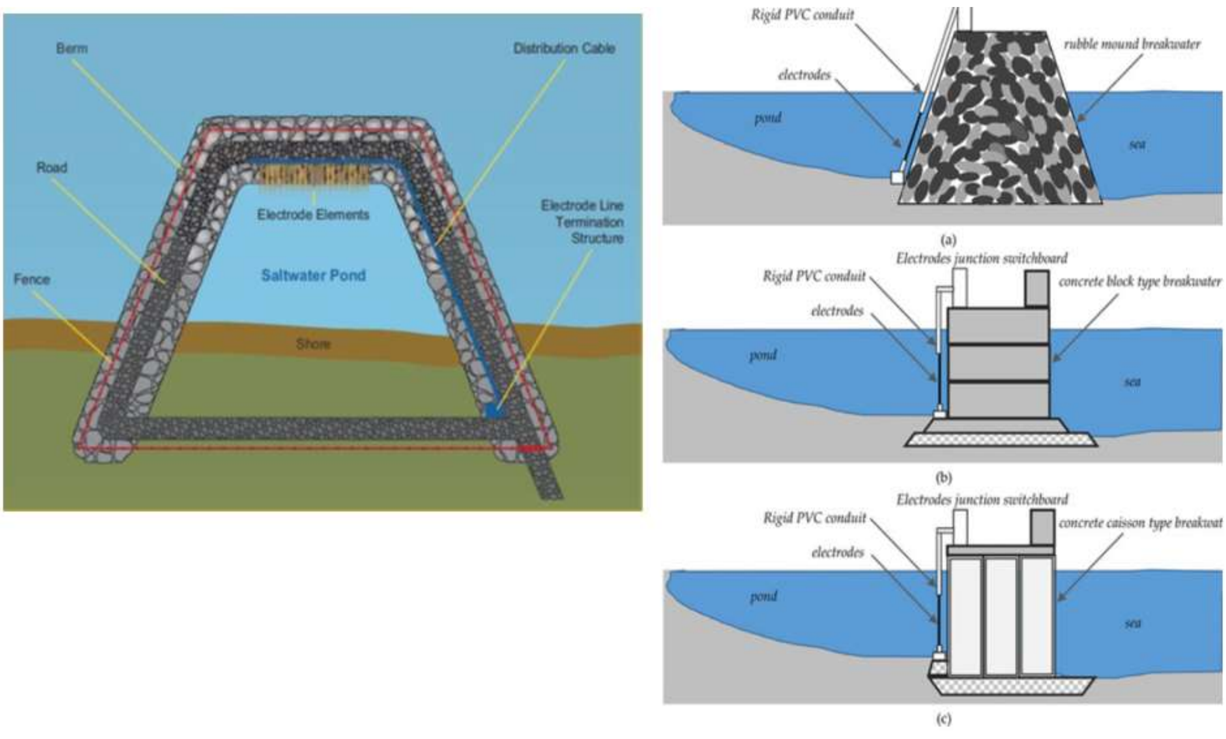



*Figure 2-8 – Example of a shoreline electrode station (right) protected by a concrete structure. The shoreline electrode station (left) can present a rubble mound breakwater (a), concrete block breakwater (b), concrete caisson breakwater (c) (source: Tsekouras et al., 2022; Sutton et al., 2017).*

The sea electrodes (both marine and pond ones) shall be far enough from other infrastructures (such as pipelines) in order to avoid any possible interference, with particular attention to the induced corrosion

(Table 2-1). The DC current density shall stay below due limits (40,000 µT as per International Commission on Non-Ionizing Radiation Protection – ICNIRP - guidelines). In open waters, far from the electrodes, the current density is expected to be extremely low, but it could still slightly alter the Earth magnetic field in the electrode proximity. The preliminary siting of the electrodes has been defined taking into account minimum separation distances from other existing and known facilities (Table 2-1). It is to be highlighted that the possible interferences with existing and future infrastructures shall be confirmed by a detailed study to be done during the engineering phase of the Project. These preliminary mitigation measures, implemented as part of the Project Design, ensure the avoidance of any interaction between the electrodes and other underwater infrastructures.

*Table 2-1 –Minimum separation distances considered in the siting between electrode and other facilities.*

| **Facilities** | **Distance (km)** |
|---|---|
| Electrical substations with grounded neutral transformers | 15 km |
| Major oil and gas pipelines | 8 km |
| Urban gas, water and sewer lines | 5 km |
| Submarine cables | 5 km |
| Concentric neutral power cables | 5 km |
| Communication cables | 3 km |
| Transmission lines | 2 km |
| Railway tracks | 2 km |
| Rural power distribution | 2 km |
| Steel wharfs | 1 km |
| Bridges | 1 km |
| Buried metal tanks | 1 km |
| Large reinforced concrete structures | 1 km |

### *2.2.3 Converter Stations*

The technological solution selected for the converter stations is Voltage Source Converter (VSC) since this is best suited for cable links, allowing the fast reversal of the power flow. The consequent space needed for each converter stations (one in Georgia and one in Romania) would be of the order of 60,000÷70,000 $m^2$ (e.g., 200÷300 m). The typical layout of a HVDC VSC converter station and the relevant space occupation is shown Figure 2-9.

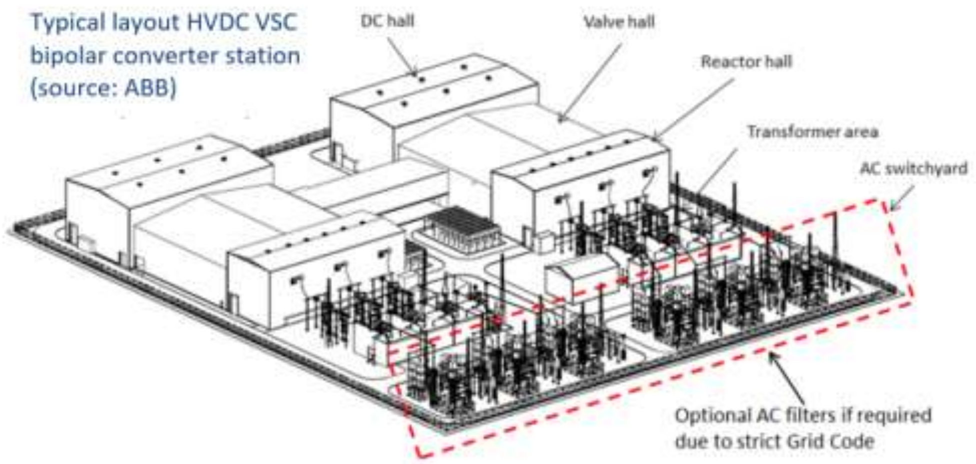



*Figure 2-9 – Typical layout of a HVDC VSC converter station and relevant space occupation.*

Since many HVDC VSC converter stations of this size (or even much more powerful) already exist, no technological criticalities are expected for the construction.

The DC link is expected to be realized by cable only (i.e., with no HVDC overhead line section/s), and this solution enables the best exploitation of the VSC converter station option, since no transient fault, such as air insulation discharges due to lightning, is expected along the link.

### *2.2.4 MV (medium voltage) Cables*

A medium voltage cable represents the ideal solution to connect the electrodes to the converter stations. The conductor cross section of the MV electrode cables is similar to the HVDC pole cable since the same DC current has to be carried, but the insulation thickness is reduced. Different configuration can be used for the MV cable, e.g., single core or multi core; the solution will be defined according to the Project optimization.

For both sites, i.e. Georgia and Romania, the sea electrode will be connected via a submarine cable link to the landing point of the HVDC cables. From the landing point to the converter station a MV underground cable line will be installed, likely in the same trenches/corridor or the HVDC cables.

Envisaged length of submarine electrode cable line are as follows:

- Georgia: between 5 and 8 km, depending on the option chosen for the electrode connection (coastal vs. marine, chapter 5.2);
- Romania: about 10 km.

### *2.2.5 Terrestrial HVDC (high voltage direct current) Transmission Cable*

The terrestrial HVDC (underground) cables will connect the submarine cable from its landing point to the converter station. In respect to submarine cables, underground cables construction foresees the use of aluminum screen/copper wires instead of lead sheath, plastic sheath as servings instead of armor and PP yarn. Same as for the submarine cable, two different types of insulation can be adopted for these terrestrial cables: MIND type (Mass Impregnated) or extruded type (XLPE). Usually, the insulation type of submarine cables and land ones of the same line is the same. The conductor can be either Aluminum or Copper but, due to thermal constraints, the copper is usually selected; Figure 2-10 present the different components of a HVDC terrestrial cable.

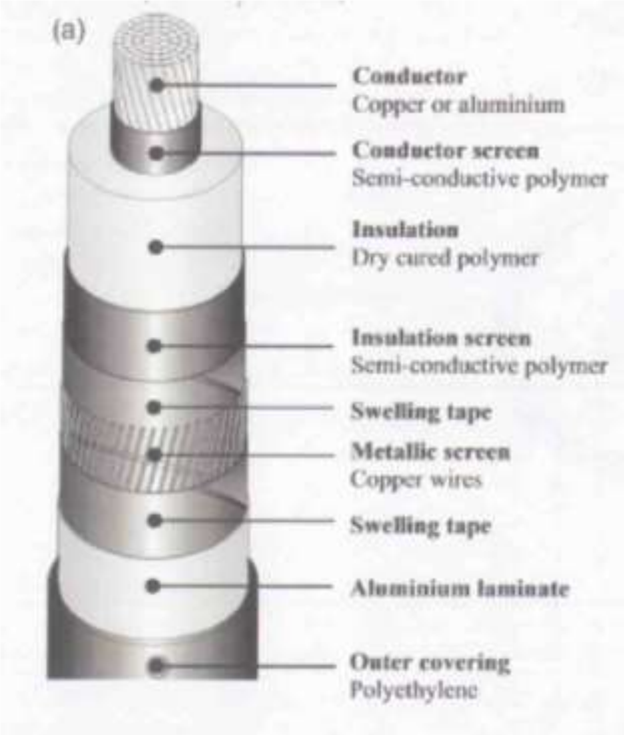



*Figure 2-10 – Typical cross section of HVDC terrestrial cable.*

The length of the HVDC cables from the submarine cable landing point to the converter stations are reported in the table below.

*Table 2-2 – Length of the HVDC underground cables.*

| GEORGIA | | |
|---|---|---|
| **Description** | **Line typology** | **Approx. Length [km]** |
| From the landing point to the converter station alternative 1 | HVDC cable | 25 |
| From the landing point to the converter station alternative 2 (see chapter 5.2 and refer to the Routing Study for more details) | HVDC cable | 17 |
| **ROMANIA** | | |
| **Description** | **Line typology** | **Approx. Length [km]** |
| From the landing point (alternative 2) to the converter station (see chapter 5.2 and refer to the Routing Study for more details) | HVDC cable | 18 |

### *2.2.6 HVAC (high voltage alternate current) OHL (overhead transmission lines)*

The terrestrial HVAC OHL cables will connect the converter station to the national transmission networks in Georgia and Romania. One OHL is expected for the Romanian side and two for the Georgia side (refer to section 3.1 for more details). The material used for this component will be of a standard overhead transmission line whereby the towers are made of steel, their foundations of concrete and the conductor material will be of steel and aluminum. The figure below is reported as an example of a standard (double circuit) HAVC overhead line.

*Figure 2-11 – Example of a standard 500 kV OHL*

## 2.3 Main Project Activities

The Construction and Operation phases of the Project can be split in several activities, described in the following sections.

### *2.3.1 Construction Phase*

**Offshore cable laying**

It involves the cables deployment on the seabed using dedicated cable laying vessels; for this Project possible vessels to be used could be similar to the Nexans Aurora CLV and Prysmian Leonardo da Vinci CLV, shown in the pictures below.


*Figure 2-12 – Nexans Aurora CLV and Prysmian Leonardo da Vinci CLV.*

The vessel example Nexans Aurora measures about 150 m long, 31 m wide and with 17,000 t loading capacity. It can accommodate 90 people of permanent and client's crew. According to the project, it can be equipped with the so-called "carousel" (drum for storage and issue of cables) with a capacity of 10,000 tons, as well as a basket for fiber-optic cable with a load capacity of 450 tons. In addition, it will receive devices for laying power cables, including laying cables in bundles, connecting and repairing cables, as well as protecting and deepening cables in trenches. Prysmian Leonardo da Vinci is about 170 mt long with a carousel capacity of 10,000 tons, 7,000 tons load capacity and equipped to conduct the deepest power cable lay up to 3000 m water depth. The vessel loads the cable at the factory in lengths of 100-200 km; each length is transported form the factory to the site and laid on the seabed.

The different cable lengths are then joined with the same vessel by means of special joints.

*Figure 2-13 – Cable Carousels/turntables. In this case, the vessel is preparing for laying of bundled laying of two power cores for DC (Cigrè).*

Small vessels can be used as guard vessels to patrol the cable line before its protection is performed. In fact, in shallower areas up to 100-150 m water depth, some sections of the cable can be protected to reduce the risk of damage due to external activities, like fishing or anchoring. The typical protection method consists in burying the cable (for example through jetting) and it can be performed using the cable laying vessel or with dedicated support vessels.

**Land approach**

It refers to the interconnection of the submarine cable with the terrestrial land approach location. There are two different solutions for protecting the cable at the interception point:

- Open-cut trench: open-cut trenching is a cable protection technique whereby the trench is cut prior to cable laying. This method is suitable for beaches that can be excavated, and it is done using standard construction equipment; therefore, it is a relatively inexpensive method.
- Conduit pipe (Horizontal Directional Drilling - HDD): this method is suitable for shores with high cliffs, hard rocks or highly erosive shoreline. In such cases, a drilling activity is required to install plastic

pipes in which the cables are pulled (one pipe for each cable). This method is quite expensive compared to open-cut trench.

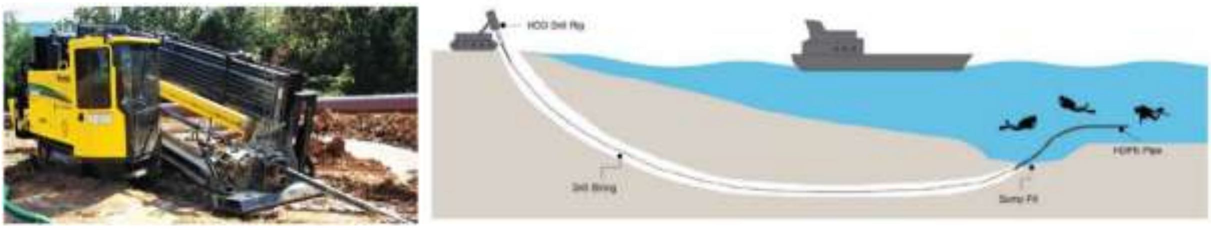


*Figure 2-14 – Drilling machine(left) and HDD profile (right).*

**Submarine cable landing, terrestrial cable installation and overhead line construction**

The submarine cable landing is the operation needed to land the subsea cable and it is performed on each side of the link (Georgia and Romania) for each cable. During this activity a portion of cable is floated to control the exact length to be pulled onshore. Once the cable reaches the landing point the buoys are then deflated.

*Figure 2-15 – Submarine cable landing operation.*

The HVDC land cable will be installed similarly to a standard HVAC cable line. Typically, two different installations can be envisaged: the cable is directly buried or it is installed in pipes. For what concern the HVAC overhead line, the construction activities are similar to that of typical HVAC lines. Both installations involve clearance of vegetation (if present), excavation, burial and the creation of temporary construction compounds and storage areas.

**Construction of the converter station**

It refers to the construction of the converter station and associated facilities/infrastructures which include clearance of vegetation (if present), excavation, temporary access points, haul roads and access roads and the creation of temporary construction compounds and storage areas.

**Construction of the electrodes (marine and coastal)**

The methods of electrode deployment vary according to the type of electrode:

- Marine electrodes (Romania side): the electrode modules are laid on the seabed by means of support vessel/s. The modules are typically pre-assembled, hence only operations for deployment on the seabed and connection via dedicated cables are needed.
- Coastal Electrodes (Georgia side): the coastal electrode in Georgia implies the construction of an artificial pond; in such case a rectangular rock berm, similar to a breakwater, will be constructed extending from the shoreline. Rock for the berm will be placed up to the high tide water level, using an excavator or front-end loader, from the shore out onto the berm. Once the pond has been constructed, the electrode components will be installed inside.

### 2.3.2 Operation Phase

**Operation of the cables**

During the operation no noise or vibrations will be emitted by the cables. On the other hand, the DC cables emit DC (static) magnetic fields that shall be under the limits prescribed by the local/international regulations (40,000 µT as per ICNIRP indication); typical values of DC magnetic field emitted by the DC power cables are in the range of few hundreds of microTesla, depending on DC current and cables configuration. There will be no DC electric field emission due to the presence of cable metallic screen.

From a thermal point of view, a negligible warming of the area/soil around by the cables is expected.

**Operation of the electrodes**

During normal operation, small amounts of electrical current will flow through the electrode to ground the system. If the transmission line stops working or requires maintenance, the full current may flow through the electrode. This will allow the transmission system to continue working until the problem is fixed. The mitigations reported in the table below will be considered in the Electrode Project Design.

*Table 2-3 – Electrode: Project Design mitigations*

| Issues | Area of Impact | Target | Physical variable | Mitigation measures |
|---|---|---|---|---|
| **Electric field** | Local | Keep electric fields low (desired level often specified within the range 1.25 – 2 V/m) to avoid harmful to the marine environment and fauna. | Current density and electric field. | ▪ Develop a proper design;<br>▪ Decrease current density in the water to avoid effects on the sea animals by increasing electrode surface/size (this can also avoid unacceptably high chlorine emissions);<br>▪ Select a proper site with rapid transition to deep water and direct access to the open sea (pond electrodes);<br>▪ Fence off the electrode area for fish and marine life (pond electrodes);<br>▪ Seclude of the active parts of the electrode, if needed (some marine electrodes are already compliant, and don't need any fencing, as the field on their active parts is very low). |
| **Magnetic field** | Local/<br>Extended | Keep magnetic fields low. | Current intensity and magnetic field. | ▪ Develop a proper design (especially for power cables). |
| **Electrolysis** | Local | Reduce the chlorine selectivity, and thus the amount of chlorine produced, and increase the oxygen evolution. | Current density in the active parts of the electrode. | ▪ Develop a proper design;<br>▪ Maintaining a low pH-value at the electrode surface by ensuring sufficient seawater exchange (movement that also disperses the chlorinated and brominated compounds formed);<br>▪ Use of proper electrode materials (MMO coated titanium is preferred). |

| Issues | Area of Impact | Target | Physical variable | Mitigation measures |
|---|---|---|---|---|
| **Stray current** | Local/<br>Extended | Reduce the corrosion-related problems. | Current and electric field intensity. | ▪ Identify an appropriate location;<br>▪ Definition of Minimum distance between the electrode site and other metallic infrastructures; interference will have to be quantitatively assessed through simulations or measurements;<br>▪ Adding more material to sacrificial anodes of impacted infrastructures;<br>▪ Introducing insulating joints along impacted infrastructures;<br>▪ Providing -if possible- impressed current cathodic protection (ICCP) systems. |

**Operation of the converter station**

During the operation of the link, the convert station will convert the DC current in AC current (and vice-versa); such conversion is performed by the converter bridge in a static way (static conversion). In respect to an HVAC station, one difference is that the converter bridge needs a cooling system that typically is one of the major sources of noise; nevertheless, the design of the system is developed so that the noise falls within the required limits. During the operation of the converter station, emissions of AC and DC electric and magnetic field, as well as radio-interference values, will be in accordance with local regulations.

**Maintenance of the infrastructures**

- **Cables:** during the operation there are no particular maintenance activities to be performed on the cables. Some inspection shall be envisaged to verify status of the cable on/under the seabed. In case of a cable damage a repair operation is needed; in such case the damage cable is replaced by a new cable length that is connected to the original cable by means of 2 repair joints.
- **Electrodes**: for the marine electrodes (Romania side) the maintenance of offshore electrodes is performed by using ROVs (Remotely Operated Vehicles) or divers, and the general status of the electrode is inspected. The maintenance of the coastal Electrodes (Georgia side) is performed very easily remaining on the ground, and, if needed, dispersing eleme**nts (i.e., the bars) can be replaced in less than one hour.**
- **Converter station:** one week a year (or every two years) has to be considered for maintenance purposes. In such period various inspections are performed on different systems of the converter stations (e.g., visual inspections, regulations, measurements, cleanings, etc).
- **HVAC overhead line:** the maintenance is similar to other standard HVAC lines.

## 2.4 Working Opportunities and Resources

### *2.4.1 Estimated number of work force and labor influx for each Country*

**Converter stations:**

- 100-200 employers for civil works (1-1.5 year);
- 70-120 workers during installation phase (1.5-2 years);
- During operations only 10-15 employers for access control, cleaning and daily operations;
- During maintenance (one week a year) 30-40 technicians.

**HVAC overhead lines:**

- 50-100 personnel during the construction;
- 40-60 personnel during conductor stringing.

Submarine Cables and Electrode: mainly offshore activities are envisaged.

### *2.4.2 Materials used for the Project*

This section provides an overview of the machineries and materials that will be used in the scope of the Project during the construction phase. The machineries will mainly be:

- Onshore: mainly excavators and trucks during civil works; mainly trucks, cranes and welding machines during installation;
- Offshore: cable installation vessel, cable support vessels, trenching/jetting machines, drilling machine (for HDD).

Below are described different material according to the Project component.

#### *2.4.2.1 Converter stations*

The construction of the converter stations will include the use of fences, materials for the construction of the different structures (e.g., control building, cooling towers, valve hall, storage for spare parts, lightning arresters, lighting poles etc.) and the technological equipment itself (transformers, HV switchgear, etc..).

The converter station area (approx. 60,000 -70,000 $m^2$) will be demarcated by a fence. Two different kinds of fence can be chosen:

- fence made of galvanized steel fabric on steel posts plus barbed wire on extension arms (typical data: 50x50 mm mesh, 3 mm wire diameter, 2.5 m height plus helical barbed wire on top);
- fence made of prefab solid panels, pillars and reinforced concrete (typical size: 2.5 m height x 0.25 m thickness).

The final choice between these two options will be made during the detailed engineering phase, generally speaking it is common practice to adopt the first option.

Within each converter station area, in addition to the conversion modules, some buildings will be erected. The foundations of different structures (e.g., cooling towers, valve hall, storage for spare parts, etc.) and the area that will host transformers and containers shall be of reinforced concrete.

The Table 2-4 below shows a rough estimation of the main materials needed for the converter station erection is shown (considering steel structure).

*Table 2-4 – Main materials needed for the converter station erection.*

| STEEL STRUCTURE | | | | |
|---|---|---|---|---|
| **Material/component** | **Weight [ton]** | **Length [m]** | **Surface [m²]** | **Volume [m³]** |
| Steel | 2300 | | | |
| Iron | 65 | | | |
| Aluminium | 20 | | | |
| Cast iron | 5 | | | |
| Concrete | 17000 | | | |
| Gravel | | | | 2500 |
| Prefab wall panels (Galvanized steel + rock wool) | | | 26000 | |
| Prefab roof panels (Galvanized steel + rock wool) | | | 11500 | |
| Fence panels | | | 3000 | |
| Fence posts | | 1200 | | |
| Barbed wire | | 16000 | | |
| Asphalt | | | | 2500 |
| PVC pipes [1] | | 7500 | | |
| Concrete pipes | | 1500 | | |

### 2.4.2.2 Submarine cable

The majority of the material used for the submarine cable (in terms of weight) is linked to the conductor, metallic sheath and armor. It is likely that the conductor will be made of aluminum in order to reduce the cable weight. The metallic sheath will be made of lead and the armor of galvanized steel.

[1] All foreseen PVC pipes are considered together, disregarding their purpose (e.g. laying of electrical cables, water drainage etc.) and their size (i.e. diameter).

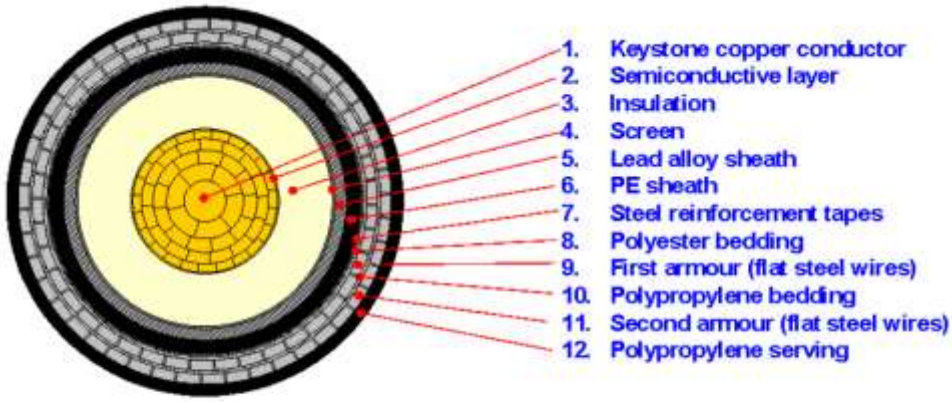



*Figure 2-16 – Example of a typical cross section of HVDC submarine cable*

### *2.4.2.3 Terrestrial cable*

The terrestrial cable is similar to the marine but a polytene sheath is used as serving (see the figure below). Similar to submarine cables, the terrestrial cables have a diameter of 120-150 mm and a weight of 30-60 kg. For underground cables, the conductor will be likely made of copper.

### *2.4.2.4 Electrodes*

For the Georgian (pond) electrode, between 50 and 70 FeSiCr bars will be probably used with each bar being approx. 2 m long. However, the majority of the material that will be used for this electrode is linked to the construction of the artificial pond. Although the pond project has to be developed, it is expected the use of armourstone, filterstone, rock filler, PVC counduit, etc., as reported in the figure below.

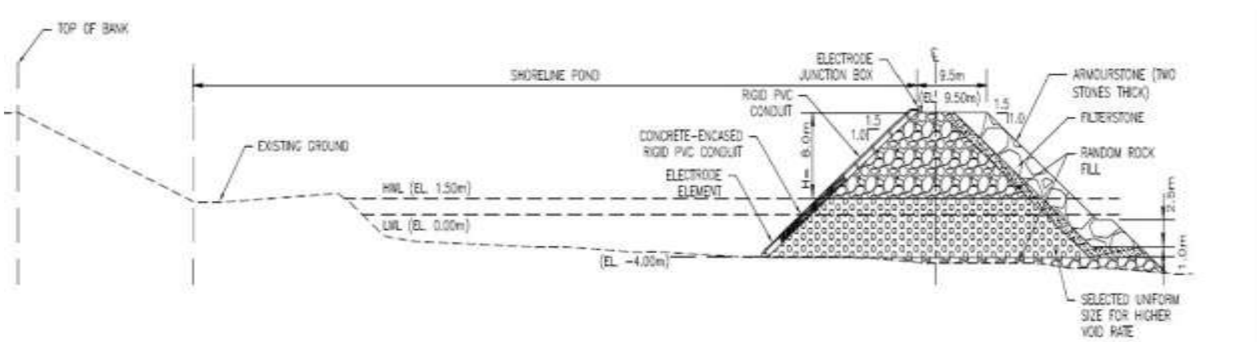



*Figure 2-17 – Example of a pond electrode*

In regard to the marine electrode (Romania side), it will be built using a titanium nets (Ti-MMO coated) with an overall dispersing area of around 1000-1500 m$^2$. Different modules will be used of approx. 20 m$^2$ each, in order to reach the total designed dispersing area. These modules are usually placed on supporting structures which can be made of different materials (including PE, fiberglass etc.), depending upon the manufacturer design. At this stage, the amount of material that will be used for the construction of the electrode cannot be estimated.

#### *2.4.2.5 Overhead power lines*

The material used for the OHL will be:

- Conductor (steel-aluminum) 30-60 T/km
- Towers
  - Structural steel: 50-75 T/km
  - Concrete for foundations: 50-85 m3/km
  - Foundation steel <10 T/km

The significant difference in the amount of material that will be used depends on type of OHL, namely single or double circuit line.

## 2.5 Project Schedule

A preliminary schedule of the Project is reported in the figure below. However, because many factors can affect the Project duration, one of the most important being the cable manufacturing capability that will be agreed with the cable manufacturer/s, this time schedule can be subjected to high variability. A more detailed time schedule will be defined along task 6 of the Feasibility Study.

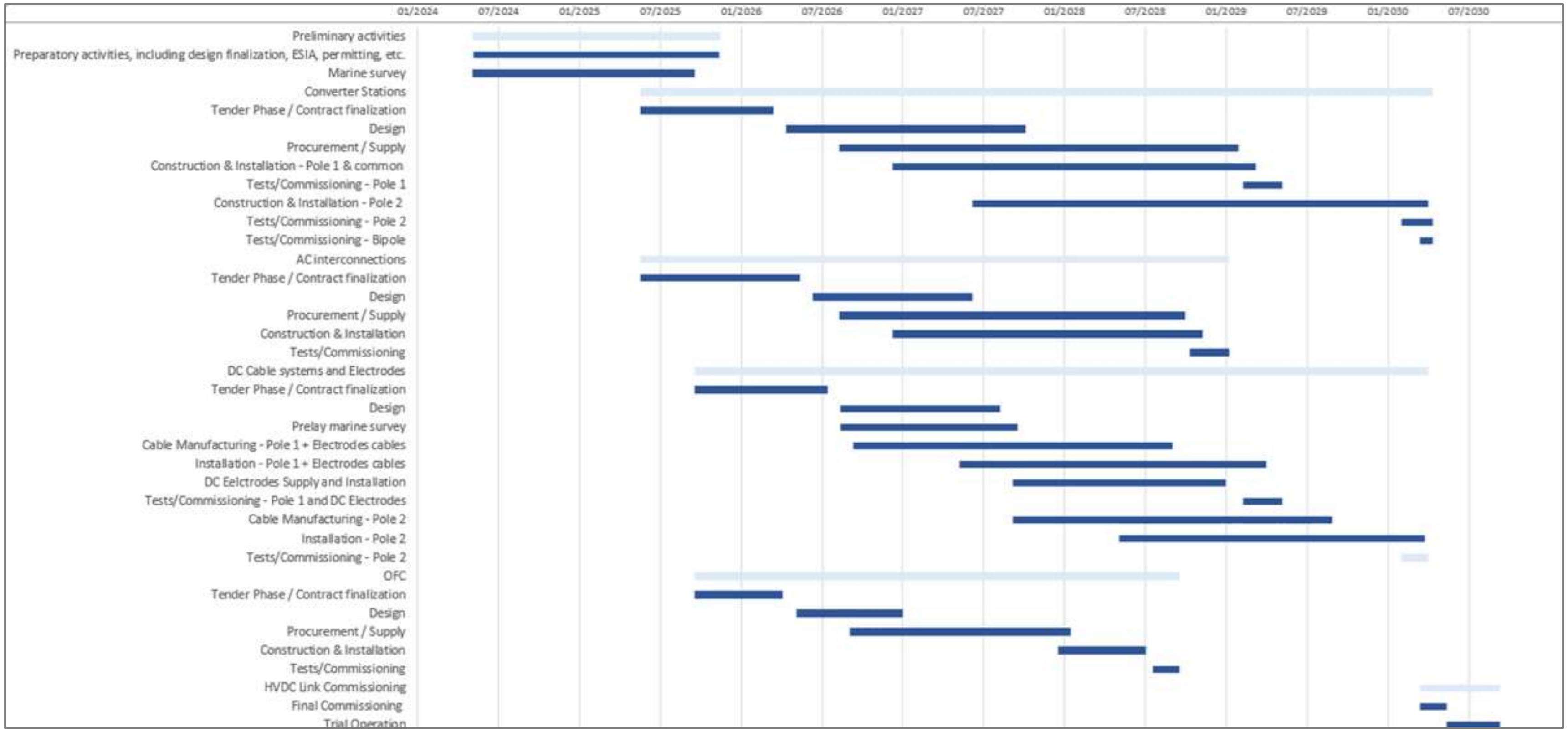



*Figure 2-18 – Preliminary schedule of the Project preparatory phase (e.g., ESIA development), construction and operation phases.*

# 3 METHODOLOGICAL APPROACH

The following sections outline the methodological approach used for the preparation of the present Scoping document.

## 3.1 Project Footprint (i.e., Area of Interest)

Four different study areas have been defined, namely **Areas of Interest (AoI)**:

- One study area for Romania;
- Two study areas for Georgia; and
- One deep-sea study area linking the two countries.

Both the onshore and offshore AoI have been already identified during the development of the Environmental and Social Screening document (documents C2011431 and C3003434), except for the second (additional) Georgian AoI.

In fact, while the Romanian and deep-sea study areas remain unvaried, the Georgian onshore AoI considered in this document comprises a new route which connects the Anaklia substation to Tskalbuto through an overhead electrical line (OHL). In the scope of the present document, the Georgian power line route that has previously been identified will be referred to as "*Main OHL*", while the new OHL will be referred to as "*Additional OHL*". Following this distinction, the buffer area that has been chosen for both the power lines which identifies their relative corridors, and so the area of interest, will be referred to as "*Main OHL AoI*" and "*Additional OHL AoI*".

Such areas are described in detail below.

### *3.1.1 The Georgian AoIs*

The Georgian Main OHL AoI has been identified through the indications and consultations with the relevant authorities (e.g., National Agency of Protected Areas, LTD Anaklia Sea Port , LEPL Maritime Transport Agency, local municipalities etc.) and includes the marine land approach and the onshore parts of the Project. It has been designed as a polygon with a 10 to 20 km width by considering the following parameters defined in consultation with the client and the relevant authorities:

- Approximative landing location;
- Approximative converter station location;
- Approximative connection with the existing line;
- The isobath of -100 m, as depth of burial of the cables for the land approach;
- The need for an electrode to be located at a sufficient distance from the HVDC cable and existing infrastructures.

The Georgian land approach and "*Main OHL AoI*" is shown in the figure below.


*Figure 3-1 – Georgian Main OHL AoI and offshore AoI for the electrode.*

The Additional OHL route requested by GSE is represented by the connection, through an overhead line, of the Anaklia converter station to the SS Tskaltubo substation with a 500 kV line, as shown below (


*Figure 3-2*) A buffer of 5 km was chosen to identify the additional AoI by considering:

- Approximative routing;
- Approximative connection with the existing line;
- Approximative converter station location.


*Figure 3-2 – The Additional Georgian OHL is represented by the green line and a 5 km buffer is reported (i.e., Additional OHL AoI) together with the Main OHL and Main OHL AoI (red line and polygon, respectively).*

### 3.1.2 The Romanian AoI

The Romanian AoI has been identified through the indications and consultations with the relevant authorities and includes the marine land approach and the onshore parts of the Project (see Figure 3-3). It has been designed as a polygon of about 20 km width, expanding offshore with an angle of about 45° and taking into account the following parameters defined in consultation with the client and the relevant authorities:

- Approximative landing location;
- Approximative converter station location;
- Approximative connection with the existing line;
- The isobath of -100 m, as depth of burial of the cables for the land approach;
- The need for an electrode to be located at a sufficient distance from the HVDC cable and existing infrastructures.

The Romanian AoI is shown in the figure below.


*Figure 3-3 – Romanian AoI, including the AoI for the electrode.*

### *3.1.3 The Deep-sea Area*

The deep-sea area represents the link between the two countries, and it was designed as a polygon sufficiently wide to avoid possible environmental constraints (if present) in the seafloor morphology (e.g., submarine canyons, mud volcanoes, etc.) which are described in detail in the Routing and Siting Study (document C3013972). Such area was designed taking into account the following parameters:

- Approximative landing locations in Georgia and Romania;
- Exclusion of the Russian and Ukrainian Exclusive Economic Zones (EEZs);
- Exclusion of the Turkish territorial waters (i.e., 12 nautical miles from the shore).

The deep-sea area is shown in the figure below.

This area also includes a portion of the Economic Exclusive Zones of Türkiye and Bulgaria.



*Figure 3-4 – The deep-sea area links Georgia and Romania.*

## 3.2 Description of International and National Legal, Regulatory, and Administrative Framework

The Project shall meet the World Bank's environmental and social standards (ESSs which are included in the Environmental and Social Framework – ESF - of the World Bank), as well as relevant European and national standards, in case they are more stringent.

International, European and National standards and relative legislation are reported for different environmental and social aspects of the Project (chapter 4).

This information was collected through an in-depth desktop analysis and the support of local experts for Georgia and Romania. Legal gaps are filled up, if possible, to build the base upon which the ESIA shall be developed in such way that satisfies requirement of both WB and National Legislation.

For Türkiye and Bulgaria, which are interested by the Project in terms of EEZs crossing, the legal framework and national legislation concerning EEZs and cable laying was retrieved trough desktop-based research and the support local Turkish experts.

## 3.3 Alternative Analysis

The purpose of the analysis of alternatives is to compare feasible alternatives to the proposed project (e.g., site, technology and design) in terms of their potential environmental and social impacts. The outcome of the alternatives analysis is the identification of the most viable and financially feasible alternatives. This approach serves to minimize adverse impacts and risks for both communities and the environment.

The alternative analysis involves the evaluation of different scenarios for the Project, including:

- "No Project" option or Zero Alternative;
- Alternative sites/corridors;
- Alternative technologies.

For the Zero Alternative analysis, the scenario in which the Project is not implemented and the relative consequences are considered and discussed.

For the alternative sites/corridors, the definition of potentially feasible corridors/sites was performed applying a routing/siting analysis including a number of environmental, social and technical criteria (called indicators) reported in detail the Routing and Siting Study (document C3013972). Following the identification of these indicators, a *least cost path* was defined. Subsequently, the best corridor which will potentially generate the lower impact on sensible receptors (for example, infrastructure' and sensitive habitat crossing, landscape view etc.) were determined. Finally, the cable experts defined the route using as much as possible the corridor as reference.

For the alternative technology analysis, different typologies of technology have been analyzed in detail and based on the Project features and possible impacts on the environment, the best option has been selected. In particular, two alternatives for the underwater cable material, for the converter station (i.e., Line Commutate Converters vs. Voltage Source Converters) and electrodes have been selected and compared.

All the above-described alternatives analysis is discussed in chapter 5.

## 3.4 Environmental and Social Baselines

The baseline aims at describing the environmental (i.e., physical and biological components) and social context prior the realization of the Project, thus, before any possible disturbance from Project activities may occur.

The environmental and social baseline was defined collecting desktop-based data that were as much site-specific as possible, by consulting scientific and grey literature, European and national environmental databases and through site visits in Georgia and Romania.

A significant amount of information was also retrieved from the Environmental and Social Screening Study previously commissioned (document C2011431). In the field where no information or only limited information were available, data were gathered through the support of local experts for both Georgia and Romania. If the target data was still not available, it was reported in the "gap's tables" (available at the end of each baseline chapter) as information to be collected in the scope of the ESIA.

Data sources for the environmental and social baseline were represented, but not limited to:

- International recognized databases (e.g., GEBCO, IUCN Red List, BirdLife International, WBG Climate Change Action Plan 2021-2025, Climatic Research Unit etc.);
- International recognized tools (e.g., Think Hazard Screening Tool, Climate and Disaster Risk Screening, etc.);
- Peer-reviewed papers (e.g., searched from databases like Google Scholar, Scopus or ISI – Web of Science, etc.);
- Grey literature (e.g., IUCN reports and/or previous ESIAs);
- Nautical charts (i.e., paper purchased and consulted from Navionics);
- Site visits for Georgia in April 2023 and August 2023 and Romania in May 2023 to evaluate the proposed project sites selected on a desktop base (already reported in the Routing and Siting Study: document C3013972).
- The comprehensive list of references is reported in the relevant section at the end of this document.

The environmental and social baseline for Georgia is reported in detail in chapter 6.1 and 6.2, the Romanian environmental and social baseline in chapter 6.3 and 6.4 and the deep-sea environmental baseline in chapter 6.5.

## 3.5 Risks and Potential Impacts Identified at the Scoping Stage

The identification of receptors and their sensitivity was based on the information gathered and collected for the development of the *Environmental and Social Baseline.*

As matter of fact, the **Projects Actions** that could potentially **affec**t some of the identified **environmental and social receptors** were assessed to **determine** primary **Impact Factors**.

The **Project Actions** are activities directly related to the Project that can generate primary pressures (Impact Factors) and, consequently, affect the current state of one or more environmental and/or social components. The **Impact Factors** are determined by the Project Actions and can be defined as potential interference sources which may positively or negatively and directly or indirectly affect the environmental/social quality status. Both **Project Actions** and **Impact Factors**, preliminarily identified within the present Scoping report, are reported in the table below.

*Table 3-1: Interrelation matrix between preliminary project actions and relative impact factors for each Project phase (i.e., construction and operation).*

| Project phase | Preliminary Project Actions | Preliminary Impact Factors |
|---|---|---|
| **Construction** | Offshore Cable laying | Coverage of the seabed |
| | | Emission of underwater noise |
| | | Emission of air pollutants and chemicals |
| | | Emission of greenhouse gases |
| | | Emission of light |
| | | Increase of marine traffic |
| | | Production of waste |
| | | Demand for goods and services |
| | | Demand for labor |
| | | Occupational Health and Safety risks |
| | Land Approach | Handling of sediments |
| | | Emission of underwater noise |
| | | Emission of air pollutants and chemicals |
| | | Emission of greenhouse gases |
| | | Emission of light |
| | | Increase of marine traffic |
| | | Production of waste |
| | | Demand for goods and services |
| | | Demand for labor |
| | | Occupational Health and Safety risks |
| | Submarine cable landing, terrestrial cable installation and overhead line construction | Consumption of water |
| | | Emission of anthropogenic noise |
| | | Emission of air pollutants and chemicals |
| | | Emission of dust |
| | | Emissions of greenhouse gases |
| | | Emission of light |
| | | Interaction with the existing structures and new traffic flows |
| | | Occupation of land |
| | | Production of waste |
| | | Removal of soil and subsoil |
| | | Removal of vegetation |
| | | Demand for goods and services |
| | | Demand for labor |
| | | Occupational Health and Safety risks |
| | Construction of the converter station | Consumption of water |
| | | Emission of anthropogenic noise |
| | | Emission of air pollutants and chemicals |
| | | Emission of dust |
| | | Emissions of greenhouse gases |
| | | Emission of light |

| Project phase | Preliminary Project Actions | Preliminary Impact Factors |
|---|---|---|
| | | Interaction with the existing structures and new traffic flows |
| | | Occupation of land |
| | | Production of waste |
| | | Removal of soil and subsoil |
| | | Removal of vegetation |
| | | Demand for goods and services |
| | | Demand for labor |
| | | Occupational Health and Safety risks |
| | Construction of the electrodes (marine and coastal) | Handling of sediments |
| | | Coverage of the seabed |
| | | Emission of underwater noise |
| | | Emission of air pollutants and chemicals |
| | | Emission of greenhouse gases |
| | | Emission of light |
| | | Increase of marine traffic |
| | | Production of waste |
| | | Demand for goods and services |
| | | Demand for labor |
| | | Occupational Health and Safety risks |
| **Operation** | Operation of the cables and electrode | Emission of electric, magnetic and/or electromagnetic fields |
| | | Interaction of the marine electrode with existing structures |
| | | Presence of the cables and electrodes |
| | | Transfer of energy and broadband data |
| | Operation of the converter station | Emission of anthropogenic noise |
| | | Emission of air pollutants and chemicals |
| | | Emissions of greenhouse gases |
| | | Emission of light |
| | | Demand for labor |
| | Maintenance of the infrastructures | Emission of anthropogenic noise |
| | | Emission of air pollutants and chemicals |
| | | Emissions of greenhouse gases |
| | | Demand for labor |

Following the identification of the preliminary Project Actions and Impact Factors, an **Impact Factors vs Environmental/Social component** interrelation matrix was produced for each project phase to preliminarily assess the presence and significance of impacts.

The list of the environmental and social components that could potentially be affected by the Projects impact factors is reported at the beginning of each preliminary impact assessment chapter.

This assessment has been carried out using a strongly precautionary approach, considering "the worst-case scenario" when no certainties were still available for the project. It is to remind, in fact, that this project is at its feasibility study stage.

Based on interrelation, when a relation between the given preliminary Impact Factor and the Environmental/Social component was identified, the potential direct and indirect impacts generated by the Black Sea Submarine Cable Project have been classified into two levels:

- **Non-significant impact;**

- **Potentially significant impact.**

While the non-significant impacts have been briefly commented by the component point of view, those classified as potentially significant have been subjected to a more thorough assessment. Such assessment, having the focus on the impact, was centered on the description of the effects of the Impact Factor on the environmental and social components and included the proposition of the main **mitigation measures** to avoid/minimize the effects of the Project.

Finally, the **hazards associated with the Project Actions were considered.**

The analysis to determine the hazards was developed according to the following main STEPS:

- Identification of the dangers associated with the Project;
- Assessment of the applicability of the hazards to the planned works (i.e., the events that could have a more or less probability to occur);
- Estimate of the possible consequences of the events.

Following the analysis, a series of accidental events, which could negatively affect the construction and/or operation phases, have been identified and grouped into 6 hazard categories:

- Anthropogenic hazards;
- Technological hazards;
- Natural hazards;
- Environmental hazards;
- Hazards related to the presence of dangerous substances;
- Health and Safety Hazards.

**Anthropogenic Hazards**

Man-made hazards include all the negative events linked to human initiatives and activities, both voluntary and involuntary, such as theft, actions aimed at damaging the plants, terroristic attacks, damage to the cable duct by anchors or trawling, collisions between vessels during construction or maintenance operations, road accidents due to the proximity of roads and urban areas. The main consequences of man-made hazards concern economic damage caused by the loss of assets or damage to them.

**Technological Hazards**

The term "technological hazards" refers both to events linked to the malfunctioning of the assets (which can derive, for example, from mechanical breakdowns), and to process interruptions due to variations of parameters in sensitive areas of the substations (which could lead, in the most serious cases, to fires and explosions).

**Natural Hazards**

The events that are grouped under natural hazards refer to environmental manifestations of particular relevance and intensity, such as submarine landslide, earthquakes, floods and wildfires.

**Environmental Hazards**

Within this category fall all the events which could lead to an alteration of the habitat with consequent negative impact on the marine and/or terrestrial flora and fauna, for example the spill of contaminants into the environment from working vehicles (both vehicles than naval units) during the construction phases of the maintenance operations.

**Hazards related to the presence of dangerous substances**

Both during construction and during operation, there could be a leak of dangerous substances and mixtures, especially diesel fuel, from the onshore construction sites. Such leak could generate explosions and fires with consequent potential damage to the systems, personnel and the surrounding environment.

**Health and Safety Hazards**

It includes all the events that could occur in both onshore and offshore part of the cable and related infrastructures, both under construction and in operation, with more or less serious consequences on the health and safety of workers. The consequences of such events include all possible damages to the personnel employed, such as injuries or accidents.

The preliminary impact assessment and analysis related to the project risks are reported in chapter 7.

## 3.6 Stakeholder Engagement and Consultation Undertaken During Scoping

A primary identification of the Georgian and Romanian stakeholders was based on the Environmental and Social Screening Study (document C2011431) which has divided the stakeholders in seven main categories, namely:

- Institutions
- Civil society
- Media
- Workers & trade unions
- Contractors, suppliers and business partners
- Businesses
- Local community

For each category, various sub-groups have been then identified (see chapter 8 for details).

The preliminary stakeholder engagement undertaken during scoping was organized by GSE through in-person and on-line meetings and consultations with the relevant Georgian state stakeholders and in-person meeting with Romanian (Transelectra representatives) stakeholders. Following these meetings, social local experts for both Georgia and Romania held a number of interviews to representatives (e.g., NGOs, local political parties, associations, etc.) of local communities, collect their expectations and concerns about the Project implementation (see chapter 8 for details).

# 4 LEGAL, REGULATORY, AND ADMINISTRATIVE FRAMEWORK

The legal framework that is relevant to the Project is presented in the following sections.

## 4.1 International Standards

### *4.1.1 World Bank Environmental and Social Standards*

The current environmental and social policies of the World Bank (WB), known as the "Safeguard Policies," provide a mechanism for managing environmental and social risks and adverse impacts and provide a framework for consultation with communities and for public disclosure. According to its Safeguard Policies, the World Bank Group believes that sustainable development is a fundamental aspect of sound business management. The WB is committed to support borrowers in the development and implementation of projects that are environmentally and socially sustainable, and to enhance the capacity of Borrowers' environmental and social frameworks to assess and manage the environmental and social risks and impacts of projects.

In order to translate a sustainable development into successful practical outcomes, the WB has defined specific Environmental and Social Standards (ESSs), which are designed to avoid, minimize, reduce or mitigate the adverse environmental and social risks and impacts of projects.

There are 10 ESSs which establish requirements for the borrowers to identify, assess, and control environmental and social risks and impacts of Bank-supported projects.

In the scope of the Project the ESSs to be considered are:

- **ESSs 1**: Assessment and Management of Environmental and Social Risks and Impacts;
- **ESSs 2:** Labor and Working Conditions;
- **ESSs 3:** Resource Efficiency and Pollution Prevention and Management;
- **ESSs 4:** Community Health and Safety;
- **ESSs 5:** Land Acquisition, Restrictions on Land Use and Involuntary Resettlement;
- **ESSs 6:** Biodiversity Conservation and Sustainable Management of Living Natural Resources;
- **ESSs 8:** Cultural Heritage; and
- **ESSs 10:** Stakeholder Engagement and Information Disclosure.

The World Bank Group's Environmental, Health and Safety Guidelines for ESIA are also applicable. They include general recommendations for all types of projects and specific guidance for Electric Power Transmission and Distribution sector.

The Project shall meet the Bank's environmental and social standards, as well as relevant Georgian and Romanian legislation if it is more stringent.

Despite the fact that the relevant legislation of Georgia covers almost all aspects required for such large-scale developing projects, there exist some gap between international standards and the applicable legislation. These specific discrepancies shall be taken into consideration during the project's ESIA to comply with both, Georgian national regulatory requirements and the international rules and standards

– the World Bank's ESF. The identified gaps as well as the recommendations for filling the gaps shall be presented into the project's ESIA.

Therefore, the ESIA shall be developed in such way that satisfies requirement of both organizations – NEA/MEPA and the World Bank and should include amendments addressing comments received from these organizations. The same approach shall be applied to the Romanian side as well.

Some of the most important environmental parameters and guidelines to consider in the scope of the Project are:

- **Air Emissions and Ambient Air Quality**: for this parameter the WBG refers to the World Health Organization guidelines (WHO) that has recently (2021) updated the air quality guidelines for each air quality parameter;
- **Noise** Thresholds: for this parameter the WBG refers to the WHO guidelines that targets sensitive key receptors with relative noise thresholders;
- **Wastewater and Ambient Water Quality**: for these parameters the WBG refers to the WHO guidelines for drinking water; to the EU, 1975 – Bathing water quality (EU Directive 76/160/EEC) and US-EPA, 1972 – Clean Water Act (CWA), for river water quality and to the EU, 1991 - Urban Waste Water Treatment (EU Directives 91/271/EEC & 98/15/EEC). (s) for sensitive (eutrophication) areas only; upper limits applies to smaller systems (i.e. 10 000 - 100 000 population equivalents). WB, 1998 - Pollution Prevention and Abatement Handbook for effluent discharge guidelines;
- **Soil and Marine Sediment** Pollutant Thresholds: for this parameter the WBG refers to the *Canadian Sediment Quality Guidelines for the Protection of Aquatic Life* which were developed by the Canadian Council of Ministers of the Environment as broadly protective tools to support the functioning of healthy aquatic ecosystems (CCME, 2001);
- Guidelines for **Assessing the Impact of Climate Change**: the World Bank Group made a commitment to align all its financing operations with the goals of the Paris Agreement in its Climate Change Action Plan 2021-2025. WBG refers to the guidelines and framework suggested by the Sabin Center for Climate Change Law – Columbia Law School (NYC, US).
- **Electromagnetism:** 40,000 µT according to the International Commission on Non-Ionizing Radiation Protection – ICNIRP - guidelines.

### *4.1.2 European Environmental and Social Standards*

The EU environmental legislation comprises approximately 300 legal instruments, mostly in the form of Directives, covering environmental protection, pollution control and other activities, production processes, procedures and procedural rights as well as products.

The key EU environmental directives that are considered to be most relevant to the project include:

- European Directive 2011/92/EUon Environmental Impact Assessment--EIA Directive, 2011);
- EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (Natura 2000) --the Habitats Directive, 2013. Nature protection laws are consistent with the Habitats Directive;

- EC Directive 2009/147/EC on the Conservation of Wild Birds—the Birds Directive, amended 2009. Similarly, nature protection is consistent with the Birds Directive.

## 4.2 Relevant Conventions/Treaties: International (e.g., Ramsar, Espoo, etc.) and Regional (concluded between Black Sea Riparian countries)

### *4.2.1 Georgian International Conventions and Agreements*

A number of international laws and conventions have been ratified by Georgia. The following are potentially relevant for this Project:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973);
- Vienna Convention for the Protection of the Ozone Layer (1985);
- Aarhus Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (1998) (Georgia law and World Bank requirements for disclosure and public participation comply with this Convention);
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention; CMS) (1979);
- Agreement on the Conservation of Bats in Europe (EUROBATS) (2001);
- Agreement on the Conservation of African-Eurasian Migratory Waterbirds (2001);
- UN (Rio) Convention on Biological Diversity Rio de Janeiro (1992);
- Paris Convention on the Protection of the World Cultural and Natural Heritage (1972);
- European Convention on the Protection of the Archaeological Heritage (1992);
- Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979);
- Convention on Wetlands of International Importance, Particularly Suitable for Waterfowl Habitat, Ramsar (1971);
- Convention of European and Mediterranean States on Major Disasters (1987).
- United Nations Convention on the Law of the Sea (UNCLOS) (1982);
- Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention; 1972; universal);
- European Landscape Convention, 2000.
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989.
- Convention for the Safeguarding of Intangible Cultural Heritage, 2003.
- Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 2000.
- Convention to Combat Desertification, 1994.
- UN Framework Convention on Climate Change, Rio de Janeiro, 1992.

- Framework Convention on Climate Change, Kyoto Protocol, 1997.
- Vienna Convention for the Protection of the Ozone Layer, 1985.
- Montreal Protocol on Substances That Deplete the Ozone Layer and amendments made in London 1990,
- Copenhagen 1992, Vienna 1995, Montreal 1997, and Beijing, 1999.
- Geneva Convention on Long-Range Transboundary Air Pollution, 1979.
- Stockholm Convention on Persistent Organic Pollutants, 2001.
- Rotterdam Convention on the Prior Informed Contest for Certain Hazardous Chemicals and Pesticides in International Trade, 1998.
- On Water Quality for Human Consumption (Council Directive).

In 1992, Georgia signed the Convention on the Protection of the Black Sea from Pollution in Bucharest on the need to protect the Black Sea. After the signing of this convention, the **Black Sea environmental program** (BSEP) was prepared, which with other international organizations, including the World Bank, the United Nations Development Program (UNDP) and the United Nations Environment Program (UNEP), jointly established the Global Environment Facility (GEF).

Two main achievements of the Black Sea Environmental Program (BSEP) were: "**Black Sea Strategic Action Plan**" adoption on October 31, 1996 of the Bucharest Convention by the signatory countries and the establishment of the "**Permanent Secretariat of the Black Sea Pollution Protection Commission**" (BSC PS) in Istanbul in 2000, whose members are representatives of the environmental protection ministries of the Black Sea countries they are. The Permanent Secretariat works on issues such as pollution source identification and pollution control assessment of results, biodiversity monitoring and surveillance of fish species, coastal zone integrated management, impact of maritime transport on the environment and its safety.

Georgia is also a **signatory to the Bern Convention on the Conservation of European Wildlife and Natural Habitats (**1979), which highlights the conservation of endangered species and their habitats, including migratory species. **Under the Convention**, **Georgia** is required to **establish** and maintain “Areas of Special Conservation Interest” (ASCI), also known as “**Emerald Sites**” (known in the EU as “Natura 2000” sites), which collectively comprise the “Emerald Network. The Habitats Directive and the Birds Directive establish requirements for assessing potential adverse effects on Emerald Network sites (in the European Union, on Natura 2000 sites) and require the implementation of measures to reduce potential impacts to acceptable levels, and to offset losses of valuable biodiversity.

In 2014, Georgia entered into an Association Agreement with the EU, and this agreement requires that environmental and social laws of Georgia must comply with EU relevant legislation. Therefore, the Project shall meet the requirements of EN 50341-1-2012 (Euro-Norms) some of which are mentioned.

In addition, Georgia has ratified a number of core labor standards of the International Labour Organization (ILO), including the following:

- Forced labor (C105);
- Child Labor (C182);
- Discrimination (C111);

- Freedom of Association and the Right to Organize (C87);
- Equal Remuneration (C100);
- Minimum Age (C138).

### *4.2.2 Romania International Conventions and Agreements*

A number of international laws and conventions have been ratified by Romania. The following are potentially relevant for this project:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora (1973);
- Vienna Convention for the Protection of the Ozone Layer (1985);
- Convention on Access to Information, Public Participation in Decision Making and Access to Justice in Environmental Matters (1998) (Romania law and World Bank requirements for disclosure and public participation comply with this Convention);
- Convention on the Conservation of Migratory Species of Wild Animals (1979);
- Agreement on the Conservation of Bats in Europe (EUROBATS) (2001);
- Agreement on the Conservation of African-Eurasian Migratory Waterbirds (2001);
- UN (Rio) Convention on Biological Diversity (1992);
- Paris Convention on the Protection of the World Cultural and Natural Heritage (1972);
- European Convention on the Protection of the Archaeological Heritage (1992);
- Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979);
- United Nations Convention on the Law of the Sea (UNCLOS) (1982);
- Convention on Environmental Impact Assessment in a Transboundary Context (Espoo) (1991).

In 1992, Romania signed the Convention on the Protection of the Black Sea from Pollution in Bucharest on the need to protect the Black Sea. General obligations of the Contracting Parties are to prevent, reduce and control the pollution in the Black Sea in order to protect and preserve the marine environment and to provide legal framework for co-operation and concerted actions to fulfil this obligation. After the signing of this convention, the **Black Sea environmental program** (BSEP) was prepared, which with other international organizations, including the World Bank, the United Nations Development Program (UNDP) and the United Nations Environment Program (UNEP), jointly established the Global Environment Facility (GEF).

Two main achievements of the Black Sea Environmental Program (BSEP) were: "**Black Sea Strategic Action Plan**" adoption on October 31, 1996 of the Bucharest Convention by the signatory countries and the establishment of the "**Permanent Secretariat of the Black Sea Pollution Protection Commission**" (BSC PS) in Istanbul in 2000, whose members are representatives of the environmental protection ministries of the Black Sea countries they are. The Permanent Secretariat works on issues such as pollution source identification and pollution control assessment of results, biodiversity monitoring and surveillance of fish species, coastal zone integrated management, impact of maritime transport on the environment and its safety.

Romania is also a **signatory to the Bern Convention on the Conservation of European Wildlife and Natural Habitats (**1979), which highlights the conservation of endangered species and their habitats, including migratory species. **Under the Convention**, during the 2001, **Romania started the "Emerald Network Pilot Project in Romania"** to elaborate and propose the "Areas of Special Conservation Interest" (ASCI), also known as "**Emerald Sites**" (known in the EU as "Natura 2000" sites), which collectively comprise the "Emerald Network. The Habitats Directive and the Birds Directive establish requirements for assessing potential adverse effects on Emerald Network sites (in the European Union, on Natura 2000 sites) and require the implementation of measures to reduce potential impacts to acceptable levels, and to offset losses of valuable biodiversity. At the present, 606 Emerald Sites have established in Romania (Romania (europa.eu).

In addition, Romania, as a founder member of the International Labour Organization (ILO), has ratified a number of core labor standards of the ILO, including the following:

- Forced labor (C105);
- Child Labor (C182);
- Discrimination (C111);
- Freedom of Association and the Right to Organize (C87);
- Equal Remuneration (C100);
- Minimum Age (C138).

## 4.3 National Legislation

### *4.3.1 Georgian National Legislation and Permitting Concerning the Cable Project and ESIA framework*

**Georgia's legal framework for environmental protection** is based on the Constitution of Georgia. Though the Constitution does not directly address environmental matters, it does confirm the right of any person to live in a healthy environment, use the natural and cultural environment, at the same time obliging any person to take care of the natural and cultural environment. The Constitution also establishes the legal framework that guarantees public access to information, stating that an individual has the right to obtain full, unbiased, and timely information regarding his or her living environment.

Under the Constitution, the legal framework includes environmental and labor laws, international agreements, subordinate legislation, normative acts, presidential orders and governmental decrees, ministerial orders, instructions and regulations. In addition to the national legal framework, Georgia is signatory to a number of international conventions, including several related to environmental and social protection.

The requirements of the national legislation of Georgia on environmental assessment are based on the Law of Georgia on Environmental Assessment Code of Georgia (Environmental assessment code adopted on 21.06.2017, last amended on 29.06.2023).

The "Environmental Assessment Code" guides the evaluation of how potential projects can affect environmental and social resources. Administered by the Ministry of Environmental Protection and Agriculture of Georgia, this Code harmonizes Georgian environmental legislation with European legislation.

The Code defines that high voltage power transmission lines (more than 110 kV) require Environmental Assessment and issuance of an Environmental Decision/permit by the LEPL National Environmental Agency (NEA) which is under the Ministry of Environmental Protection and Agriculture (MEPA). This procedure includes scoping, impact assessment, disclosure of information and public consultation on both levels, expert examination, and permitting.

The Georgian relevant legislation on environmental and social issues is reported in detail in Annex 1 of the present report.

**EIA Procedure** (Environmental and Social Impact Assessment for projects) is performed by submitting the EIA report (paper and electronic copies) to the LEPL National Environmental Agency.

The Proponent will hold a series of meetings engaging with all the identified stakeholders, which may include government agencies, local authorities, nongovernmental organizations, or citizens. Following the meetings, the Proponent will submit to the Ministry of Environmental Protection and Agriculture a summary of all comments and discussions during the meetings together with a comment-response document. The public consultation/ESIA disclosure meetings which are the critical part of ESIA discussion, conducts LEPL Environmental Information and Education Centre (MEPA) with GSE and consultants/ESIA authors participation. All Q/A and comments raised at the meetings shall be considered and responded adequately by the Client (GSE). A copy of all written comments, the meeting summary, and the comment-response document will be included in the final ESIA as an appendix.

Application for the environmental permit shall be prepared, submitted, and progressed by the Client (GSE) with the assistance of the consultant.

Construction of an overhead or underground power transmission cable with the capacity of 220kV or more and with the length greater than 15km is subject to EIA and environmental permitting. However, construction and operation of an underwater power transmission cable is not listed among activities subject to EIA or those subject to environmental screening with the purpose to identify need for EIA. Therefore, national law does not require any environmental due diligence regarding underwater power transmission cables.

Finally, the final EIA will be submitted to the Ministry of Environmental Protection and Agriculture and made available to the public, along with a project location map, an executive summary, of the planned development, reports on emissions and allowable limits. The permit will then be issued or denied within 55 days from registration of the submission.

### *4.3.2 Georgian Institutions Mandated to Administer Environmental, Social, Health and Safety Aspects Relevant to The Cable Project*

The **Ministry of Environmental Protection and Agriculture of Georgia** is primarily responsible for environmental protection issues. As the competent authority, the Ministry’s responsibilities include:

- To intermit, limit, or stop any activity having or likely to have adverse impact on the environment, as well as unreasonable use of natural resources;
- To review and approve environmental and social assessments and to issue a series of licenses and permits, including for environmental impact;
- To control the implementation of mitigation measures by the developer, which in this case is GSE;

- To receive free and unrestricted information from the developer about the use of natural resources, monitoring systems, waste management, etc., and explanations from authorities concerned with the project;
- To ensure public participation in environmental the decision-making process. One of the main elements is that public participation has to be ensured at all stages of decision-making, not only at the time the ESIA report is prepared and disclosed.

There are several key agencies within the Ministry of Environmental Protection and Agriculture.

**LEPL Agency of Protected Areas**. This Agency is responsible of controlling, preserve, rehabilitate and protect state reserves, national parks, natural monuments, managed reserves, protected landscapes, biosphere reserves, world heritage districts and wetlands of international importance.

**LEPL National Environmental Agency.** It is responsible for preparing informational documents, forecasts and warnings regarding to existing and expected hydro-meteorological and geodynamic processes, also environment pollution conditions in order to provide state security, existing and expected hydro meteorological forecasting of rivers, water reserves and the Black Sea territorial waters, to assess conditions of geodynamic processes, engineering and geo-ecological conditions of environment and to prepare and spread information on environmental conditions, to create database of engineering infrastructure of coastal zone, to manage united state fund information on minerals, to establish and manage informational fund in geological, geodesic, cartographic and land resources state fund, , to inventor and register industrial and scientific geological activities, to create and renew state balance and create database on mineral deposits and exposures, to create environmental information database, to monitor coastal zone, to provide civil aviation with meteorological information.

**LEPL The State Sub-Agency Department of Environmental Supervision**. This Agency monitors and enforces environmental laws and permit requirements, reviews reports submitted by permittees/licensees, and plans and coordinates state control and oversight of permittees/licensees. The Inspectorate periodically issues reports on its activities, prepares informational documents, forecasts, warnings regarding, and controls the implementation of international commitments related to environment protection. The Parliamentary Committee on Environment is in charge of legislative activities.

**LEPL National Forestry Agency**. The Agency main goals include forest maintenance and reforestation, and sustainable use of components of biological diversity in the forest. The Agency is responsible for forest fund management, regulation of forest management and implementation of forest inventory.

Other governmental entities that will play a role in the process for the Project, include but are not limited to:

- LEPL National Agency for Cultural Heritage Preservation, of Georgia (NACHPG) it is the Georgian government agency responsible for preservation, protection, research and promotion of the cultural heritage of the country and represents the only organization issuing all orders and decrees related to cultural heritage legislation. NACHP is responsible for any type of permits and approvals for construction purposes;
- Ministry of Labor, Health and Social Affairs; it ensures sustainable development of human capital through elaborating and implementing effective national health and social policies;
- National Agency of Public Registry. The Agency plays an important role both in developing and realizing the resettlement action plan. At the stage of developing the resettlement action plan, when

the land owners/users are identified and their property rights are specified, the documents proving the property are to be obtained. The materials preserved with the archives of the territorial registration offices are an important source for the owners who have to legalize their rights to property, but have no full supporting documentation at hand, to obtain the documents proving their land property rights. The role of the National Agency of Public Registry in realizing the resettlement action plan is even more important, as under the Law of Georgia —On Public Registry, the National Agency of Public Registry is the registering body discharging the public and legal authorization set forth by the law, which registers the property right of the lands of the affected persons (PAPs) (termed as the Primary registration' as per the resettlement action plan terminology) and registering the legal act of transferring the property right from the owner to the state (‘Secondary registration').

- Property Rights Recognition Commission. Under the Law of Georgia on Recognition of the Property Ownership Rights Regarding the Land Plots Owned (Used) by Physical Persons or Legal entities, Property Rights Recognition Commission verifies and authorizes application of ownership for registration with the National Agency of Public Registry. The agency authorizes application of only those PAPs, who are not registered but have residential land or agricultural plots adjacent to the residential land (non-rightful land owners, according to definition of Georgian regulations);
- Georgian State Electrosystem (GSE), which is the implementing agency for the Project. GSE is responsible for OHL construction as well as land acquisition and resettlement of the Project Affected People (PAPs). GSE is assisted by a number of other government departments and private agencies in the design, construction and operation of the Project. Pursuant to the active legislation, National Agency of Public Registry (above described) within the Ministry of Justice is in charge of the recognition of ownership rights of rightful owners and registration of ownership rights. The local governments at municipal levels are involved in the legalization of land plots, land acquisition and resettlement. The Ministry of Environmental Protection and Agriculture is responsible for environmental issues;
- Village and Self-governing unit. Self-governing unit is the executive branch of self-government headed by Representative of Mayor. Representative of mayor has the primary role in the process of legalization and registration of land plots. Representative of mayor confirms ownership of affected land plots, parameters of land plots and endorses the cadastral maps and related data prepared for case of legalization. Representative of mayor plays important role for legalization of non-rightful owners (owners in possession before the enactment of current law on privatization of land in Georgia without prior permission of the government). Self-governing unit has power to authorize details of the occupied land plot and verify its usage pattern as the first-hand verification and authorization for further consideration in the Property Rights Registration Commission as a basic step for registration with the Public Registry;
- Sakrebulo is the representative branch of self-government at municipal and village level. The village/municipal level Sakrebulo has now less involvement in the process of legalization of legalizable land plots.

### *4.3.3 Romania National Legislation and Permitting Concerning the Cable Project and ESIA framework*

The national environmental legislation is based on EU standards and sets four general principles of environmental policy (polluter-pays, integrated monitoring, sustainable development, NGOs and public participation, international cooperation, rehabilitation of degraded areas). It also adopts the general ways for the enforcement of these principles, such as: harmonization of environmental policies and economic and social development programs of the territory, correlation between special and environmental development, compulsory use of the environmental permitting procedure for the economic and social activities with significant environmental impacts, use of economic incentives. The legal framework for environmental protection and related activities includes the Governmental Emergency Ordinance 195/2005 on the protection of the environment approved by Law no.265/2006, on the basis of which different type of operation permits is granted.

The Romanian environmental protection legislation suffered significant updates in the recent years, reflecting the changes in the EU legislation as well as the new EC guidance documents. Significant changes in the national legislation are also expected in the near future in relation to the Appropriate Assessment (impact on Natura 2000 Areas).

The Romanian relevant legislation on environmental and social issues is reported in detail in Annex 1 of the present report.

In the light of the foreseeable changes for the AA legislation, it is likely that EPA, conducting the permitting phase, will request a full AA procedure (with the elaboration of an Appropriate Assessment AA Report).

The submarine cable project needs to undergo the environmental permitting, which is to be done in two phases (Strategic Environmental Assessment & Environmental Impact Assessment). Environmental permitting includes stakeholders' consultations /steps agreed through the Aarhus Convention (ratified by Romania through Law 86/2000 and invoked in the proceedings of the Government Decision no. 878 from 28 July 2005 regarding the access of public to information on the environment) and transboundary stakeholder consultation and per the Espoo Convention (ratified by Romania through Law 22 from 22 February 2001)

**SEA Procedure** (Strategic Environmental Assessment for plans & programs) is conducted in Romania based on Government Decision no. 1076/2004. The SEA legislation in Romania is expected to be modified following the amending of the SEA Directive[2]. In recent years, the European Commission has started a consultation process with a view to revising the SEA Directive, but no visible progress has been made during the pandemics. Changes to the GD no. 1076/2004 are not likely to occur during 2023.

**EIA Procedure** (Environmental Impact Assessment for projects) is performed as per "the Revised EIA Directive" (Directive 2014/52/EU). The new directive was transposed in the Romanian legislation by the Law no. 292/2018. The law introduced several changes both in the EIA procedure as well as in the content of the EIA Report. The EIA procedure becomes more coherent (e.g., AA procedure is conducted within the EIA Procedure) and unitary (e.g., the need for a water permit is decided within the screening stage of the EIA procedure). Also, new requirements (e.g., climate change assessment) need to be covered in the EIA Report.

The accomplishment of full EIA on which basis the environmental agreement would be issued, is mandatory for all projects listed in Appendix I of Law no.292 / 2018 on the evaluation of the impact of certain public and private projects on the environment, as well as all projects proposed for the coastal zone and those proposed in protected hydro-geological areas. Projects listed in Appendix II of the same

[2] Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment

normative act are subject to the screening procedure. The result of the screening procedure is a decision based on which the project is further subject to the EIA or not. The current regulations require that the information provided by the developer of the EIA process shall include the measures envisaged in order to avoid, reduce and where possible, offset the significant adverse effects.

**AA Procedure** (Appropriate Assessment for plans & projects) is conducted in Romania based on the Environment Ministry Order (MO) no. 19/2010. Order no. 19/2010 was modified in 2020 by Environment Ministry Order no. 262. The changes introduced by MO no. 262/2020 are exclusively related to the AA procedure, as the requirements foreseen for the AA Report were not changed. The changes are mainly generated by the enforcement of Law no. 292/2018. As an example, the Natura 2000 permit was abrogated as the AA procedure cannot be anymore conducted independently, but only under SEA or EIA procedures.

It is expected that the new EC Guidance on the application of Article 6(3) and 6(4) of the Habitats Directive[3] generates further regulatory changes. The significant changes that will be introduced by the new legislation will include:

- A general methodological guideline which:
  - Introduce a new procedural stage (similar to EIA Law no. 292/2018): "Initial assessment". This is the first stage of the procedure which needs to identify the Natura 2000 sites likely to be affected by a project, based on four criteria: i) Natura 2000 site is intersected by the proposed project; ii) Natura 2000 site is intersected by the project's area of influence; iii) Natura 2000 site is hosting species with high mobility that can reach the project site; iv) The proposed project is intersecting an ecological corridor to which Natura 2000 sites are connected;
  - Significance of impact is to be determined at the screening stage and therefore the Presentation Memoire needs to be more technical and more detailed that previously;
  - Prevention, avoidance and mitigation measures are not accepted in the Screening stage. If there is a need for such measures, they need to be analysed and proposed in the AA Report (long AA procedure have to be conducted);
  - Field surveys and the methodologies to conduct the impact assessment needs to be presented in more details in the Scoping report;
  - Impact assessment is conducted at the level of each parameter (of the conservation status) for each habitat / species. All species needs to be assessed, not only the ones likely to be affected;
  - Significance of impacts have to consider very ambitious significance thresholds (for some habitats no loss is accepted; for others habitats any loss >1% should be considered significant);
  - Cumulative impact is assessed at the level of the entire Natura 2000 site as the conservation objectives, parameters and targets are set for the entire site;
  - All proposed measures have to be SMART (specific, measurable, applicable, relevant and time bound).

[3] Revised methodological guidance on Article 6(3) and (4) of the Habitats Directive 92/43/EEC: https://ec.europa.eu/environment/nature/natura2000/management/pdf/methodological-guidance_2021-10/EN.pdf

- A specific methodological guideline which:
  - Details the specific requirements for the energy projects (the specific guideline include four sectors: transportation, energy, mining, plans);
  - Provide some methodological guidance on how to conduct the assessment.

These requirements are already applied in the AA Reports prepared for the EU financed projects. It usually results in an increase of resources allocated (increase of field activities, increase of duration for elaboration, increase of costs).

#### *4.3.4 Romanian Institutions Mandated to Administer Environmental, Social, Health and Safety Aspects Relevant to The Cable Project*

The main institutions with which the project developer may interact during the project development may be the **Ministry of Environment/National Environmental Protection Agency** (considering that the project will be declared of national importance) and the Work inspection inspectorate, on the social side, especially during the construction and operation phases.

**Ministry of Environment and Forests (MoEF)**

The MoEF is the main institution responsible for the development of general policy and legislation in the areas of environmental management, water resources, and forestry, as well as monitoring and enforcement of policy implementation, and collection and public disclosure of data on the state of the environment. Its organizational structure spans both technical and administrative functions.

Administration of the ministry is the responsibility of a General Secretary supported by two deputy general secretaries and fiduciary units. The main performance and accountability mechanism at senior management level is the Ministry College which meets weekly or bi-monthly, is chaired by the Minister, and comprises all senior managers and, as well as the executive directors of the affiliated agencies.

**National Environmental Protection Agency (NEPA)**

While the MoEF is responsible for policy-making and planning, operational functions (implementation, monitoring and enforcement) are delegated to territorial agencies, the National Environmental Protection Agency (NEPA) and National Environmental Guard (NEG).

NEPA, as the environmental policy implementation arm of the central government, is a special agency responsible for enforcement and reporting on the Romania ‘s state of the environment. It carries out these functions through the technical coordination of territorial environmental protection authorities at local level.

The main functions of the environment protection agency structure include:

- Issuing permits for all activities with a potential impact on the environment;
- Collaborating with entities in charge of environmental inspections;
- Monitoring environmental quality with a particular focus on ambient air quality and radioactivity. and
- Reporting periodically on the state of the environment to MoEF.

**The National Agency for Natural Protected Areas (ANANP)** is a public institution with legal personality, who's objective is to ensure the unitary and efficient administration of protected natural areas and the conservation of natural habitats, flora and fauna, regulated by the provisions of Government Emergency Ordinance no. 57/2007.

The National Agency for Protected Natural Areas has several specific responsibilities, among which, participation in the Environmental permitting procedure by *issuing Natura 2000 permits*, if the case.

**The National Environmental Guard** is a separate institution in charge of *monitoring and enforcement of the provisions of environmental permits*. It coordinates with NEPA and local authorities. Its functions are seemingly distinct from the Inspection and Control Directorate within MoEF, which can also control compliance with environmental standards.

**The National Administration for Romanian Waters** (ANAR) is a public institution with financial autonomy, under MoEF coordination. ANAR is responsible for implementation of government strategies on water management, flood protection and safety of hydraulic structures at national level and with regards to the Danube River basin. Water management is conducted at the river basin level (decision making happens through River Basin Committees). ANAR is in charge of management of protected areas either for intake of water for domestic use or for habitants of aquatic species, as well as monitoring of areas vulnerable to nutrients and nitrates pollution (the entire territory of Romania is considered sensitive area). ANAR is involved in implementation of EC directives on water and flood risk management.

ANAR has two strategic departments (river basin planning and water management infrastructure development) and two operational departments (water resources management and administration of water management infrastructure). This department's organization at the central office is reflected at the level of the river basin directorates.

The River Basin Planning Department is responsible for preparation and management of river basin management plans. These are to be developed in accordance with the EU Water Framework Directive (WFD) and the National Water Management Plan (NWDP). The NWDP is the main instrument for implementation of the WFD and will be further integrated into the Plan of the Danube River Hydrographic District. The Department also coordinates and collaborates with neighboring countries on river basin issues.

The Department for Water Management Infrastructure Development is responsible for the development and implementation of new investment programs as approved by MoEF.

The Water Resources Management Department is responsible for management of water for users and regulation of water use through license and permits.

In addition, the department contributes to monitoring the implementation of several EC directives (e.g., urban wastewater, IPPC, nitrates, groundwater protection, industrial pollution) through its regular activities.

The Department for Administration of Water Management Infrastructure is in charge with the management, operation, maintenance and monitoring of all hydraulic infrastructures and flood protection, and for preparedness and response in case of emergency.

An important activity consists in monitoring safety of infrastructure (particularly dams and dykes) through regular inspections and preparation of periodic reports submitted to the National Commission on Dams Safety.

The Work Inspection Inspectorate fulfils the function of state authority, through which it ensures the exercise of control in the fields of labour relations, safety and health at work and market surveillance.

The Work Inspection Inspectorate acts to ensure the social protection of work, based on the provisions of the Constitution of Romania, and, respectively, of the provisions of the Convention of the International Labour Organization no. 81/1947 regarding labour inspection in industry and commerce, ratified by State Council Decree no. 284/1973 and of the Convention of the International Labour Organization no. 129/1969 regarding labour inspection in agriculture, ratified by State Council Decree no. 83/1975.

The Work Inspection Inspectorate is organized in territorial labour inspectorates, institutions with legal personality, which are organized in each county and in the municipality of Bucharest.

During the environmental permitting phase, there may be interactions with a significant larger number of entities and institutions as different permits and/or agreements may be requested.

### *4.3.5 Türkiye Economic Exclusive Zones (EEZ), Relevant Legislation and Permitting*

The Republic of Türkiye has not signed the Espoo Convention and has no obligations under the Convention. Therefore, the Project is subject to Turkish legal requirements within the framework described in the "Decision on the Turkish Exclusive Economic Zone" enacted as a supplement to the Decree No 86-11264 dated 5 December 1986.

The decision's relevant text is given in:

- Article 2 (2) Likewise, in the same region, Türkiye has the exclusive rights and jurisdiction: To perform, to authorize, regulate or execute marine scientific research; To apply the required regulations and inspections to protect and preserve the marine environment and to prevent, reduce and control the pollution of the sea.
- Article 2 (3) The regulations regarding the use of the rights and jurisdiction explained above will be subject to this Decree and other procedures and principles enforced by Turkish Laws. The rights of other countries are regulated by Article 3 of the Decree of the Council of Ministers. Accordingly.
- Article 3 Within the EEZ of Türkiye in the Black Sea, other countries can exercise the freedom of navigation and overflight; as well as the freedom to lay submarine cables and pipelines.

However, while exercising this freedom, other countries will comply with the Turkish Legislation and general practice. Below are described the Turkish environmental regulatory authorities and agencies, permits that must be granted and the legal framework with relative law(s).

#### *4.3.5.1 Regulatory Authorities*

The Ministry of Agriculture and Forestry (“MoAF”) is the responsible organization for the issuing and implementation of policies and legislation adopted for the protected areas.

The Ministry of Environment and Urbanisation and Climate Change (“MoEUCC”) (https://www.csb.gov.tr/) is the responsible organization for the issuing and implementation of policies and legislation adopted for protection and conservation of the environment and for sustainable development and management of natural resources, including:

- Environmental protection;

- Prevention of pollution;
- Monitoring facilities and plants;
- Issuing permits;
- Sustainable development;
- Global warming;
- Climate Change.

**Other ministries and agencies with environmental-related functions are:**

- General Directorate of Environmental Management;
- General Directorate of Protection of Natural Assets;
- General Directorate of Environmental Impact Assessment Permit and Audit;
- Turkish Environmental Agency.

#### *4.3.5.2 Permits and Regulator*

The following facilities must obtain environmental permits and licences at the start of construction:

- **Environmental Permit and an Environmental Permit and Licence**. An environmental permit covers air emissions, environmental noise, deep sea discharge and hazardous waste discharge, while the environment licence addresses the technical sufficiency of the applicant facility.
- **Workplace Operating Licence**. A workplace operating licence must be obtained from the relevant municipality (Regulation on Workplace Opening and Operating Licence).

#### *4.3.5.3 Relevant Legal Framework*

In terms of legislation, the referring environmental low is the **Law No. 2782 (1983).** This Regulation sets forth administrative and technical procedures and principles governing the Environmental Impact Assessments. This regulation also lists the projects to which an Environmental Impact Assessment shall be applied. Therefore, first and foremost, it is necessary to determine whether an activity is subject to EIA by subjecting it to the screening process.

It is mandatory to prepare an EIA Report for the projects stated in the Annex-1 List and the projects stated in the Annex-2 List for which "EIA Required" decision is made, and the projects considered out of scope in the case of planning a capacity increase and/or expansion equal to or exceeding the thresholds in Annex-1, together with the total of existing capacity and capacity increases.

For the projects reported in **Annex-1,** an **EIA application file** is prepared by a licensed company and submitted to the Ministry of Environment, Urbanization, and Climate Change (MoEUCC). Subsequently, an “EIA Commission” is established by the MoUECC which defines all the required studies for the EIA Report. Following the EIA Report submission, which must include the scoping and public participations, the MoEUCC is authorized to decide whether the “EIA Positive” or “EIA Negative” decision is obtained.

In terms of projects included in the **Annex-2 List** or evaluated as out of scope shall obtain an "EIA Required" or "EIA Not Required" decision which subjects them to selection and screening phases according to Article 15 of the Regulation. In this case, a **Pre-EIA Report** (or Project Presentation File) is prepared by authorized licensed company which does not include the scoping and public participation steps and is directed by the Provincial Directorate of Environment, Urbanization and Climate Change ("PDoEUCC"). The PDoEUCC evaluates the Pre-EIA Report in accordance with Annex-4 of the Regulation and decides whether a project receives "EIA Required" or "EIA Not Required" decision.

For projects that received an "EIA is Required" decision, it is mandatory to follow the EIA process explained above and obtain an "EIA Positive" to initiate investments. In terms of projects that receive an "EIA Not Required" decision, investments should be initiated within five years; otherwise, the EIA decision shall become invalid.

**Considering what reported above, on the basis of the collected information, the crossing of Türkiye EEZ while lying the submarine cable is subject to the submission of the Pre-EIA Report (or Project Presentation File).**

A detailed step by step Turkish EIA framework is reported in Annex 2 together with the Turkish National Regulations that have implemented the Environmental Low No. 2782.

#### *4.3.6 Bulgaria Economic Exclusive Zones (EEZ) Relevant Legislation and Permitting*

Bulgaria, differently from Türkiye, has signed and ratified the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo) Convention. The Convention requires States to carry out an environmental impact assessment procedure for all activities listed in Appendix I that are likely to have a 'significant adverse transboundary impact' (Article 2(2)).

However, Parties may decide, by mutual consent, **to extend** the Convention's application **to activities not listed in Appendix I but which are likely none the less to cause a 'significant adverse transboundary impact'** (Articles 2(5) and 3(7)). Criteria for determining 'significant adverse impact' are set out in Appendix III of the Convention (Article 2(5)). States planning an activity likely to cause a 'significant transboundary environmental impact' are required to notify other States likely to be affected of the proposed project (Articles 2(4) and 3(1)) and allow the public of affected States to participate in the environmental impact assessment procedure in the same manner as its own public (Article 2(6)).

it is cited in Appendix I the activity of laying large-diameter pipelines for the transport of oil, gas or chemicals. However, there is no mention concerning the laying of submarine electrical cables.

Therefore, in accordance with the Convention, the criteria reported in Appendix III for the determination of a 'significant adverse impact' are as follow:

- **Size**: proposed activities which are large for the type of the activity;
- **Location**: proposed activities which are located in or close to an area of special environmental sensitivity or importance (such as Ramsar sites, national parks, nature reserves, sites of special scientific interest, or sites of archaeological, cultural or historical importance);
- **Effects:** proposed activities with particularly complex and potentially adverse effects, including those giving rise to serious effects on humans or on valued species or organisms, those which threaten the existing or potential use of an affected area and those causing additional loading which cannot be sustained by the carrying capacity of the environment.

Considering that the displacement of electrical large-diameter cables is not reported among the activities in Appendix I of the Convention list and, considering the criteria to determine a 'significant adverse impact' defying in Appendix III of the convention, the Project should probably be exonerated from the process of EIA development.

Article 58(1) of UNCLOS (ratified by Bulgaria in 1996) confers on all states the freedom, within the state's Exclusive Economic Zone (EEZ), to lay submarine cables and to pursue ''internationally lawful uses'' related to the freedom to lay submarine cables, irrespective of the installation method chosen.

However, while exercising this freedom, other countries will comply with the Bulgarian Legislation and general practice.

As mentioned above, it is likely that the crossing of the Bulgarian EEZ doesn't request the development of an EIA process, in any case this should be confirmed by the Bulgarian authority.

A possible approach to be applied consists in the preparation of a Notification document. According to the Bulgarian legislation this Notification document must be prepared in line with Article 4 paragraph 3 of the Bulgarian EIA Ordinance.

The Notification is submitted to the Ministry of Environment and Water (MoEW), and to the affected local authorities (e.g., Marine Authorities; Marine Users and Business Associations; and Local and national non-government organisations (NGOs). The MoEW will screen the Notification and within 14 days will advise regarding the necessity of an EIA and Appropriate Assessment study and required activities to be undertaken.

In case, the MoEW, following the analysis of the Notification document, requests an EIA, below are described the Bulgarian environmental regulatory authorities and agencies, permits that must be granted and the legal framework with relative law(s) and the EIA legal framework.

#### *4.3.6.1 Regulatory Authorities*

The **Bulgarian Ministry of Environment and Water** (MoEW) is the main organisation, which sets policies and takes measures regarding:

- Development and implementation of the environmental policy
- Environmental protection.
- Prevention of pollution.
- Issuing permits.
- Implementation of sector policies

**Other ministries and agencies with environmental-related functions are:**

- Executive Environment Agency;
- Regional Inspectorates of Environment and Water (RIEW);
- Enterprise for Management of Environmental Protection Activities;
- Basin Directorates;
- National Park Directorates;
- The municipality Mayors and, in the cities subdivided into wards, the ward mayors as well;

- The Regional Governors.

#### *4.3.6.2 Relevant Legal Framework*

Following the MoEW decision for the development of a National Bulgarian EIA 3 stages must be considered:

1. **EIA Terms of Reference (ToR).** This stage includes the preparation of the Terms of Reference for the Project and coordination with the MoEW. Additionally, the competent authority will provide instructions and recommendations for the EIA consultations and specify the mandatory stakeholders to be consulted for the Project as part of the EIA process.

2. **EIA development.** The EIA will comply with the requirements of Article 96 of the Environmental Protect Act, the ToR and the MoEW's comments and recommendations to the ToR.

3. **Reporting and Disclosure.** Public Hearings will be undertaken as determined by the MoEW in accordance with the requirements of the EIA Ordinance. The results of the Public Hearings will be submitted to the competent authority within 10 days from the date of the last Public Hearing.

Detailed Bulgarian EIA application process is reported in Annex 2 of the present report.

## 4.4 Gaps in Legal and Administrative Coverage of the Cable Project-Related Aspects

The identified approaches to be followed for the cable crossing of the Turkish and Bulgarian EEZs and they shall be revised with the direct involvement of local competent authorities, respectively the Ministry of Environment and Urbanization and Climate Change ("MoEUCC") in Türkiye and the Ministry of Environment and Water (MoEW) in Bulgaria.

# 5 ALTERNATIVES ANALYSIS

## 5.1 Zero Alternative

The Black Sea Submarine Project is part of initiatives aimed at promoting the growth of renewable energies and the improvement of energy efficiency. The energy policy of the European Union sets itself various objectives in this regard in order to reduce greenhouse gas emissions, leading to a progressive energy decarbonisation in all economic sectors, thus defining a common European framework for a fair and secure transition.

The Project represents a strategic task and a great opportunity for Georgia, Romania and its neighboring countries as it aims at exporting energy from the South Caucasus Countries (SCC) to Romania and South-Eastern Europe.

Currently, about 80% of Georgian produced energy (around 3,250 MW) is considered “clean energy” generated in the form of Hydro power followed by thermal generation. During “wet’ spring and summer months, Georgia can export the excess of electricity generated by HPPs, while during “dry” winter months when consumption is at maximum level, generation from available thermal and hydro capacities is not sufficient and Georgia imports electricity.

The creation of the new underwater cable connecting Romania to Georgia will allow to integrate a growing share of renewables in Europe through electricity interconnections. This is expected to have a considerable positive impact on climate change and emission reduction.

According to the European Commission President Ursula von der Leyen, the cable could transform Georgia into an electricity hub and integrate it into the EU's internal electricity market (https://ec.europa.eu/commission/presscorner/detail/en/ac_22_7888).

Moreover, it will contribute to the development of the renewable energy sector, increase transit opportunities and bilateral trade potential between the EU and the South Caucasus Countries. In fact, the European Commission President Ursula von der Leyen was also present at the signing ceremony of the Memorandum of Understanding (MoU) for the development of the Black Sea Energy submarine cable. During the ceremony, the Prime Minister of Georgia, Irakli Garibashvili, the President of the Republic of Azerbaijan, Ilham Aliyev, the Prime Minister of Romania, Nikolae Chuka and the Prime Minister of Hungary, Victor Orban, signed the MoU with the objective of bringing the European Union closer to the partners in the South Caucasus region, and to support both Europe and SCC to achieve the clean energy transition.

Implementation of the Project would therefore guarantee a surplus of electricity production from renewable sources, contributing to the achievement of the objectives of European and National Energy Strategy which includes the decarbonisation, growth of renewable energies and energy efficiency.

The zero alternative, which envisages the non-realization of the Project, would not be in line with the European and National Energy Strategy, not favoring the objectives set by the European Union on the production and promotion of energy from renewable sources.

## 5.2 Siting/Routing Alternatives

The areas crossed by the power lines have been schematically divided into four macro-domains:

- The Romanian area, from the Constanta Nord-Medgidia Sud future 400 kV powerline to the coast (land approach) and from the latter to the 100 m isobath offshore;

- The “deep sea” area, from the 100 m isobath on the Romanian side to the 100 m isobath on the Georgian side, crossing the Black Sea longitudinally;
- The Georgian area, from the 100 m isobath offshore to the coast limit (land approach) and from the latter to the Jvari electrical substation (Main OHL);
- The Georgian area, from the Anaklia substation to Tskhaltubo electrical substation (Additional OHL).

The identification of the optimal routing options for the corridor was performed using the GoldSET tool that integrates a multi-criteria analysis approach and geospatial information management. This analysis was performed considering:

- Project components:
  - Submarine HVDC cable in the Black Sea;
  - HVDC transmission lines within the territories of Georgia and Romania (underground cables); and
  - HVAC overhead transmission lines in Georgia and Romania;
- Indicators:
  - constrains (e.g., protected areas, wetlands, wrecks, etc.); or
  - opportunities (e.g., proximity to roads, presence of cropland and grass land, etc.).

For the first three macro-domains (i.e., Romanian, Black Sea and Georgian Main OHL), the analysis of the possible corridors and locations are reported in detail in the Routing and Siting Study (document C3013972– Appendix A). For the Georgian Main OHL (Anaklia-Jvari), besides the Routing and Siting Study, a specific and more detailed analysis of the routing alternatives has also been performed (Annex F of the Routing and Siting Study, doc C3013972) and it is briefly reported in the Onshore Georgia Alternative Analysis. The Georgian Additional OHL was implemented as a single corridor (defined by GSE), therefore no routing alternative analysis was carried out for this OHL. However, an Interconnection (Anaklia-Tskaltubo) Routing Analysis and Preliminary Feasibility Study have been carried out and reported in Annex D and E of the Routing and Siting Study (Appendix A: doc C3013972), respectively.

The main results of the Routing/Siting studies are briefly reported below.

In the **Romanian area**, three possible sites where the converter stations could be built were identified. Each substation site is associated with an alternative route, and thus a distinct tolerance corridor. From the three converter stations sites, three possible routes (and corridors) head towards two coastal landing points and three toward the Constanta-Medgidia 400kV future power line; therefore, six tolerance corridors are present in the Romanian land area.

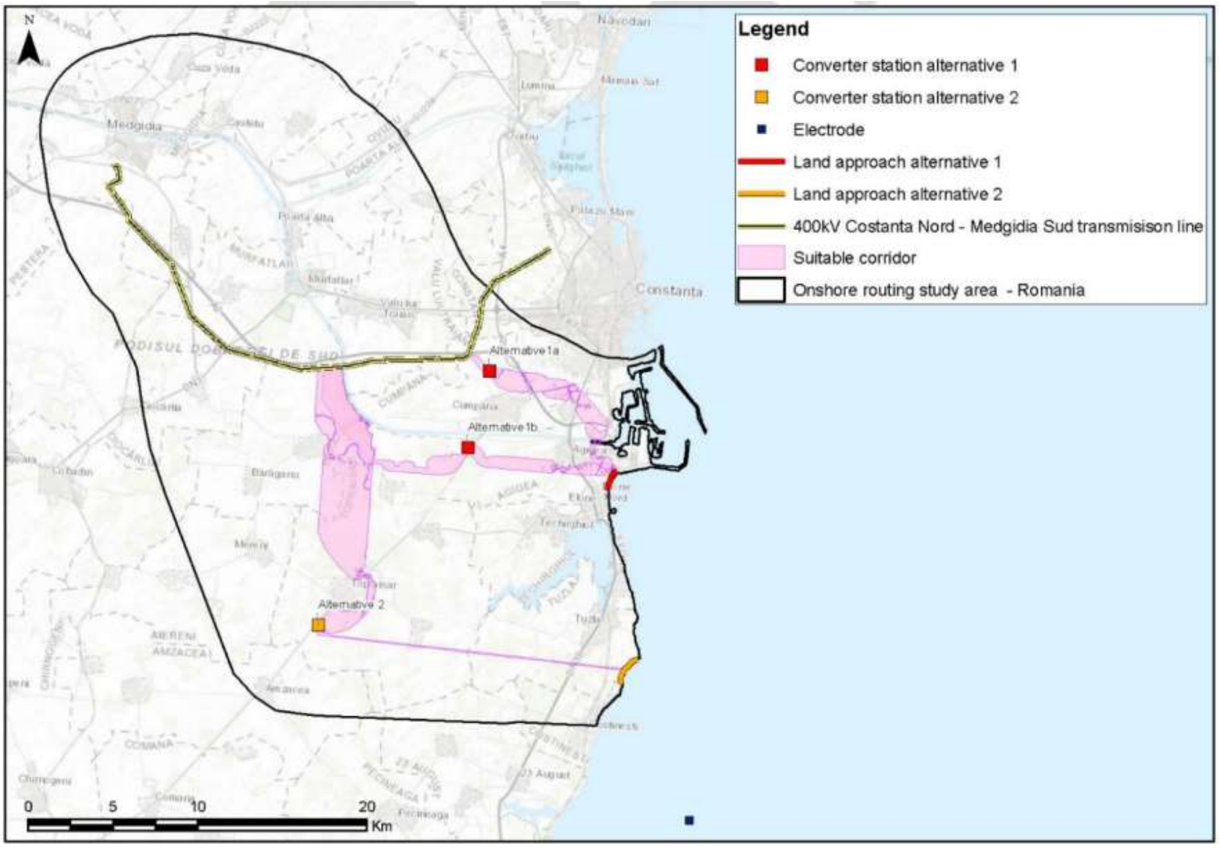



*Figure 5-1 -The converter stations, HVDC and HVAC transmission line alternatives analyzed in Romania.*

In Romania, “Alternative 2” (converter station and land approach “Alternative 2”, reported in blue in the figure below) is considered the most suitable alternative, based on the GoldSET analysis and siting visit.

The Alternative 2 corridor intersects only a small portion of a marine coastal protected area, while Alternative 1 (reported in green in the figure below) intercepts a significant portion of it. Therefore, from an environmental standpoint, a minor environmental impact is expected by choosing Alternative 2 land approach compared to Alternative 1. Moreover, the land approach Alternative 1 is located in close proximity to the Constanta harbor entrance corridor which is characterized by a high naval traffic (refer to 6.4.16 for more details). In addition, the presence of numerous boys and a wreck on the seafloor in correspondence of Alternative 1 land approach (figure below) constitutes a significant constrain. All these constrains for the Romanian coastline land approach and marine corridor are discussed in detail in the in the Routing and Siting Study and are reported below in Table 5-1.

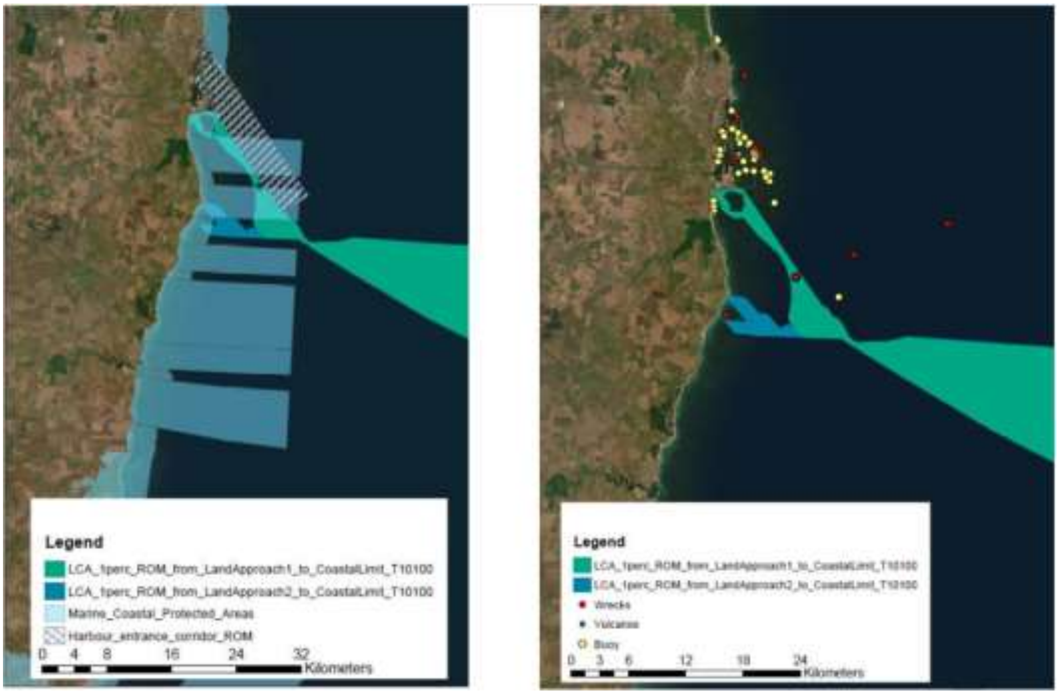



*Figure 5-2 – Images showing the two alternatives analyzed for the land approach together with the marine corridor constrains identified during the analysis. Land Approach Alternative 1 is reported in green while Alternative 2 in blue.*

Below is reported a detailed table showing all the constrains for the Romanian coastline land approach and marine corridor.

*Table 5-1: Constrains that have been identified for the Romanian coastline land approach and marine corridor*

| Constraint | Extension | Source |
|---|---|---|
| Anchorage areas | Footprint | Navionics nautical charts |
| Buoys | Footprint + 0.1 NM buffer | Navionics nautical charts |
| Fish Farm | Footprint + 200 m buffer | Navionics nautical charts |
| Fish Trap Area | Footprint + 200 m buffer | Navionics nautical charts |
| Former mined areas | Footprint | Navionics nautical charts |
| Gas fields and platforms | Footprint + 2 km buffer | Consultant database |
| Harbor entrance corridor | Footprint | Navionics nautical charts |
| Restricted Area - No Entry Area | Footprint | Navionics nautical charts |
| Submarine Pipe - Sewage | Footprint + 20 m buffer | Navionics nautical charts |
| Volcanos and fluid discharge | Footprint + 1 km buffer | Literature |
| Wrecks and submerged obstacles exclusion | Footprint + 500 m buffer | Literature |

In regard to the converter station alternatives, the Alternative 1a crosses a small portion of a protected area, therefore, Alternative 1b and 2 are preferred. Considering what discussed above about the preference for land approach Alternative 2, the converter station Alternative 2 represents the optimal siting choice in terms of distance from the land approach point.

The **submarine cable corridor** was chosen in order to avoid as much as possible a series of canyons and fans valleys located on the seafloor, possible military combat training areas and explosive dumping areas. Across the Black Sea, the cable corridor was also selected to avoid the crossing of Türkiye and Bulgaria national waters, only their Exclusive Economic Zones will be interested by the cable laying.

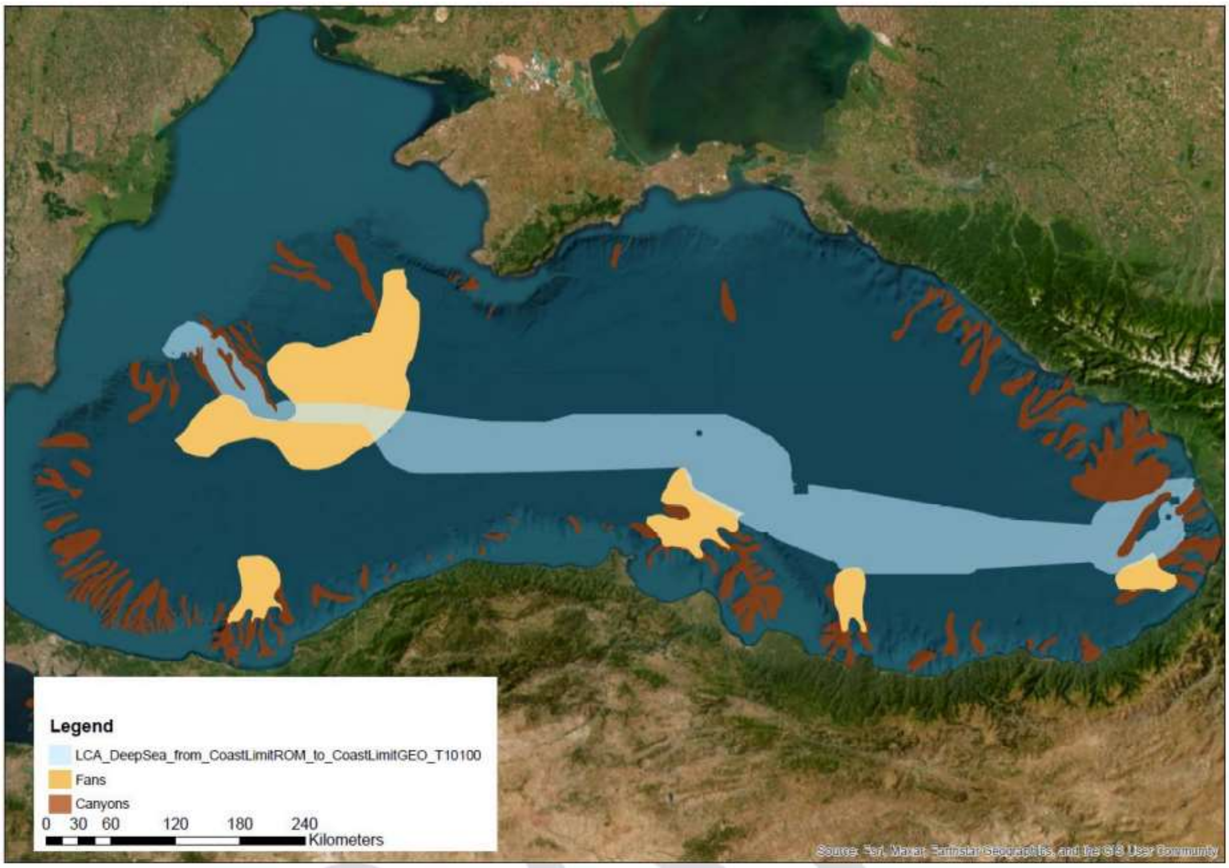



*Figure 5-3 – Selected corridor for the submarine cable.*

**On the Georgia side**, the corridor in coastal water was selected to minimize the interaction with the Kolkheti National Park, the Anaklia port development project, a future shellfish farm located south of Anaklia and other recreational uses of the coastal marine areas (e.g., boating, fishing, etc.). The most suitable corridor of the BSSC has being been finalized in April 2023 when the first version of the routing study report has been released. The routing study has been performed by means of proprietary SW and based on a different set of data gathered by the Consultant from different sources applying the best practices of route engineering. Among the others, such optimal route defined, has been chosen with the aim of avoiding the Kolkheti Marine Protected Area. The corridor width varies in function of water depth. After marine survey, the detailed route of the 3 cables (2 HVDC + 1 optical fiber) will be defined inside such corridor based upon survey outcomes.

Considering the fact that construction project of Anaklia deep-water port has been re-newed since Spring of 2023, some overlapping of both projects' footprints can be anticipated.

The following **Error! Reference source not found.**5-4a presents the BSSC ROSR route (black line) and t he Alternative ROSR one (blue line) defined to avoid the interference with the port area. As it is possible to see, the black line crosses the possible port entry channel in correspondence of very shallow water (approx. 10-15 m wd). Such channel normally uses by the vessels to access to the port; due to specific geomorphological conditions of the native seabed, this area need to be dredged to create the suitable channel for the envisaged marine traffic), this dredging activity is not foreseen only during the construction of the port, but also during its operativity (expected frequency for dredging is once/twice per year). It is then obvious that the BSSC routes cannot be located on the place that may cross such channel. In order to avoid this interaction, some changes in the original route may be required. Due to the fact the port entry channel is placed at the edge of a marine protected area (i.e., the Kolkheti National Park, on the northern side), it is easy recognizable that the sole alternative is to move the BSSC ROSR route in the marine area.

Therefore, some changes of the marine corridor for the Georgian land approach may be still on place based on the Anaklia port development project. As matter of facts, a submarine cable corridor alternative has been implemented to minimize the interaction with both the future shellfish farm and the Anaklia port development project, which, however, envisages the crossing of some portion of the Kolkheti marine protected area, as shown in Figure 5-4 below.

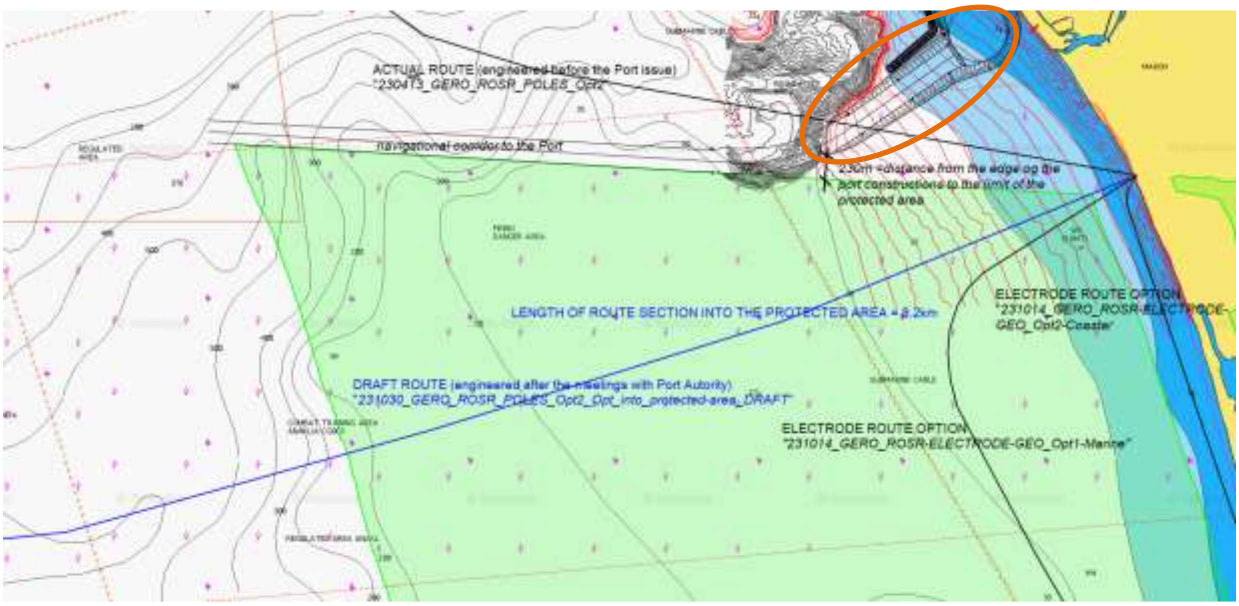



*Figure 5-4 Alternative of the submarine cable route is shin in blue, while the actual route is shown in black. The green area represents the marine protected area, in orange is shown the Anaklia port boat channel. The present route (black) would cross the submarine canyon, the port channel (interested by dredging activities) and the future shellfish farm located in proximity of the port (not visible in the map).*

In case the alternative route (blue in Figure 5-4) is chosen, possible impacts of the cables on the marine protected area will be analyzed and discussed in detail in scope of the ESIA. However, at this stage it is still possible to consider that minor impacts may be expected given the characteristics of the marine protected area. First, the marine portion of the Kolkheti national park was established for its recognition as a regionally important congregation site for the endemic marine mammals of the Black Sea and the presence of five sturgeon species (chapter 6.1.5.2. Therefore, it was not established to preserve a marine benthic habitat, rather as a conservation site for specific pelagic organisms. Second, according to the available data, the seafloor of the park is characterized by sandy/muddy bottoms and the absence of seagrasses and/or complex benthic bioconstructions. However, specialist marine surveys will be carried out in the scope of the ESIA to address any possible issue on the marine environment.

Moreover, because the coastal zone of the Kolkheti National Park includes numerous seashore erosion areas and the marine area located in its proximity is interested by high sedimentation rates, the benthonic community is expected to be dominated by opportunistic species, highly tolerant to disturbances and/or typical of unstable seafloor and resistant to high sedimentation rates. Although seabed surveys will confirm this preliminary information retrieved from scientific literature, it is quite likely that the cables installation (e.g., trenching and cable lying) will not represent a critical issue during the construction phase.

Also, the development of the cable routes in proximity of the navigational channel can lead to an increasing risk of damage as consequence of the enhanced likelihood of anchor dropped by vessels for emergency respond during transit. As mitigation measure, a high-level cable protection (i.e. increase of depth of burial) might be considered (e.g. sediment suspension) in consideration of the proximity to the protected area.

Another aspect to be considered is that the area northward in respect to the marine protected area, shows a quite complex seabed morphology due to the presence of canyons and steep slopes which is preferable to avoid for cable integrity purposes.

For what concern possible impacts of the cables on the marine protected area, they will be analyzed and discussed in detail in scope of the ESIA. However, at this stage it is still possible to draw some considerations. First, the main reasons the marine portion of the Kolkheti national park was established are:

- recognition as a regionally important congregation site for all the three endemic marine mammals of the Black Sea (the Black Sea harbour porpoise, Black Sea bottlenose dolphin and Black Sea common dolphin), and
- presence of five sturgeon species (i.e., the beluga, European sturgeon, stellate sturgeon, ship sturgeon and the Persian sturgeon).

Also, it is to be highlighted that such kind of marine areas are typically characterized by a very low level of anthropogenic activities (i.e. especially shipping; see **Error! Reference source not found.**) hence it is e xpected that, due to limited threats for the cables, the required level of protection for the cables inside this area might be lower; this will consequently reduce the environmental impact (reduced sediment suspension during protection activity on cables). Moreover, in such area where the risk of cable damage is low it is typically possible to use alternative non/less-invasive protection methods such as tubular protection (Cast Iron shells or polyurethane sleeves), concrete mattresses or rock dumping. The choice of preferable protection method will be evaluated along a dedicated further cable damage risk study.

For what concern the environmental effects of the cables while in operation, a possible impact is linked to the emission of electromagnetic fields and warming of the cable's surroundings. In fact, the DC cables emit DC (static) magnetic fields in the range of few hundreds of microTesla, depending on DC current and cables configuration, that are well under the limits prescribed by the local/international regulations (40,000 μT as per ICNIRP indication). Although the emission of electromagnetic fields will be discussed in detail in the scope of the ESIA, the presence of cable metallic outer screen will eliminate the DC electric field emission outside the cables.

From a thermal point of view, a very negligible warming of the area/soil surround the cables is expected.

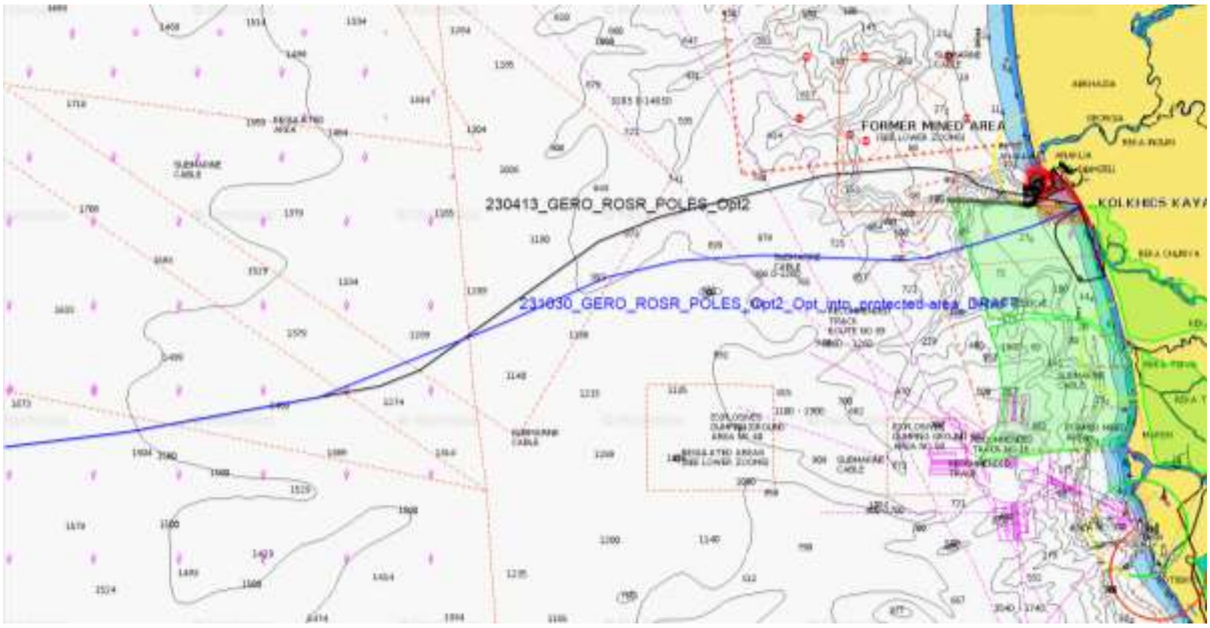



Figure 5-4a. the Alternative ROSR crossing the Kolkheti National Park

As it is possible to see from above figure, the Alternative ROSR runs for about 8.2km inside the marine protected area; considering that at the end of the survey the three routes will be designed and considering a nominal mutual distance between them of 100m, it is possible to estimate a total buffer of approx. **820.000m²** to be dedicated to the BSSC submarine cables in the Kolkheti marine protected area. This is only a preliminary estimation as a precise route of the cables can be defined only after the completion of the seabed investigations.

For what explained in the present reports it is possible to conclude that the best solution to avoid interaction with the future Deep-Sea Anaklia Port is to define an alternative ROSR route of the BSSC through the Kolkheti marine protected area. The advantages of this route are:

- Avoiding interaction with Anaklia port entry channel limiting risk for both the cable and the vessels; indeed, in emergency conditions the vessels can drop their anchors even up to 200-250m water depth. Moreover, the avoidance of interaction will avoid mutual disturbance during operation of both the port and the BSSC.
- Reducing the environmental impact protection having the possibility to limit the target burial depth as consequence of limited risk of damages (considerable minor vessel traffic inside the park). This translates to a reduced production of sediment suspension during cable protection operation. Actually, the impact might be almost equal to zero in case of use of non-invasive protection methods.
- Optimizing the cable route from a geomorphological point of view as the possibility to pass in the protected area allows the avoidance potential steep slopes and canyons area located northward. **Error! Reference source not found.** shows the full comparison between the original BSSC route and the alternative one.

In consideration of possible impact on the environment, they will be addressed in detail in the scope of the ESIA, when more specific Project design will also be available. However, based on what reported above (features of the seafloor, purposes for the marine park establishment, Project features), both the cable's installation and operation should not represent a relevant issue for the environment.

On the onshore area, the Main OHL onshore corridor in Georgia develops in areas predominantly characterized by the presence of agricultural land, following the infrastructure network (some of the roads and railway).

For the converter station, two alternatives were identified together with three HVDC and three OHL Alternatives (Figure **5-5**). Although both the converter station alternatives are still under evaluation, GSE expressed preference for the Alternative (see following map). Therefore, all the two alternatives for the HVDC cables and the three alternatives HVAC OHL are also still under consideration, although some major constrains identified for HVAC OHL Alternative B and C (e.g., closest proximity to the occupied territory of Abkhazia) might point at the Alternative A as a the most suitable corridor (Appendix A).

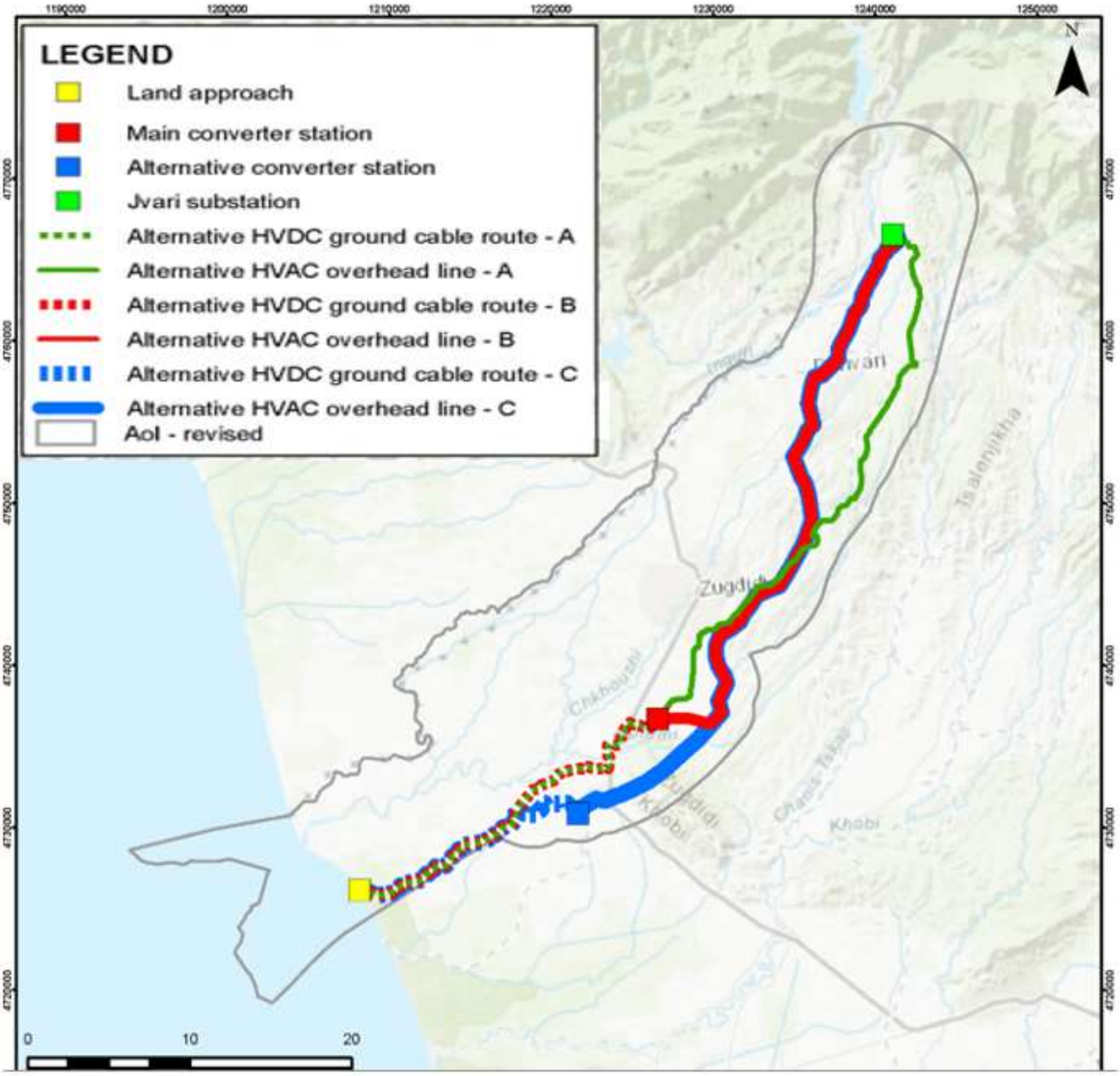



*Figure 5-5 – The Georgian land approach, two converter station alternatives and three HVDC cables and HVAC OHL alternatives.*

As previous reported, the Additional OHL corridor was implemented as a single corridor (defined by GSE), therefore no routing alternative analysis was carried out for this OHL.

Finally, for the Georgian side, the connection of the (pond) electrode through a submarine MVDC link is still under evaluation. Indeed, two possible connection alternatives for the submarine MVDC link from the pond electrode to the landing point (same point as for HVDC cables) have been developed:

- Coastal Alternative: parallel to the coastline at a distance of approximately 200 m from the coastline (i.e., not intercepting the marine area of the Kolkheti National Park);
- Marine Alternative: parallel to the coastline at a distance of approximately 2-2.5 km from the coastline (i.e., intercepting part of the marine area of the Kolkheti National Park);

Both alternatives are still under evaluation; nonetheless, the Coastal Alternative is considered of high geohazard risk. For Georgia, all the routes located in close proximity to the shoreline are likely subjected to erosion phenomena, geomorphological and sedimentary changes as well as sediment mobility induced by the presence of the Churia river mouth. A dedicated hydro-sedimentary study together with a MetOcean analysis (wind, wave) will be conducted in the scope of the ESIA to verify the route's feasibility and defined the associated risks.

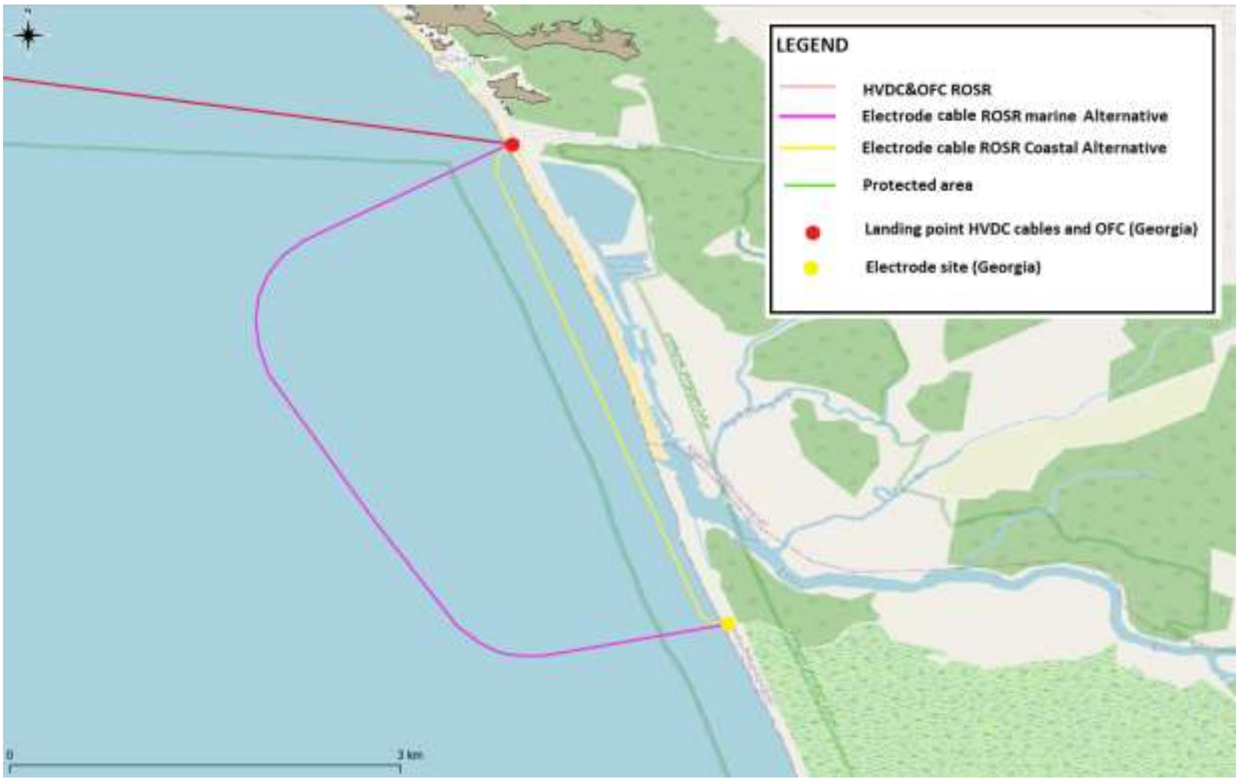



*Figure 5-6 – Coastal and Marine alternatives analyzed for the connection between the Georgia electrode and the cable at the land approach site.*

## 5.3 Alternative technologies

The Project alternative technologies and relevant selection criteria are discussed in the following paragraphs for three components of the Project, namely HVDC cables, converter station and electrodes.

### *5.3.1 HVDC cables*

Two different types of insulation can be adopted for HVDC cables with long length: MIND type (Mass Impregnated) or extruded type (XLPE).

Mass-Impregnated (MI, also called MIND) cables are mainly used for submarine HVDC applications for large power (up to 525 kV DC) transmission interconnectors. The insulation system is realized with cellulose pulp (kraft paper) subjected to a vacuum-heat-drying phase followed by hot impregnation with high viscosity and high-voltage grade impregnation compound. In order to restrict the formation of cavities inside the insulation, the operating temperature of these cables is limited to 55 °C.

Mass-impregnated HVDC cables with high-viscosity compounds can be used for ideally indefinite route length because they are not depending on external pressurization from (on-shore) feeding stations unlike Oil Filled cables. Also, from an environmental perspective, it is worth to mention that cables with MI insulation do not leak oil into the environment (soil or sea water) even when they are severely damaged (this is the case of the oil filled cable, not adequate for this project due to the long length). This property is of high importance for submarine cables installed, for example, in sensitive environments.

Typical construction of a submarine MIND is shown in the Figure 5-7 below.

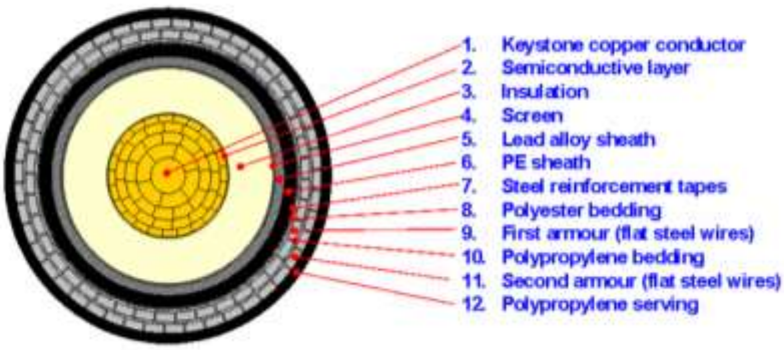



*Figure 5-7 – Typical cross section of HVDC MI submarine cable*[4]

The use of MI cable insulation in HVDC links began more than 50 years ago as demonstrated, for example, by the 200 kV DC SA.CO.I. link in Italy commissioned in 1967. The maximum available voltage level used today is 525kV DC and different projects are in service with such maximum voltage level. Moreover, due to their proven design, MI cables have been used for high-water depth installation by numerous existing projects (e.g., SAPEI, GRITA, MONITA), and others under construction (e.g., Tyrrhenian Link).

The alternative technology (i.e., extruded XLPE cable type), has been used for HVDC links since the latest 1900s and Extruded XLPE (Figure 5-8) cables of considerable length have been used in several projects till the present time.

One of the main advantages of XLPE insulation compared to MI is the higher operating temperature. Depending on the DC-XLPE solution adopted and on the specific manufacturer, the maximum temperature for the insulation can range between 70 °C and 90 °C. This makes the cable lighter (i.e., lower conductor cross-section for the same transmissible power) which is translated in advantages for its installation too.

[4] The design of the conductor in terms of material and cross-section will be defined along the detailed engineering phase of the project; nevertheless, it is possible to anticipate that the conductor will be most likely in aluminum so to reduce the weight of the cable and facilitate the installation activity at envisaged high water depth (up to approx. 2200m).

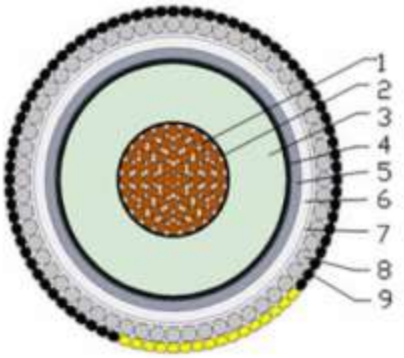



*Figure 5-8 – Typical cross section of HVDC XLPE submarine cable*[5]

The first HVDC-XLPE insulated submarine cable was installed in 2002 in US for the 'Cross Sound Cable' Project at a voltage level of 200 kV. Since then, many other DC-XLPE cables have been installed at voltages up to 320 kV, in particular as "export cables" for the connection of offshore wind farms especially in the North Sea (Europe). However, in all these projects, the water depth is limited to a few tenths of meters with a maximum voltage of 320 kV which has become a standard voltage level for DC-extruded cables.

Qualification of the first 525 kV XLPE cable system was performed in 2015. Subsequently, other land 525 kV XLPE systems have been qualified. These tests have been requested by the German transmission system operators for the construction of long underground HVDC 525 kV links for connecting the North Sea wind farms to the southern part of the country. Moreover, in Germany and Netherland, more than 10 offshore wind farms will be developed in the next years that will envisage a 525 kV XLPE cable system (commissioning date from 2029). However, these links are still under construction and no XLPE cable is currently in operation at this voltage level worldwide. Also, the HVDC cables will be only installed in shallow water (< 100 m water depth).

When considering worldwide projects that use extruded XLPE insulated cables, it appears clear that the majority of the cables operate at 320 kV DC. Only one submarine link is in operation at 400 kV and several underground links at 525 kV are still under construction for terrestrial and/or shallow water application.

Considering the Black Sea features, such as high-water depth, and the experience gained form other operating projects worldwide, the advisable cable technology to be used for this Project is MI since it has proven to be suitable for both high DC voltage level (525kV) and high-water depths.

### 5.3.2 AC/DC converter station

Two different technologies can be used for the converter station: Line Commutate Converters (LCC) and Voltage Source Converters (VSC).

Line Commutated Converters use thyristors bridges generally organized in 12-pulse configuration. The valve' commutations are dictated by the AC network the converter is connected to; the control system of the converter station can control the firing instant of the thyristors only. LCC represents the oldest

[5] Exactly as for what reported above.

technology available on the market, being the first HVDC links built with this technology dated back to 1950s. A simplified depiction of a 12-pulse bridge is shown in the figure below.

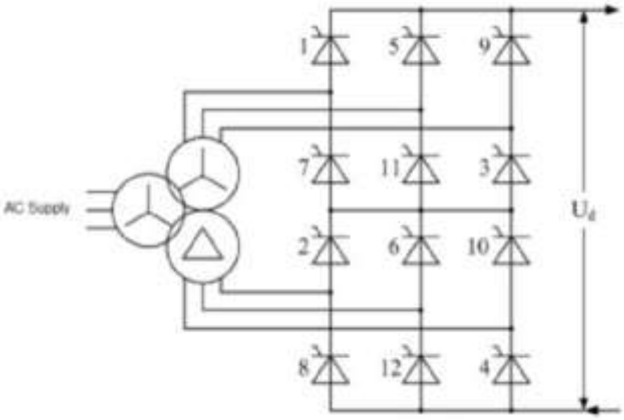



*Figure 5-9 – Schematic example of a 12-pulse thyristor bridge (one pole)*

Due to the presence of thyristor valves (which allow the current to flow in one direction only), power reversal in LCC plants implies the reversal of the voltage on the link. This may pose some problems in case of cable connections since the cables can sustain only a certain number of polarity reversals per year, depending on their technology.

Moreover, a typical footprint for a 1000 MW LCC bipolar converter station is around 40,000÷60,000 m$^2$ and, as it is shown in the figure below a considerable part of the area is dedicated to the AC filters.

*Figure 5-10 – Footprint of a 1000 MW bipolar LCC converter station (Latina converter station of SAPEI Interconnector). OThe overall footprint is 48,000 sqm; the area occupied by the AC filters is marked in red.*

Since the '90s, the Voltage Source Converter technology has been developed. The main difference between the LCC and VSC technologies involves the use of IGBT valves instead of thyristors for the VSC.

VSC-type converters have evolved in several different technologies which have shown progressively improving performance, namely two-level, three-level and Modular Multilevel Converters (MMC). Starting from 2010, MMC technology has become the dominant VSC technology. Most of the HVDC links currently under construction or planned for the next future worldwide are of the VSC-MMC type. In this case, each arm of the converter is made of several (up to hundreds) half-bridge modules connected in series. Each half-bridge module consists of 2 IGBTs, 2 diodes and one capacitor.

With respect to thyristors, IGBTs allow a more flexible and faster controllability, allowing the current to flow in both directions. For this reason, the power reversal in VSC half bridge converters is obtained through current inversion. The overall power reversal procedure is generally faster in VSC type converters than in LCC ones. Moreover, due to the fact that DC voltage does not need to be reversed, for both converter stations and cables no limitation in the number of allowable power (polarity) reversals is generally considered.

A typical footprint for a 1000 MW VSC half bridge bipolar station is between 30,000÷40,000 m$^2$, thus it occupies less surface than a LCC one at the same power rating. The footprint here indicated is for a general/standard project and it is strongly affected by the configuration/layout of the station especially in consideration of HVAC section (specifically for this project it is expected a footprint in the range of 60,000-70,000 m$^2$)

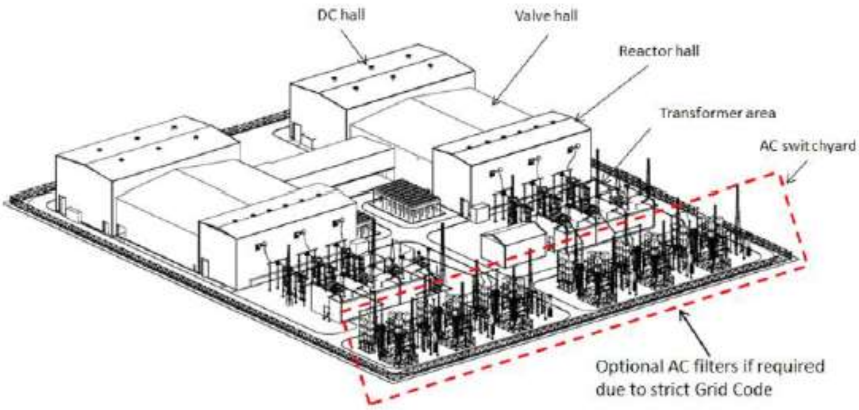



*Figure 5-11 – Typical layout of VSC bipolar converter station (source: ABB)*

A comparison between the two technologies is reported in the following table. Beside the significant advantages related to the possibility of avoiding polarity reversal (no limitation in terms of power reversal), VSC presents numerous advantages such as reactive power control, black start capability, and a reduced footprint. For these reasons the VSC technology is the one proposed for the project even in consideration of the costs that are similar for the two technologies.

*Table 5-2: Comparison between different HVDC technologies relative to LCC and VSC technologies*

| HVDC technology | LCC | VSC |
|---|---|---|
| On-state losses | Low<br>(0.1% no-load, 0.6% full load) | Moderate<br>(0.1% no-load, 0.8% full load) |

| HVDC technology | LCC | VSC |
|---|---|---|
| **Active power reversal** | DC voltage polarity must be changed<br>Number of reversals per year limited by cable; not feasible with extruded cables | Instantaneous (0.1 s) and no change of DC voltage polarity. Unlimited number of reversals per year |
| **Reactive power control** | Limited and discontinuous | Continuous and inherent within the converter control |
| **Black start capability** | No | Yes |
| **Reliability** | Excellent (Conv. stations EA[6]≥ 98.5 %) | Good (Conv. stations EA≥98 %) |
| **Maturity degree of converter technology** | Very high, technology available from about 1970. | High, technology available from about 2010 (MMC). |
| **Number of potential Suppliers** | All HVDC Suppliers | All HVDC Suppliers |
| **Station size** | Approx 40000÷60000 $m^2$ | Approx 30000÷40000 $m^2$ |

### *5.3.3 Assessment of possible interconnection typologies*

HVDC links can be built in several different typologies. The main differences among them are relevant to:

- Number of poles;
- Link symmetry:
- Presence of an alternative return path for the DC current (other than the main path).

The combination of the features above-described leads to five main typologies of interconnection that are all applied in other projects worldwide and are shown in the figure below.

[6] Energy Availability

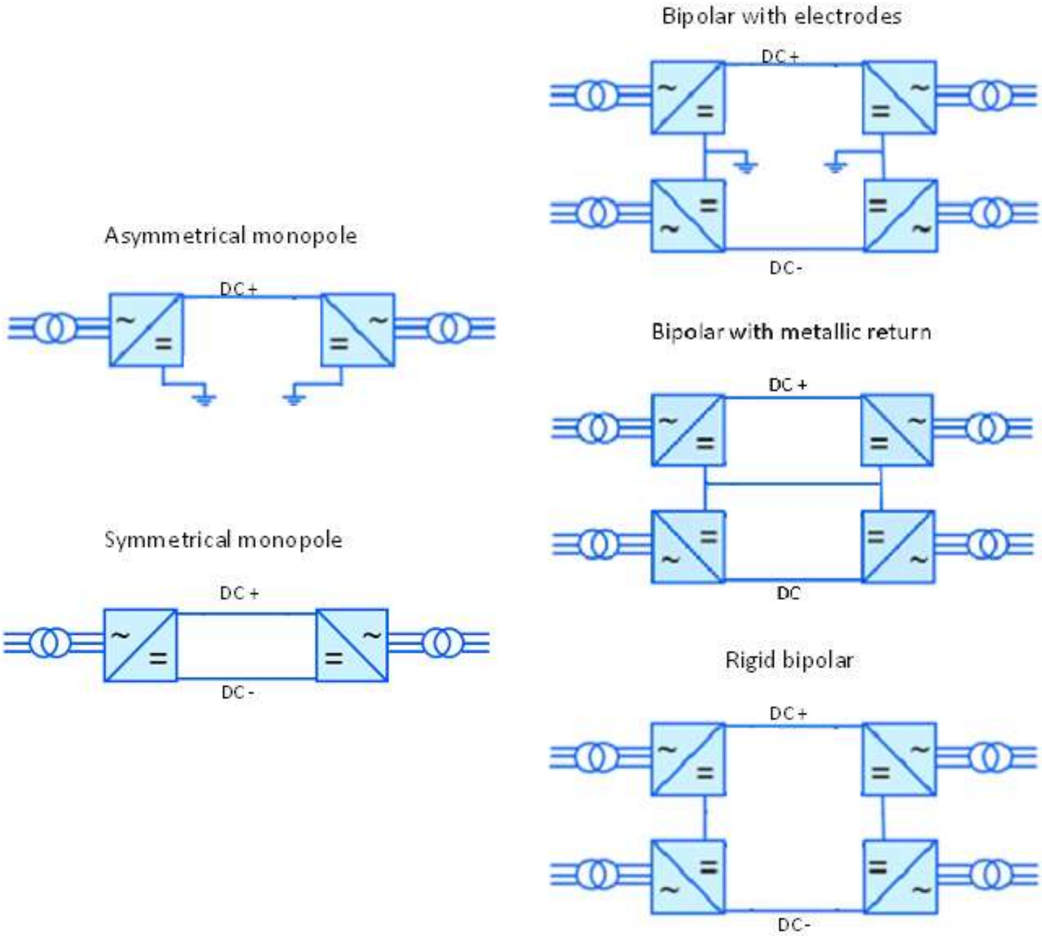



*Figure 5-12 - Possible interconnection typologies.*

In consideration of the envisaged size of the link (1000-1500 MW), in terms of link typology, in order to improve the reliability of the system the best option would be the "bipolar with return" one. In particular, it seems more cost-effective – considering the length of the link – to use sea as return path (i.e., by installing sea electrodes) instead of laying a third cable in the sea.

The main advantages of this solution in the specific case of the HVDC Georgia – Romania Interconnection are as follows:

- In case of single fault either on a converter or on a cable, it is possible to transmit 50 % of the power by exploiting the return path. Considering the presence of very long cable laid at significant water depth, it is expected that a cable fault may require several weeks for repairing. In this respect, the advantage of the proposed typology in terms of energy transmission is significant.
- Considering the expected long delivery time of the HVDC cables, this solution allows to start operation in monopolar configuration (using one cable, one converter and the return path) and to switch to bipolar one once the second cable is installed.

### 5.3.4 DC Electrode

Due to a large variation in geographical, geophysical and technical properties of electrode sites and HVDC system requirements, different electrode shapes and configurations have been developed (CIGRÉ, 2017; Carloni et al., 2019). Among the sea electrodes, there are three typical configurations (Sutton et al., 2017; CIGRÉ, 2017).

**1. Beach electrodes**

An electrode array located on the shore above the high tide water level. The active part of each electrode is recessed into the beach substrate, up to a depth below the lowest tide sea level and, for such reason, in indirect contact with the seawater through the wet sand.

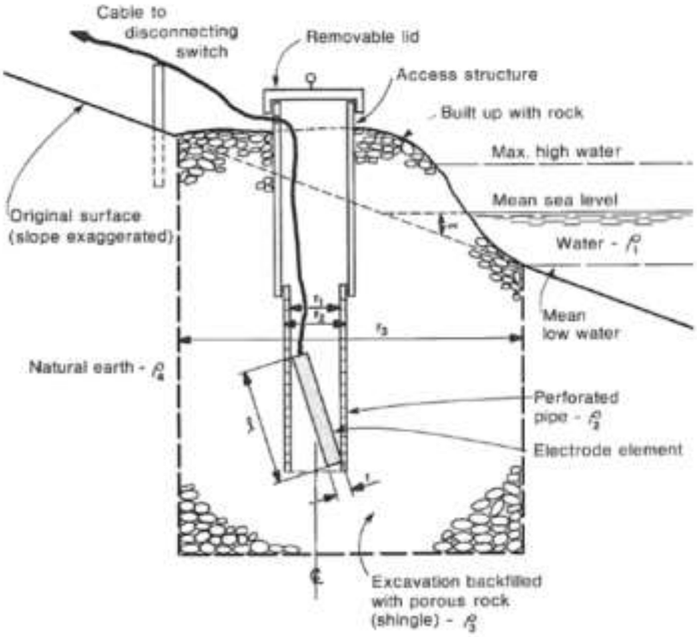



*Figure 5-13 – Profile View of Beach Electrode in Shallow Well (Cigrè TB 675).*

**2. Pond electrodes**

An electrode array installed on the shore within a natural lagoon or artificial bay or pond, protected against waves and sea currents by means of a breakwater barrier. The active part of each electrode is attached to a fence or hung from a pontoon within the pond below the low tide water level, in direct contact with the seawater.

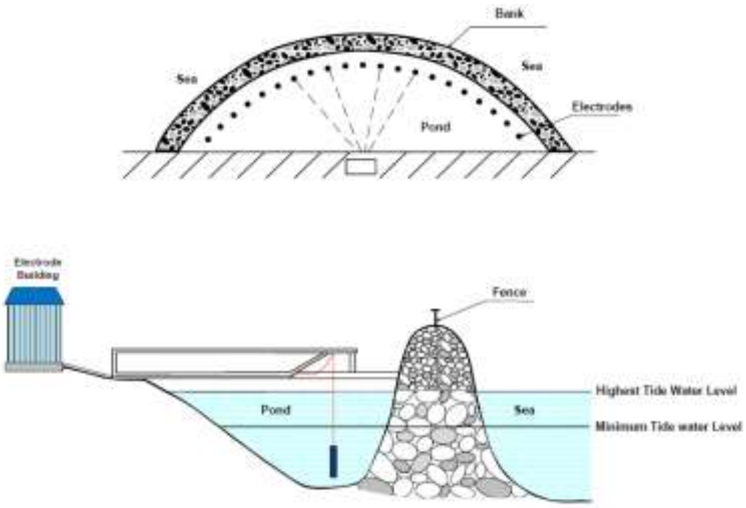



*Figure 5-14 – Conceptual Plan and Profile Views of a Pond Electrode (Cigrè TB 675).*

**3. Marine electrodes**

Either a long bare conductor (often in a ring configuration) or an electrode array installed with or without barriers on the seafloor in a location not closer than few hundred meters from the shoreline and possibly not deeper than 30 – 35 m.

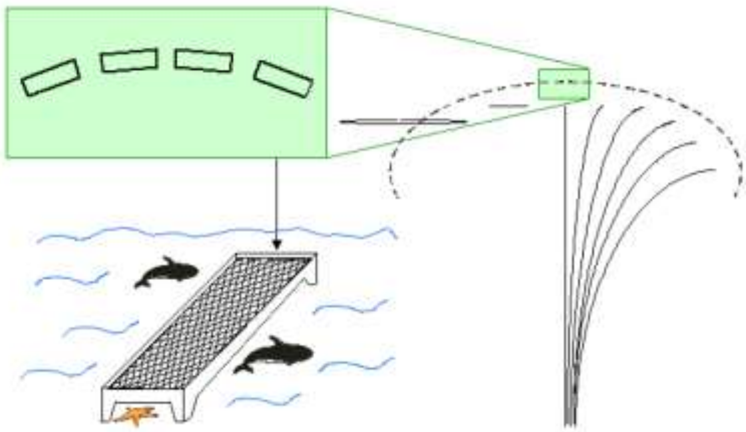


*Figure 5-15 – Sea Electrode with Titanium Net (Cigrè TB 675).*

Two different configurations of marine electrodes are considered for this project: POND and MARINE electrodes, as shore electrodes present a number of drawbacks (more complex maintenance compared to pond electrodes, sensitivity to tidal levels, possibility of sub-electrodes' drying, etc.).

When considering projects implemented in heavily anthropogenic/urbanized areas, thus characterized by a high number of facilities and infrastructures (such as in the case of the Project), the type of electrode usually chosen is the marine one. This is especially link to the electrode's high corrosive power that may be detrimental to metal structures located in their proximity. However, in order to install a marine electrode some requirements are necessary, such as the presence of a flat and shallow (maximum water depth of 30-35 m) suitable seabed.

In Romania, a potentially suitable area has been found at approx. 7 km from the coast.

In Georgia, due to the presence of the Kolkheti marine protected area, it has not been possible to find a suitable area to install the sea electrode, hence the pond type (with artificial lagoon) is proposed. This solution represents the preferred one especially from an environmental standpoint because a reduced environmental impact is expected from this type of electrode in terms of magnetic field emission (see also conclusion of CESI report C2018084 "*Potential Effects of HVDC Sea Electrodes on Marine Protected Areas*").

Nevertheless, possible impacts of the electrode shall be studied in detail from an environmental and corrosion point of view in a more advanced stage of the Project.

# 6 ENVIRONMENTAL AND SOCIAL BASELINE

## 6.1 Georgian Environmental Baseline

The environmental baseline serves to evaluate the environmental conditions within the Project's designated Area of Interest (AoI), target possible key receptors present within the AoI and highlight the presence of sensitive environmental components which need particular consideration within the scope of the EIA (Environmental Assessment Code of Georgia).

A preliminary descriptive framework of these environmental aspects is provided in the following chapters.

### *6.1.1 Onshore Physical Baseline*

#### *6.1.1.1 Air Quality, Meteorology, Climate and Climate Change*

##### *6.1.1.1.1 Air Quality*

Air pollution generated from any emission can lead to the creation of primary and secondary pollutants. Primary pollutants are those emitted directly to the atmosphere as exhaust emissions, whereas secondary pollutants are formed as a result of atmospheric chemical reactions of the formers (EEA Air pollution sources). The emitted primary pollutants typically include carbon monoxide (CO), hydrocarbons (e.g., benzene, aldehydes and PAHs), sulphur dioxide ($SO_2$) and nitrogen oxides ($NO_x$); secondary pollutants include ozone ($O_3$), hydrocarbons, sulphates and nitrate aerosols (WHO Air quality and health). Particles present within the atmosphere can bind and trap air pollutants. Fine particles $PM_{2.5}$ (particulate matter with a diameter smaller than 2.5 µm) can contain secondarily formed aerosols, while coarse particles $PM_{10}$ (particulate matter with a diameter between 2.5 and 10 µm) can contain earth crust materials and dusts from roads and industries (Fenger, 2002). The impact of particles on human health is largely dependent on the particle characteristics, such as particle size, chemical composition, the duration, frequency and magnitude of the exposure/s (Kampa & Castanas, 2008).

###### 6.1.1.1.1.1 Main OHL AoI

There is limited data available on the emission type and level of air pollution within the area; however, air quality in the Samegrelo-Zemo Svaneti region is negatively affected by 87 stationary sources of air pollutants operating in the region. Among these facilities, the main air polluters are marine terminals (49.67%) and harbors (17.18%), as well as asphalt producers (19.44%). The air pollution (mainly dust - $PM_{2.5}$ and $PM_{10}$ - $NO_2$ and $SO_2$) released by these facilities, accounts for 86.3% of the total emissions in the area. However, these data were retrieved from relatively old sources and need to be confirmed with field data. Other sources of air emissions are expected to be bulk cargoes (dust), diesel engines and zones of welding works in repair shops. Also, a train railway is present in the Area of Interest. Train handling (unloading of train wagons and trucks; transportation to/from the warehouses) together with the Zugdidi airport may have an impact on the air quality of the Main OHL AoI.

###### 6.1.1.1.1.2 Additional OHL AoI

There is limited data available on the emission type and level of air pollution within the Additional OHL AoI. The only available air quality data were retrieved from two towns located in the proximity of the

AoI: Senaki and Kutaisi (both sited at ca 3 km from Additional OHL AoI). According to the Georgian Air Quality website (https://air.gov.ge/en/) the air quality of Senaki ranges from “good” to “fair”, with a concentration of $NO_2$ µg/m$^3$ equals to 35.13, $NO_2$ µg/m$^3$ equals to 20.19 and $O_3$ µg/m$^3$ equals to 35.09. For Kutaisi, the air quality ranges from to “fair” (with $NO_2$ µg/m$^3$ concentration of 23.01 and $C_6H_6$ µg/m$^3$ concentration of 1.40) to “moderate” (with $NO_2$ µg/m$^3$ concentration of 42.83). However, these information date back to November 2022 and they can’t be considered representative of the actual air quality (chapter 6.1.2.3).

#### *6.1.1.1.2 Meteorology and Climate*

##### 6.1.1.1.2.1 Main OHL AoI

The Georgian climate is influenced by the distance from the Black Sea coast and the altitude. The Main OHL AoI extends over both coastal and foothill areas which experience a milder climate with average winter temperatures above freezing and relatively warm summers with higher humidity and higher average precipitation (World Bank Group, 2021). In fact, the area is classified as humid subtropical area (cfa) and temperate oceanic climate (cfb) by Köppen & Geiger climate classification system (Climate Data, 2023).

Due to the vastness of the investigated zone, two different reference points were chosen in order to describe the potential variability of the climate in the region:

- Chkvaleri (foothill zone in the northern part of the Main OHL AoI);
- Anaklia (coastal zone in the southern part of the Main OHL AoI).

In Chkvaleri, the temperatures range from -1 / 0.5 °C in winter to 24 °C in summer. August represents the warmest month (average temperature of 20.8°C); whereas the coldest month is January (average temperature of -1.0°C). In Anaklia, the temperatures range from 6 / 7 °C in winter to 24 °C in summer. August represents the warmest month (average temperature of 24.6°C); whereas the coldest month is January (average temperature of 6.4°C).

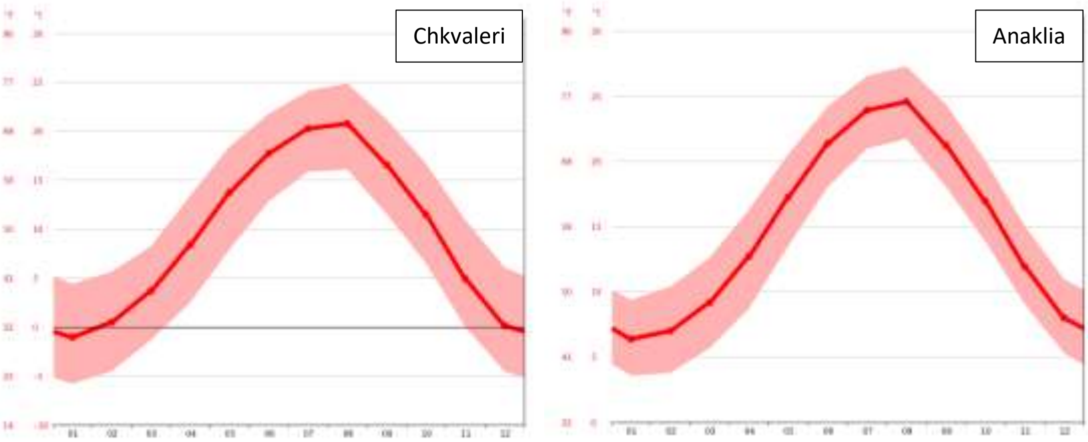



*Figure 6-1 – Average temperature in Chkvaleri (left) and Anaklia (right) (Source: Climate Data.org).*

Precipitation is relatively consistent throughout the year, even during driest month, with 900 – 2,300 mm of rainfall per annum (World Bank Group, 2021). The average monthly temperature and rainfall for the two reference points are shown in Figure 6-2. The greatest amount of precipitation occurs in June (207 mm) in Chkvaleri and during September (195 mm) in Anaklia. Whereas the driest month occurs in February for the entire area with precipitations of 140 mm in Chkvaleri and 106 mm in Anaklia (Climate Data, 2023).

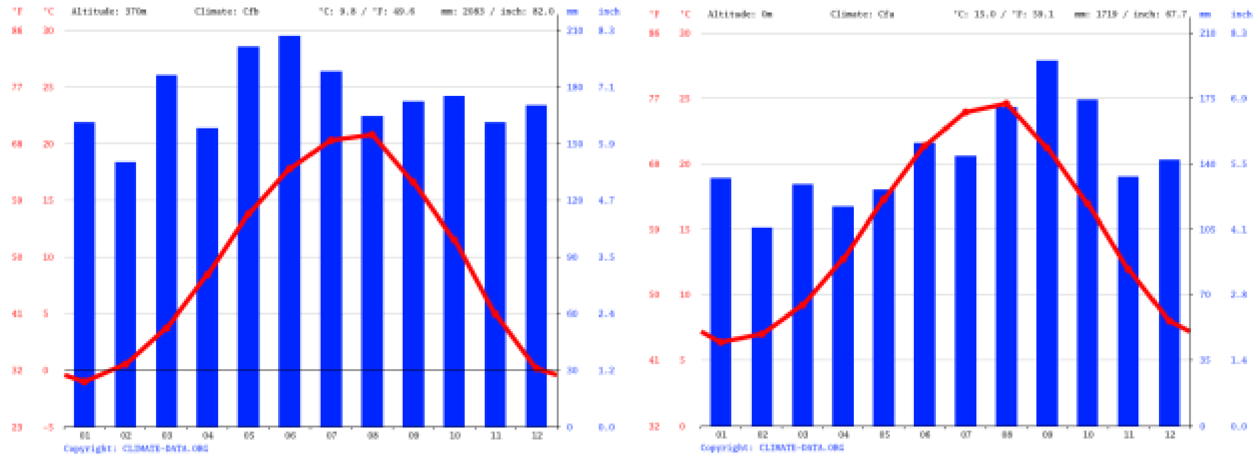



*Figure 6-2 – Average monthly precipitation (mm) and temperature (°C) from 1991-202 in Chkvaleri (on the left) and Anaklia (on the right; Source: Climate Data.org).*

The region where the Main OHL is located is characterized by more intense wind along the coastal zone than in the foothill areas, with an average speed of 6.3 m/s (22.7 km/h) (Figure 6-3). In the areas close to the Main OHL AoI the period between November and April is the windiest of the year, with February ranked as the windiest month (generally in the coastal areas the average hourly wind speed is up to 11 km/h). The Figure 6-4 shows the annual wind speed trend in Anaklia.

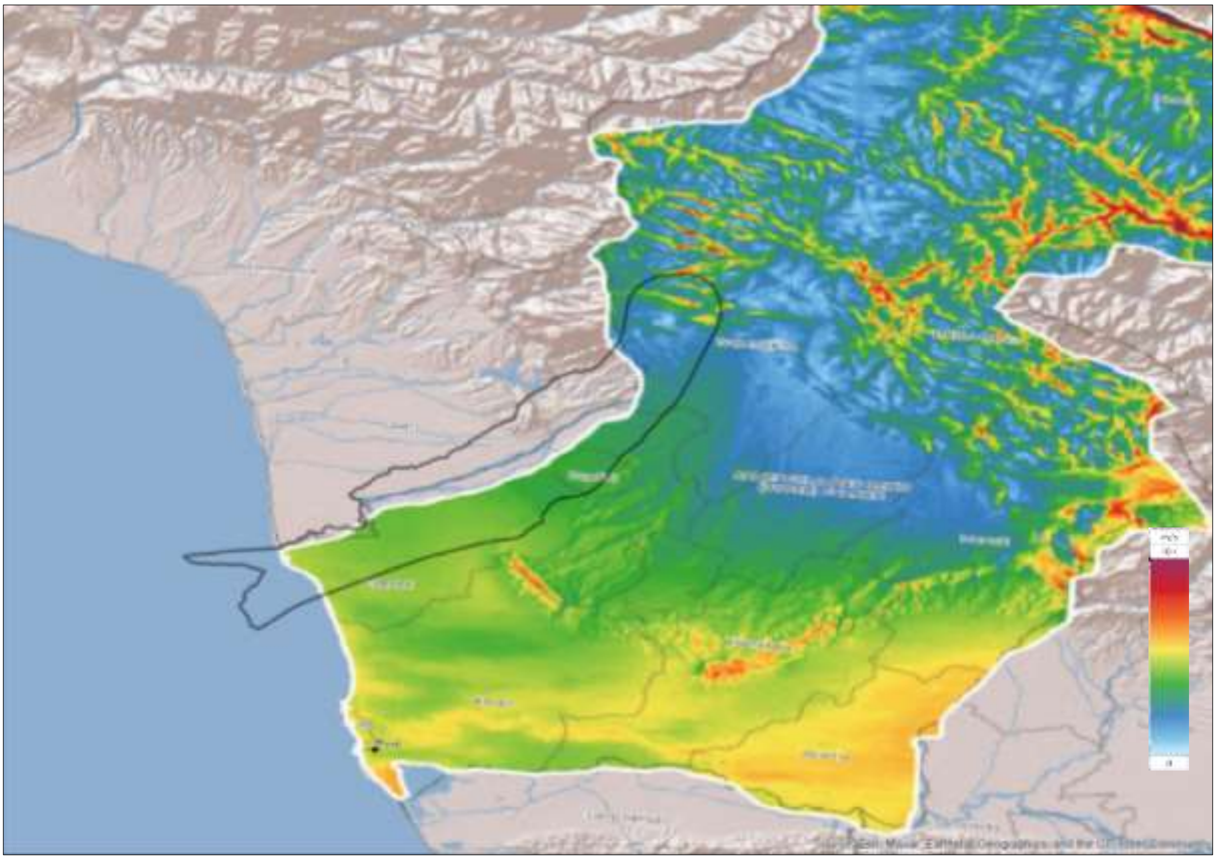


*Figure 6-3 – Average wind speed at 50 m in Georgia – Samegrelo Zemo Svaneti region (Source: Global Wind Atlas). The black polygon indicates the Main OHL AoI.*

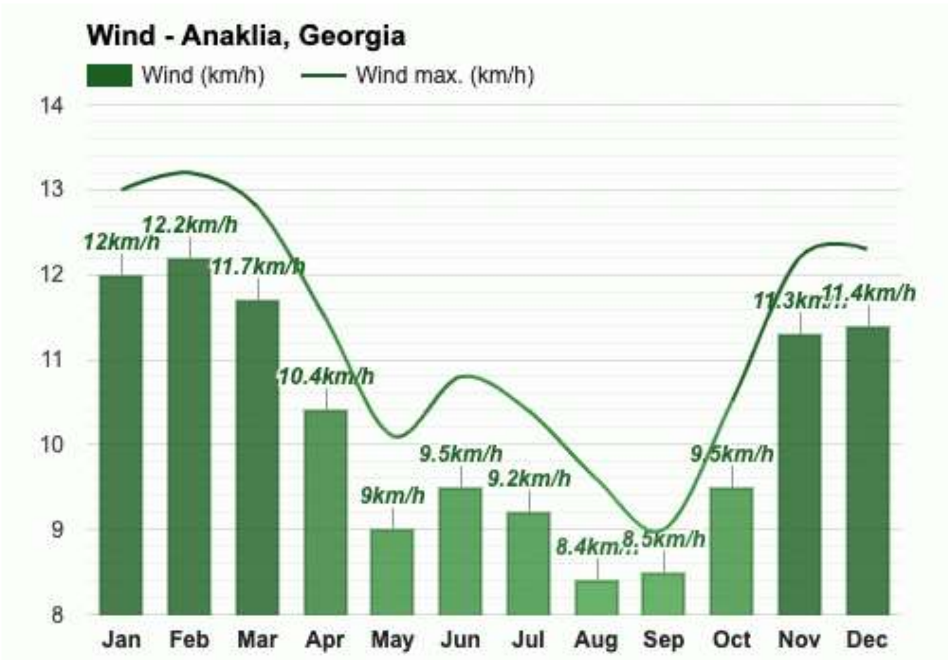



*Figure 6-4 – Average wind speed in Anaklia (source: Weather Atlas.com).*

The predominant wind direction varies throughout the year. Considering the city located in the middle of the Main OHL AoI (Zugdidi), the dominant wind blows mainly from west during the spring-summer months and from east-southeast between October and March (Figure 6-5).


*Figure 6-5 – Dominant wind direction in Zugdidi between 03/2013 – 01/2023 (Source: Windfinder).*

6.1.1.1.2.2 Additional OHL AoI

The Additional OHL AoI extends over foothill areas which experience a milder climate with average winter temperatures above freezing and relatively warm summers with higher humidity and higher average precipitation. Due to the vastness of the investigated zone, two different reference points were chosen in order to describe the potential variability of the climate along the new corridor:

- Senaki, located on the coastal side of the Additional OHL AoI at about 33 km from the coast and at 38 m altitude;
- Tskhaltubo, located on the inland side of the Additional OHL AoI at 145 m altitude.

Both Senaki's and Tskhaltubo's climate is classified as warm and temperate, with an average temperature of 14.0 °C and a significant amount of rainfall (about 1566 mm and 1633 mm for Senaki and Tskhaltubo, respectively) during the year. Similar to the Main OHL AoI, these areas are both classified as humid subtropical area (cfa) by Köppen & Geiger climate classification system (Climate Data, 2023).

The temperature's range for the two reference points is similar to the Anaklia's one and varies with season (Figure 6-6) between 3 / 5°C during winter months and 25°C in summer for both the Senaki's and Tskhaltubo's areas.

August represents the warmest month of the year with an average temperature of 24.4°C in Senaki and 24.7°C in Tskhaltubo; whereas the coldest period occurs in January with temperatures around 4.5°C in Senaki and 3.5°C in Tskhaltubo.

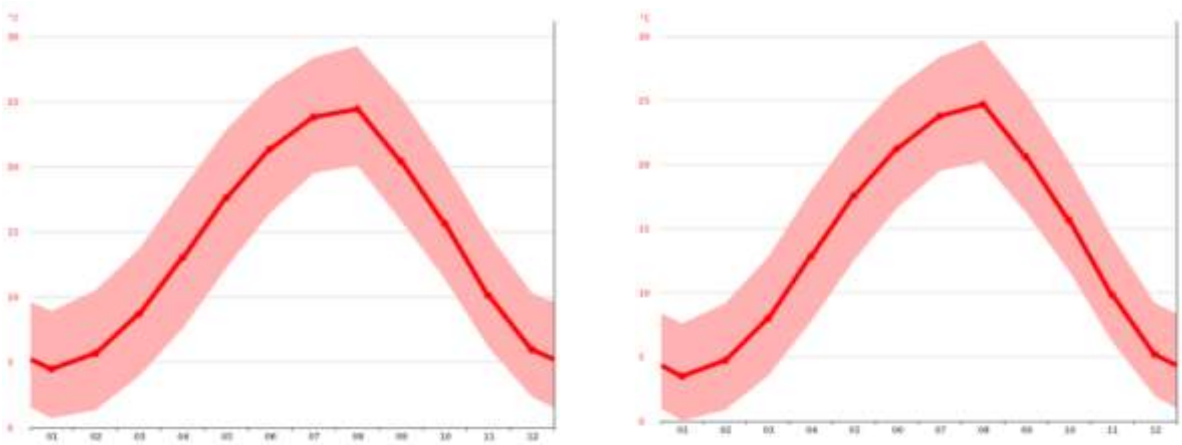


*Figure 6-6 – Average temperature in Senaki (left) and Tskahaltubo (right) (Source: Climate Data.org).*

Precipitation is relatively consistent throughout the year, and the average monthly temperature and rainfall for the reference points (i.e., Senaki and Tskhaltubo) are shown in Figure 6-7. In Senaki the greatest amount of precipitation occurs in September and October (160 mm), while the driest months are represented by February, April and May (110 mm). In Tskhaltubo the greatest amount of precipitation occurs during the winter months between October and March, with the highest precipitation registered in March (160 mm), while the driest months are represented by July and August with 115 and 109 mm precipitation, respectively (Climate Data, 2023).

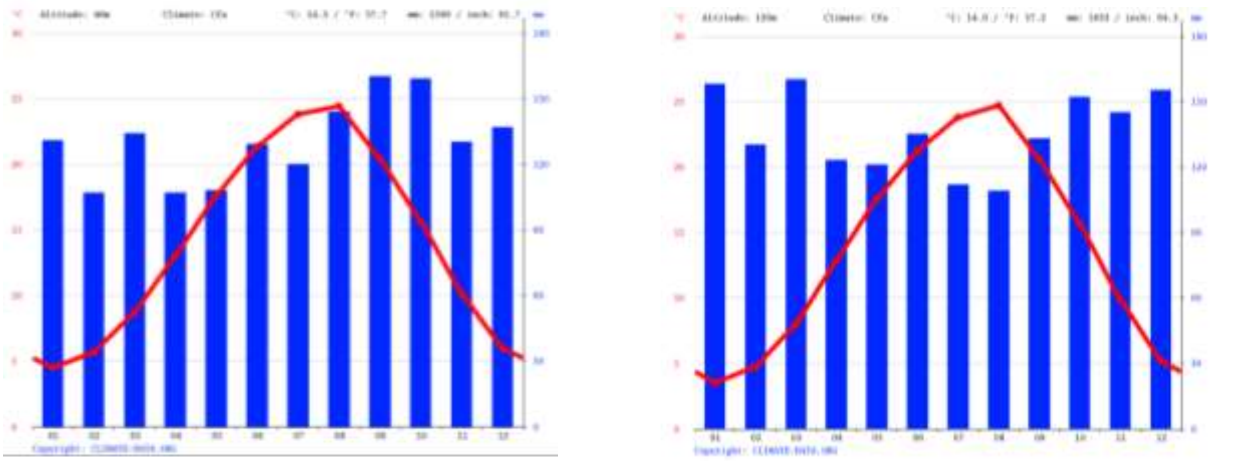


*Figure 6-7 – Average monthly precipitation (mm) and temperature (°C) from 1991-2021 in Senaki (on the left) and Tskhaltubo (on the right; Source: Climate Data.org).*

Regarding the wind direction, it was not possible to retrieve data concerning Senaki or Tskhaltubo, however, data were available for the Kutaisi international Airport which is located at 5 km distance from the Additional OHL AoI. The predominant wind direction varies throughout the year with a prevalent wind direction blowing from east between September and April and from west to south-west from May to August (figure below).


*Figure 6-8 – Dominant wind direction at Kutaisi international airport between 03/2013 - 01/2023 (Source: Windfinder).*

### *6.1.1.1.3 Climate Change*

Georgia faces various natural hazards, including fluvial and coastal floods, sea level rise and coastal erosion, heavy winds and storms. All of these risks, which are in part due to the area's geomorphological nature and in part due to anthropogenic factors, such as land use changes, are expected to be aggravated by climate change.

The World Bank Group's Climate and Disaster Risk Screening Tool has been used to model climate projection in terms of future average temperature and precipitation through the Coupled Model Inter-comparison Projects (CMIPs), overseen by the World Climate Research Program. Georgian climate projections have been analyzed under four emission scenarios: RCP2.6, RCP4.5, RCP6.0 and RCP8.5; with the latter representing the higher emission pathway. The main climate change related effect is expected to be an increase in temperatures (both the average temperature and anomalies) and precipitations, as described below.

**Increased temperature**

In Georgia, temperatures are projected to increase significantly by the end of the 21st century under all four emission scenarios analyzed. Under the highest emissions scenario (RCP8.5), average temperatures are projected to rise by 4.9°C by the 2090s, compared with a global average rise of 3.7°C. It is expected to detect the largest rise in temperature in summer (May to September), although this seasonality is less significant in the lowest emissions scenario, RCP2.6.

**Increased Magnitude of Precipitation**

This phenomenon is highly dependent on local geographical contexts, however, while it is difficult to predict local long-term future precipitation trends, some global trends are evident. The intensity of sub-daily extreme rainfall events appears to be increasing with temperature. Projections do indicate that western and northern areas of Georgia, especially areas along the Black Sea, are likely to experience a slight increase in days with rainfall greater than 20 mm, while eastern and southern areas are likely to experience a reduction in these days.

The future increase in temperature and intensity of precipitation can exacerbate climate change-related hazards, namely:

- **Heatwaves:** the annual probability of a heat wave could increase significantly in Georgia by the 2050s and continue rising over the remaining decades of the 21st century. Under the highest emissions scenario, the high probability of observing a heat wave is projected to affect all regions of the country equally;
- **Drought:** two primary types of droughts may affect Georgia, meteorological (usually associated with a precipitation deficit) and hydrological (usually associated with a deficit in surface and subsurface water flow, potentially originating in the region's wider river basins). RCP8.5 projects an increase in annual severe drought probability of 70% which can also increase wildfire occurrence and consequent loss of assets and land field;
- **Sea level rise and increase of coastal erosion:** it has been estimated that more than 30 million $m^3$ of sand and gravel was removed from the Georgian beaches between 1945 and 1965 (Zenkovicha, 1987). Sea Level Rise is expected to exacerbate coastal erosion across most of coastal Georgia. Moreover, extreme marine weather conditions such as strong winds, high waves and high-water levels can damage buildings and assets;
- **Fluvial and Coastal floods:** it is expected an increased magnitude and occurrence of flooding events which can also enhance pollution in water and soil from sub-standard sewerage plants and waste sites in coastal Georgia (https://climateknowledgeportal.worldbank.org/sites/default/files/2021-06/15836-WB_Georgia%20Country%20Profile-WEB.pdf).

**Effects of the Project on Climate change.**

- **Negative**. The Project is expected to have negative effects on climate change during the construction phase, as the use of vessels, heavy vehicles and machineries will lead to the introduction of greenhouse and climate change gases into the atmosphere.

- **Positive**. Climate change is a major risk to good development outcomes, and the World Bank Group is committed to play an important role in helping countries integrate climate action into their core development agendas. In this context, Under the 2015 Paris Agreement, Georgia has pledged to enhance sustainable development and to curb global warming through its recently updated Nationally Determined Contribution (NDC) which sets forth specific measures for greenhouse gas emission reductions and climate-change adaptation. As part of its updated NDC, Georgia pledged a 35% reduction of greenhouse gas emissions by 2030 as compared to 1990.

Currently, Georgia has about 4,600 MW of installed capacity, the majority (77%, around 3,400 MW) of which is "clean energy" in the form of Hydro power followed by thermal generation - 22% (around 1200 MW), and other renewable energy sources (wind) – 1% (about 21 MW). During "wet' spring and summer months, Georgia exports excess of electricity generated by HPPs even all TPPs are not operating, while during "dry" winter months when consumption is at maximum level, generation from available thermal and hydro capacities is not sufficient and Georgia imports electricity. In future periods, commissioning of new HPPs is expected in Georgia (Ten-Year Network Development Plan of Georgia 2023-2033).

The creation of the new underwater cable connecting Romania to Georgia will allow to integrate a growing share of renewables in Europe through electricity interconnections. This is expected to have a considerable positive impact on climate change and emission reduction.

### *6.1.1.2 Geology, Geomorphology and Soil*

Geologically, the territory of Georgia lies between the Euro-Asiatic and Afro-Arabian plates subdivided into three major tectonic units (Melikadze et al., 2010):

- Fold system of the Greater Caucasus, which represents a marginal sea in the geological past;
- Trans-Caucasus inter-mountain area, which marks the northern part of the Trans-Caucasus island arc;
- Fold system of the Lesser Caucasus, the southern part of the ancient Trans-Caucasus island arc.

The geology of the AoI is predominantly characterized by Quaternary and Cretaceous deposits in the form of carbonate rocks (limestone and dolostones) and pseudokarst (clays and sandstones wit gypsum content) (Gamkrelidze et al., 2011; Lezhava et al., 2019).

#### *6.1.1.2.1 Geologic Activity*

From a tectonic standpoint, the Caucasus is one of the most seismically active regions in the Alpine-Himalayan collision belt (Javakhishvili et al., 2007) and Georgia is characterized by the presence of several active faults (Figure 6-9). Based on the geology of the territory, Gamkrelidze et al. (1998) have identify and mapped the active faults of Georgia upon which is based the Country's seismic zonation. The latter is used, together with historical data, to build models (i.e., Probabilistic Seismic Hazard Analysis, PSHA, Chelidze et al., 1999; Varazanashvili et al., 2021) which are able to predict earthquake probabilities in the Georgian region (Figure 6-10).

6.1.1.2.1.1 Main OHL AoI

The Main OHL AoI is located in a medium risk seismic area by being close to an active fault (number 13 in Figure 6-9). This is also supported by the World Bank GFDRR hazard screening tool (thinkhazard.org) which highlights a 10% probability of potentially damaging earthquake occurring in the AoI in the next 50 years.

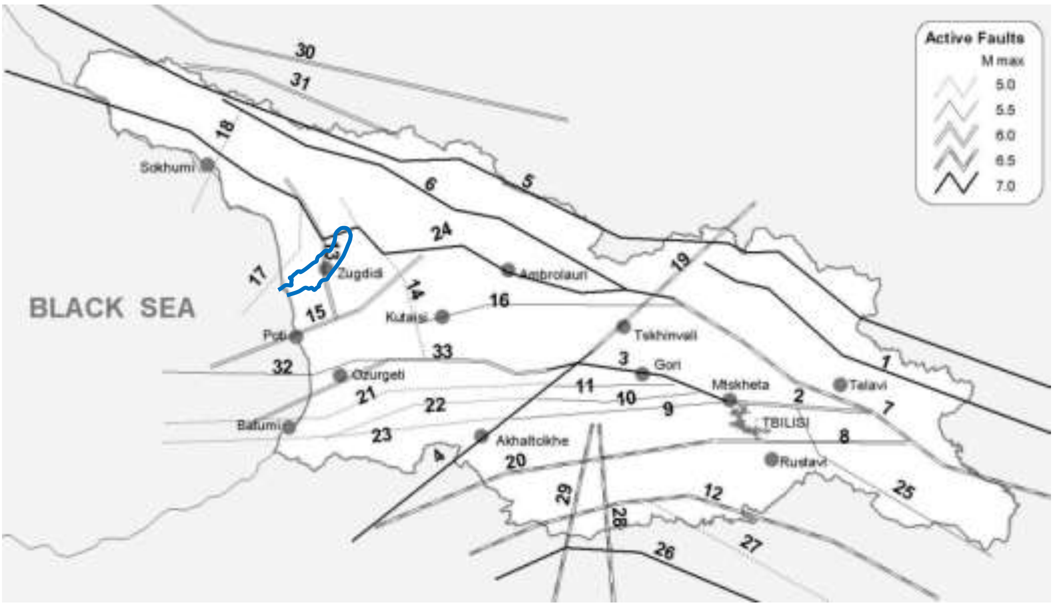



*Figure 6-9 – Active faults and seismic areas of Georgia (Chelidze et al., 1999). The Main OHL AoI is shaped in blue.*

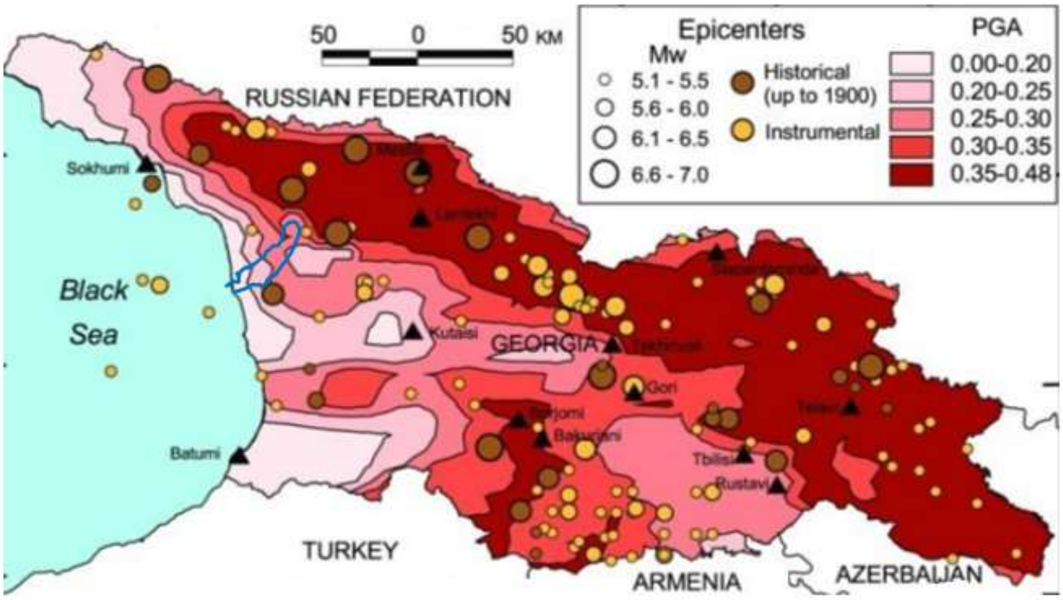



*Figure 6-10 – Map of Georgia from the study of Varazanashvili et al. (2021) showing earthquake probabilities. Plotted circles represent historical (brown) and possible future (yellow) earthquake epicenters. Only the epicenters of strong earthquakes (Moment Magnitude Mw> 5) are plotted on the map and, differences in the circle's diameters indicate diverse Mw. Different color layers (from light pink to red) represent diverse PGA intensity. The Main OHL AoI is shaped in blue and is located in a medium risk seismic area: PGA between 0.2 to 0.3, Mw between 5.0 to 65.*

#### 6.1.1.2.1.2 Additional OHL AoI

Even the Additional OHL AoI, as the Main OHL AoI, is located in a medium risk seismic area by stretching across four active faults (number 13, 14, 15 and 16 in Figure 6-11).

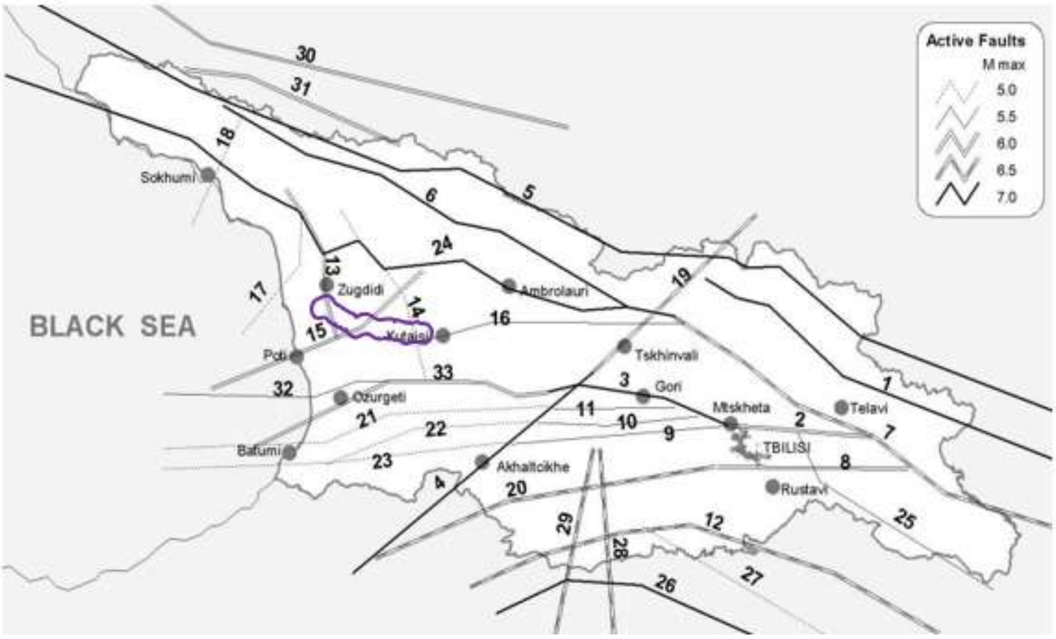



*Figure 6-11 – Active faults and seismic areas of Georgia (Chelidze et al., 1999). The Additional OHL AoI is shaped in purple.*

This is also supported by the World Bank GFDRR hazard screening tool (thinkhazard.org) which highlights a 10% probability of potentially damaging earthquake occurring in the AoI in the next 50 years.

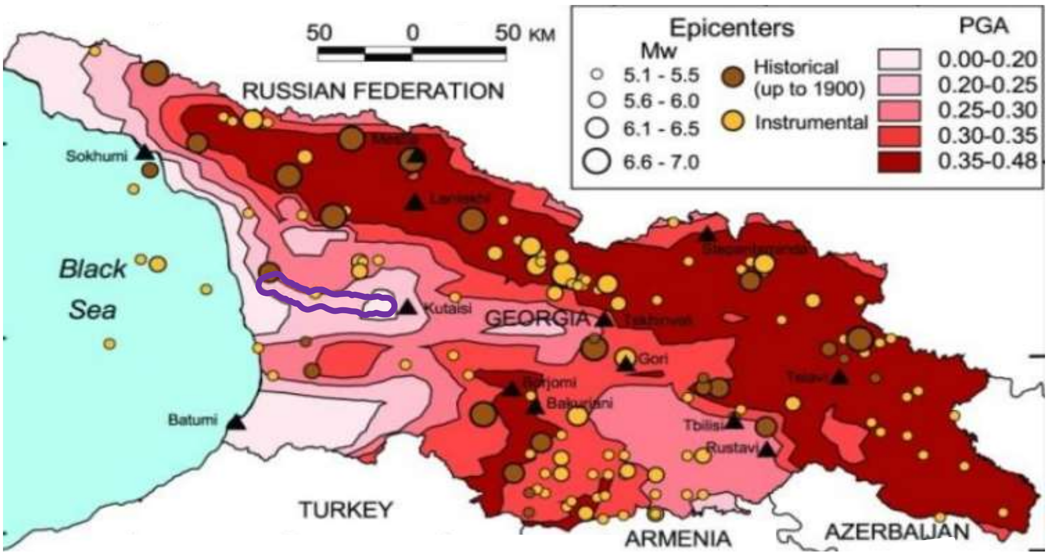



*Figure 6-12 – Map of Georgia from the study of Varazanashvili et al. (2021) showing earthquake probabilities. Plotted circles represent historical (brown) and possible future (yellow) earthquake epicenters. Only the epicenters of strong earthquakes (Moment Magnitude Mw> 5) are plotted on the map and, differences in the circle's diameters indicate diverse Mw. Different color layers (from light pink to red) represent diverse PGA intensity. The Additional OHL AoI is shaped in purple and is located in a medium risk seismic area: PGA between 0.2 to 0.3, Mw between 5.0 to 6.5.*

###### *6.1.1.2.2 Volcano Hazard*

###### 6.1.1.2.2.1 Main OHL AoI

Zugdidi (located in the middle of the Main OHL AoI) volcanic hazard is classified as high according to the information that is currently available (World Bank GFDRR hazard screening tool, thinkhazard.org). This means that the selected area is located at less than 50 km from a volcano for which a potentially damaging eruption has been recorded in the past 2,000 years and that future damaging eruptions are possible.

###### 6.1.1.2.2.2 Additional OHL AoI

As for the Main OHL AoI, also the Additional OHL AoI is located in an area considered of high risk in terms of volcanic hazard (World Bank GFDRR hazard screening tool, thinkhazard.org).

#### *6.1.1.3 Wildfire Hazard*

In Georgia, forest fires are a significant problem. From 2000 to 2015, a total of 6,000 fires were recorded in the country and, in 2008 fires covered up to 1,000 hectares which was assessed as ecocide.

Forest fires are caused by a combination of both natural and anthropogenic factors. The main causes of anthropogenic fires are proximity to the residential areas (negligence of population, existence of landfills etc.), practice of burning agricultural areas, absence of fire breaks, and the violation of forest use rules. A smaller portion of forest fires are solely due to natural causes (e.g., extreme heat, lightning) whereby drought climate and strong winds are a catalyst for the fire spreading, such as the outbreaks in Georgia in summer 2014. The most important forest fire hazards are fires in Samtskhe-Javakheti, Imereti, Kakheti, Shida Kartli and Adjara regions (areas belonging to I-III fire hazards).

##### *6.1.1.3.1 Main OHL AoI*

Within the Samegrelo-Zemo Svaneti region, which includes the city of Zugdidi, the wildfire hazard is classified as high according to the information that is currently available on the World Bank GFDRR hazard screening tool (thinkhazard.org). This highlights there is greater than a 50% chance of encountering weather that could support a significant wildfire, which may result in both life and property loss in any given year.

##### *6.1.1.3.2 Additional OHL AoI*

Within the Samergelo-Zemo Svaneti region, which includes the cities of Khobi and Senaki, and the Imereti region, which includes the cities of Tskhaltubo and Kutaisi, the wildfire hazard is classified as high in both regions according to the information that is currently available on the World Bank GFDRR hazard screening tool (thinkhazard.org).

### *6.1.1.4 Surface and Ground Water*

#### *6.1.1.4.1 Main OHL AoI*

In terms of **surface water**, the Enguri river represents the main freshwater body of the Main OHL AoI, with 213 km length and a drainage basin of 4,060 km$^2$ (Barinova & Kukhaleishvili, 2017). The overall annual water flow of the Enguri river into the Black Sea can reach 3.15 km$^3$ of water (Mikhailova, 2009) discharging about 2.7 * 10$^6$ tons of sediment (Diakonidze et al., 2018; Figure 6-13).

Floods are very frequent in Georgia with recorded high-water levels during spring and summer months, when intensive spring rainfalls coincides with snow melt. In general, the lower course of the Enguri river basin is more sensitive to flood and flash flood hazards. According to the information reported on the World Bank GFDRR hazard screening tool (thinkhazard.org), this AoI is classified as medium risk in terms of flood hazard. This means that there is a chance of more than 20% that potentially damaging and life-threatening river floods occur in the coming 10 years.

In terms of **ground water**, the basin is quite shallow in Anaklia (0.5 - 1.2 m depth), while in Zugdidi and Jvari it varies from 7 to 10 m depth.

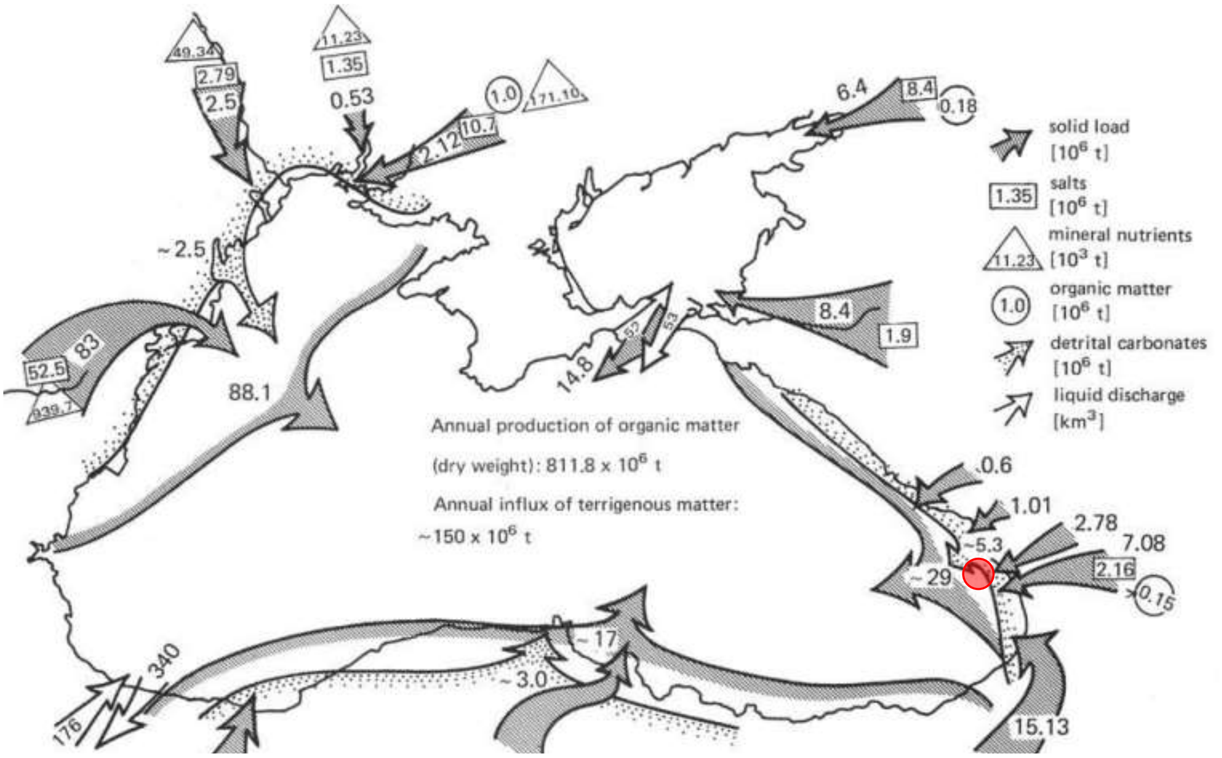



*Figure 6-13 – Annual production of organic matter (sediment flows by river intakes) of the Black Sea basin source: Diakonidze et al., (2018). The red circle indicates the AoI.*

#### *6.1.1.4.2 Additional OHL AoI*

In terms of **surface water,** 11 rivers have been identified crossing the Additional OHL AoI as shown below in Figure 6-14. Additional information about surface watercourses shall be collected at the ESIA stage in order to assess potential interactions between construction activities and nearby surface waterways.


*Figure 6-14 – Map of the 11 rivers that cross the Additional OHL AoI.*

Regarding the possibility of floods, according to the information reported on the World Bank GFDRR hazard screening tool (thinkhazard.org) the Additional OHL AoI is located in areas characterized by medium to high risk in terms of flood hazard. In the area of Tskhaltubo, the river flood hazard is classified as medium, while in Tskhakaia, Khobi, Abasha and Samtredia areas, the river flood hazard is classified as high, as shown in the map below. This means that potentially damaging and life-threatening river floods are expected to occur at least once in the next 10 years.

In terms of **groundwater,** no available data was retrieved for the Additional OHL AoI and the information should be collected during the ESIA implementation (chapter 6.1.2.3).

### *6.1.1.5 Watersheds*

Watersheds in Georgia have a significant presence and play a crucial role in the country's hydrological dynamics. A presence of 26,060 rivers has been estimated in Georgia, with a total length of about 60,000 km. The hydrographical network of Georgia (99.4%) mainly consists of little (<25 km) and very little (<10 km) rivers. The average water flow that is formed on Georgia's territory is 56.5 km$^3$.

These rivers belong to two main basins which are divided by the Likhi mountain ridge: 65% of them belong to the Black Sea basin and 30.5% to the Caspian Sea basin.

The Rioni River Basin covers the regions of Imereti (where the Additional OHL AoI is located) and Samegrelo-Zemo Svaneti (region of the Main OHL AoI). The main rivers present within these regions are: Rioni River, Enguri River and Khobi River.

### *6.1.1.6 Terrestrial Acoustics*

Noise is typically defined as is unwanted acoustic sound deemed as unpleasant, loud and/or disruptive to hearing and thus poses a nuisance. The accepted range of sound audible to humans is typically from

0 dB to 140 dB and the frequency response of the ear is generally accepted as covering a range of 20 Hz to 20,000 Hz (Daniel, 2007).

The WHO together with the Organisation for Economic Co-operation and Development (OECD) have developed guidelines based on the effects of the exposure to environmental noise, which are:

- The **2009 WHO Night Noise Guidelines for Europe.** It provides recommendations and targets the limits for night noise to limit noise pollution;
- These guidelines integrate the **2002 EU Environmental Noise Directive** – END **(2002/49/EC)**, which requires countries to map hotspots and reduce exposure, but does not set noise limit values.

The WHO recommends a standard guideline value for average outdoor noise levels of 55 dB(A) during the day and 45 dB(A) at night-time. The WHO further recommends that, during the night-time, the maximum level of any single event should not exceed 60 dB(A) to avoid sleep disruption. Specific ambient guidelines are also set for sensitive targets (i.e., dwellings, bedrooms and schools), which are reported in Table 6-1.

*Table 6-1 – WHO noise guidelines for day- and night-time according to the target environment.*

| Receptors | Ambient sound level $L_{Aeq}$ (dB(A)) | | | |
|---|---|---|---|---|
| | Daytime | | Night-time | |
| | Indoor | Outdoor | Indoor | Outdoor |
| Dwellings | 50 | 50 | - | - |
| Bedrooms | - | - | 30 | 45 |
| Schools | 35 | 55 | - | - |

Other guidelines on noise pollution include the WB Guidelines for noise management, which adopt the Guidelines for Community Noise presented in the table below.

*Table 6-2 – WB noise guidelines for day- and night-time according to the target environment.*

| Receptors | Maximum allowable ambient noise level | |
|---|---|---|
| | 1-hour $L_{Aeq}$ (dB(A)) | |
| | Daytime | Night-time |
| | 07:00 – 22:00 | 22:00 – 07:00 |
| Residential/institutional/educational | 55 | 45 |
| Industrial/commercial | 70 | 70 |
| *Note: $L_{Aeq}$ values are not specifies for rural areas.* | | |

The Georgia National legislation encompasses the EU and WHO directives on noise through: "On acoustic noise norms in the premises and areas of residential houses and public/public institutions" (2017), which indicates the various noise standards. In some cases, the standards are stringent than WB requirements (Table 6-3). The Explanatory Note of the Georgian Law specifies that it corresponds 2002/49/ EC Directive "On assessment of noise in the environment and appropriate management".

*Table 6-3 – Georgian standards on noise by national law.*

| Receptor | Georgian Noise standard (dBA) | | |
|---|---|---|---|
| | Daytime | Evening-time | Night-time |
| Residential | 50 | 45 | 40 |

Data on the acoustics and vibrations in the Main and Additional OHL AoI are scarce. The only available information concerns the Anaklia region that was studied during the port development's project, and it is:

- Sea noise at Anaklia (150 - 200 m from seaside);
- Traffic noise;
- Noise from several crushers located along the Enguri river.

However, it may be assumed that most of the noise in the area can also derived from households in the bigger town centres and Zugdidi airport. Because the AoI includes several settlements characterized by the presence of sensitive targets (such as schools, hospitals etc.), the site might affect residential and recreational areas, hence nuisance from the operations may be expected. Noise could be generated from the increase of traffic during operation. This will require minimum baseline measurements at key receptors that may be located in proximity of sensitive targets (chapter 6.1.2.3).

###### *6.1.1.6.1 Main OHL AoI*

Data on the acoustics and vibrations in the Main OHL AoI are scarce. The only available information concerns the Anaklia region that was studied during the port development's project, and it is:

- Sea noise at Anaklia (150 - 200 m from seaside);
- Traffic noise;
- Noise from several crushers located along the Enguri river.

However, it may be assumed that most of the noise in the area can also derived from households in the bigger town centres and Zugdidi airport. Because the AoI includes several settlements characterised by the presence of sensitive targets (such as schools, hospitals etc.), the site might affect residential and recreational areas, hence nuisance from the operations may be expected. Noise could be generated from the increase of traffic during operation.

###### *6.1.1.6.2 Additional OHL AoI*

Data on the acoustics and vibrations in the Additional OHL AoI are scarce. However, the Additional OHL is located in an area characterized by extensive trees and sparse cropland and grassland. Several main towns are also located within the 5 km buffer of the Additional OHL, as shown in Figure 6-15, below.

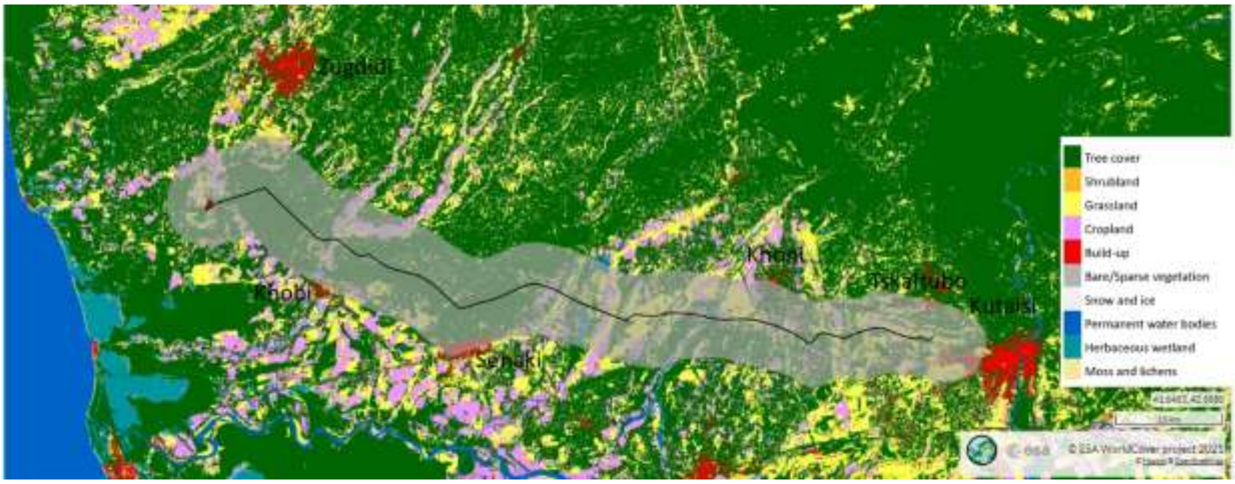



*Figure 6-15 – Land cover map of the Additional OHL AoI and main towns reported along the corridor (the grey area identifies a 5 Km buffer along the corridor. The red tringle on the left indicates Anaklia substation).*

It may be assumed that most of the noise in the area can derive from households in the bigger town centres (e.g., Senaki, Kutaisi, etc.) and Senaki airport (which is just outside of the 5 km buffer). The AoI is also crossed by secondary streets in 8 points and by railway in two points, as shown in Figure 6-16**,** which may represent another source of anthropogenic noise. Because the AoI includes several settlements characterised by the presence of sensitive targets (such as schools, hospitals, etc.), the construction sites might affect residential and recreational areas, hence nuisance from the operations may be expected.

### *6.1.1.7 Light Pollution*

The term "light pollution" refers to the anthropogenic alteration of natural lighting levels at night (Cinzano et al., 2014). This alteration is primarily caused by the inefficient or excessive artificial lightning (Pocora et al., 2015). Light pollution encompasses various issues arising from the improper, misdirected, or excessive use of artificial light sources (Pocora et al., 2015). The primary sources of light pollution include over-illumination, glare, sky glow, light clutter, and light trespass (Pocora et al., 2015).

Over-illumination is characterized by excessive and wasteful use of light. Factors contributing to this phenomenon include inappropriate selection of light bulbs and lamps for street illumination, the absence of timers and sensors to control lighting when not required, extensive use of LED panels for nocturnal advertising, inadequate maintenance of lighting systems, and lack of public awareness. Glare occurs when there is a high contrast between dark areas and bright light sources. Various types of glare that impact the environment include blinding glare, disability glare, and discomfort glare. Sky glow is the visual manifestation of light pollution, which can be observed as an orange cloud hovering over densely populated area. It is caused by the scattering and reflection of artificial light and is influenced by the light's wavelength. Light clutter refers to the excessive clustering of light sources, which can lead to visual confusion, often observed in poorly designed road lighting systems. Light trespass occurs when unwanted light enters private properties, such as light passing through fences or trees.

Light pollution can be visually assessed based on the map's color scale, with different colors corresponding to different ratios between the artificial sky brightness and the reference average natural sky brightness (approximately 21.6 V magarcsec$^{-2}$ or 252 µcdm$^{-2}$, Garstang 1986).

Based on the artificial sky brightness/natural sky brightness ratio value, the color scale is defined as follows:

- 0.11–0.33 (blue)
- 0.33–1 (green)
- 1–3 (yellow)
- 3–9 (orange)
- 9–27 (red)
- > 27 (white)

Ratios lower than 1 (colors from blue to green) indicate that the natural brightness is higher than the artificial brightness. Conversely, ratios above 1 (colors from yellow to white) suggest that artificial brightness surpasses natural brightness. In such cases, artificial lighting sources such as streetlights, buildings, and other man-made light sources dominate over natural light sources.

Areas where the artificial sky brightness (caused by artificial lighting) exceeds 1% of the reference natural brightness are depicted in dark grey. In these areas, despite some level of artificial lighting, the night sky can still be considered unpolluted (Cinzano et al., 2000).

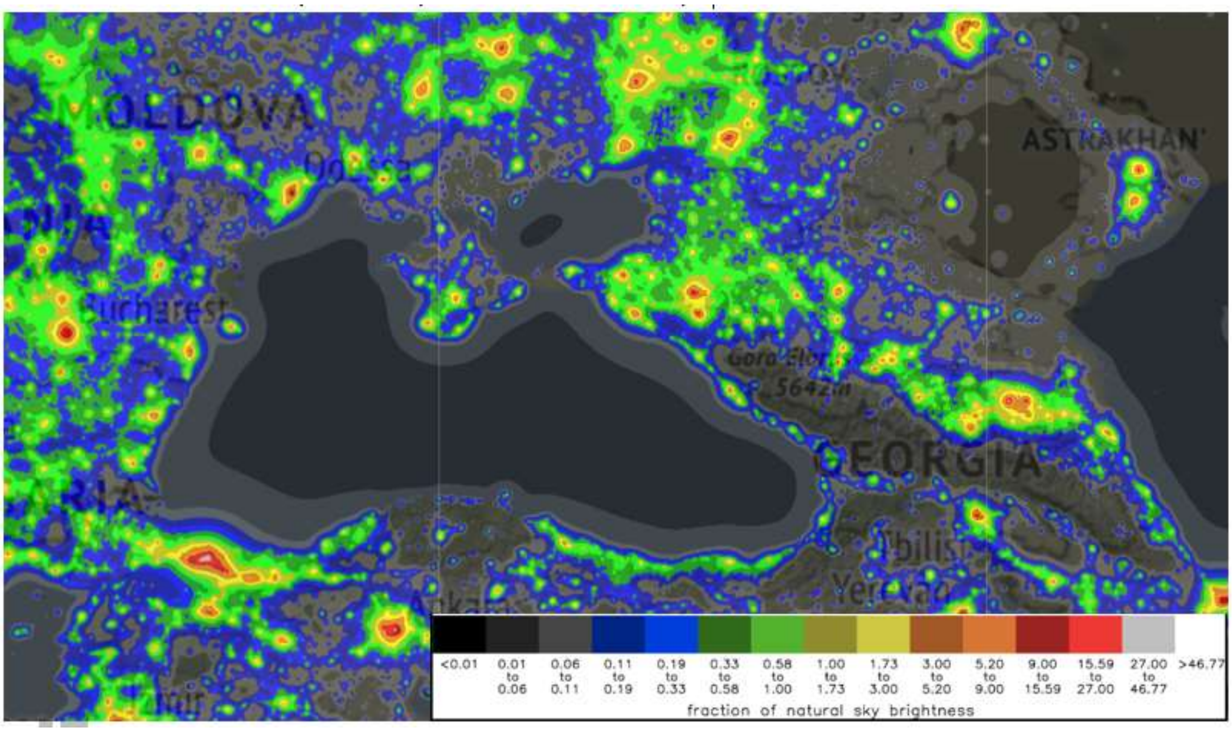



*Figure 6-17 – An overview of the light pollution level in Georgia (source: [Light Pollution Atlas 2020 (djlorenz.github.io).](djlorenz.github.io)*

As observed in Figure 6-17, a substantial portion of the offshore and onshore Georgian AoI present a range of artificial/natural brightness ratio varying between 0.01 and 1.73.

#### 6.1.1.7.1 Main OHL AoI

Within the Main OHL AoI, the area characterized by the highest light pollution is represented by the city of Zugdidi with an artificial/natural brightness ratio value ranging between 3 and 9, while the remaining area presents a ratio of 0.33 – 1 (meaning that artificial brightness surpasses natural brightness by onefold; Figure 6-18). Generally, the coastal area does not show high light pollution by varying between 0.19 and 1, only near Ankalia port the ratio reaches 1.73.

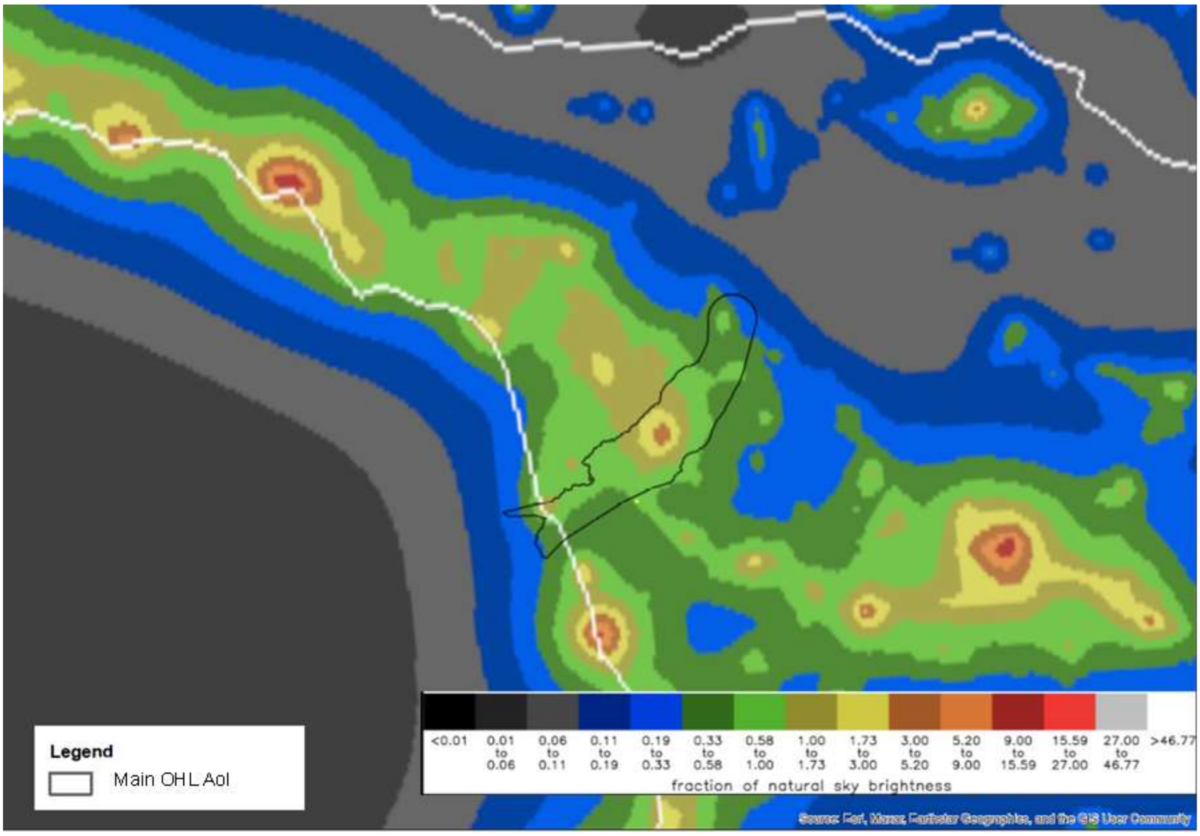



*Figure 6-18 – Light pollution level in the Main OHL AoI. The black polygon identifies the AoI.*

#### 6.1.1.7.2 Additional OHL AoI

Similarly, also within the Additional OHL AoI, the area with the highest light pollution is represented by the city of Kutaisi which enters the AoI 5 km buffer only partially. For this area, the artificial/natural brightness ratio value ranges between 3 and 5, while in the remaining AoI the range varies between 0,19 and 3 (Figure 6-19).

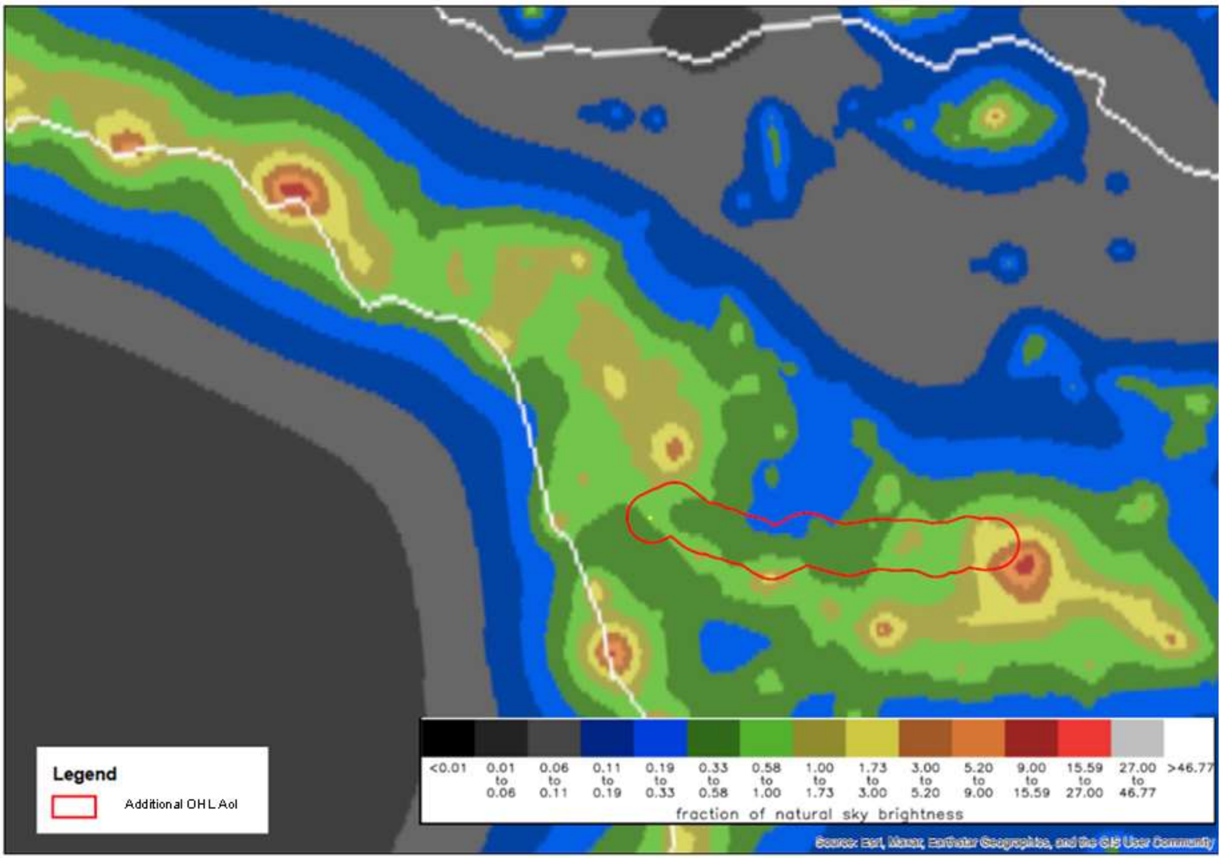



*Figure 6-19 – Light pollution level in the Additional OHL AoI. The red polygon identifies the AoI.*

### *6.1.2 Onshore Biological Baseline*

#### *6.1.2.1 Terrestrial Habitats and Biodiversity*

Based on the review of available literature data, species considered to be threatened (Vulnerable VU, Endangered EN, or Critically Endangered CR) or endemic/restricted-range and potentially occurring in the AoI were identified.

##### *6.1.2.1.1 Terrestrial Fauna*

###### 6.1.2.1.1.1 *Main OHL AoI*

According to literature review, 31 species potentially present within the Main OHL AoI are considered threatened.

Based on the Global IUCN Red List, eight species are **Critically Endangered CR** (all fish species: *Acipenser gueldenstaedtii, Acipenser nudiventris, Acipenser persicus, Acipenser stellatus, Acipenser sturio, Anguilla anguilla, Huso huso*); four species are **Endangered EN** (one reptile species: *Vipera kaznakovi*; three bird species: *Falco cherrug, Neophron percnopterus, Oxyura leucocephala*); ten species are **Vulnerable VU** (seven bird species: *Anser erythropus, Aquila heliaca, Aythya ferina, Clanga clanga, Marmaronetta angustirostris, Melanitta fusca, Podiceps auritus;* three bat species: *Miniopterus schreibersii, Nyctalus lasiopterus, Rhinolophus mehelyi*). Other 23 species are Near Threatened (NT) and 10 Data Deficient (DD). All the remaining species are classified as Least Concern (LC).

Among the species potentially present, one mollusk species (*Paladilhiopsis schakuranica*, DD) and one crustacean species (*Troglocaris ablaskiri*, DD) were identified as endemic to Caucasus region and Georgia Country, respectively, but their distribution is poorly known, and further studies are needed to know whether they are restricted range. Eight fish species (*Acipenser gueldenstaedtii*, CR; *Acipenser nudiventris,* CR; *Acipenser stellatus*, CR; *Huso huso*, CR; *Babka gymnotrachelus*, LC; *Mesogobius batrachocephalus*, LC; *Neogobius fluviatilis*, LC; *Neogobius melanostomus*, LC; *Ponticola ratan*, LC) are not endemic or restricted-range, but they may be considered as belonging to the Black Sea and Azov Sea subpopulation. Another fish species (*Ponticola constructor*, LC) is endemic to Caucasian region and restricted range. One amphibian (*Pelodytes caucasicus*, NT) and three reptiles (*Darevskia brauneri*, LC; *Darevskia derjugini*, NT; *Vipera kaznakovi*, EN) are endemic (the former is endemic to west and central Caucasus and Black Sea coast, while the latter two are endemic to Caucasus region), as well as restricted-range.

###### 6.1.2.1.1.2 *Additional OHL AoI*

According to literature review, 20 species potentially present withing the Additional OHL AoI are considered threatened. Based on the Global IUCN Red List, six species are **Critically Endangered CR** (five fish species: *Anguilla anguilla*, *Acipenser gueldenstaedtii*, *Acipenser stellatus, Acipenser sturio, Huso huso*; one bird species: *Vanellus gregarious*); five species are **Endangered EN** (one reptile species: *Vipera kaznakovi*; four bird species: *Oxyura leucocephala*, *Aquila nipalensis*, *Neophron percnopterus*, *Falco cherrug*); eleven species are **Vulnerable VU** (three bat species: *Nyctalus lasiopterus*, *Rhinolophus mehelyi*, *Miniopterus schreibersii*; eight bird species: *Anser erythropus*, *Aythya ferina*, *Clanga clanga*, *Aquila heliacal*, *Streptopelia turtur*, *Otis tarda*, *Falco vespertinus*, *Podiceps auratus*). Other 22 species are Near Threatened (NT) and 7 Data Deficient (DD). All the remaining species are classified as Least Concern (LC).

Among the species potentially present, one fish species (*Ponticola constructor*, LC), two mammal species (*Talpa caucasica*, LC; *Talpa levantis*, LC), three amphibian species (*Pelodytes caucasicus*, NT; *Bufo verrucosissimus*, NT; *Rana macrocnemis*, LC) and two reptile species (*Darevskia derjugini*, NT; *Vipera kaznakovi*, EN) are endemic to Caucasian region and restricted range. In addition, the mollusk species *Paladilhiopsis schakuranica* (DD) and the crustacean species *Troglocaris ablaskiri* (DD) were identified as endemic to Caucasus region and Georgia Country, respectively, but their distribution is poorly known, so further studies are needed.

##### *6.1.2.1.2 Terrestrial Flora*

###### 6.1.2.1.2.1 Main OHL AoI

According to literature review, 31 species potentially present within the AoI are considered threatened.

One species is classified as **Critically Endangered CR** (*Trapa colchica*), two as **Endangered EN** (*Astrantia colchica* and *Dianthus charadzeae*), seven as **Vulnerable VU** (*Barbamine ketzkhovelii, Carum grossheimii, Cirsium oblongifolium, Corylus colchica, Cynoglossum imeretinum, Kemulariella colchica, Trapa maleevii).*

A total of 17 species are considered endemic as well as restricted range (*Astrantia colchica, Carum grossheimii, Peucedanum adae, Cirsium imereticum, Cirsium oblongifolium, Cirsium sosnowskyi, Pilosella abakurae, Psephellus vvedenskii, Kemulariella colchica, Cynoglossum imeretinum, Myosotis lazica,* *Barbamine ketzkhovelii, Draba mingrelica, Dianthus charadzeae, Trapa colchica, Trapa maleevii, Woodsia caucasica).* Eight more species are considered endemic but with a wider distribution range.

6.1.2.1.2.2 Additional OHL AoI

According to literature review, 8 species potentially present within the Additional OHL AoI are considered threatened. One species is classified as **Critically Endangered CR** (*Trapa colchica*), two as **Endangered EN** (*Astrantia colchica* and *Polylophium panjutinii*), five as **Vulnerable VU** (*Kemulariella colchica*, *Cirsium oblongifolium*, *Campanula engurensis*, *Trapa maleevii*, *Cynoglossum imeretinum*).

A total of 23 species are considered endemic as well as restricted-range (i.e., *Astrantia colchica*, *Campanula engurensis*, *Cirsium imereticum*, *Cirsium oblongifolium*, *Cirsium pugnax*, *Cirsium sosnowskyi*, *Cynoglossum imeretinum*, *Draba mingrelica*, *Pilosella abakurae*, *Polylophium panjutinii*, *Trapa colchica*, *Trapa maleevii*, *Symphytum ibericum*, *Seseli petraeum*, *Pimpinella idae*, *Peucedanum adae*, *Myosotis lazica*, *Psephellus vvedenskii*, *Heracleum freynianum*, *Heracleum leskovii*, *Heracleum mantegazzianum*, *Kemulariella colchica*, *Prenanthes abietina*).

*6.1.2.1.3 Terrestrial habitats and ecosystems*

6.1.2.1.3.1 Main OHL AoI

The Main AoI is located between 0 m and 985 m within the **terrestrial ecoregions** "PA0422 - Euxine-Colchic Broadleaf Forests" and "PA0408 - Caucasus Mixed Forests" which are part of the broader biome category "Temperate broadleaf and mixed forests".

The **Euxine-Colchic Broadleaf Forests** ecoregion extends along the southern Black Sea coast from Türkiye's Istiranca Mountains in the west to the Abkhazia region of Georgia in the east. The eastern or Colchic portion of this region, where the Project is located, is highly humid (annual precipitation average: 1,500 - 2,500 mm) and broadleaf deciduous forests constitute the main vegetation type with the evergreen but mesomorphic broadleaf understory. This area is also an important transit and resting area for large migratory populations of waterbirds, passerines, and raptors. This migratory pathway is known as the 'East Black Sea Migration Route'.

The **Caucasus Mixed Forests** ecoregion follows the Greater and Lesser Caucasus Mountain ranges, spanning five countries: Georgia, Russia, Azerbaijan, Türkiye, and Armenia. The climate is temperate and average annual rainfall is generally higher in the western portion along the Black Sea of the ecoregion where the Project is located, ranging from 1,500 to 2,000 mm. This ecoregion is characterized by remarkable biodiversity and the highest levels of endemism in the temperate world. Temperate broadleaf forests of oriental beech, oak, hornbeam, and chestnut are widespread in the region, while parts of the mountain belt are populated by dark coniferous forests of oriental spruce and Caucasian fir.

The Main OHL AoI is also part of the "**433 - Western Transcaucasia**" **freshwater ecoregion**, which includes river drainage areas and lakes of the Black Sea coast in Russia, Georgia, and Türkiye. The rivers of this ecoregion are characterized by large dips and a considerable volume of water. The AoI, in fact, falls within the **Rioni River basin**, the second largest in the country, originating in the Greater Caucasus range and flowing into the Black Sea.

The presence of natural habitats in the AoI has been identified according to the EUNIS habitat classification (level 3). The habitats likely to be present were determined based on habitats description given in literature review, including Global Land Cover, and through the analysis of satellite images on Google Earth.

The Main OHL AoI is mostly characterized by **Natural habitats** (Figure 6-20), particularly woodlands.

The terrestrial Natural habitats potentially present in the AoI, their corresponding EUNIS habitat code and their main characteristics are described below.

- **Permanent non-tidal, fast, turbulent watercourses (C2.2)**

  Permanent water courses with fast-flowing turbulent water and their associated animal and microscopic algal pelagic and benthic communities. Rivers, streams, brooks, rivulets, rills, torrents, waterfalls, cascades and rapids are included. The bed is typically composed of rocks, stones or gravel with only occasional sandy and silty patches. Features of the riverbed, uncovered by low water or permanently emerging, such as gravel or rock islands and bars, are treated as the littoral zone (C3). Such habitat includes high, mid and low-altitude, usually small to medium-sized streams as defined by the EU Water Framework Directive. Within the AoI this habitat could be represented by the Enguri River.

- **Meso- and eutrophic *Quercus, Carpinus, Fraxinus, Acer, Tilia, Ulmus* and related woodland (G1.A)**

  Woods, typically with mixed canopy composition, on rich and moderately rich soils. Such habitat includes woods dominated by *Acer*, *Carpinus*, *Fraxinus*, *Quercus* (especially *Quercus petraea* and *Quercus robur*), *Tilia* and *Ulmus*.

- **Mixed deciduous woodland of the Black and Caspian Seas (G1.A7)**

  Mixed summer-green broad-leaved forests limited mainly to the mountains bordering the Black Sea and the Caspian Sea.

- **Wet-ground woodland of the Black and Caspian Seas (G1.44)**

  Most hygrophilous communities of the mixed mesic Euxino-Hyrcanian forests (units G1.A71, G1.A74). They may include, in particular, *Fraxinus angustifolia* galleries, as well as dense *Alnus barbata* forest stands occupying areas of black damp or swampy soils on coastal alluvial plains, with *Fraxinus angustifolia* and an understory of *Rubus hirtus*, *Smilax excelsa* and other climbers and shrubs, notably of Rosaceae.

- **Fagus woodland (G1.6)**

  Forests dominated by *Fagus orientalis* and other *Fagus* species in southeastern Europe and the Pontic region. Many montane formations are mixed beech-fir or beech-fir-spruce forests, which are listed under G4.6.

- **Mixed fir - spruce - beech woodland (G4.6)**

  Forests in which *Fagus* species including Fagus *orientalis* in southeastern Europe and Pontic Asia (G1.6), is associated in the main canopy with fir *Abies* spp. and/or spruce *Picea* spp. (G3.1), sometimes with an admixture of other conifers, in particular pines (*Pinus* spp).

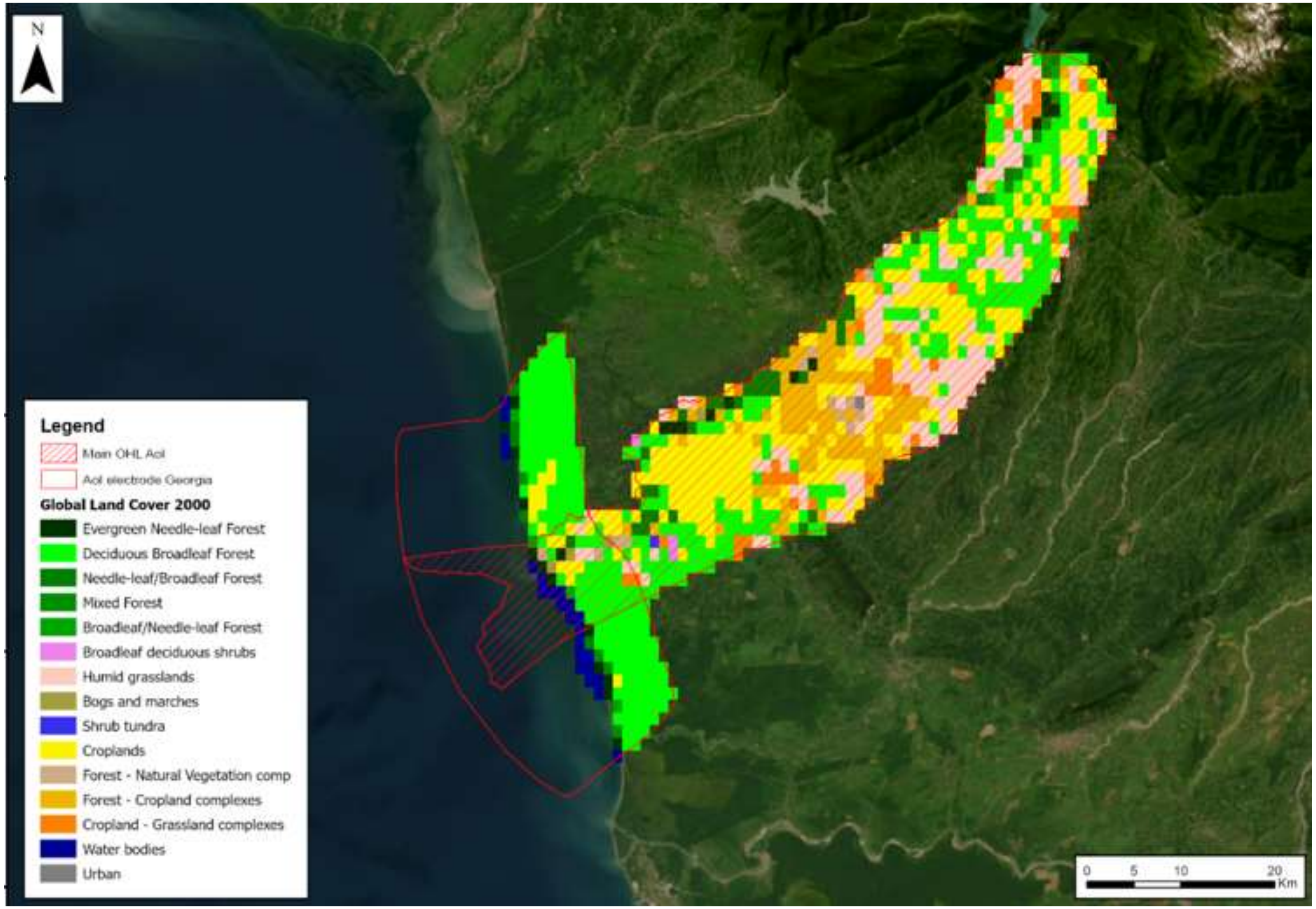



*Figure 6-20 – Terrestrial Habitat map of the Main OHL AoI based on Global Land Cover 2000.*

6.1.2.1.3.2 Additional OHL AoI

The Additional OHL AoI is located within the **terrestrial ecoregions** "PA0422 - Euxine-Colchic Broadleaf Forests" and "PA0408 - Caucasus Mixed Forests" which are part of the broader biome category "Temperate broadleaf and mixed forests" (Figure 6-21). The Additional AoI is also part of the "**433 - Western Transcaucasia**" **freshwater ecoregion**, which includes river drainage areas and lakes of the Black Sea coast in Russia, Georgia, and Türkiye. The rivers of this ecoregion are characterized by large dips and a considerable volume of water. These ecoregions have been already described in detail in the previous chapter 6.1.2.1.3.1.

As for the Main OHL AoI, also the Additional OHL AoI is mostly characterized by **Natural habitats**, particularly woodlands, as shown in Figure below.

The terrestrial Natural habitats potentially present in the AoI, their corresponding EUNIS habitat code and their main characteristics have all been reported above for the Main OHL AoI (6.1.2.1.3.1).

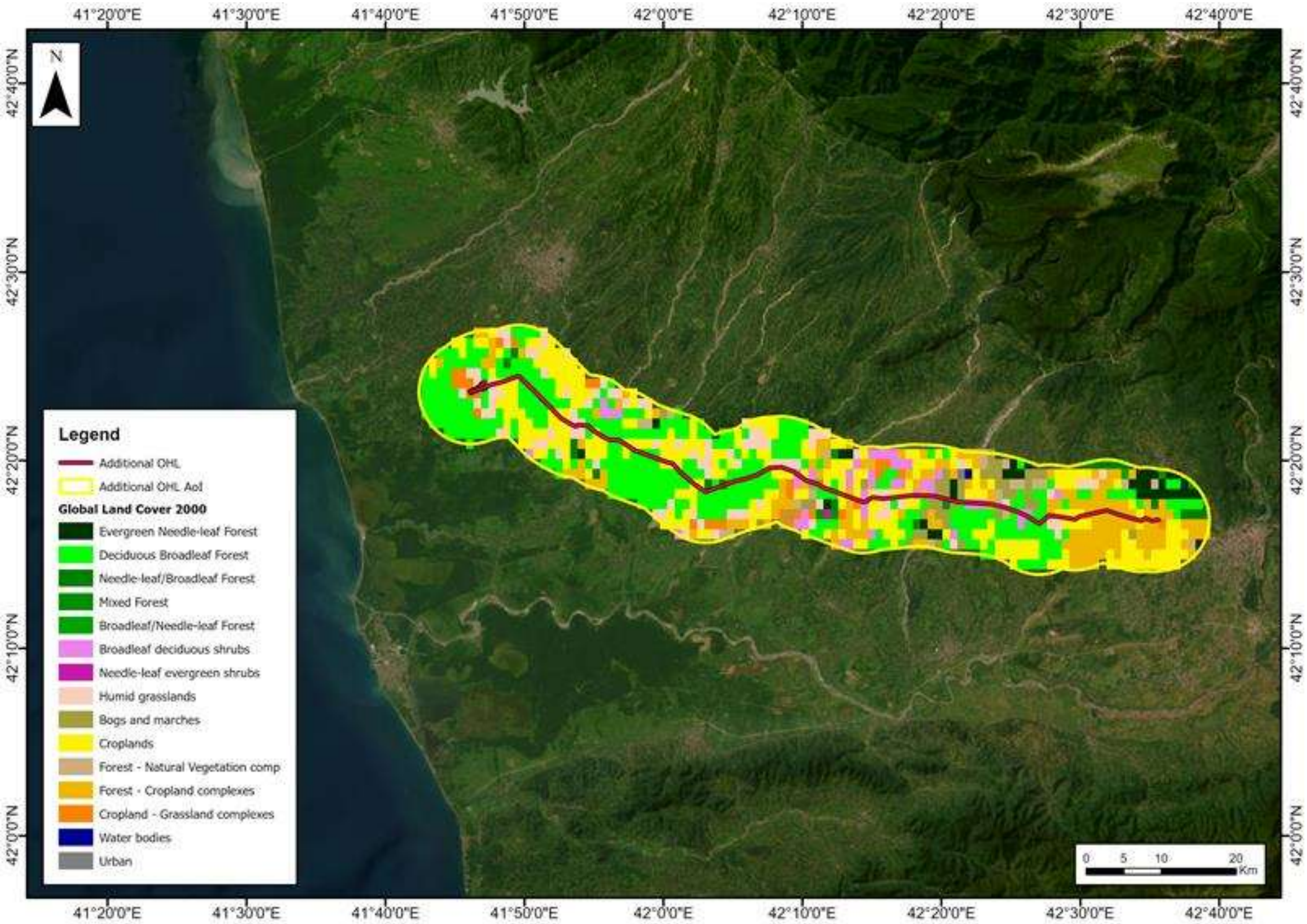



*Figure 6-21 - Terrestrial Habitat map of the Additional OHL AoI based on Global Land Cover 2000.*

### *6.1.2.2 Terrestrial Legally Protected Areas and Important Areas for Biodiversity*

**Legally protected areas** are clearly defined geographical spaces, nationally or internationally recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values (IUCN, 2008). Legally protected areas are divided in the following typologies on the basis of the level of protection they benefit from and may be both terrestrial and marine.

- **Nationally designated protected areas**

  Both terrestrial and marine areas designated by a national legislative designation instrument. This may be coincident with other internationally recognized protected areas or not and may also include and/or overlap with important areas for biodiversity.

- **UNESCO Man and the Biosphere (MAB) Reserves**

  Areas comprising terrestrial, marine and coastal ecosystems. Each reserve promotes solutions reconciling the conservation of biodiversity with its sustainable use. Those reserves are nominated by national governments and remain under the sovereign jurisdiction of the states where they are located. Even if MAB are not always under protection, states are encouraged to legally constitute the core area and to designate buffer zones as legally protected. Their status is internationally recognized (UNESCO, 2019a).

- **UNESCO World Heritage Sites**

  These are landmarks or areas as having cultural, historical, scientific or other form of significance. Even if they are not always under protection, many World Heritage Sites are legally protected by international treaties since they are judged important to the collective interests of humanity. They are unique in some respect as a geographically and historically identifiable place having special cultural or physical significance, such as ancient ruins or historical structures, buildings, cities, complexes, deserts, forests, islands, lakes, monuments, mountains or wilderness areas (UNESCO, 2019b).

- **Strict Nature Reserves (IUCN Cat. Ia)**

  Protected areas that are strictly set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for scientific research and monitoring (IUCN, 2019a).

- **Wilderness Areas (IUCN Cat. Ib)**

  Protected areas that are usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, which are protected and managed so as to preserve their natural condition (IUCN, 2019b).

- **National Parks (IUCN Cat. II)**

  Large natural or near natural areas set aside to protect large-scale ecological processes, along with the complement of species and ecosystems characteristic of the area, which also provide a foundation for environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities (IUCN, 2019c).

- **Natural Monuments or Features (IUCN Cat. III)**

Protected areas set aside to protect a specific natural monument, which can be a landform, sea mount, submarine cavern, geological feature such as a cave or even a living feature such as an ancient grove. They are generally quite small protected areas and often have high visitor value (IUCN, 2019d).

- **Habitat/Species Management Areas (IUCN Cat. IV)**

  Protected areas aiming to protect particular species or habitats and management reflects this priority. Many category IV protected areas need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category (IUCN, 2019e).

- **Protected Landscape/Seascape (IUCN Cat. V)**

  Protected areas where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value, and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values (IUCN, 2019f).

- **Protected areas with sustainable use of natural resources (IUCN Cat. VI)**

  Protected areas that conserve ecosystems and habitats, together with associated cultural values and traditional natural resource management systems. They are generally large, with most of the area in a natural condition, where a proportion is under sustainable natural resource management and where low-level non-industrial use of natural resources compatible with nature conservation is seen as one of the main aims of the area (IUCN, 2019g).

- **Ramsar Sites**

  Sites designated under the Ramsar Convention. They are sites to be protected and managed in order to habitat degradation and loss. Even if they are not always under protection, many Ramsar Sites are protected under national schemes or regional systems, such as Natura 2000 network, the UNESCO World Heritage List or MABs (Ramsar, 2019).

**Important areas for biodiversity** are internationally recognized areas identified and designated because their particular features have the potential to support global biodiversity. Officially, they are non-legally protected areas and are usually defined by networks of internationally recognized environmental NGOs and Institutions (e.g., IUCN; Conservation International; Birdlife International, etc.) based on solid standardized scientific criteria. Some of the important areas for biodiversity may also overlap with legally protected areas, while others remain with no legal protection for a period of time until they are eventually recognized as such by the local authorities. Important areas for biodiversity may be addressed to the conservation of both a given group of organisms and biological diversity in general. All the typologies described below may both terrestrial and marine, whereas exclusively marine areas are described in 6.1.5.2.

- **Key Biodiversity Areas (KBAs)**

  Areas of international significance for the conservation of biodiversity for the peculiarity of its habitats and/or the species inhabiting it. They are usually identified by means of globally standardized criteria, but often lack any form of formal protection or are only partially protected (BirdLife International, 2019a). Because of the broader criteria used for the definition of KBAs, they often overlap with the other typologies of important areas for biodiversity.

- **Important Bird Areas (IBAs)**

  These are usually formally recognized in national legislation as sites of particular importance to be taken into consideration by the land-use planning and development processes. Those areas are places of international significance for the conservation of birds and other biodiversity components. IBAs are large enough to safeguard a viable population of a species, group of species, or entire avian community during at least part of its life-cycle, but are small enough to be conserved in their entirety (BirdLife International, 2019b).

- **Important Plant Area (IPA)**

  IPAs are globally significant sites for rare and threatened wild species, botanical richness (including socially, economically, and culturally valuable plants) and threatened habitats. IPAs are a well-established and globally-recognized tool to help halt species extinction and restore native wild plants and habitats. Identified at a national level, these sites are invaluable in implementing the Global Biodiversity Framework and a crucial component of National Biodiversity Strategies and Action Plans under the UN Convention on Biological Diversity (CBD). In many cases, the resultant IPA networks have been designated within existing protected areas and integrated into national conservation planning and monitoring schemes.

- **Emerald Sites**

  Implemented by the Council of Europe as part of its work under the Bern Convention, the Emerald Network is an ecological network made up of Areas of Special Conservation Interest. The objective of this Network is the long-term survival of the species and habitats (listed respectively in Resolution No. 4 of 1996 and Resolution No. 6 of 1998) of the Bern Convention requiring specific protection measures. The Emerald Network is to be set up in each Contracting Party or observer State to the Convention and its adopted sites have to be designated and managed at national level. The Natura 2000 sites are therefore considered as the contribution from the EU member States to the Emerald Network.

- **Alliance for Zero Extinction (AZE) sites**

  The Alliance for Zero Extinction engages governments, multilateral institutions and non-governmental biodiversity conservation organizations working to prevent species extinctions. AZE sites areas that hold the last-remaining populations of one or more species evaluated to be Endangered or Critically Endangered on the IUCN Red List. These locations need be effectively conserved to prevent the loss of the world's species at highest risk of extinction, through protected area planning or other effective conservation strategies (Alliance for Zero Extinction, 2019).

- **Prime Butterfly Areas (PBAs)**

  PBAs are considered important sites for butterfly species of priority protection and conservation in Europe. The main criteria for the target butterfly species selection are the EU Habitats Directive 92/43/EEC and Annexes II and IV respectively, which define species requiring special protection measures, as well as their distribution, international and national status, etc. These areas often overlap with other typologies of important areas for biodiversity and may also represent one of the criteria for the establishment of ecologically important areas.

Based on literature review, the total surface covered with legally protected areas in Georgia was 697,250 ha in 2019, corresponding to 9.9% of the country's territory. It is hence plausible to assume that such percentage has increased at present. Georgia, in fact, adopted its National Biodiversity Strategy and Action Plan 2014 - 2020 (MENRP, 2014), whose goal was to have at least 12% of the country's terrestrial and inland water areas and 2.5% of marine areas covered by protected areas by 2020. At the time where available bibliographic data are available, Georgia was quite close to reach the national target and, as part of Convention on Biological Diversity (CBD), the country improved the protected areas network moving from 7.1% of the territory in 2007 to 9.9% in 2019 (Agency of Protected Areas of Georgia, 2022). However, Georgia is still far from achieving the Aichi biodiversity target, which sets to have at least 17% of terrestrial and inland water protected areas and 10% of coastal and marine protected areas. The nationally protected area system and the Emerald Network under the Bern Convention are the two main coordinated European networks of protected areas.

#### *6.1.2.2.1 Main OHL AoI*

The Main OHL AoI partially overlaps with the *Kolkheti* National Park (see Figure 6-22), a **legally protected area** by national law. Part of the National Park includes also important areas for biodiversity, such as a Ramsar Site (namely Ramsar Site 893 - Wetlands of Central Kolkheti), a UNESCO World Heritage Site (ID 1616), an Emerald Site (ID GE0000006), a Key Biodiversity Area (KBA, ID 46,687.00) and an Important Bird Area (IBA, ID GE004). But the land area overlapped with the Kolkheti National Park is located at the edge of the existing local road and the cable is planned to burry under the ground. Another important area for biodiversity present within the Area of Interest is the *Enguri River* KBA.

In addition, it should be mentioned that the Area of Interest is located close to other three **important areas for biodiversity**: the *Rioni River* (9 km), *Khobi River* (4.5 km), and *Supsa River* (27 km) KBAs.

All the mentioned areas are shown in Figure 6-22 and described below.

***Kolkheti* National Park (Ramsar Site, UNESCO Site, Emerald Site, KBA and IBA)**

The *Kolkheti* National Park is located on the eastern coastal region of the Black Sea, within the Adjara, Guria, and Samegrelo-Svaneti regions, extending from 0 m to 200 m a.s.l. The site includes terrestrial, freshwater, and marine areas and habitats. The marine part of such site is described in 6.1.5.2.

As previously said, the area includes the *Ispani Mire* and *Wetlands of Central Kolkheti* Ramsar Sites, as well as part of the Emerald Network and nominated on the UNESCO World Heritage List for its Colchic rainforests and wetlands (https://nationalparks.ge/en/site/kolxetinp).

The Ramsar Site is composed of three distinct peat marsh complexes (Anaklia-Churia, Nabada and Pichori-Paliastomi), the Paliastomi lake, the adjoining wet forests, the Black Sea coastal area, and the mouths and lowermost parts of the Khobi (or Khobistskali) and Rioni rivers, described later.

The IBA, consisting of wetlands and damp woodland, encompasses the Lower Rioni River and the Lake Paliastomi, and evergreen vegetation covers much of the coastline within the site. The wintering presence of waterbirds, with an estimated population of 100,000 - 499,000 individuals, meets the A4iii IBA criterion *"Site known or thought to hold on a regular basis at least 10,000 pairs of seabirds"*. Among the wintering and transiting birds attracted by the wetlands, it is worth mentioning *Gavia arctica*, several species of grebes, *Puffinus yelkouan*, ciconiiformes, wildfowls (several dabbling duck species, amongst which *Clangula hyemalis*, *Melanitta fusca*, *Mergus albellus*), shorebirds, gulls, and terns.

Bird species of global conservation concern reported for the area that do not meet the IBA criteria are: *Pelecanus crispus* (uncommon in winter), *Haliaeetus albicilla* (at least two breeding pairs and 13 birds in winter), *Circus macrourus,* and *Aquila clanga* (both frequent on passage) (BirdLife International, 2022).


*Figure 6-22 – Georgian Protected areas and Internationally Recognized Areas of importance for biodiversity in the vicinity of the Main OHL AoI.*

Furthermore, the water surface of the Black Sea in the west and the pattern of the Little Caucasus Mountain range in the east come together to form a migration bottleneck in the southern part of the site. In fact, the Kolkheti lowland and adjacent foothills of Meskheti Ridge are important sites for thousands of migrating birds of the western part of the Palearctic region (Gurielidze et al., 2012), which use the area for wintering and as steppingstone (Lewis et al., 2013). The species most present include migrating raptors (at least 25 species) and other large, soaring birds that occur in the area during the spring and autumn.

Counts have covered only small periods of the spring and autumn migration seasons, but include (seasonal total in brackets) *Ciconia nigra* (350-500, autumn), *Pernis apivorus* (8,420, autumn), *Milvus migrans* (2,300, spring), *Accipiter brevipes/ A. nisus* (1,500, spring), *Aquila pomarina* (268, autumn), *Aquila nipalensis* (127, autumn), *Buteo buteo* (44,900, spring), *Hieraaetus pennatus* (156, spring), *Circus aeruginosus* (181, autumn), and several species of the genus *Falco*.

Among the threatened fauna species reported for this area, one mammal species is reported (the European otter, *Lutra lutra*, NT), five sturgeons (the beluga, *Huso huso*, CR, the European sturgeon, *Acipenser sturio*, CR, the stellate sturgeon, *Acipenser stellatus*, CR, the ship sturgeon, *Acipenser nudiventris*, CR, and the Persian sturgeon, *Acipenser persicus*, CR), and two bird species (the white-headed duck, *Oxyura leucocephala*, EN, and the lesser white-fronted goose, *Anser erythropus*, VU).

From the botanic point of view, Colchis wetlands are important lowlands of relict origin and, due to their origin, in Kolcheti can be found a typical flora of the northern tundra and taiga wetlands. Some boreal species, such as Sphangum mosses (*Sphagnum imbricatum*, *S. palustre*, *S. acutiflium*), the round-leaved sundew (*Drosera rotundiflora*), the Northern sedge (*Carex lasiocarpa*), Alpine plants like the sedge and rhododendron (*Rhododendron ponticum*) can be found in marshes. In wetlands and humid forests the alder (*Alnus glutinosa*), wingnut (*Pterocarya fraxinifolia*), Imeretian oak (*Quercus robur* subsp. *imeretina*) and *Quercus hartwissiana* are reported, with its well-developed evergreen undergrowth mainly represented by the Colchis ivy (*Hedera colchica*). The sea buckthorn (*Hippophae rhamnoides*) and *Paliurus spina-christi* are the most frequent species in the sandy zone of the dunes.

In addition, the Georgian Red List reports the following rare and endangered species for this area: Strandzha oak (*Quercus hartwissiana*), Caucasian wingnut (*Pterocarya pterocarpa*), Colchis boxwood (*Buxus colchica*), common ash (*Fraxinus excelsior*), Georgian oak (*Quercus iberica*), alder (*Alnus glutinosa* subsp. *barbata*), yellow-horned poppy (*Glaucium flavum*) and sea lily (*Pancratium maritimum*).

**Enguri River KBA**

The *Enguri River* KBA is located in the western Georgia, and it is extended from 0 m to 800 m a.s.l. (Key Biodiversity Areas Partnership, 2022). It was identified in the CEPF Ecosystem Profile of the Caucasus Hotspot (2003, updated 2004)[7]. The Enguri River begins in the northern region of Svaneti, where glaciers from Caucasian peaks feed its waters, and it is 213 km long.

The KBA covers a total area of 23,836 ha and is triggered by the following threatened fish species: the beluga (*Huso huso*, CR), the Russian sturgeon (*Acipenser gueldenstaedtii*, CR), the stellate sturgeon (*Acipenser stellatus*, CR), and the Persian sturgeon (*Acipenser persicus*, CR).

[7] https://www.cepf.net/our-work/biodiversity-hotspots/caucasus

**Rioni River (KBA)**

Rioni River KBA is represented by the main river of western Georgia. It originates in the Caucasus Mountains, in the region of Racha and flows west to the Black Sea. The highest elevation of the area is only 100 m a.s.l. It was identified in the CEPF Ecosystem Profile of the Caucasus Hotspot (2003, updated 2004). In year 2022 Georgia has officially expanded the Kolkheti National Park, adding just over 670 ha that run 7 km upstream from the estuary of Rioni River[8].

The KBA is located about 20 km south from the Area of Influence and it covers a total area of 36,774 ha incorporating vitally important habitats for critically threatened sturgeon species: the beluga (*Huso huso*, CR), the Russian sturgeon (*Acipenser gueldenstaedtii*, CR), the stellate sturgeon (*Acipenser stellatus*, CR), the Persian sturgeon (*Acipenser persicus*, CR), the ship sturgeon (*Acipenser nudiventris* (CR), and the European sturgeon (*Acipenser sturio*, CR).

**Khobi River (KBA)**

Khobi River KBA incorporates the homonym river 150 km long, which flows into the Black Sea through the Colchis Lowland, reaching the highest elevation of 100 m a.s.l. It was identified in the CEPF Ecosystem Profile of the Caucasus Hotspot (2003, updated 2004).

Khobi River, situated 15 km from the Area of Influence, is a migratory corridor and contains important spawning areas for threatened or rare sturgeon and salmon species and is triggered by the same threatened sturgeons of Rioni River KBA described previously.

Vegetation consists of typical bog and peatland species, with freshwater marshes supporting reedbeds and brackish areas supporting halophytic plants. Several species of waterbirds use the site for wintering. Nesting species in internationally important numbers include white-tailed sea-eagle (*Haliaeetus albicilla*) and osprey (*Pandion haliaetus*).

**Supsa River (KBA)**

Supsa River KBA is characterized by the homonym river, the third according to the length river in west Georgia, which flows approximately west for 108 km until it joins the Black Sea close to the village Supsa. The upper reaches area has complex mountain topography with narrow and deep canyons. Within the rest of the basin, below the village Bukistsikhe, the landform is smoother, hilly, however deep with numerous canyons of the tributaries. However, the KBA incorporates only the most low-lying part of the river close to the Black Sea. The area was identified in the CEPF Ecosystem Profile of the Caucasus Hotspot (2003, updated 2004). This KBA is located quite far from the Area of Influence (about 40 km).

The triggering species of this KBA is represented by the European sturgeon (*Acipenser sturio*, CR).

#### *6.1.2.2.2 Additional OHL*

The Additional OHL AoI is located close to some of the **important areas for biodiversity** already described above (6.1.2.2.1), namely Kolkheti National Park, Enguri River, Rioni River, and Khobi River, with the addition of:

[8] https://wwf.panda.org/wwf_news/?5976916/New-Protected-Area-in-Georgia-is-a-big-boost-for-sturgeon

- **Three KBAs** (i.e., the Sataplia Nature Reserve (about 6 km distance), Askhi-Karst Massif (about 10 km distance), and Supsa River (30 km distance) KBAs);
- Several **nationally protected areas** represented by caves, canyons and waterfalls (e.g., Imereti Caves, Ochkomuri Waterfall, Okatse Canyon, etc.); and
- **Two managed reserves** (i.e., Katsoburi and Ajameti located at 14 and 20 km distance, respectively).

Also, the Additional OHL runs through the region where is located the Gelati World Heritage Site which is about 15 km far from the planned OHL.

Presence of other cultural heritage sites having various landscape protective zones – 300m and 500m depending on their legal status (Cultural Heritage Monument – 300m, Cultural Heritage Monument of National significance – 500m) shall be considered also.

All the mentioned areas are shown in Figure 6-23 and described below.

**Sataplia Nature Reserve (KBA, Strict Nature Reserve)**

The Sataplia Nature Reserve KBA covers 394 ha[9], extending from 300 to 494 m a.s.l. (Key Biodiversity Areas, 2023). According to the to the Georgian APA (2023)[10], 98% of the area is covered by the Colchian type subtropical forest, which includes both subtropical and alpine plants, such as the strandzha oak (*Quercus hartwissiana*), the common rhododendron (*Rhododendron ponticum*), the butcher's-broom (*Ruscus aculeatus*), the European bladdernut (*Staphylea pinnata*), the Colchis bladdernut (*Staphylea colchica*), the Caucasian whortleberry (*Vaccinium arctostaphylos*), the Colchis box tree (*Buxus colchica*) and the Imeretian backthorn (*Rhamnus imeretina)*. Among these plants, *B. colchica*, *S. pinnata*, *R. imeretina* are considered relict species; other relict species are the Caucasian hornbeam (*Carpinus caucasica*), the Georgian oak (*Quercus iberica*), the oriental beech (*Fagus orientalis*) and the sweet chestnut (*Castanea sativa*). The following 8 woody species present in the KBA are also reported in the Georgian Red List as rare and/or endangered: common yew (*Taxus baccata*), Colchis box tree, sweet chestnut, Imeretian oak (*Quercus robur subsp. Imeretina*), Colchis bladdernut, and Caucasian zelkova (*Zelkova carpinifolia*). Several species of mammals, reptiles, amphibians, and birds inhabit the area.

Birds such as the Barn swallow (*Hirundo rustica*), European greenfinch (*Chloris chloris*), common chiffchaff (*Phylloscopus collybita*), Eurasian blackbird (*Turdus merula*), common quail (*Coturnix coturnix*) and Eurasian woodcock (*Scolopax rusticola*) may visit the area. Other bird species included in the Red List of Georgia are: lesser kestrel (*Falco naumanni*), levant sparrowhawk (*Accipiter brevipes*), long-legged buzzard (*Buteo rufinus*), greater spotted eagle (*Clanga clanga*).

Reported mammals of interest are the golden jackal (*Canis aureus*), the Eurasian badger (*Meles meles*), the European pine marten (*Martes martes*), the Eurasian red squirrel (*Sciurus vulgaris*), the European hare (*Lepus europaeus*), the red fox (*Vulpes vulpes*), the grey wolf (*Canis lupus*) and the European roe deer (*Capreolus capreolus*). The karst caves in the area are a shelter for many bat species: greater horseshoe bat (*Rhinolophus ferrumequinum*), lesser mouse-eared myotis (*Myotis blythii*), lesser horseshoe bat (*Rhinolophus hipposideros*), whiskered myotis (*Myotis mystacinus*), lesser noctule

[9] Sataplia Nature Reserve, Georgia - KeyBiodiversityAreas.org

[10] apa.gov.ge

(*Nyctalus leisleri*) and noctule (*Nyctalus noctula*). In addition, the bechstein's myotis (*Myotis bechsteinii*) is listed in the Georgian Red List.


*Figure 6-23 – Georgian Protected areas and Internationally Recognized Areas of importance for biodiversity in the vicinity of the Additional OHL AoI.*

**Askhi-Karst Massif (KBA)**

The Askhi-Karst Massif KBA covers about 40 ha, extending from 500 to 3,016 m a.s.l. (Key Biodiversity Areas, 2023), and it is included in the CEPF Ecosystem Profile of the Caucasus Hotspot (2003, updated 2004). This area is rich in waterfalls and caves, such as Jortsku Cave, Leskhulukhe Cave, Motena Cave and Turchu Cave. No specific information about flora and fauna species is currently available for this KBA.

**Supsa River (KBA)**

The Supsa KBA covers about 1,980 ha, extending from 0 to 100 m a.s.l. (Key Biodiversity Areas, 2023), and it is included in the CEPF Ecosystem Profile of the Caucasus Hotspot (2003, updated 2004). The KBA is valuable for the presence of the Atlantic Sturgeon (*Acipenser sturio).*

**Sataplia Managed Reserve (Managed Reserve)**

According to the Georgian APA, the Sataplia Managed Reserve was established in 2012 and covers an area of 34 ha.  Information related to flora and fauna are reported above in the Sataplia Nature Reserve section.

**Katsoburi (Managed Reserve)**

The Katsoburi Managed Reserve is in western Georgia and covers an area of 270 ha in the Colchis region (Bolashvili and Neidze, 2022). It was established in 1964 and renewed in 2007 to protect foodplain forest territories, which extend up to 40 m a.s.l. The area also includes a part of the Rioni River and its tributary Megruli Skurda River, and Narionali Lake. Vegetation consists mainly of alder groves, and includes alder (*Alnus barbata*), common ash (*Fraxinus excelsior*), caucasian wingnut (*Pterocarya fraxinifolia*), goat willow (*Salix caprea*), pear (*Pyrus communis subsp. caucasica*), russian olive (*Elaeagnus angustifolia*), Indigo (*Amorpha fruticosa*), silver wattle (*Acacia dealbata*), and wild plum (*Prunus divaricata*).

Several bird species visit the area: common chaffinch (*Fringilla coelebs*), common pheasant (*Phasianus colchicus*), common woodpigeon (*Columba palumbus*), Mallard (*Anas platyrhynchos*), ferruginous duck (*Aythya nyroca*), grey heron (*Ardea cinerea*), northern goshawk (*Accipiter gentilis*), and Eurasian sparrowhawk (*Accipiter nisus*). Common mammals inhabiting the area are the wild boar (*Sus scrofa*), the European roe deer, the European badger, the European wildcat (*Felis silvestris*), the European hare, the Eurasian otter (*Lutra lutra*), the grey wolf and the golden jackal.

**Ajameti (Managed Reserve)**

The Ajameti Managed Reserve covers about 4840 ha (APA Georgia). The reserve was established in 1929 and renewed in 2003 (Bolashvili and Neidze, 2022) to preserve relict Imeretian oaks and Caucasian zelkova trees, which can reach 100-year age (APA, 2023). Here, the forests cover about 4738 ha of the Reserve and includes several floral species, such as the common hornbeam (*Carpinus betulus*), the oriental hornbeam (*Carpinus orientalis*), the common rhododendron, and the medlar (*Mespilus germanica*), some of which are listed on the Georgian Red List (e.g., Imeretian oak, Caucasian zelkova, *Corylus colchica*, *Ulmus glabra* and Caucasian wingnut).

Regarding the fauna, mammals present in the area include some already described, such as the red fox, the golden jackal, the European hare, the Eurasian red squirrel, the Eurasian badger and the European roe deer. Other mammals are: the Caucasian squirrel (*Sciurus anomalus*), the least weasel (*Mustela nivalis*), and the edible dormouse (*Glis glis*). Amphibians present in the area are:  the marsh frog (*Pelophylax ridibundus*), the Caucasian toad (*Bufo verrucosissimus*), and the varying toad (*Bufotes variabilis*); the reptiles are: the grass snake (*Natrix natrix*), and the dice snake (*Natrix tessellate*).

More than 60 bird species have been recorded in the reserve, but only 21 species nest in the forest; the other species are migratory.

Species considered endemic to the Ajameti territory are the Sothern white-breasted hedgehog (*Erinaceus concolor*), the caucasian mole (*Talpa caucasica*), the lesser shrew (*Crocidura suaveolens*), the mehely's horseshoe bat (*Rhinolophus mehelyi*), the schreiber's bent-winged bat (*Miniopterus schreibersii*), the European hare, and the Eurasian red squirrel. The Georgian Red List includes *Nyctalus lasiopterus*, the noctule, the lesser noctule, the Caucasian squirrel, the edible dormouse, and the Eurasian otter.

**Nationally protected areas**

Nationally protected areas within the Additional AoI are mainly represented by caves and canyons, followed by waterfalls and a lake (Cracked Lake), as reported in Figure 6-23, below. The territory is mainly occupied by Colchic forests and limestone caves and the information about flora and fauna species of the area are reported in the Sataplia Nature Reserve section above.

### *6.1.2.3 Terrestrial Critical Habitat Screening*

#### *6.1.2.3.1 Main OHL AoI*

A Critical Habitat (CH) screening was conducted in order to identify the potential presence of Critical Habitats within the Main OHL AoI according to the Environmental and Social Standard 6 (ESS6), whose definition is triggered by the criteria discussed in the following chapter and assessed below.

Critical Habitats are likely present in the Main OHL AoI considering the threatened species, legally protected areas and important areas for biodiversity identified in the previous chapters. The likely and potential Critical Habitats identified in the AoI by the "UNEP-WCMC Global Critical Habitat Screening" are shown in Figure 6-24.

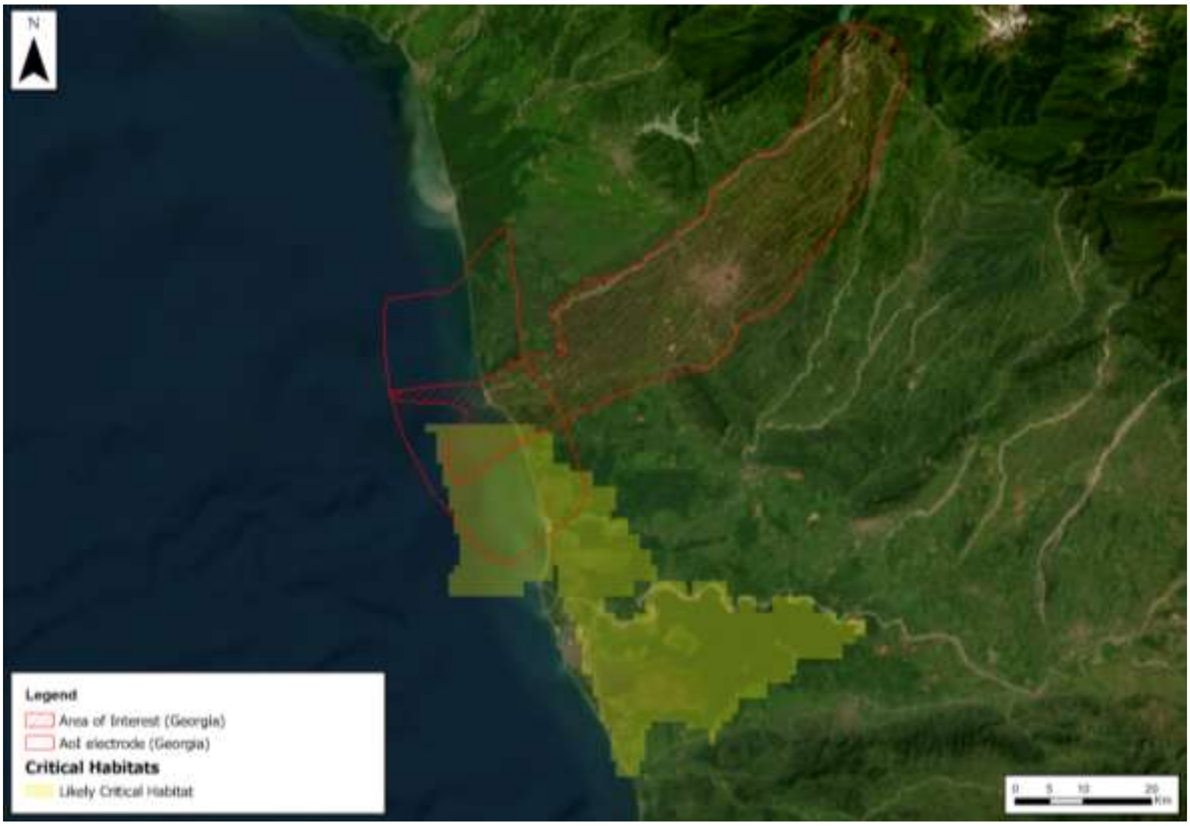



*Figure 6-24 – Likely Critical Habitat in the Main OHL AoI (UNEP-WCMC Global Critical Habitat Screening, 2021).*

The areas identified as likely Critical Habitat is represented by marine and terrestrial areas of the Kolkheti National Park, which partially overlaps with the AoI (chapter 6.1.2.2.1).

A preliminary Critical Habitat Screening is reported below. <u>The likelihood of impacts on transformed, natural, and critical habitats as defined in ESS 6 of the World Bank should be carefully assessed in the scope of the ESIA</u>.

**Criterion a: Highly threatened or unique ecosystems**

At present, none of the habitats identified within the Main OHL AoI is considered to be "highly threatened and/or unique ecosystems". Therefore, no Critical Habitat is expected to be present in the Main OHL AoI according to this criterion.

**Criterion b: Habitat important to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches.**

The flora and fauna species listed as having Endangered (EN) or Critically Endangered (CR) conservation status according to Global IUCN are summarized in the following table.

*Table 6-4 – Flora and fauna species with Endangered or Critically Endangered conservation status according to the IUCN Red List potentially present in the Main OHL AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Flora | Apiaceae | *Astrantia colchica* | Colchic Masterwort | EN | Endemic/RR |
| | Caryophyllaceae | *Dianthus charadzeae* | Kharadze's Pink | EN | Endemic/RR |
| | Lythraceae | *Trapa colchica* | Colchis Water-Chestnut | CR | Endemic/RR |
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | CR | - |
| | | *Acipenser nudiventris* | Barbel Sturgeon | CR | - |
| | | *Acipenser persicus* | Persian Sturgeon | CR | - |
| | | *Acipenser stellatus* | Stellate Sturgeon | CR | - |
| | | *Acipenser sturio* | Atlantic Sturgeon | CR | - |
| | | *Huso huso* | Beluga Sturgeon | CR | - |
| | Anguillidae | *Anguilla anguilla* | Common Eel | CR | - |
| Reptiles | Viperidae | *Vipera kaznakovi* | Caucasus Viper | EN | Endemic/RR |
| Birds | Accipitridae | *Neophron percnopterus* | Egyptian Vulture | EN | - |
| | Anatidae | *Oxyura leucocephala* | White-headed Duck | EN | - |
| | Falconidae | *Falco cherrug* | Saker Falcon | EN | - |

No threshold is provided in the guidelines so, using a precautionary approach, all these species are considered to potentially trigger Critical Habitat under Criterion b. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion c: Habitats of significant importance to endemic or geographically restricted species**

The flora and fauna species listed as local endemic were considered as potentially triggering Critical Habitat according to these criteria, based on a precautionary approach, since they can include restricted range species.

*Table 6-5 – Locally endemic flora and fauna species potentially present in the Main OHL AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Flora | Apiaceae | *Astrantia colchica* | Colchic Masterwort | EN | Endemic/RR |
| | | *Carum grossheimii* | Grossheim's Caraway | VU | Endemic/RR |
| | | *Peucedanum adae* | Ada's Hog's-fennel | LC | Endemic/RR |
| | Asteraceae | *Cirsium imereticum* | Imeretian Thistle | LC | Endemic/RR |
| | | *Cirsium oblongifolium* | Oblong-leaved Thistle | VU | Endemic/RR |
| | | *Cirsium sosnowskyi* | Sosnowsky's Thistle | LC | Endemic/RR |
| | | *Pilosella abakurae* | Abakurian Hawkweed | DD | Endemic/RR |
| | | *Psephellus vvedenskii* | - | LC | Endemic/RR |
| | | *Kemulariella colchica* | Colchic Kemulariella | VU | Endemic/RR |
| | Boraginaceae | *Cynoglossum imeretinum* | Imeretian Hound's-tongue | VU | Endemic/RR |
| | | *Myosotis lazica* | Lazetian Forget-me-not | NT | Endemic/RR |
| | Brassicaceae | *Barbamine ketzkhovelii* | Ketskhoveli's Barbarea | VU | Endemic/RR |
| | Brassicaceae | *Draba mingrelica* | Megrelian Whitelow-grass | NT | Endemic/RR |
| | Caryophyllaceae | *Dianthus charadzeae* | Kharadze's Pink | EN | Endemic/RR |
| | Lythraceae | *Trapa colchica* | Colchis Water-Chestnut | CR | Endemic/RR |
| | Lythraceae | *Trapa maleevii* | Maleev's Water-Chestnut | VU | Endemic/RR |
| | Woodsiaceae | *Woodsia caucasica* | Caucasian Woodsia | NT | Endemic/RR |

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Crustaceans | Atyidae | *Troglocaris ablaskiri* | - | DD | Endemic |
| Fish | Gobiidae | *Ponticola constructor* | Caucasian goby | LC | Endemic/RR |
| Amphibians | Pelodytidae | *Pelodytes caucasicus* | Caucasian Parsley Frog | NT | Endemic/RR |
| Reptiles | Lacertidae | *Darevskia brauneri* | Brauner's Rock Lizard | LC | Endemic/RR |
| | | *Darevskia derjugini* | Derjugin's Lizard | NT | Endemic/RR |
| | Viperidae | *Vipera kaznakovi* | Caucasus Viper | EN | Endemic/RR |

Considering the typology of the study, using a precautionary approach, all these species are considered to potentially trigger Critical Habitat under Criterion c. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion d: Habitats supporting globally significant migratory or congregatory species**

The AoI partially overlapped with the Kolkheti IBA and KBA which is on the migration path of many raptors passing through Georgia. This area is recognized as a regionally important congregations site known or thought to hold, on a regular basis, at least 20,000 waterbirds of one or more species. In addition, according to the IUCN Red List, eight migratory and/or congregatory fish species may potentially occur within the AoI (Table 6-6).

*Table 6-6 – Migratory and/or congregatory fish species potentially present in the Main OHL AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Migratory/ Congregatory |
|---|---|---|---|---|---|
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | CR | Migratory |
| | | *Acipenser nudiventris* | Barbel Sturgeon | CR | Migratory |
| | | *Acipenser persicus* | Persian Sturgeon | CR | Migratory |
| | | *Acipenser stellatus* | Stellate Sturgeon | CR | Migratory |
| | | *Acipenser sturio* | Atlantic Sturgeon | CR | Migratory |
| | | *Huso huso* | Beluga Sturgeon | CR | Migratory |

| Taxon | Family | Species | Common name | IUCN status (Global) | Migratory/ Congregatory |
|---|---|---|---|---|---|
| | Anguillidae | *Anguilla anguilla* | Common Eel | CR | Migratory/ Congregatory |
| | Clupeidae | *Alosa immaculata* | Black Sea herring | VU | Migratory/ Congregatory |

Considering the typology of the study, using a precautionary approach, all these fish species are considered to potentially trigger Critical Habitat under Criterion c. In addition, based on the abovementioned considerations, the Kolkheti IBA may also be considered as a potential Critical Habitat for birds under Criterion c.

Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion e: Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).**

The Main OHL AoI is not known to contain landscape feature and/or subpopulations of species with unique evolutionary history. In fact, although some endemic species are present, the Main OHL AoI is not characterized by a particular level of isolation, spatial heterogeneity, and wealth of environmental gradients or edaphic interfaces. Moreover, the area is not considered to be of demonstrated importance as to climate change adaptation or as biological corridor. These considerations suggest that the Main OHL AoI does not support any key evolutionary processes.

Therefore, no Critical Habitat is expected to be present in the Main OHL AoI according to this criterion.

##### *6.1.2.3.2 Additional OHL AoI*

Similar to the Main OHL AoI, a Critical Habitat (CH) screening was carried out in order to determine the possible existence of Critical Habitats within the Additional OHL AoI, as defined by the World Bank's Environmental and Social Standards 6 (ESS 6). The criteria for triggering this definition are discussed in the following chapter and evaluated below.

Critical Habitats are likely present in the AoI considering the threatened species, legally protected areas and important areas for biodiversity identified in the previous chapters. The likely and potential Critical Habitats identified in the AoI by the "UNEP-WCMC Global Critical Habitat Screening" are shown in the figure below.


*Figure 6-25 – Likely Critical Habitat in the Additional OHL AoI (UNEP-WCMC Global Critical Habitat Screening, 2021).*

The areas identified as likely Critical Habitat are represented by the marine and terrestrial areas of the Kolkheti National Park along with the Sataplia Nature Reserve, both located outside the borders of the AoI (chapter 6.1.2.2.2). However, the presence of Critical Habitats within the AoI cannot be excluded at this stage.

According to the definitions and criteria provided by ESS 6, a preliminary Critical Habitat Screening is reported below. It is to note that, the likelihood of impacts on transformed, natural, and critical habitats as defined in ESS 6 of the World Bank shall be carefully assessed in the scope of the ESIA.

**Criterion a: Highly threatened or unique ecosystems**

At present, none of the habitats identified within the Main OHL AoI is considered to be "highly threatened and/or unique ecosystems". Therefore, no Critical Habitat is expected to be present in the Main OHL AoI according to this criterion.

**Criterion b: Habitat of significant importance to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches.**

The flora and fauna species listed as having Endangered (EN) or Critically Endangered (CR) conservation status according to Global IUCN are summarized in the following table.

*Table 6-7 – Flora and fauna species with Endangered or Critically Endangered conservation status according to the IUCN Red List potentially present in the Additional OHL AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Flora | Trapaceae | *Trapa colchica* | Colchis Water-Chestnut | CR | Endemic/RR |
| | Apiaceae | *Astrantia colchica* | Colchic Masterwort | EN | Endemic/RR |
| | Apiaceae | *Polylophium panjutinii* | Panjutin's Polylophium | EN | Endemic/RR |
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | CR | - |
| | | *Acipenser stellatus* | Stellate Sturgeon | CR | - |
| | | *Acipenser sturio* | Atlantic Sturgeon | CR | - |
| | | *Huso huso* | Beluga Sturgeon | CR | - |
| | Anguillidae | *Anguilla anguilla* | Common Eel | CR | - |
| Reptiles | Viperidae | *Vipera kaznakovi* | Caucasus Viper | EN | Endemic/RR |
| Birds | Charadriidae | *Vanellus gregarius* | Sociable Lapwing | CR | - |
| | Accipitridae | *Neophron percnopterus* | Egyptian Vulture | EN | - |
| | Anatidae | *Oxyura leucocephala* | White-headed Duck | EN | - |
| | Falconidae | *Falco cherrug* | Saker Falcon | EN | - |
| | Accipitridae | *Aquila nipalensis* | Steppe Eagle | EN | - |

No threshold is provided by ESS 6. Therefore, using a precautionary approach, all these species are considered to potentially trigger Critical Habitat under Criterion b. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion c: Habitat of significant importance to endemic or restricted-range species**

Following a precautionary approach, the species of flora and fauna categorized as local endemics were considered as potentially triggering Critical Habitat, as they might include species characterized by restricted geographic distributions.

*Table 6-8 – Locally endemic flora and fauna species potentially present in the Additional OHL AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Flora | Apiaceae | *Astrantia colchica* | Colchic Masterwort | EN | Endemic/RR |
| | | *Peucedanum adae* | Ada's Hog's-fennel | LC | Endemic/RR |
| | | *Heracleum freynianum* | Freyn's Cow-Parsnip | LC | Endemic/RR |
| | | *Pimpinella idae* | Ida's Burnet Saxifrage | DD | Endemic/RR |
| | | *Heracleum leskovii* | Leskov's Cow-Parsnip | LC | Endemic/RR |
| | | *Heracleum mantegazzianum* | Mantegazzi's Cow-Parsnip | LC | Endemic/RR |
| | | *Polylophium panjutinii* | Panjutin's Polylophium | EN | Endemic/RR |
| | | *Seseli petraeum* | Stone Seseli | LC | Endemic/RR |
| | Asteraceae | *Cirsium imereticum* | Imeretian Thistle | LC | Endemic/RR |
| | | *Cirsium oblongifolium* | Oblong-leaved Thistle | VU | Endemic/RR |
| | | *Cirsium pugnax* | Armed Thistle | LC | Endemic/RR |
| | | *Cirsium sosnowskyi* | Sosnowsky's Thistle | LC | Endemic/RR |
| | | *Pilosella abakurae* | Abakurian Hawkweed | DD | Endemic/RR |
| | | *Psephellus vvedenskii* | - | LC | Endemic/RR |
| | | *Kemulariella colchica* | Colchic Kemulariella | VU | Endemic/RR |
| | | *Prenanthes abietina* | Fir-tree Rattlesnake Root | LC | Endemic/RR |
| | Boraginaceae | *Symphytum ibericum* | Georgian Comfrey | DD | Endemic/RR |
| | | *Cynoglossum imeretinum* | Imeretian Hound's-tongue | VU | Endemic/RR |

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| | | *Myosotis lazica* | Lazetian Forget-me-not | NT | Endemic/RR |
| | Brassicaceae | *Draba mingrelica* | Megrelian Whitelow-grass | NT | Endemic/RR |
| | Campanulaceae | *Campanula engurensis* | Engurian Bellflower | VU | Endemic/RR |
| | Lythraceae | *Trapa colchica* | Colchis Water-Chestnut | CR | Endemic/RR |
| | Lythraceae | *Trapa maleevii* | Maleev's Water-Chestnut | VU | Endemic/RR |
| Mollusks | Moitessieriidae | *Paladilhiopsis schakuranica* | Paladilhiopsis schakuranica | DD | Endemic/RR |
| Crustaceans | Atyidae | *Troglocaris ablaskiri* | - | DD | Endemic |
| Fish | Gobiidae | *Ponticola constructor* | Caucasian goby | LC | Endemic/RR |
| Amphibians | Pelodytidae | *Pelodytes caucasicus* | Caucasian Parsley Frog | NT | Endemic/RR |
| | Bufonidae | *Bufo verrucosissimus* | Caucasian Toad | NT | Endemic/RR |
| | Ranidae | *Rana macrocnemis* | Brusa Frog | LC | Endemic/RR |
| Reptiles | Lacertidae | *Darevskia derjugini* | Derjugin's Lizard | NT | Endemic/RR |
| | Viperidae | *Vipera kaznakovi* | Caucasus Viper | EN | Endemic/RR |
| Mammals | Talpidae | *Talpa caucasica* | Caucasian Mole | LC | Endemic/RR |
| | Talpidae | *Talpa levantis* | Levant Mole | LC | Endemic/RR |

Given the study's typology and using a precautionary approach, all of these species abovementioned are considered to potentially trigger Critical Habitat under Criterion c. Specific field surveys should be conducted as part of the ESIA in order to confirm the existence of Critical Habitat.

**Criterion d: Habitat supporting globally or nationally significant concentrations of migratory or congregatory species**

The Additional OHL AoI partially overlaps the Khobi River KBA, being also at a reduced distance from the Kolkheti IBA and KBA. As stated in chapter 6.1.2.2, the Kolkheti area is crossed by several migration paths of raptors passing through Georgia, which is why this area is recognized as a regionally important congregation site. In addition, according to the IUCN Red List, three migratory and/or congregatory fish species may potentially occur within the AoI (Table 6-9).

*Table 6-9 – Migratory and/or congregatory fish species potentially present in the Additional OHL AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Migratory/ Congregatory |
|---|---|---|---|---|---|
| Fish | Acipenseridae | *Acipenser sturio* | Atlantic Sturgeon | CR | Migratory |
| | | *Acipenser stellatus* | Stellate Sturgeon | CR | Migratory |
| | | *Acipenser gueldenstaedtii* | Danube Sturgeon | CR | Migratory |
| | | *Huso huso* | Beluga Sturgeon | CR | Migratory |
| | Anguillidae | *Anguilla anguilla* | Common Eel | CR | Migratory/ Congregatory |

Considering the typology of the study, using a precautionary approach, all these fish species are considered to potentially trigger Critical Habitat under Criterion d. In addition, given the importance of the the Kolkheti IBA and its proximity to the AoI, this area may also be considered as a potential Critical Habitat for birds under Criterion c. Specific field surveys should however be performed within the scope of the ESIA to assess the Critical Habitat.

**Criterion e: Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).**

The Additional OHL AoI is not known to contain landscape feature, ecological functions and/or characteristics that are needed to maintain the viability of the biodiversity values listed in the (a) to (d) ESS 6 criteria. In fact, while there are some endemic species present, the AoI is not recognized as an important area for biodiversity, falling outside any area classified as such (with the sole exception of a limited overlap with the Khobi River KBA).

### *6.1.3 Onshore Environmental Gaps' Information and Recommendations*

The table below reports the main gaps identified in the Georgian onshore baseline and recommendations for filling-in the identified gaps.

*Table 6-10 – Primary gaps and recommendations for the onshore environmental Georgian baseline.*

| Component | Gaps | Recommendations |
|---|---|---|
| **Physical components** | | |
| Air Quality, Meteorology, Climate and Climate Change | Missing exact data on air quality within the AoI.<br>Lack of historical data/future forecasts related to the main climatic variables. | ▪ Perform additional in-depth desktop studies on the Georgian National Dust and Air Pollution monitoring and databases (if any) to better address the types, levels and standards of air pollutants in the areas that may be associated with the Project activities.<br>▪ Perform a site-specific assessment of past climate patterns and future evolution of key climate indicators under different emission scenarios. |
| Geology, Geomorphology and Soil | No relevant gaps. | ▪ Consider the information collected during the technical feasibility assessment and project design stages in order to obtain the essential data needed for assessing the project's susceptibility to seismic hazard.<br>▪ Assess the soils structure, features and sensitivity (e.g., composition, stratification, porosity, etc.), soil and subsoil quality and status (e.g., presence of contaminants, degree of stress, etc.) and land use of the area interested by the Project activities.<br>▪ Determine geological and hydrogeological risk zones. |
| Wildfire hazard | No relevant gaps. | ▪ Utilize the data gathered during the technical feasibility assessment and project design phases to acquire the necessary information for evaluating the project's exposure to wildfire hazard. |
| Surface and Ground Water | Missing site specific data on surface and underground water bodies. | ▪ Assess the presence of surface or underground aquifers in the areas affected by construction works.<br>▪ Use the data obtained during the technical feasibility assessment and project design stages to ensure a comprehensive evaluation of the project's susceptibility to river flood hazard. |
| Terrestrial Acoustics | Missing on-site data on key sensitive receptors within the AoI. | ▪ Perform an in-depth desktop study on the acoustic zonation of the AoI. |

| | | |
|---|---|---|
| | | ▪ Assess the possible existence of vulnerable receptors in the vicinity of the construction sites. |
| Light Pollution | No relevant gaps | ▪ N/A |
| **Biological components** | | |
| Terrestrial Habitats and Biodiversity | Missing on-site data on the exact distribution of terrestrial habitats. | ▪ Perform field studies about the actual terrestrial habitat distribution, especially along the cable route as well as specific assessment of the suitability of such habitats for the threatened species listed in this chapter.<br>▪ A Critical Habitat Assessment (CHA) under ESS 6 is suggested to ensure No Net Loss to Natural Habitats and Net Gain to Critical Habitats. |
| Terrestrial Legally Protected Areas and Important Biodiversity Areas | Missing information regarding the actual level of protection and zoning of the identified areas. | ▪ Additional in-depth desktop studies on the true protection levels in the legally protected areas (e.g., existing zonation etc.) are suggested in the scope of the ESIA, as well as permitted and non-permitted activities within such areas.<br>▪ Consultations with the authorities on the existence of plans to create new protected areas within the AoI should be considered. |

### 6.1.4 *Offshore Physical Baseline*

#### *6.1.4.1 Sediments and Seafloor Morphology*

A narrow shelf (less than 5 km wide in some areas) occurs in the eastern Black Sea (where the Georgian AoI is located) which extends from Novorossiysk to Batumi for about 490 km (Panin and Jipa, 1998; Panin, 2005; Ignatov, 2008; Ivanov & Belokopytov, 2013; Harris et al., 2014). Conventionally, this eastern shelf is subdivided into three parts: a northern part (the Novorossiysk-Sochi Shelf), a middle part (Gudauta Shelf) and a southern part (Ochamchire-Batumi Shelf), which extends further south toward the Turkish Shelf and where the AoI may be considered as located. The three shelf subunits vary both in areal shape and areal extension, as reported in Table 6-11.

From the narrow shelf, the Caucasus rugged and steep (with 5–8° average gradient, but up to 30–40°) continental slope reaches the bathymetry of – 2000 m (Jipa and Panin, 2020).

*Table 6-11 – The three main subunits of the eastern continental shelf. Differences in areal length and width are reported.*

| Eastern and Northeastern Black Sea (Caucasian) Shelf | Shelf area (sq. km) | Shelf width (km) | Shelf length (km) |
|---|---|---|---|
| Novorossiysk - Sochi Shelf | 1750 | 3-4 to 7- 12 | 260 |
| Gudauta Shelf | 815 | 28 | 45 |
| Ochanchire - Batumi Shelf | 1000 | 1.5–15 | 150 |

The eastern Black Sea is also characterized by the presence of complex canyon systems and fan valleys. Along the Georgian coastline, the canyon's heads incise the narrow shelf at shallow depths and in proximity of the coast, such as the Poti canyon head located at -10 m and at about 600 meters from the shoreline (Papashvili et al., 2010). A close relationship seems to exist between the Georgian canyons and rivers, whereby the major canyons of this area (Bzyb, Kodori, Inguri, Rioni, Supsa, and Chorokhitcoruh) are all located at close vicinity of the river's mouth (Jaoshvili, 2002). In general, Caucasian rivers have a very short course, being mostly medium and small size rivers, with the only exception of the Rioni, Enguri and Çoruh rivers. However, although the Caucasian rivers deliver into the Black Sea only 14% of the basin freshwater inputs, the sediment discharge results significatively high in this area (about 40% of the total Black Sea sediment inflow). In particular, Georgian rivers are responsible of about 30% of sediment entering the deep Black Sea waters transported through submarine canyons (Jaoshvili, 2002). Additional information about the submarine canyons, being located just outside the Georgian AoI, are reported in 6.5.1.2.2.

The littoral sediment drift system along the Georgian coastline (

*Figure 6-26*), influence the sedimentation pattern and type of sediment which accumulate along the continental slope or reach the deep-sea. Textural analyses of cores from the eastern basins reflect the shoreline morphodynamics and river's sediment discharge rates. For example, a high abundance of turbidites and silty material in the cores off the eastern coast indicates a variability in the sedimentation pattern.

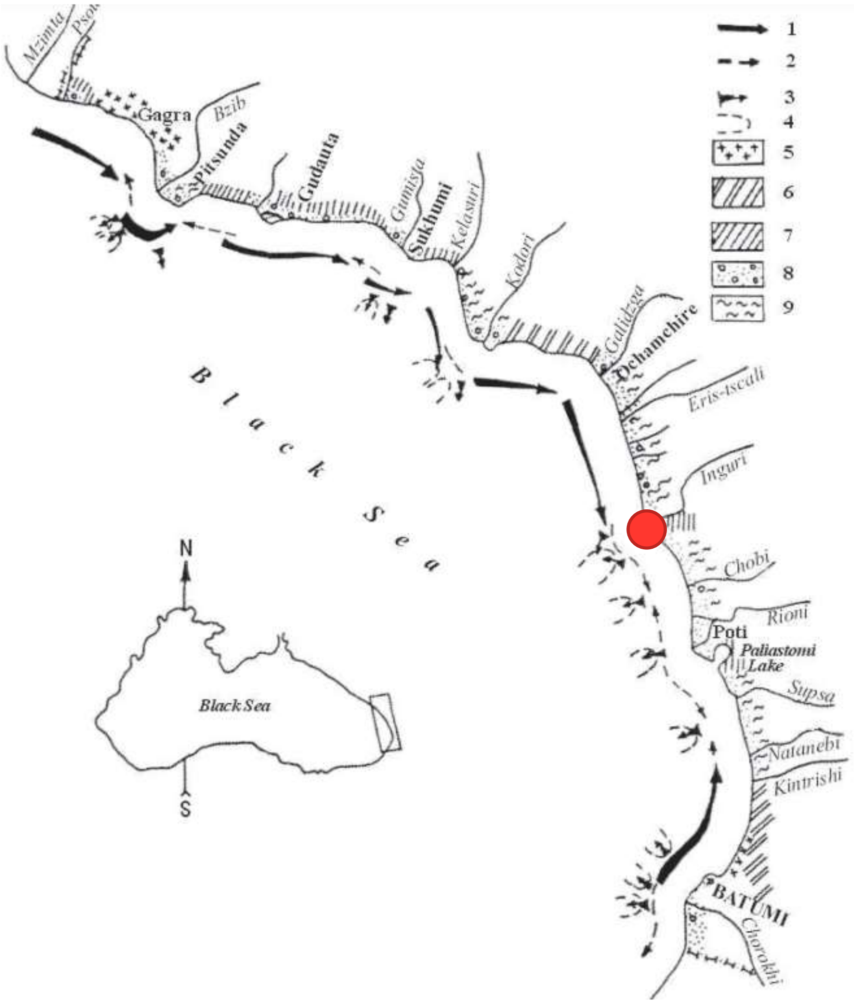



*Figure 6-26 – Schematic map of the littoral sediment drift system in the Black Sea along the Georgian coastline (Kiknadze, 1993) Legend: 1- Longshore sediment drift direction and relative capacity; 2 - Direction of fine grained sediments migration; 3 - Partial loss of sediments towards the deep sea through canyons; 4 - Canyon heads; 5 - Cliffs in hard rocks (metamorphic and eruptive); 6 - Cliffs in conglomerates, sandstones, marls, schists; 7 - Soft rock and flat relief; 8 - Non-consolidated deposits (peabbles, gravels, sands) forming beaches, terraces, coastal dunes; 9 - Lacustrine and lagoon deposits. The red dot indicates the AoI location.*

In general, the deep-water sediments of the Black Sea are mainly fine grained while coarse material is found locally on the basin slope and deeper areas (e.g., canyons and fan valleys). The terrigenous material derived from drainage areas enters the deep basin often in the form of turbidite deposits. There is a grain-size differentiation of clay minerals and carbonate content in the surface sediments. The highest clay and carbonate content is found in central areas of the eastern basins. On the basis of grain size, carbonate, and organic carbon content, it is possible to distinguish 12 genetic types of Black Sea sediments (Figure 6-27). It is notable that kaolinite (coarsest) is mostly found around coastal area, while montmorillonite and illite are more common in the deeper areas. The shallow coastal area of AoI is characterized by the presence of carbonate-free terrigenous sediments ($CaCO_3$ content 10%) which dominates over other sediment type (Shimkus and Trimonis, 1974).

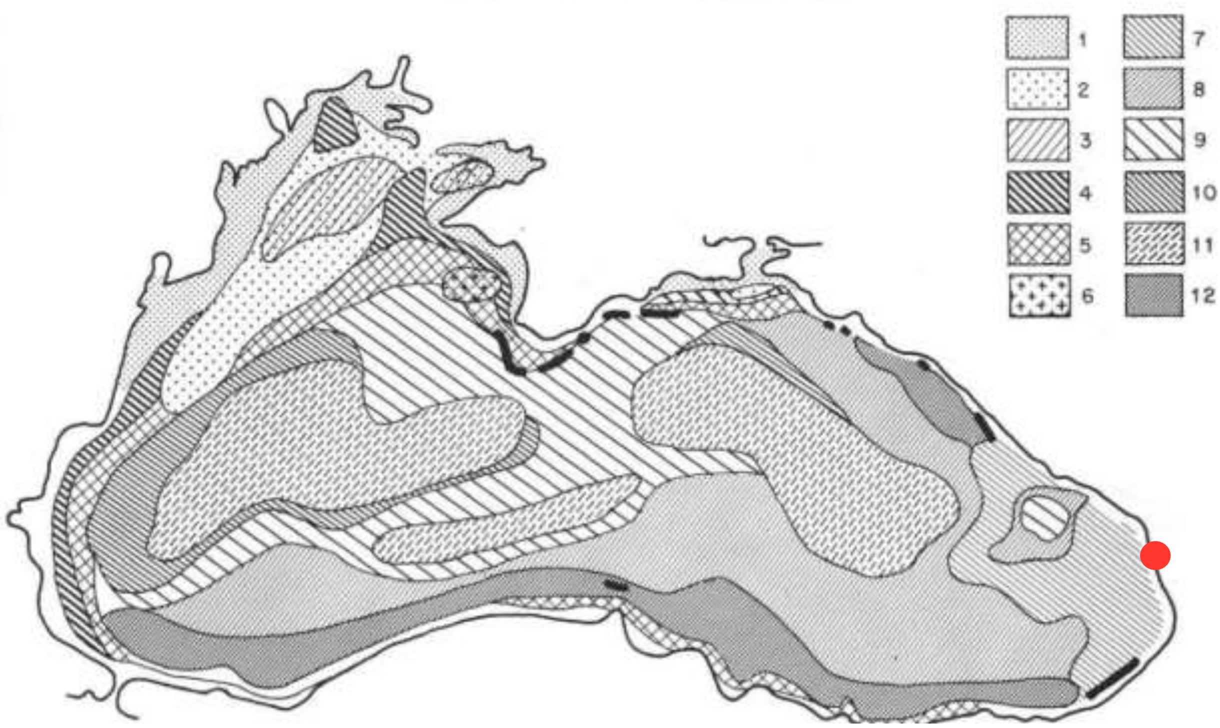



*Figure 6-27 – Compositional-genetic types of modern Black Sea sediments, from Shimkus and Trimonis (1974). Shallow-water sediments: (1) organogenic-clastic, very coarse-grained and coarse-grained sediments; (2) carbonate-rich shelly sediments; ($CaCO_3$ 50%); (3) sediments covered by overgrowth of Phyllophora; (4) carbonate-poor and carbonate-bearing, organogenic-terrigenous mytilid muds ($CaCO_3$ = 10-50%); (5) carbonate-poor and carbonate-bearing phaseolina muds concretions. Deep-water sediments: (7) carbonate-free terrigenous sediments ($CaCO_3$ content 10%); (8) carbonate-poor organogenic-terrigenous muds ($CaCO_3$ content = 10-30%); (9) carbonate-poor, organogenic-terrigenous, finely dispersed muds ($CaCO_3$ content = 10-30%); (10) carbonate-bearing, organogenic-terrigenous, finely dispersed Coccolith muds ($CaCO_3$ content = 30-50%); (11) carbonate-rich (locally carbonate-bearing), finely dispersed Coccolith muds rich in organic matter; (12) modern sediments of considerable diversity with predominance of carbon-poor organogenic-terrigenic muds. The red dot indicates the AoI location.*

The characteristics of the seafloor morphology and sediments flows by the river intake of the Rioni Depression zone (which includes the AoI) are reported in the table below.

*Table 6-12 – Seafloor morphology and sediments of the Rioni Depression zone.*

| | Zone Section | Length Km | Characteristics, description | Observations on sediment feeding and littoral drift system |
|---|---|---|---|---|
| **Rioni Depression zone** | *General overview* | 115 | Low, straight coast, with important input of sediments from the rivers debouching in this zone | Littoral drift of sediments with variable directions; Numerous canyons capturing a part of sediments |
| | 1 Kobuleti - Supsa River | 10 | Very narrow shelf | Northward littoral drift: in front of Supsa River there is a very active canyon. |
| | 2. Supsa River - Poti (Inguri River Delta) | 24 | Accumulative sandy coast | Southward littoral drift: there is a canyon in front of the Southern distributary of the Inguri River Delta |
| | 3. Poti - Khobi River moutht | 19 | Accumulative sandy coast | Northward littoral drift |

| | Zone Section | Length Km | Characteristics, description | Observations on sediment feeding and littoral drift system |
|---|---|---|---|---|
| | 4. Khobi River - Inguri River Delta | 23 | Accumulative sandy coast | Southward littoral drift; a canyon in front of Inguri River mouth |
| | 5. Enguri River - Ochamchire | 39 | Accumulative sandy coast Strong | Southward littoral drift |

### *6.1.4.2 Coastal Erosion*

Georgia's coastline has undergone a severe geomorphological transformation over the course of the past few decades, predominantly due to several development projects, mainly commercial ports, oil terminals, coastal transport infrastructure, coastal erosion control measures, and hydropower dams.

The creation of these structures (e.g., the commercial ports of Batumi and Poti) has exacerbated the process of coastal erosion. This is linked to both downdrift current diversion linked to the new structures and the lack of river sediment deposition. Anaklia beach is currently affected by erosion and shoreline retreat. This downdrift erosion is also partly caused by the reduced sediment supply from the Enguri River which has begun after the dam construction. Beach control structures in the form of offshore breakwaters have been used to address the erosion, but with limited success.

*Figure 6-28 – Sediment Erosion along the Shoreline at Anaklia (Source: DOWHA Engineering Co, 2011).*

### *6.1.4.3 Oceanography and Seawater Quality*

The Black Sea is characterized by four vertical water layers that do not mix, with the bottom one being the largest anoxic water body on Earth (Toderascu & Rusu, 2013). The surface layer spreads from the sea level up to 50 m depth, and it is strongly influenced by seasonal temperature variations and wind fields. The second layer represents the cold intermediate layer, whose depth stretches from 50 m up to 180 m. Below the second layer (not included in the AoI, reaching only 100 m of depth), a permanent pycnocline is present characterised by a constant temperature (between 6 °C and 8 °C) because it is not influenced by temperature changes in the upper layers (Kostianoy et al., 2008; Stanev et al., 2019). The bottom layer begins below 200 m depth and presents mostly stagnant waters with slight changes in their properties (Toderascu & Rusu, 2013).

While the intermediate and deep waters present a relatively stable temperature, surface waters are subject to strong seasonal temperature variations. In particular, along the Georgian coastline, the average seasonal water temperatures are 12 °C in winter, 13 °C in spring, 25.4 °C in summer, and 21.6 °C in autumn. The minimum water temperature (9 °C) in Batumi is registered in February, while the maximum (27.3 °C) in August (https://seatemperature.info/batumi-water-temperature.html).

The strong pycnocline and water stratification of the Black Sea is reflected in the variation of salinity among the water layers. The top layer influenced by fluvial inputs and rain presents a lower salinity (17.5–18.5 psu) than the bottom layer (21–22 psu) fed by warm salty waters from the Mediterranean Sea through the Bosporus (Shapiro, 2009; Cochran et al., 2019).

###### *6.1.4.3.1 Currents and Eddies*

The AoI is influenced by the presence of a permanent cyclonic coastal current referred to as the Rim Current (RC; Figure 6-29, a; Shapiro 2009; Kershaw & Liu, 2015). The RC flows across the entire basin along the shoreline at depths like the continental slope. Hence, the RC distance from the Georgian shore is about 3–5 km (where the continental shelf is narrow) in contrast to the 200 km in the northwestern area due to the extensive shelf. The average RC speed is 0.2 $ms^{-1}$ at the surface and rarely exceeds 1 $ms^{-1}$, with a width of 40–70 km (Oguz et al., 1993; Toderascu & Rusu, 2013).

Traditionally, the cyclonic wind pattern has been recognized as the primary driver of cyclonic surface circulation. The surface water movement is driven by westward-moving winds from the Caucasus Mountains in the northeast, to produce an anticlockwise RC (Zatsepin et al., 2007, 2011; Kershaw & Liu 2015). However, data suggests that the seasonal thermohaline, together with water masses of diverse density due to river runoff, can enhance the effects of wind-driven circulation (Ozer et al., 2022). The low-salinity surface waters, which are formed over the northwest shelf due to intense river discharge, travel with the RC and reach the Anatolian coast where their properties changes (i.e., higher salinity) due to the layer mixing.

Several anticyclonic eddies are formed between the RC and the coast and in the central area of the Black Sea. While the three major anticyclonic gyres exist as permanent features in the central basin, minor eddies develop seasonally across the Black Sea and are unstable (Figure 6-29, a; Korotenko, 2017). In general, small coastal anticyclonic eddies forms during warm seasons and they have a short life span (few weeks) compared to larger anticyclonic eddies such as the Batumi eddy in the eastern area (Shapiro, 2009; Oguz et al., 1993).

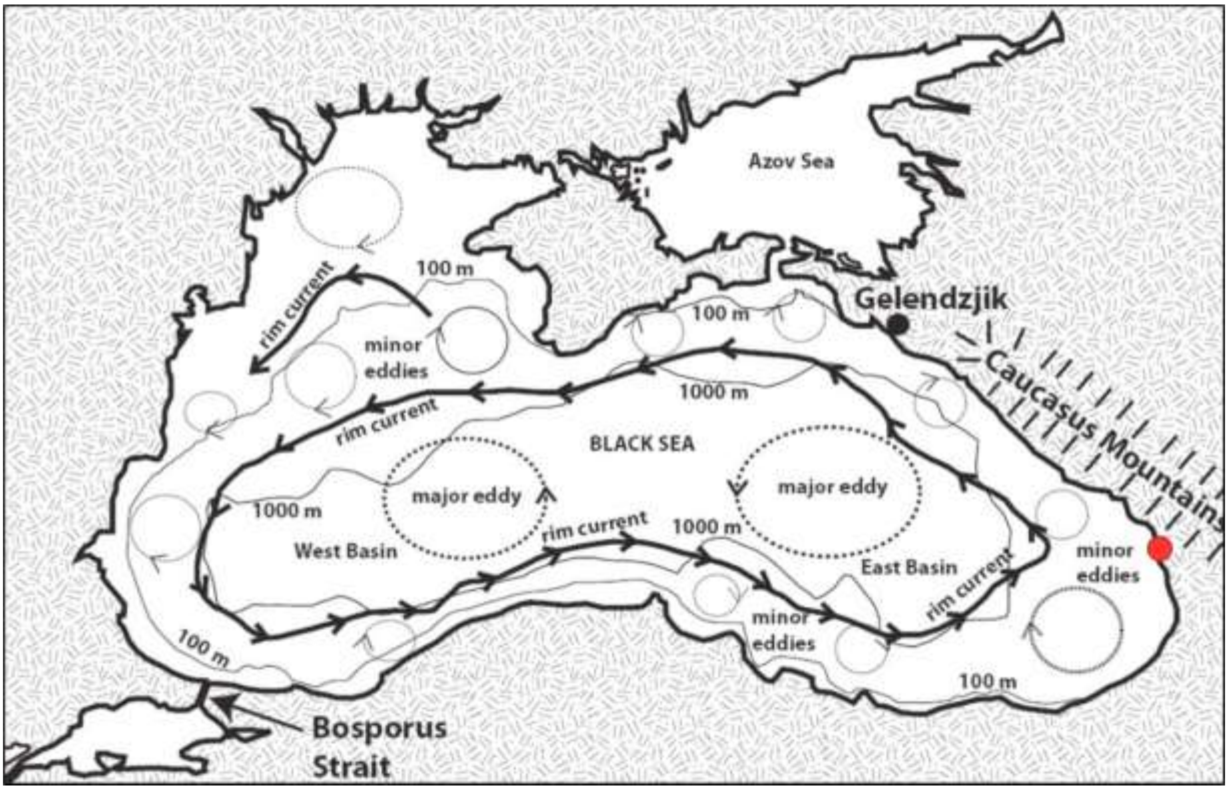



*Figure 6-29 – Currents and eddies of the Black Sea. The continuous black line represents the Rim current permanently present during the year with the arrow indicating the current direction. The bigger central eddies are permanent while smaller eddies are seasonal-dependent (source: Kershaw & Liu, 2015). The red dot indicates the AoI location.*

### *6.1.4.3.2 Tides*

Tides in the Black Sea are semidiurnal (i.e., having two high waters and two low waters each lunar day, with little or no diurnal inequality) and they are classified as microtidal. In fact, diurnal and semidiurnal tides are nearly nonexistent in the Black Sea and near the AoI, they reach a level of 13 centimeters (Tides of the Black Sea mirplaneta.com). Offshore the water level of the Black Sea is subject to seasonal fluctuations averaging about 20 cm (Shapiro, 2009). For these reasons, tides may be considered as negligible for the AoI.

### *6.1.4.3.3 Upwelling and Downwelling Processes*

Although upwelling and downwelling processes are uncommon in the Black Sea, these events are observed almost every year when specific conditions are met (Kershaw & Liu, 2015). In fact, data suggest the existence of these processes mainly depending on wind intensity, direction, and water stratification. In general, upwelling motions are associated with the cyclonic circulation system while downwelling ones with anticycloning circulation. According to the map shown in Figure 6-30, the AoI, in its deeper zone, is expected to represent a downwelling area.

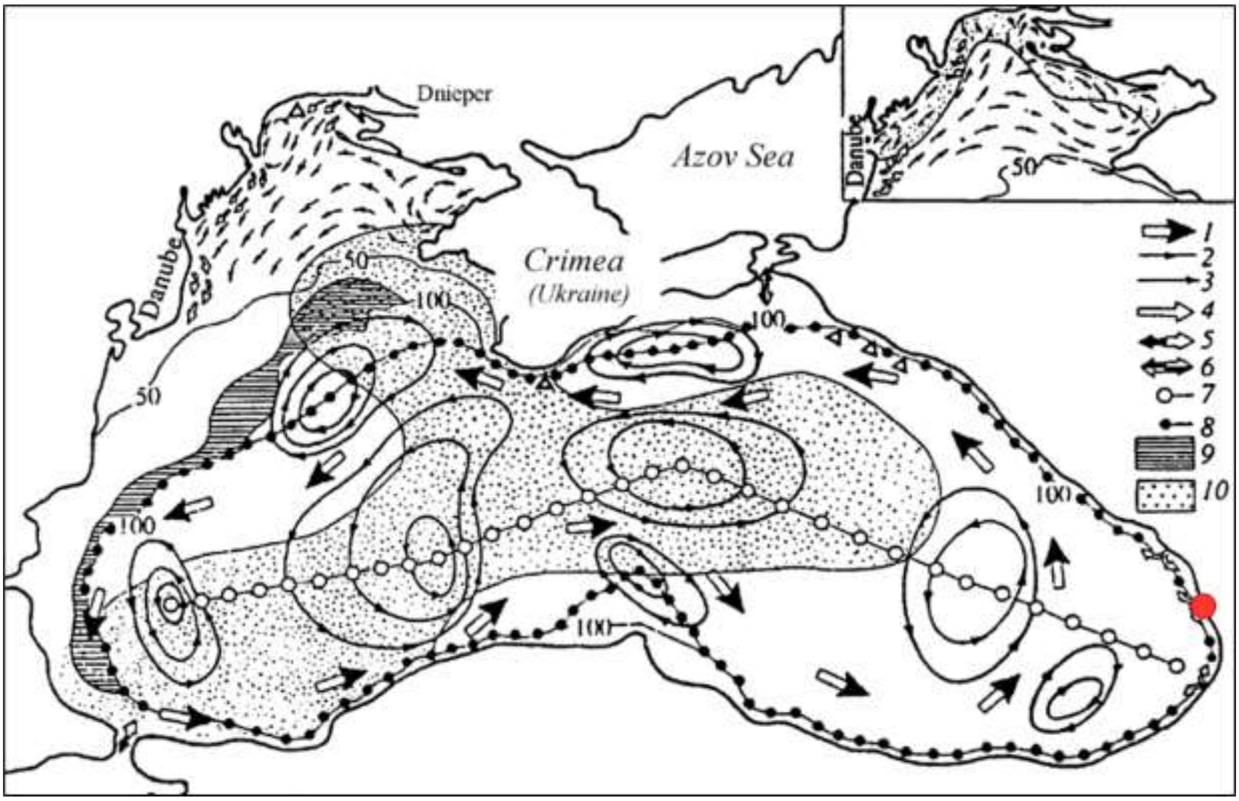



*Figure 6-30 – Up- and downwelling movements occurring in the Black Sea. The black line with white dots (7) indicates upwelling motion predominantly occurring in the central part of the basin. The black line with black dots (8) indicates downwelling motion predominantly occurring along the coastlines. 1 direction of RC; 2 synoptic eddies; 3 drift currents; 4 discharge currents; 5–6 exchange via straits; 9 areas of penetration of deep hypoxia onto the shelf; 10 areas of the maximum wave height (source: Fashchuk, 1997). The red dot indicates the AoI location.*

**Tsunami**

Although tsunami events are rare in the Black Sea, 22 documented tsunamis have been recorded since the first century, nine of which occurred in the twentieth century (Yalçiner et al., 2004). Most of the tsunami events occurred in the northern and northeastern areas of the Black Sea. However, in the first century, the town of Dioskuriada (Georgia) was destroyed by a subsurface event and submerged beneath the sea (Yalçiner et al., 2004). For such reason, catastrophic events such as tsunamis may be considered as very unlikely but not completely excludable.

### *6.1.4.4 Marine acoustics*

In acoustics, the term “sound” is usually referred to as the acoustic energy radiated from a vibrating object, with no particular reference for its function or potential effect, whereas “noise” is usually referred to as the acoustic emission causing specifically described adverse effects (Southall et al., 2009) or technical distinctions (i.e., ambient noise).

Sounds are omnipresent in the underwater environment and can be produced by both natural (physical and biological) and anthropogenic sources (OSPAR, 2015).

Many are the offshore natural physical and biological factors determining a sound source. The main physical natural factors contributing to the underwater ambient noise include wind, breaking waves, splashes from raindrops and lightning, as well as the sound produced by the interactions between marine fauna and waves (TNO, 2009). Otherwise, among the biological ones, the main sound sources are mostly related to the marine fauna communication phenomena, including those of echolocation used by cetaceans (Southall & Nowacek, 2009).

Anthropogenic activities (such as shipping, military activities, construction works, oil & gas exploitations, etc.) are responsible for increasing underwater sound sources in areas where natural sources would typically be the only available sources. Nowadays, there is an increasing concern about the possibility of negative effects of anthropogenic underwater noise on the life of marine fauna. In fact, behaviour such as foraging, migration and reproduction could be modified or disrupted (Southall et al., 2009). In addition, some sounds, constantly present within the marine environment, define the "background environmental noise". The typical sound levels of ocean background acoustics at different frequencies as measured by Wenz (1962) are shown in the graph below, also referred to as the Wenz curves (

*Figure 6-31*).

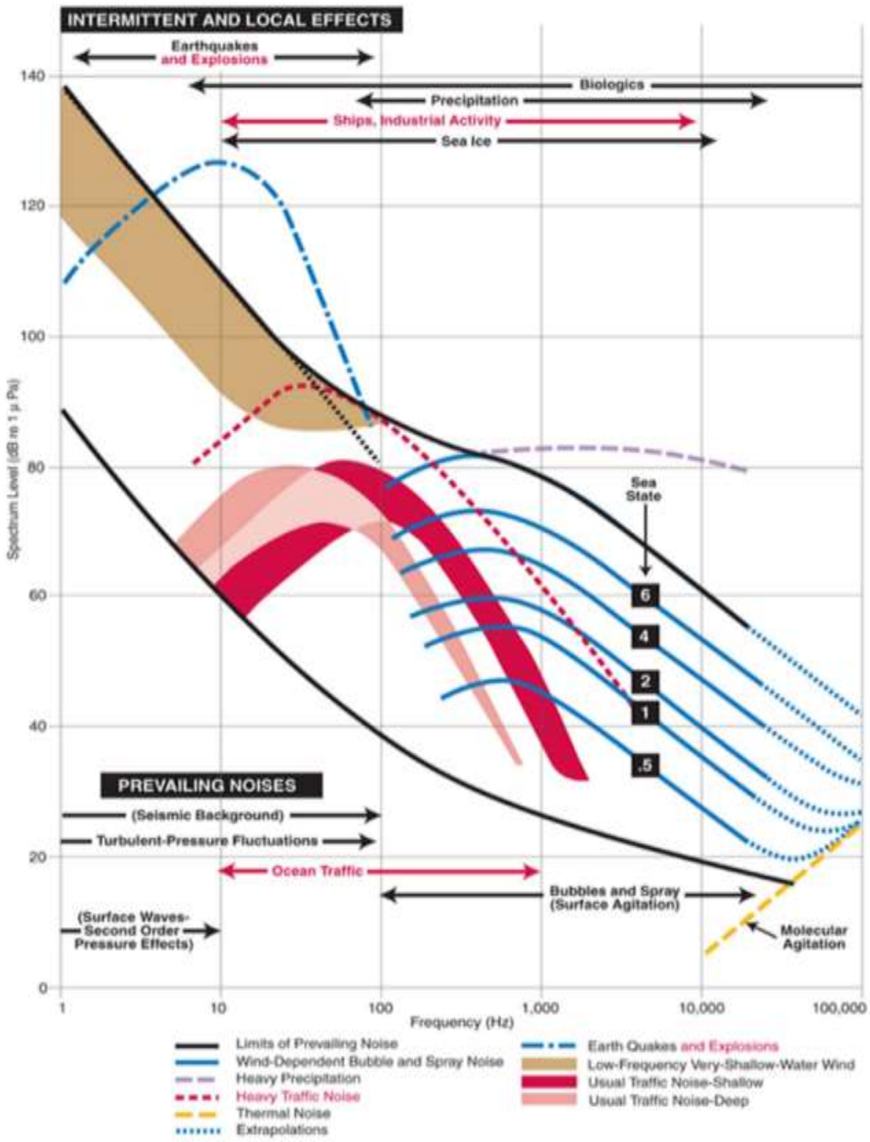



*Figure 6-31 – Wenz curves, showing prevailing ocean noise and sounds (source: dosits.org).*

Generally, the wave noise generated by the wind is prevailing in offshore environments. In absence of anthropogenic noise sources, the wind-generated environmental noise can be recorded at a frequency interval ranging from 1 Hz to 100 kHz. The sound levels may vary in relation to the sources (e.g., rain may increase the environmental noise up to 35 dB in a frequency range between 100 Hz and 20 kHz) (Wenz, 1962).

Despite no specific information is currently available, the underwater acoustic climate of the AoI may be primarily influenced by anthropogenic (i.e., marine traffic) and natural biological sources (i.e., marine fauna).

Among the possible **anthropogenic noise sources**, maritime traffic is certainly one of the most important sources within the AoI, which hosts the port of Kulevi. Maritime traffic is a low-frequency sound source, which means that the produced sounds are at frequencies generally lower than 300 Hz and are able to propagate over long distances through the water column (Skarsoulis et al., 2017), with possible consequences on marine fauna. Large commercial vessels generally produce relatively loud, low frequency sounds. The main noise sources include propellers cavitation, vibration of engines and related facilities and water displacement caused by the moving hull. The source noise levels may range 180 dB to 195 dB re 1 µPa at 1 m with peak levels in the 10 Hz - 50 Hz frequency band. At frequencies lower than 200 Hz, the propeller systems mostly contribute to the underwater noise. Large cargo vessels may emit high frequency sounds with sound levels over 150 dB re 1 µPa at 1 m around 30 Hz. Moreover, additional noise sources may be the on-board equipment (e.g., equipment in the machine room or auxiliary systems) and the hydrodynamic flow around the vessel hull. Noise also increases with an increase in the vessel speed and the sound pressure levels depend on the vessel propeller system (McKenna et al., 2013).

The following Table 6-13 shows the average emission levels of the main anthropogenic sound sources potentially detectable in the AoI.

*Table 6-13 – Main anthropogenic acoustic sources present in the Georgian AoI with their relative frequency, duration and directionality (source: Prideaux, 2017)*

| Activity | Bandwidth | Intensity | Emission frequency | Directionality |
|---|---|---|---|---|
| **Constant activities for the area** | | | | |
| Small vessels | 10 kHz | 160-190 dB rms to 1 m SPL | Continuous | Omnidirectional |
| Medium sized boats | Less than 1 kHz | 165-180 dB rms to 1 m SPL | Continuous | Omnidirectional |
| Large vessels | A few hundred Hz | 180-190 dB rms to 1 m SPL | Continuous | Omnidirectional |
| **Potentially frequent activities for the area** | | | | |
| Active low frequency military sonar | <1 kHz | 240 dB re 1µPa to 1 m SPL | 600-1,000 ms | Horizontal |
| Active medium frequency military sonar | 1-5 kHz | 235 dB re 1µPa to 1 m SPL | 1-2 s | Horizontal |
| Continuous military sonar | 3 kHz | 182 dB re 1µPa to 1 m SPL | 18 s | Horizontal |
| **Occasional activities (exploration, work, etc.)** | | | | |

| Activity | Bandwidth | Intensity | Emission frequency | Directionality |
|---|---|---|---|---|
| Echo sounder Single beam | 12 kHz-700 kHz (a seconda dall'applicazione) | 240 dB re 1μPa to 1 m SPL | 0.1 ms | Vertical |
| Side Scan Sonar | 50 kHz-1600 kHz (a seconda dall'applicazione) | 240 dB re 1μPa to 1 m SPL | 0.1 ms | Vertical/ Horizontal |
| Echo sounder Multibeam | 12 kHz-500 kHz (a seconda dall'applicazione) | 240 dB re 1μPa to 1 m SPL | 0.1 ms | Vertical/ Horizontal |
| Dredging activities | 1 kHz | 150 dB rms to 1 m SPL | Continuous | Omnidirectional |

As already mentioned above, communication between marine organisms is one of the main **natural biological sources** affecting the underwater acoustic climate within the AoI.

Particularly important is the contribution of cetaceans, which produce sounds for communication, orientation and navigation purposes. These sounds may range from a low frequency value of about 10 kHz of some whales, absent in the Black Sea, to a high frequency value of 200 kHz for some dolphins. Source levels for communication sounds are around 170 dB to 180 dB re 1 µPa at 1 m, while echolocation clicks range from a source level of 175 dB re 1 µPa at 1 m in the frequency range of 125 to 200 kHz for the Black Sea harbour porpoise (*Phocoena phocoena relicta*), up to 226 dB re 1 µPa at 1 m in the frequency range of 23 kHz to 102 kHz for the bottlenose dolphin (*Tursiops truncatus*), as well as for its Black Sea subspecies (*Tursiops truncatus ponticus*) (Richards *et al.,* 2007; Southall *et al.*, 2009). Both subspecies are present in the AoI.

For all the reasons above, the underwater ambient noise of the AoI may be assumed as currently dominated by low frequency anthropogenic noises generated by vessels and high to very high frequency biological vocalizations produced by cetaceans.

Finally, it should be noted that the United Nations Convention on the Law of the Sea (UNCLOS) includes the introduction of energy (including sound) into the marine environment under the definition of pollution in Article 1 (4). The whole Black Sea and consequently the AoI is under the ACCOBAMS (Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area) that is a regional international treaty that binds its States Parties on the conservation of Cetacea in their territories.

### *6.1.4.5 Offshore Light Pollution*

No specific data on light pollution are available regarding the offshore area of the Georgian AoI.

Based on the Global Light Pollution Atlas (

*Figure 6-81*), The majority of light pollution is concentrated within the first 12 kilometers from the coastline with the majority of the artificial brightness/natural brightness ratio varying between 0.19 and 1. In some areas located in close proximity to the Anaklia port the ratio reaches 1.73, see 6.3.2.7. At greater distances from the coast the natural brightness appears to surpass artificial brightness.

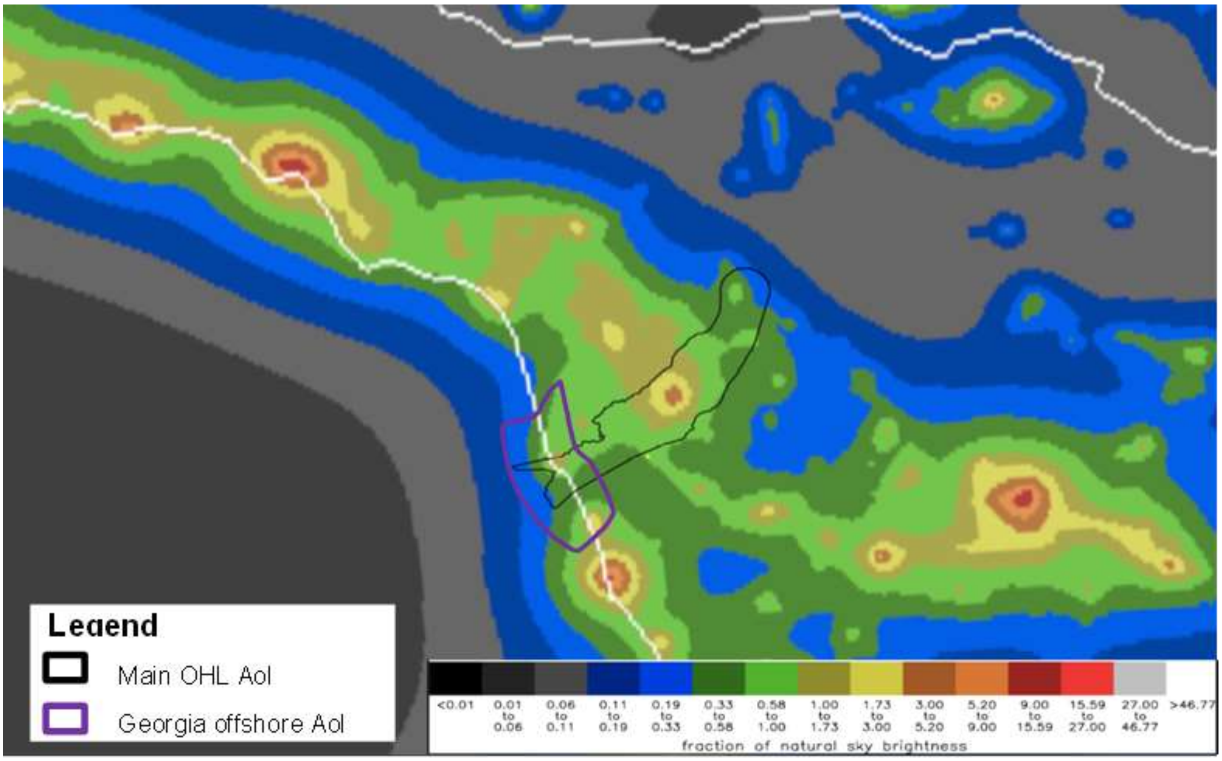



*Figure 6-32 – Offshore light pollution level in the Electrode AoI. The purple polygon identifies the offshore AoI.*

### *6.1.5 Offshore Biological Baseline*

#### *6.1.5.1 Marine Habitats and Biodiversity*

##### *6.1.5.1.1 Benthic domain*

As previously stated (see 6.1.4.1), the continental shelf along the Georgian coast is mainly characterized by soft bottoms with more or less fine and cohesive sands and/or muds. Thus, the variety of biotopes present allows for the development of different biocenoses dominated especially by burrowing and suspension feeder organisms such as bivalve mollusks, polychaete worms and crustaceans. In addition, the presence of the Enguri River mouth creates, for example, a transition and mixing zone that is an optimal habitat for the settlement of euryhaline species adapted to live in very soft substrates (fine muds mixed with terrestrial and freshwater debris) with a high organic content. On the other hand, some of the offshore benthic habitats, typically characterized by anoxic or suboxic conditions below 100-150 m depth, are devoid of aerobic life (ANEMONE Deliverable 1.3, 2021) and inhabited by a few specialized species able to tolerate the lower oxygen levels and organic matter.

Varshanidze et al. (2021) carried out a local/regional study to describe the **benthic habitats** and assess the biodiversity and distribution of macrozoobenthic communities in the Gonio-Anaklia water area (Georgian coast which includes the AoI). Based on samples analysis of dominant species and sediment type, the benthic habitats potentially found in the AoI are expected to be the following (Varshanidze et al., 2021):

- Infralittoral sand with *Donax trunculus*, *Lentidium mediterraneum*, *Ampelisca diadema*;
- Infralittoral sand with shells, *Lucinella divaricata*, *Donax semistriatus*, *Chamelea gallina*, *Spisula subtruncata*;

- Infralittoral mud with *Heteromastus filiformis*;
- Infralittoral mud with shells, *Donax semistriatus*, *Lucinella divaricata*;
- Circalittoral mud and organogenic muddy sand with *Prionospio cirrifera*, *Aricidea cerrutii*, *Pitar rudis*;
- Circalittoral mud with *Aricidea* (*Acmira*) *cerrutii*, *Heteromastus filiformis*, *Prionospio cirrifera*.

Generally, the maximum abundance of macrozoobenthos is found in the infralittoral zones, where mollusks and crustaceans dominate, while the minimum is in the circalittoral and deep-water zones, where polychaetes are the most abundant group (Varshanidze et al., 2021). However, Anaklia (corresponding to the AoI) shows a lower species richness compared to the other stations in the Georgian coast (Figure 6-33). The low biodiversity grade or a low colonization rate might be a sign of an already degraded environment compared to the rest of the national coasts. In fact, the presence of the Kulevi oil terminal and the Enguri river mouth (potentially carrying wastes, pesticides and fertilizers) are significant anthropogenic sources of impact on benthic habitats near Anaklia, thus contributing to the progressive reduction of their quality (Devidze et al., 2020).

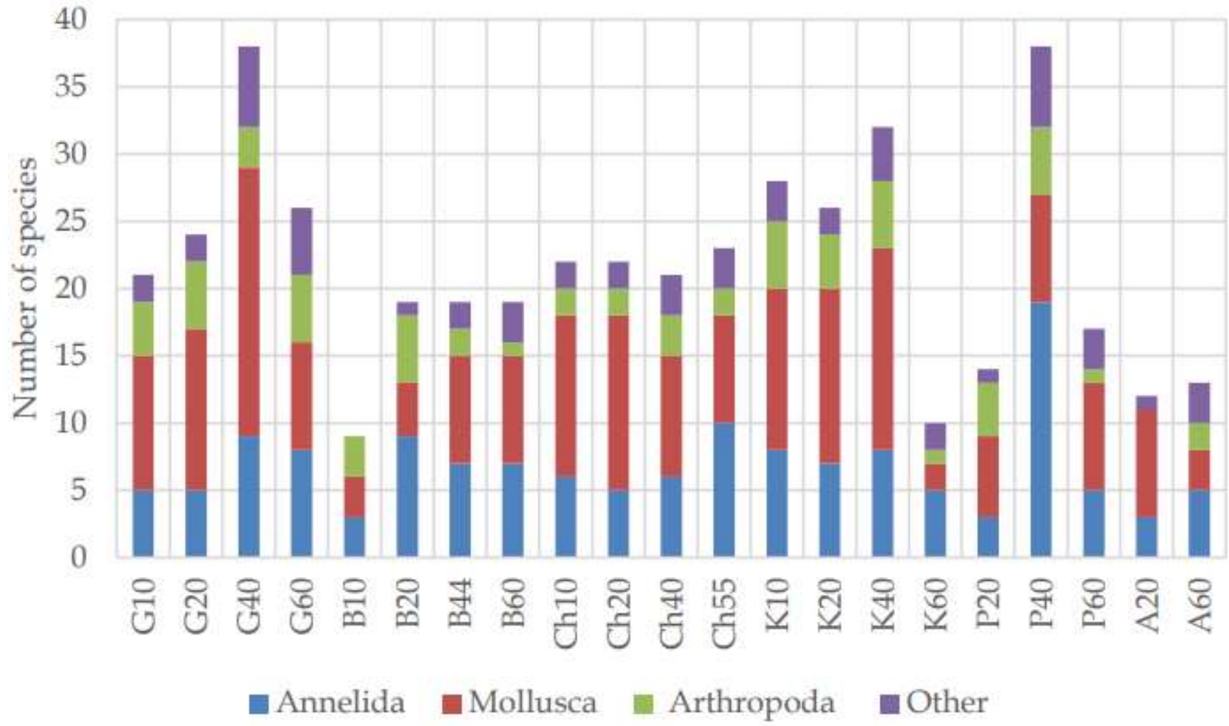



*Figure 6-33 – Number of species in the different stations: Anaklia (A), Batumi (B), Chakvi (Ch), Gonio (G), Khobuleti (K) and Poti (P) (Varshanidze et al., 2021).*

Finally, the study reports that no hard substrate habitat is present in the AoI and none of the species registered in the habitats are threatened for the UNEP or IUCN.

Cross-referencing the information from literature with EUNIS and the MSFD (EU Marine Strategy Framework Directive) benthic broad habitats map provided by EMODnet (EUSeaMap, 2016), it was possible to identify the potentially predominant EUNIS habitats along the AoI. The MSFD benthic broad habitat types are listed by Commission Decision EU/2017/848 Annex, Part II and equate to one or more habitat types at hierarchical level 2 of the EUNIS habitat classification 2019. The major division in the EUNIS benthic habitats classification at level 2 is based on major biological zones (related to depth) and substrate type (ANEMONE Deliverable 1.3, 2021). Following that, the EUNIS sub-habitat included in the broad ones were considered. The identified benthic habitats potentially present in the AoI are reported in the following table.

*Table 6-14 – EUNIS benthic habitat types potentially present in the AoI and description of their characteristics.*

| EUNIS 2019 | EUNIS 2012 | Ecosystem description |
|---|---|---|
| **MB54 – Black Sea infralittoral sand** | | |
| **MB541** – Estuarine Black Sea infralittoral sand | **A5.22** – Estuarine Pontic infralittoral sand | Estuarine infralittoral sands in front of the large rivers form an important habitat type, often with underwater dunes. The habitat also occurs in association with smaller rivers.<br><br>Characteristic species are mostly euryhaline: *Palaemon adspersus*, *Cerastoderma glaucum*, *Bittium reticulatum*. |
| **MB542** – Black Sea infralittoral sands and muddy sands without macroalgae | **A5.237** – Pontic infralittoral sands and muddy sands without macroalgae | Sandy habitats dominated by faunal species occurring in the infralittoral zone down to 20 m depth with many variations. This ranges from medium to coarse grained sands on exposed beaches to offshore infralittoral fine sand banks and includes many types of surface features at different scales (banks, ripples, mounds and burrows of infauna). The depth and waves or current exposure are important elements in defining the species composition. |
| **MB543** – Black Sea infralittoral muddy sand | **A5.24** – Pontic infralittoral muddy sand | Non-cohesive muddy sand (with 5% to 20% silt/clay) in the lower infralittoral zone. The habitat is dominated by faunal species including ghost shrimps and bivalves.<br><br>Characteristic species: *Upogebia pusilla*, *Mya arenaria*, *Anadara inaequivalvis*, *Abra alba*, *Spisula subtruncata* and *Pitar rudis*. |
| **MB64 – Black Sea infralittoral mud** | | |
| **MB642** – Black Sea infralittoral terrigenous muds | **A5.33** – Pontic infralittoral terrigenous muds | Infralittoral coastal terrigenous muds are characterized by mud and sandy mud with a terrestrial origin. There are two distinct sub habitats which are characterized by the dominant faunal communities. The first is dominated by polychaetes, whilst the second is dominated by mussels (this one does not occur in Marmara Sea).<br><br>Characteristic species: *Melinna palmata*, *Heteromastus filiformis*, *Aricidea claudiae*, *Mytilus galloprovincialis* and *Mytilaster lineatus*. |
| **MC64 – Black Sea circalittoral mud** | | |
| **MC641** – Black Sea circalittoral terrigenous muds | **A5.3** – Sublittoral mud | Circalittoral mud of terrestrial origin, the fauna varies depending on the mechanism and rapidity of deposition of the sediments.<br><br>Characteristic species: *Abra alba*, *Acanthocardium paucicostatum* and *Papillicardium papillosum*. |

| EUNIS 2019 | EUNIS 2012 | Ecosystem description |
|---|---|---|
| **MC643** – Black Sea upper circalittoral sandy mud | **A5.35** – Pontic upper circalittoral sandy mud | Sandy muds in the upper circalittoral zone found all around the Black Sea coast. The habitat is characterised by faunal communities dominated by bivalve molluscs and polychaete worms.<br><br><u>Characteristic species</u>: *Heteromastus filiformis*, *Dipolydora quadrilobata*, *Nephthys hombergii* and *Spisula subtruncata*. |
| **MC644** – Black Sea upper circalittoral fine mud | **A5.36** – Pontic upper circalittoral fine mud | Fine muds in the upper circalittoral zone below the photic zone at depths between 20 and 50 m. The habitat is characterised by faunal communities dominated by bivalves and polychaete worms.<br><br><u>Characteristic species</u>: *Mya arenaria*, *Spisula subtruncata*, *Melinna palmata*, *Heteromastus filiformis* and *Aricidea claudiae*. |
| **MC645** – Black Sea lower circalittoral mud | **A5.37** – Pontic lower circalittoral mud | Terrigenous muds (mud of terrestrial origin), calcareous muds and biogenic detritic bottoms at depths of 60-180 m. The benthic fauna is dominated by bean mussels *Modiolula phaseolina*, polychaetes and solitary ascidians. At the greatest depths the environment becomes hypoxic. Here the sediment consists of periazoic calcareous white muds and faunal communities become impoverished.<br><br><u>Characteristic species</u>: *Modiolula phaseolina*, *Amphiura stepanovi*, *Terebellides stroemi*, *Pachycerianthus solitarius*, solitary ascidians (*Ascidiella aspersa*, *Ciona intestinalis*, *Eugyra*), hydrozoans, nematodes and oligochaetes. |
| **MD54 – Black Sea offshore circalittoral sand** | | |
| **MD54** – Black Sea offshore circalittoral sand | **A5.27** – Deep circalittoral sand | Black Sea sand circalittoral habitats with fine sands or non-cohesive muddy sands below the influence of wave action. Predominately oxic but can be anoxic in deeper waters. |
| **MD64 – Black Sea offshore circalittoral mud** | | |
| **MD64** – Black Sea offshore circalittoral mud | **A5.37** – Deep circalittoral mud | Mud and cohesive sandy mud in the offshore circalittoral zone of the Black Sea. Predominantly oxic but also locally suboxic and anoxic. |
| **ME54 – Black Sea upper bathyal sand** | | |
| **ME54** – Black Sea upper bathyal sand | **A6.3** – Deep-sea sand | Predominately sandy anoxic substrates in the upper bathyal zone of the Black Sea. |
| **ME64 – Black Sea upper bathyal mud** | | |
| **ME64** – Black Sea upper bathyal mud | **A6.5** – Deep-sea mud<br><br>**A6.95** – Pontic anoxic $H_2S$ black muds of the slope and abyssal plain, with anaerobic sulphate | Predominately anoxic muddy substrates in the upper bathyal zone of the Black Sea. Fine mud is the most widespread habitat in the bathyal zone of the Black Sea. |

| EUNIS 2019 | EUNIS 2012 | Ecosystem description |
|---|---|---|
| | reducing bacteria and nematodes | |
| **MF54 – Black Sea lower bathyal sand** | | |
| **MF54** – Black Sea lower bathyal sand | **A6.3** – Deep-sea sand | Predominately sandy sediments in the lower bathyal zone of the Black Sea. These sediments are anoxic. |
| **MF64 – Black Sea lower bathyal mud** | | |
| **MF64** – Black Sea upper bathyal mud | **A6.5** – Deep-sea mud<br><br>**A6.95** – Pontic anoxic $H_2S$ black muds of the slope and abyssal plain, with anaerobic sulphate reducing bacteria and nematodes | Anoxic predominately muddy substrates in the lower bathyal zone of the Black Sea, this is the most widespread habitat in the lower bathyal zone of the Black Sea. |

Among the habitats listed above, the presence of the EUNIS habitat **A5.24A** – "**Pontic lower infralittoral thalassinid-dominated muddy sands with *Upogebia pusilla* and sparse macrofauna**" as sub-habitat of MB54 "Black Sea infralittoral sand" within the AoI is confirmed from literature. This habitat is characterized by non-cohesive to cohesive muddy sand bottom (starting with 5% to 20% silt/clay and up to 80%) riddled with the deep burrows (0.2-1 m) of the thalassinid crustacean *Upogebia pusilla* (Petagna, 1792). This crustacean is clearly dominant in terms of both density and biomass, with high densities (over 100 individuals per $m^2$) over large areas. *U. pusilla* has a sizeable influence on the ecosystem for its biofiltering, bioturbation, sediment resuspension and benthic-pelagic coupling role. The dominance of filter-feeding mollusks occurring in this habitat is decreased through competition and larval predation by *U. pusilla* (Micu et al., 2015).

In the EU 28, the habitat type is assessed as **Endangered** (EN) for the Red List Criterion B1b due to its restricted geographical distribution and the threatening pollution and eutrophication processes which are likely to cause a continuing decline in quality and quantity over the next 20 years (Gubbay et al., 2016; EUNIS, 2015). Even though the extent of the of the habitat in the Black Sea is likely not to have changed, it results to be highly sensitive to hypoxia and a significant degradation of the habitat quality, also with *U. pusilla* mortality events, has been already recorded and assessed (Micu et al., 2015).

*Upogebia pusilla* itself is also classified as endangered by the Annex 2 (Provisional List of Species of the Black Sea Importance) of the "Black Sea Biodiversity and Landscape Conservation Protocol to the Convention on the Protection of the Black Sea Against Pollution" framed in 2002 and ratified by Georgia in 2009.

The related habitat types as referred to in Annex I[11] of the EU Habitats Directive (Council Directive 92/43/EEC) may be considered as:

- **1110** – Sandbanks which are slightly covered by sea water all the time;
- **1130** – Estuaries;

[11] "Natural habitat types of community interest whose conservation requires the designation of special areas of conservation".

- **1160** – Large shallow inlets and bays.

As previously stated, besides the possible presence of *Upogebia pusilla* (threatened according to UNEP), **no globally threatened species, protected species or endemic species** are reported.

Focusing on the **alien invasive species** along the Georgian coast, the scientific literature provides some indication about the potential alien/invasive species present in the AoI. Studies have shown eight different invasive species in the Georgian coast (Varshanidze & Guchmanidze, 2004; ANEMONE, 2021; Table 6-15).

*Table 6-15 – List of alien species potentially present in the Area of Interest according to EUNIS and scientific literature.*

| Phylum | Class | Species |
|---|---|---|
| **ANNELIDA** | Polychaeta | *Ficopomatus enigmaticus* (Fauvel, 1923) |
| **ARTHROPODA** | Malacostraca | *Amphibalanus improvisus* (Darwin, 1854) |
| | | *Rhithropanopeus harrisii* (Gould, 1841) |
| **MOLLUSCA** | Bivalvia | *Anadara cornea* (Reeve, 1844) |
| | | *Anadara inaequivalvis* (Bruguière, 1789) |
| | | *Anadara kagoshimensis* (Tokunaga, 1906) |
| | | *Mya arenaria* Linnaeus, 1758 |
| | Gastropoda | *Rapana venosa* (Valenciennes, 1846) |

Invasive species are known to have transformed marine habitats around the world. The most harmful of these invaders displace native species, change community structure and food webs, and alter fundamental processes, such as nutrient cycling and sedimentation. Alien invasive species are reported to have damaged economies by diminishing fisheries, fouling ships' hulls, and clogging intake pipes (Molnar et al., 2008). For such reason, their presence in the AoI should be carefully assessed.

### *6.1.5.1.2 Pelagic domain*

#### 6.1.5.1.2.1 Plankton

The Georgian coastal zone of the Black Sea shows seasonal fluctuations in phytoplankton and zooplankton abundance, with differences in distributional patterns depending on environmental and climatic factors, such as salinity, temperature, river discharges, type and amount of nutrients, storms, wind direction, and other factors (Janelidze et al., 2011).

**Phytoplankton** are the most important "*primary producers*" of the seas, base of the pelagic food chain and key component of the carbon cycle (Falkowski and Raven, 2007). In the Georgian coastal waters, which include the AoI, phytoplankton composition includes mainly species and subspecies of Bacillariophyceae (diatoms, such as *Skeletonema costatum*, *Chaetoceros socialis*, *Chaetoceros curvisetus*, *Chaetoceros affinis* and *Cyclotella caspia*) and Dinophyceae (dinoflagellates, such as *Prorocentrum cordatum*, *Prorocentrum micans*, *Prorocentrum compressum*, *Protoperidinium pellucidum*, *Hetercocapsa triguetra* and *Cetarium fusus*), but also of Chlorophyceae, Cyanophyceae, Chrysophyceae, Euglenophyceae (Nesterova et al., 2008). Generally, during the year, it is possible to observe three or four phytoplankton peaks corresponding to spring, summer, and autumn (Janelidze et al., 2011; Figure 6-34).

Diatoms usually show up in early spring, when surface waters are rich in nitrogen and phosphorous, and late summer while, instead, coccolithophores are known to dominate in late spring and early summer, when warmer temperatures and fewer storms leave the seawater more stratified and poorer in nitrogen (Silkin et al., 2019).

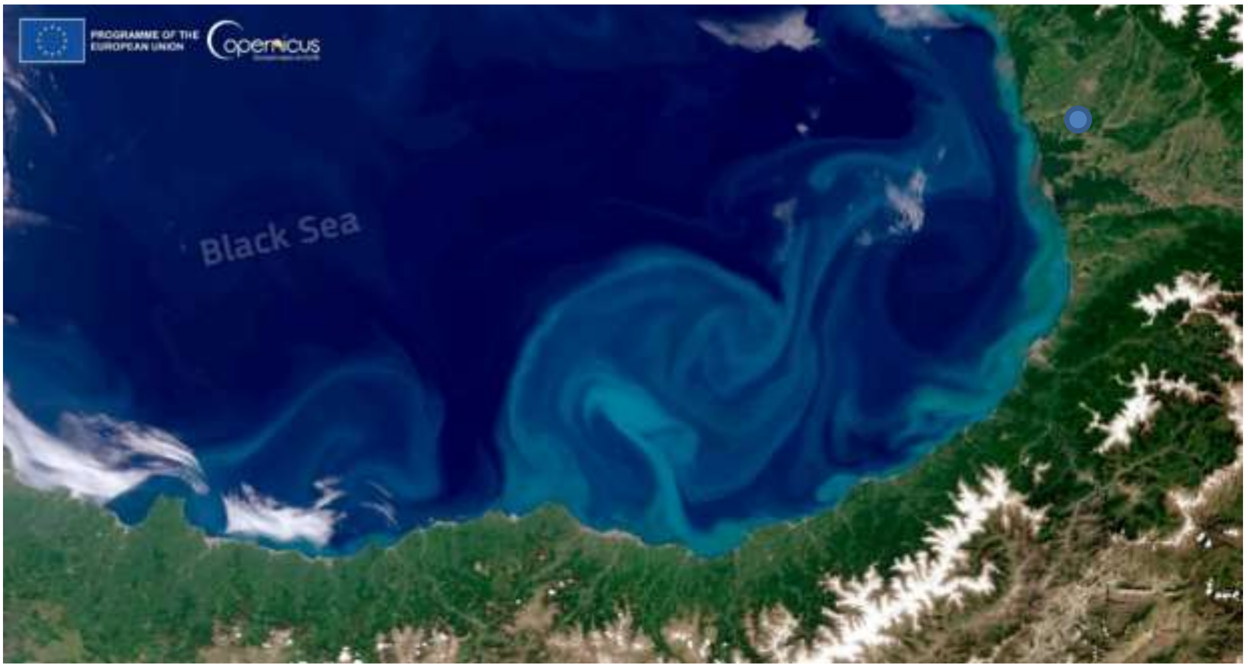



*Figure 6-34 – Phytoplankton bloom in the southeastern Black Sea region (Copernicus, 2022). The red circle identifies the AoI.*

Zooplankton, that include many different species of animals, is the major consumer of the primary production and constitute the food source of organisms at higher trophic levels. This biological component, as well as phytoplankton, is a comparatively mobile part of the ecosystem and its condition is closely connected with biotic, abiotic and, recently, anthropogenic factors (Mazmanidi & Komakhidze, 1998). In the southeastern and eastern area of the Black Sea, where the AoI is located, zooplankton abundance peaks coincide with or follow those of phytoplankton (Janelidze et al., 2011). Two or three zooplankton maximum peaks usually show up in the coastal areas during spring, summer and autumn (Kovalev et al., 1999; BSC, 2019). The mesozooplankton dominant groups result to be mainly copepods (such as *Acartia clause*, *Acartia tonsa*, *Oithona davisae*, *Paracalanus parvus*, *Centropages ponticus*, *Pseudocalanus elongates*, etc.) and cladocers, as well as gastropods nauplial forms and polychaetes larvae (Arashkevich et al., 2014; BSC, 2019).

#### 6.1.5.1.2.2 Fish

As previously stated, due to the numerous river mouths flowing into sea, the waters of the AoI are known to be particularly rich in nutrients and to host a relatively high biodiversity compared to other Black Sea areas. The narrow continental shelf off the Georgian coast and the quantity of hydrosulfide in coastal waters are the main reasons for the abundance of pelagic fish species (anchovy, sprat, bluefish) and the scarcity of benthic and demersal (whiting, mullet, turbot, flounder and others) fish species (FAO, 2005).

The composition of the Black Sea ichthyofauna has changed in response to the alterations of the living conditions in the sea (Radu et al., 2013). Some of these changes had an impact on coastal waters, others on the pelagic zone, affecting common and rare species, juveniles and adults, commercial and non-commercial species (Zaitsev & Mamaev, 1997). Currently, the fish fauna of the AoI is estimated to be of about 44 marine species and 23 transitory species (CHM-CBD, 2019), including threatened (Vulnerable VU, Endangered EN, or Critically Endangered CR) and endemic species.

The anchovy (*Engraulis encrasicolus*, LC), an important resource both for ecosystems (e.g., as a prey for predatory fish) and for its commercial value, is the most abundant species in the Black Sea (FAO, 2005; Radu et al., 2011). From the northern areas, anchovy adults and juveniles aggregate forming dense shoals and undertake extensive migrations to warmer waters in the south-eastern Black Sea (Chashchin, 1996; Guraslan et al., 2017; Gücü et al., 2017). Anchovies find along the Georgian coastal zone, and in particular within the Kolkheti Marine Area (which partially overlaps with the AoI), suitable conditions for overwintering and spawning during winter and spring (Chashchin, 1996).

Other important commercial fish resident in Georgian sea waters are the Atlantic bonito (*Sarda sarda*, LC), European sprat (*Sprattus sprattus*, LC), whiting (*Merlangius merlangus*, LC), blunt-snouted mullet (*Mullus ponticus*, NE), red striped mullet (*Mullus surmuletus*, LC), red mullet (*Mullus barbatus*, LC), Mediterranean horse mackerel (*Trachurus mediterraneus*, LC) and turbot (*Scophthalmus maximus*, LC) (FAO, 2005; Radu et al., 2011; Yankova et al., 2014). The muddy substrates of seabed and estuaries (present in the AoI; see 6.1.5.1.1) constitute an important habitat and breeding area also for the European flounder (*Platichthys flesus*, LC) (Chashchin, 1996). Furthermore, among the cartilaginous marine fish, the spiny dogfish (*Squalus acanthias*, VU) is the most common commercially valuable and targeted fish in the Georgian coastal bays and estuaries (FAO, 2005).

The presence of mixing zones between fresh and salt waters (deltas and estuaries), makes Georgian coastal waters a good habitat for anadromous and catadromous migratory species. In particular, the Rioni River, whose mouth is located close to the AoI, is known to be the only remaining functional sturgeon spawning river in the eastern Black Sea (Guchmanidze, 2009; Gurielidze et al., 2012; Beridze et al., 2021).

Sturgeons (Acipenseridae) are amongst the most endangered species in the world (IUCN, 2010) and, as anadromous fish, are known to undertake important spawning migrations upstream from estuaries. Due to habitat degradation, including river damming and consequent high sediment flushing, overharvesting, poaching and pollution, populations have been in steep decline since the early 20$^{th}$ century and some species have become locally extinct (Beridze et al., 2021, 2022). The destruction and fragmentation of habitats, poaching and the accompanying of a large number of newly grown individuals are the main reasons for the constant decline of the sturgeon's wild populations and the sharp decline in their areas (WWF, 2017).

From recent studies, the Critically Endangered sturgeon species resident in the Rioni River and its mouth (including also marine coastal habitats) are the barbel sturgeon (*Acipenser nudiventris*, CR), beluga (*Huso huso*, CR), Atlantic sturgeon (*Acipenser sturio*, CR), Russian sturgeon (*Acipenser gueldenstaedtii*, CR), Persian sturgeon (*Acipenser persicus*, CR) and stellate sturgeon (*Acipenser stellatus*, CR).

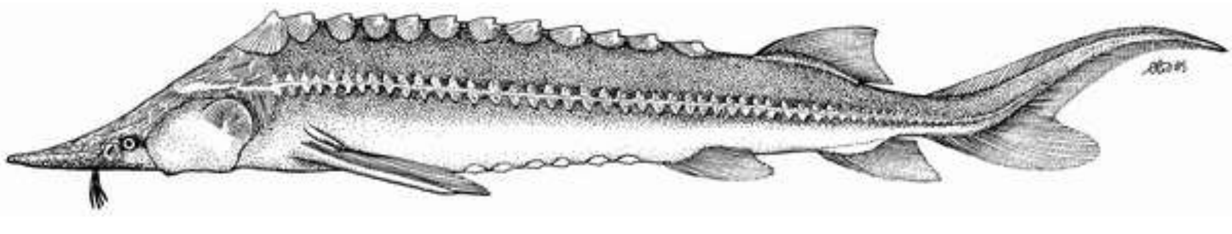


*Figure 6-35 – Barbel sturgeon (Acipenser nudiventris) (source: europa.eu).*

Besides these species, local experts confirm the presence of the Colchic sturgeon subspecies (*Acipenser persicus colchicus*). However, the bibliography reports it as a synonym of *Acipenser gueldenstaedtii*. Furthermore, molecular studies show a close correlation between the Colchic sturgeon (*Acipenser persicus*) and the Russian sturgeon (*Acipenser gueldenstaedtii*), not excluding that they may be conspecific. Being the discussion still open, using a precautionary approach, they are currently considered as two separate species in this baseline. It will be necessary to carry out specific studies in order to evaluate which sturgeon species are present in the area in the scope of the ESIA.

Other two migratory species included on the Red List and widespread in the water ecosystems of Georgia are the Black Sea herring (*Alosa immaculata*, VU) and the European eel (*Anguilla anguilla*, CR) (Guchmanidze 2009; Ninua et al., 2013).

#### 6.1.5.1.2.3 Marine mammals

The Georgian coastal and shelf waters are commonly inhabited by all the three endemic marine mammals of the Black Sea:

- The Black Sea harbour porpoise (*Phocoena phocoena relicta*);
- The Black Sea bottlenose dolphin (*Tursiops truncatus ponticus*); and
- The Black Sea common dolphin (*Delphinus delphis ponticus*).

Other species may occasionally occur in the basin but are not considered as resident (BlackSeaWatch, 2022).

The **Black Sea harbour porpoise** inhabits mainly shallow waters (0 to 200 m deep) over the continental shelf surrounding the entire Black Sea basin, but sometimes it can also be seen in deep waters quite far from the coast (Birkun & Frantzis, 2008; IUCN, 2012). This species does not avoid the low salinity and high turbidity waters of bays, brackish lagoons, and estuaries (Birkun, 2006; Birkun & Frantzis, 2008), where it can find a good feeding ground. This small cetacean undertakes annual migrations, leaving the Azov Sea and north-western Black Sea before winter and returning in spring. The primary wintering and feeding areas are in the south-eastern Black Sea, and particularly in the Georgian territorial waters, which include the AoI (Birkun et al., 2006; IUCN, 2012). Most of the Black Sea porpoise population congregates every year near these coasts forming large aggregations of some hundred individuals (IUCN, 2012). In fact, this winter-feeding ground coincide with those of the anchovy (*Engraulis encrasicolus*), one of main prey for harbour porpoises, during the cold season (Kleinenberg 1956; IUCN, 2012). The sprat (*Sprattus sprattus*), whiting (*Merlangius merlangus*) and gobies (Gobiidae) are other important preys in its diet (Birkun & Frantzis, 2008). The number of Black Sea harbour porpoises is in continuous decrease due to the entanglement in fishing gear (bottom-set gillnets), ship strikes, habitat degradation, depletion of their food source and mass mortality events. The current population numbers at least several thousand and possibly a few tens of thousands (IIUCN, 2012).


*Figure 6-36 – Black Sea harbour porpoise (Phocoena phocoena relicta) (source: fisheries.noaa.gov).*

The Black Sea harbour porpoise (*Phocoena phocoena relicta*) is classified as Endangered (EN) according to the IUCN Global Red List (Birkun & Frantzis, 2008) and the UNEP Black Sea Protocol. It is also included in ACCOBAMS, Annexes II and IV of EU Habitats Directive, Annexes II and revised I of the Bern Convention, Annex II of the CMS and Annex II of CITES.

The **Black Sea bottlenose dolphin** occurs throughout the Black Sea basin and is genetically and morphologically distinct from other bottlenose dolphin populations in the Mediterranean Sea and north-eastern Atlantic Ocean, although limited gene flow between populations is probable (IUCN, 2012; Birkun, 2012). The population structure within the Black Sea is probably formed of several subpopulations or "semi-resident" communities (Birkun, 2012). Generally, this dolphin is mostly found on the continental shelf but can also be found far from the coast (Beaubrun, 1995; Yaskin and Yukhov, 1997), especially upon the continental slope where it usually feeds. Different groups of bottlenose dolphins (about 10 to 150 animals) move and gather every autumn in the waters south of Crimea and in other areas, including the Georgian coasts. Other spring and summer aggregations have been observed in geographically and ecologically different areas (IUCN, 2012; Birkun, 2012). Courtship behaviours and presence of calves close to the Georgian coasts suggest that this area may be also used for mating and early stages of calf rearing (Kopaliani et al., 2015, 2017). However, their aggregations are typically correlated with seasonal fish migration into these areas. In fact, bottlenose dolphins are primarily piscivorous, catching both benthic and pelagic fish such as mullets, turbots, anchovies and sprats (Birkun, 2012). The Georgian coastal waters and, the mouths of the Enguri, Khobistskhali (both within the AoI), Rioni, Supsa and Chorokhi rivers represent their main feeding grounds (Kopaliani et al., 2017). The total Black Sea population size is unknown but due to the past active commercial catches, is likely to be less than a thousand. Stock depletion of bottlenose dolphin prey species and diseases due to increasing sewage pollution have been identified as the main threats to the survival of this endangered subspecies (IUCN, 2012).


*Figure 6-37 – Black Sea bottlenose dolphin (Tursiops truncatus ponticus) (source: fisheries.noaa.gov).*

For both the IUCN Global Red List (Birkun, 2012) and the UNEP Black Sea Protocol, the Black Sea Bottlenose Dolphin (*Tursiops truncatus ponticus*) is assessed as Endangered (EN). Besides, the subspecies is also listed in the Red Data Books of Georgia. It is also included in ACCOBAMS, Annexes II and IV of EU Habitats Directive, Annexes II and revised I of the Bern Convention, Annex I of the CMS and Annex II of CITES.

The **Black Sea common dolphin**, a distinct subspecies from the Mediterranean one, occurs almost throughout the Black Sea, except for the Kerch Strait and the Sea of Azov. It is primarily found in the open sea, through which it moves to reach wintering or feeding grounds, but it can also be spotted in shallow coastal waters following seasonal aggregations and mass migrations of their preferred prey (Tzalkin, 1940; Kleinenberg, 1956; Geptner et al., 1976). Annual winter and spring concentrations of large shoals of anchovies (*Engraulis encrasicolus*) in the southeastern Black Sea, especially in the waters surrounding the Georgian coast, create the ideal conditions for dolphin aggregations (Chashchin, 1996; Birkun, 2008). Summer foraging is rather made of sprat (*Sprattus sprattus*) in the northwest, northeast and central Black Sea (Birkun, 2008). In addition, based on several records, it is assumed that the Georgian waters, which include the AoI, may be used for coupling and early stages of calf rearing (Kopaliani et al., 2017). Differently from the other Black Sea marine mammals, the Common Dolphin avoids waters with low salinity, including river deltas, and this may explain why they never occur in the Sea of Azov and in the Kerch Strait. In the past the population collapsed and disappeared almost entirely due to the so many commercial catches. Nowadays, although the population size is unknown, it may consist of tens of thousands of individuals. Current threats to these dolphins in the Black Sea are overfishing of their main prey species (anchovies and sprats) and increasing water eutrophication, as well as disease (IUCN, 2012).


*Figure 6-38 – Black Sea common dolphin (Delphinus delphis ponticus) (source: fisheries.noaa.gov).*

The Black Sea common dolphin (*Delphinus delphis ponticus*) is listed as Vulnerable (VU) in the IUCN Global Red List (Birkun, 2008) and classified as Endangered for the UNEP Black Sea Protocol. It is also included in ACCOBAMS, Annex IV of EU Habitats Directive, Annexes II and revised I of the Bern Convention, Annexes I and II of the CMS and Annex II of CITES.

### *6.1.5.2 Marine Legally Protected Areas and Important Areas for Biodiversity*

While all the legally protected areas are the same in both the terrestrial and marine environments (and therefore are described in 6.1.2.2), the marine important areas for biodiversity usually differ from those that are terrestrial. While the general definition of an important area for biodiversity is given in 6.1.2.2, here below are reported only the marine important areas for biodiversity.

- **Ecologically or Biologically Significant Marine Areas (EBSAs)**

  EBSAs are areas of the ocean carrying special importance in terms of ecological and biological characteristics: for example, by providing essential habitats, food sources or breeding grounds for particular species. They are designated under the CBD, but their designation does not bring any management measures or restriction of activities. However, it can be of support for the identification of new areas to be legally protected.

- **Important Marine Mammal Areas (IMMAs)**

  Areas defined as discrete portions of habitat, important to marine mammal species, that have the potential to be delineated and managed for conservation. IMMAs consist of areas that may merit place-based protection and/or monitoring. They are not legally protected or managed and have usually the aim of support existing EBSA and KBA designations as a basis for promoting environmental protection and developing management plans for specific areas in the world's oceans.

- **Cetacean Critical Habitats (CCHs)**

  These are parts of a cetacean range within the ACCOBAMS area (i.e. Mediterranean and Black Seas, and the Atlantic area contiguous to the Gibraltar Strait), either a whole species or a particular population of that species, that are essential for day-to-day survival, as well as for maintaining a healthy population growth rate. CCHs can include both areas that are regularly used for feeding, breeding and raising calves, as well as, sometimes, migrating, and areas where cetaceans are known to under direct threats (ship strike, by-catch, impulsive noise, harassment from whale-watching or pleasure boating, etc.).

- **Areas of Special Concern**

  Areas should be considered of Special Concern when human activities identified as representing important risk factors for endangered or sensitive species, such as the use of intense sound sources for marine mammals, are contemplated within such areas. Such activities should be fully justified with EIAs (or similar documents), including a report on the lack of alternative locations and an independently evaluated protocol to implement effective mitigation measures.

Although about one third (27.8%) of the marine area in the Georgian Exclusive Economic Zone (EEZ) is classified as a hotspot of risk for marine biota due to the presence of multiple human-related threats and pressures (such as fisheries, pollution and biological invasions), only less than 1% of its EEZ hosts marine protected areas (Almpanidou et al., 2021).

The Area of Interest (AoI) partially overlaps with the marine part of the *Kolkheti* National Park (see Figure 6-22), a **legally protected area** by national law. Such marine area also includes important areas for biodiversity, such as a Key Biodiversity Area (KBA) and an Ecologically or Biologically Significant Marine Area (EBSA).

In addition, the AoI includes other two **important areas for biodiversity**: the *Colchis* IMMA and the *Cape Anaklia to Sarpi* CCH.

All the mentioned areas described below.

***Kolkheti* National Park (KBA and EBSA)**

The Kolkheti National Park (IUCN category II) was established in 1998 with the purpose of protecting and maintaining wetland ecosystems and consists of both a land/wetland zone and a coastal/marine zone. Sites of National Park are located on the territory of five administrative districts: Zugdidi, Khobi, Senaki, Abasha, Lanchkhuti and they are parts of the historical lands of Georgia-Samegrelo and Guria (Devidze et al., 2020). Due to its high biodiversity and globally unique habitats, the Kolkheti National Park is also classified as Ramsar Site, UNESCO World Heritage Site, Emerald Network Site, Important Bird Area (IBA) and Key Biodiversity Area (KBA) (see 6.1.2.2). The Kolkheti NP Aquatory KBA largely overlaps the marine area of the Kolkheti National Park (about 53%; KBA, 2022) and includes an additional offshore section of deeper water.

The marine area (approximately 153 km$^2$ of National Park and 238,7 km$^2$ of KBA) spreads from the coastline for about 6-8 km on the continental shelf and includes important habitats (open sea and circulation zone, estuaries, coastal lagoons and shallow water bays) for endangered and vulnerable species. The large amount of nutrients transported to sea by rivers makes the coastal water of this area particularly rich and productive, supporting the food chain at different trophic levels. The biological communities are characterized by a high density and richness of zooplankton species and bivalves, among which there could also be *Ostrea edulis* which forms biogenic barriers of high conservation interest (Natura 2000 habitat 1170 "*Reefs*"; Todorova & Micu, 2009).

The infralittoral muddy and sandy bottoms are the preferred habitat for demersal fish such as turbots, flounders and mullets. Anchovies (*Engraulis encrasicolus*, LC), Black Sea herring (*Alosa immaculata*, VU) and critically endangered sturgeons (*Acipenser nudiventris*, *Huso huso*, *Acipenser gueldenstaedtii, Acipenser persicus* and *Acipenser stellatus*) are reported to use the area as a site of aggregation and/or spawning (Guchmanidze, 2009). This area is also used all year-round by the three species of Black Sea cetaceans (*Tursiops truncatus ponticus*, *Delphinus delphis ponticus* and *Phocoena phocoena relicta*) as feeding, breeding, and nursery ground (Kopaliani et al., 2015). In addition, wetlands, coastal lagoons, river deltas as well as the adjacent stretch of sea serve as wintering and/or breeding area for a large number of seabirds and migratory birds, such as the Yelkouan shearwater (*Puffinus yelkouan*, VU), Velvet scoter (*Melanitta fusca*, VU), Dalmatian pelican (*Pelecanus crispus*, LC), Ruddy turnstone (*Arenaria interpres*, LC), Broad-billed sandpiper (*Calidris falcinellus*, VU) and Common tern (*Sterna hirundo*, LC).

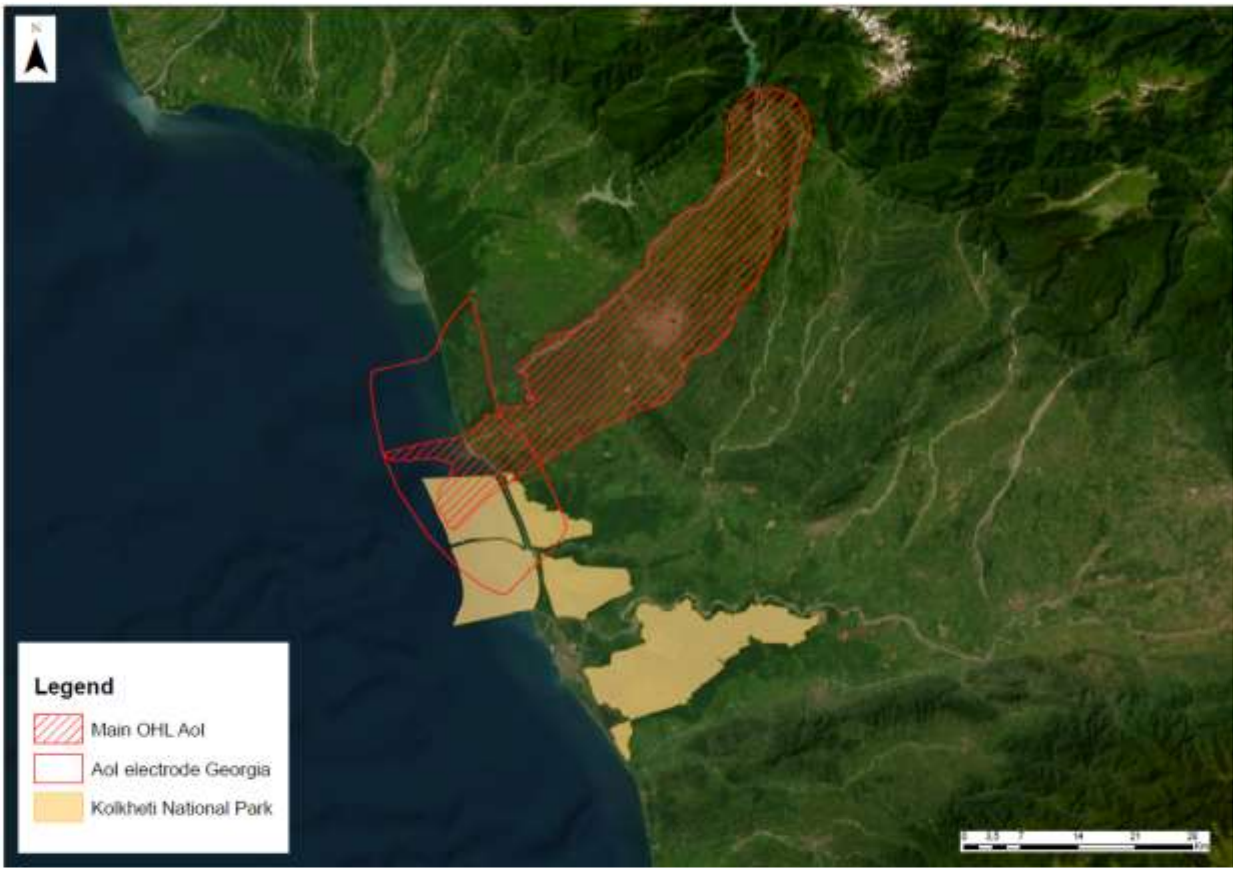



*Figure 6-39 – The Kolkheti National Park. In red is depicted the Main OHL AoI and the electrode AoI.*

Complying with the scientific criteria set out in the Convention on Biological Diversity[12] (CBD), the Kolkheti Marine Area has been recognized as an Ecologically or Biologically Significant marine Area (EBSA) given its importance as biodiversity hotspot and ecologically important habitat for endemic, threatened and migratory species (the three Black Sea cetaceans).

The marine area of Kolkheti extends for 502.4 km$^2$ between the Tikori River and the mouth of the Rioni River and includes the marine part and adjacent waters of the Kolkheti National Park (CHM-CBD, 2019). Overlapping the marine area of Kolkheti National Park, the priority habitats and species are the same as described above.

As previously stated, besides the Kolkheti National Park, KBA and EBSA, there are two other important areas for biodiversity. Such areas are not officially protected, unless they overlap (totally or partially) with a legally protected area (in this case, they partially overlap with the Kolkheti National Park). However, they are globally recognized as areas needing protection by international institutions and NGOs. Their presence may require particular care and the definition of specific mitigation and monitoring measures.

[12] Annex I "*Scientific criteria for identifying ecologically or biologically significant marine areas in need of protection in open-ocean waters and deep-sea habitats*" of Decision IX/20 "*Marine ad coastal biodiversity*" adopted by the Conference of the Parties to the Convention on Biological Diversity (COP 9), 2008.

### *Colchis* IMMA

The marine area between Anaklia Cape and Sarpi was already known to have importance for Black Sea cetaceans (ACCOBAMS-MOP4/2010/Res.4.15) and was formally recognized as Important Marine Mammal Area (IMMA) during the 7th IMMA Regional Workshop (2021)[13]. The Colchis IMMA, with an extension of 4630 km$^2$, overlaps with the marine part of the Kolkheti National Park and the Kolkheti Marine Area EBSA (IUCN, 2021a).

The presence of a narrow continental shelf and several river mouths (particularly those of the Enguri, Rioni, Khobistskhali, Supsa and Chorokhi rivers) make this area an excellent aggregation, feeding, breeding and nursery ground for all three endemic marine mammals of the Black Sea (*Tursiops truncatus ponticus*, *Delphinus delphis ponticus* and *Phocoena phocoena relicta*). Observations of courtship behaviour of bottlenose and common dolphins in May and June, records of all three Black Sea species associated with calves under 3 months of age, and records of stranded harbour porpoise within the area in the late stages of gestation are clear evidence of the Colchis IMMA importance for mating and early stages of calf rearing (Kopaliani et al., 2015, 2017). Aggregations, especially of harbour porpoises and common dolphins, are generally observed during winter and spring in correspondence with large shoals of anchovies (Chashchin, 1996). Furthermore, these species use the area also as wintering ground (Birkun & Frantzis, 2008; Kopaliani et al., 2015).

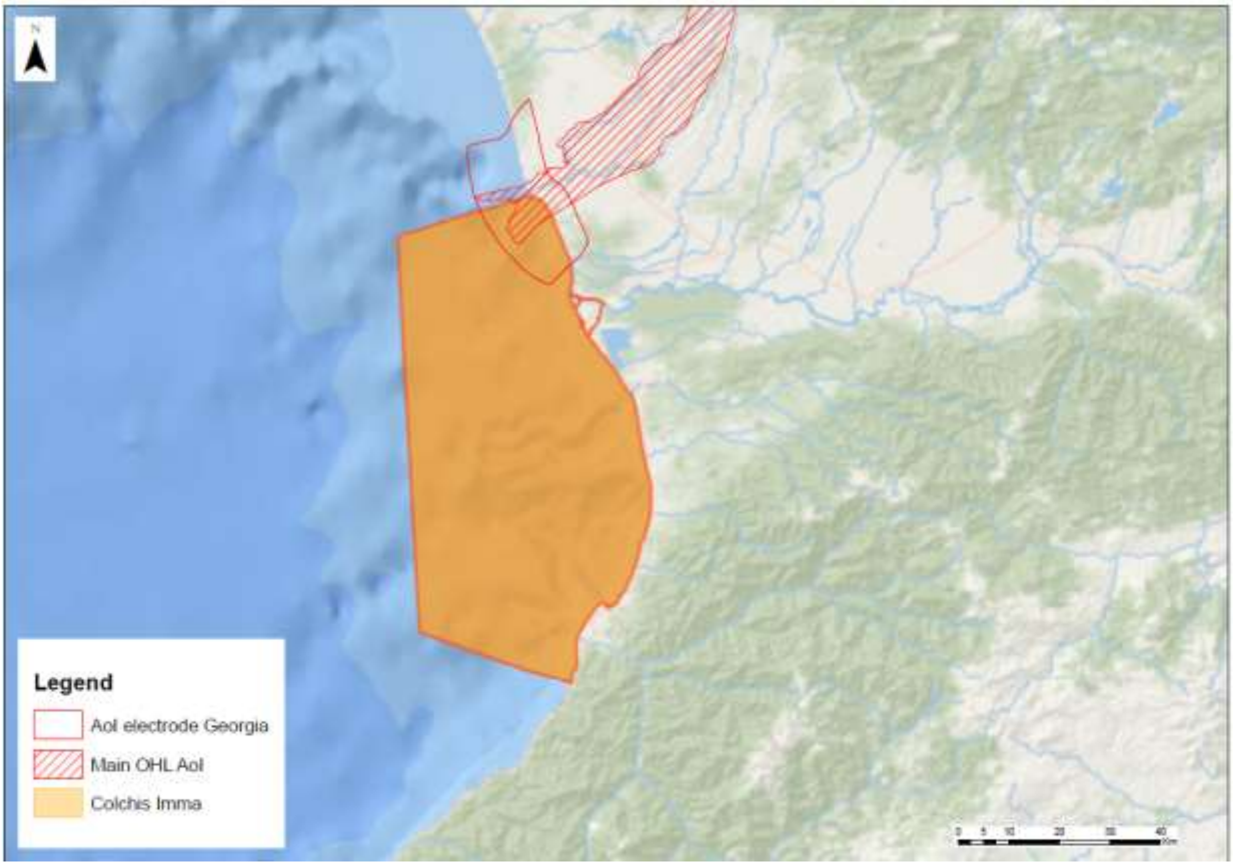



*Figure 6-40 – The Colchis IMMA (Marine Mammal Habitat). The red shape indicates the Main OHL AoI.*

[13] *Important Marine Mammal Area Regional Workshop for the Black Sea, Turkish Straits System and Caspian Sea* (IUCN MMPATF, 2021).

***Cape Anaklia to Sarpi*** **CCH**

As previously stated, the continental shelf between Cape Anaklia and Sarpi (where the AoI is located) is highly frequented by the three endemic and protected species of cetaceans widespread in Black Sea. The area results to be an important site for different key life cycle stages and activities (feeding, reproduction, raising calves and wintering) of these species. However, there are numerous threats that could directly or indirectly affect Black Sea cetaceans. During the last decades, sea water pollution processes by phenols, oil products and nitrogen compounds (especially pesticides and fertilizers used in agriculture) have been observed. The presence of major infrastructure, such as the Anaklia and Poti seaport and the Kulevi oil terminal, and the rising maritime traffic increase in particular the risk of ship strike and the underwater acoustic climate (Devidze et al., 2020).

Thus, due to its importance for Black Sea cetaceans, especially for common dolphin and harbour porpoise, ACCOBAMS, in 2010 Resolution 4.15, classified this area as Cetacean Critical Habitat (CCH)[14] in order to reduce the main anthropogenic threats, protect and conserve populations and habitats status, and also improve the knowledge of these animals.


*Figure 6-41 – Cetaceans Critical Habitats (CCH) identified by ACCOBAMS in the Mediterranean and Black Sea areas (2017); Cape Anaklia to Sapi CCH is shown on the right side of the map with number 13.*

### *6.1.5.3 Marine Critical Habitat Screening*

Similar to the terrestrial baseline (chapter 6.1.2.3), a Critical Habitat (CH) screening was conducted in order to identify the potential presence of Critical Habitats within the offshore AoI according to the Environmental and Social Standard 6 (ESS6), whose definition is triggered by the criteria discussed in the following chapter.

[14] ACCOBAMS Resolution 4.15: Marine Protected Areas of Importance for Cetaceans Conservation (*Meeting of the Parties to the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea, and contiguous Atlantic area*).

A preliminary Critical Habitat Screening is reported below. The likelihood of impacts on transformed, natural, and critical habitats as defined in ESS 6 of the World Bank should be carefully assessed in the scope of the ESIA.

**Criterion a: Highly threatened or unique ecosystems**

The AoI partially overlaps with the marine area of the Kolkheti National Park, the Kolkheti NP Aquatory KBA, and the Colchis IMMA (see 6.1.5.2). This area is recognized as a regionally important congregation site for a large number of seabirds, migratory birds and for all the three endemic marine mammals of the Black Sea.

In addition, in the AoI, the EUNIS habitat A5.24A – "Pontic lower infralittoral thalassinid-dominated muddy sands with *Upogebia pusilla* and sparse macrofauna" is reported (see 6.1.5.1.1). Such habitat is classified as EN.

For the above reasons, the AoI may be considered as potential Critical Habitat under Criterion a. using a strong precautionary approach. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion b: habitat important to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or under national law**

For this section, a more detailed and comprehensive evaluation has been carried out by using the ESS6 and relative guidelines which recognizes: "Areas that support species classified as Critically Endangered (CR) or Endangered (EN) according to the IUCN Red List", "Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR" and "Areas containing important concentrations of a nationally or regionally listed EN or CR species".

The marine species meeting the criterion "Areas that support species classified as Critically Endangered (CR) or Endangered (EN) according to the IUCN Red List" are summarized in the following table.

*Table 6-16 – Marine species with Endangered or Critically Endangered conservation status according to the IUCN Red List potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | CR | - |
| | | *Acipenser nudiventris* | Barbel Sturgeon | CR | - |
| | | *Acipenser persicus* | Persian Sturgeon | CR | - |
| | | *Acipenser stellatus* | Stellate Sturgeon | CR | - |
| | | *Acipenser sturio* | Atlantic Sturgeon | CR | - |
| | | *Huso huso* | Beluga Sturgeon | CR | - |
| | Anguillidae | *Anguilla anguilla* | Common Eel | CR | - |

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| | Gymnuridae | *Gymnura altavela* | Spiny Butterfly Ray | EN | - |
| Marine mammals | Phocoenidae | *Phocoena phocoena relicta* | Black Sea Harbour Porpoise | EN | Endemic |
| | Delphinidae | *Tursiops truncatus ponticus* | Black Sea Bottlenose Dolphin | EN | Endemic |

Marine species meeting the criterion "Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72" (Guidance Note 6,) are summarized in the following table.

*Table 6-17 – Marine species with Vulnerable conservation status according to the IUCN Red List, using a precautionary approach, potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Fish | Clupeidae | *Alosa immaculata* | Black Sea herring | VU | Endemic |
| | Dasyatidae | *Dasyatis pastinaca* | Stingray | VU | - |
| Marine mammals | Delphinidae | *Delphinus delphis ponticus* | Black Sea Common Dolphin | VU | Endemic |

Fauna species meeting the criterion "As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species" are summarized in the following table.

*Table 6-18 – Marine species with Endangered or Critically Endangered conservation status according to the Georgian Red List potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Georgia) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | EN | - |
| | | *Acipenser nudiventris* | Barbel Sturgeon | EN | - |
| | | *Acipenser persicus* | Persian Sturgeon | CR | - |
| | | *Acipenser stellatus* | Stellate Sturgeon | EN | - |
| | | *Huso huso* | Beluga Sturgeon | EN | - |
| | Gymnuridae | *Gymnura altavela* | Spiny Butterfly Ray | EN | - |
| Marine mammals | Delphinidae | *Tursiops truncatus ponticus* | Black Sea Bottlenose Dolphin | EN | Endemic |

No threshold is provided by ESS6 so, using a precautionary approach, all these species are considered to potentially trigger Critical Habitat under Criterion b. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion c: Habitats of important to endemic or geographically restricted species**

The flora and fauna species listed as local endemic were considered as potentially triggering Critical Habitat according to these criteria, based on a precautionary approach, since they can include restricted range species.

*Table 6-19 – Locally endemic and restricted-range marine species potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Fish | Gobiidae | *Ponticola ratan* | Caspian Ratan Goby | LC | Endemic |
| | Clupeidae | *Alosa immaculata* | Black Sea herring | VU | Endemic |
| Marine mammals | Delphinidae | *Delphinus delphis ponticus* | Black Sea Common Dolphin | VU | Endemic |
| | | *Tursiops truncatus ponticus* | Black Sea Bottlenose Dolphin | EN | Endemic |
| | Phocoenidae | *Phocoena phocoena relicta* | Black Sea Harbour Porpoise | EN | Endemic |

Considering the typology of the study, using a precautionary approach, all these species are considered to potentially trigger Critical Habitat under Criterion c. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion d: Habitats supporting globally significant migratory or congregatory species**

Bibliographical data and habitat features suggest that a temporary presence of congregatory, migratory and wintering fauna may occur in the AoI. Based on the definition of the IUCN Red List, 34 migratory and/or congregatory species were retrieved as potentially present within the AoI. However, based on the ecology of the species and expert judgement, 15 species are considered as potentially present in the AoI (Table 6-20).

*Table 6-20 – Migratory and/or congregatory species potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Migratory/ Congregatory |
|---|---|---|---|---|---|
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | CR | Migratory |
| | | *Acipenser nudiventris* | Barbel Sturgeon | CR | Migratory |
| | | *Acipenser persicus* | Persian Sturgeon | CR | Migratory |
| | | *Acipenser stellatus* | Stellate Sturgeon | CR | Migratory |
| | | *Acipenser sturio* | Atlantic Sturgeon | CR | Migratory |

| Taxon | Family | Species | Common name | IUCN status (Global) | Migratory/ Congregatory |
|---|---|---|---|---|---|
| | | *Huso huso* | Beluga Sturgeon | CR | Migratory |
| | Anguillidae | *Anguilla anguilla* | Common Eel | CR | Migratory/ Congregatory |
| | Clupeidae | *Alosa immaculata* | Black Sea herring | VU | Migratory/ Congregatory |
| | Engraulidae | *Engraulis encrasicolus* | European Anchovy | LC | Migratory/ Congregatory |
| | Pleuronectidae | *Auxis rochei* | Bullet Tuna | LC | Migratory/ Congregatory |
| | | *Sarda sarda* | Atlantic Bonito | LC | Migratory/ Congregatory |
| | Xiphiidae | *Xiphias gladius* | Swordfish | NT | Migratory |
| Marine mammals | Delphinidae | *Delphinus delphis ponticus* | Black Sea Common Dolphin | VU | Congregatory |
| | | *Tursiops truncatus ponticus* | Black Sea Bottlenose Dolphin | EN | Congregatory |
| | Phocoenidae | *Phocoena phocoena relicta* | Black Sea Harbour Porpoise | EN | Migratory/ Congregatory |

Considering the typology of the study, using a precautionary approach, all these species are considered to potentially trigger Critical Habitat under Criterion d. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion e: Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).**

The Main OHL AoI is not known to contain landscape feature and/or subpopulations of species with unique evolutionary history. In fact, although some endemic species are present, the Main OHL AoI is not characterized by a particular level of isolation, spatial heterogeneity, and wealth of environmental gradients or edaphic interfaces. Moreover, the area is not considered to be of demonstrated importance as to climate change adaptation or as biological corridor. These considerations suggest that the Main OHL AoI does not support any key evolutionary processes.

Therefore, no Critical Habitat is expected to be present in the Main OHL AoI according to this criterion.

### *6.1.6 Offshore Environmental Gaps' Information and Recommendations*

The table below reports the main gaps identified in the Georgian offshore baseline and recommendations for filling-in the identified gaps.

*Table 6-21 – Primary gaps recommendations for the offshore environmental Georgian baseline.*

| Component | Gaps | Recommendation |
|---|---|---|
| **Physical components** | | |
| Sediment and Seafloor morphology | Missing specific data on seafloor morphology in the Project's AoI. | ▪ Specific field surveys on the seafloor morphology are suggested in the scope of the ESIA. Such surveys may also be completed within the scope of the Project design (e.g., MBES, SSS etc.) and will also serve in the definition of the benthic habitats of the area.<br>▪ Sediment samplings should be performed to assess the sediment typology and grain size, as well as the presence of pre-existing pollution (if any). |
| Oceanography | Missing data on currents and waves patterns in the AoI. | ▪ Additional in-depth desktop studies on the currents and waves of the AoI are suggested in the scope of the ESIA, as well as on the seawater quality (i.e., pollution etc.).<br>▪ Primary data collection on seawater characteristics, especially in correspondence of the coastal electrode footprints, is recommended.<br>▪ If possible, field measurements of the coastal currents may be useful to model the possible dispersion of contaminants (if any) and sediments in the scope of the ESIA. |
| Coastal erosion | Lack of specific and up-to-date data on erosion rates and sediment dynamics in the Anaklia area. | ▪ Additional in-depth studies on erosion rates, sediment transport patterns, and the effectiveness of existing coastal protection measures within the specific region. A numerical model for costal erosion prediction should be elaborated. |
| Marine Acoustic | Site specific measurements are not available. | ▪ The gap is a minor one, and considering the project features it is not essential the collection of primary data in the field. Nevertheless, an in-depth desktop study on the potential underwater noise sources is recommended. |
| Offshore light pollution | Missing specific on-site data on light pollution and sensitive receptors. | ▪ Data on light pollution regarding the offshore area of the Georgian AoI should be collected based on desktop and in situ observations. |
| **Biological components** | | |
| Marine habitats and biodiversity and Critical Habitats | Missing on-site data on the exact distribution of marine habitats. | ▪ Field studies about the actual marine habitat distribution (e.g., through SSS, sediment sampling, visual inspections etc.), especially along the cable route, are suggested in the |

| | | |
|---|---|---|
| | | scope of the ESIA, as well as specific assessment of the suitability of such habitats for the threatened species listed in this chapter.<br>▪ A Critical Habitat Assessment (CHA) under ESS 6 is required to ensure No Net Loss to Natural Habitats and Net Gain to Critical Habitats. |
| Marine legally protected areas and important biodiversity areas | Missing information regarding the actual level of protection and zoning of the identified areas. | ▪ Additional in-depth desktop studies on the true protection levels in the legally protected areas (e.g., existing zonation etc.) are suggested in the scope of the ESIA, as well as permitted and non-permitted activities within such areas.<br>▪ Consultations with the authorities on the existence of plans to create new protected areas within the AoI should be considered. |

## 6.2 Georgian Social Baseline

The social baseline for Georgia serves to evaluate the social conditions within the Project's designated Area of Interest (AoI), target possible key receptors present within the AoI and highlight sensitive social components which need particular consideration in the scope of the ESIA.

A preliminary descriptive framework of the social aspects is provided in the following chapters.

### *6.2.1 Population and Demographics*

#### *6.2.1.1 Georgia's demographic and administrative framework*

Georgia is located between Southeastern Europe and western Asia, bordering the Black Sea, Russia, Türkiye, Armenia and Azerbaijan, extending over an area of 69,700 km$^2$. More than 20% of Georgia is occupied by Russian Federation in the Abkhazia and South Ossetia regions.

The majority of the population is concentrated in the capital city of Tbilisi in the East, but there also small urban agglomerations along the Black Sea coastline, with Batumi being the largest on.

Georgia counts 3,688,600 people (Georgian National Institute of Statistics, 2022) and four main different ethnic groups: Georgians who accounts for the 86.8 % of the population, Azeri who accounts for 6.3%, Armenians for the 4.5% and others (i.e., Russian, Ossetian, Yazidi, Ukrainian, Kist, Greek) who accounts for the 2.3%.

The primary languages spoken in the country are: Georgian, the official language, which is used by 87.6% of the population, followed by Azerbaijani at 6.2%, Armenian at 3.9%, Russian at 1.2% and Abkhaz at 1%, which is the official language in Abkhazia. As for religious affiliations, the majority of Georgians, approximately 83.4%, practice Orthodox Christianity, while 10.7% are Muslims, and 2.9% are Armenian Apostolic.

Since 2006 the territorial legislation of Georgia has been based on three levels of subdivision. There are three autonomous regions in Georgia: Abkhazia, Adjara and South Osetia (Abkhazia and South Ossetia are currently occupied by Russian Federation). The second level of autonomy is represented by the nine regions (Kvemo Kartli, Guria, Imereti, Kakheti, Shida Kartli, Mtskheta-Mtianeti, Samegrelo Zemo Svaneti, Racha-Lechkhumi and Kvemo Svaneti, and Samtskhe-Javakheti) and the capital Tbilisi which has the same competencies of bigger regions. The third level of administrative division is the 69 local entities, that include 64 municipalities and five cities with special status (Mądry & Kaczmarek-Khubnaia, 2016). After the 2006 Resolution, Georgia has had a "single-Tier territorial self-government" based on the *raion* division, which means that legislative and executive decentralization has been awarded to regions. The current divisions do not coincide with the traditional divisions (respecting borders of different ethnical groups) as for example for the region of Samegrelo-Zemo Svaneti which is now inhabited by two different ethnical groups.

##### *6.2.1.1.1 Main OHL AoI*

The Main OHL AoI is located in the Samegrelo-Zemo Svaneti region, in the municipalities of Tsalenjikha and Zugdidi, where the high-density towns of Jvari and Zugdidi are located.

The population of the Samegrelo-Zemo Svaneti region is decreasing; it dropped from about 477,000 people in 2011 to about 329,000 people in 2016. In 2020, the population has undergone a further decrease reaching about 311,000 inhabitants distributed over 7,505 km² with a density of 41.46 people/km² (State Department for Statistics of Georgia, 2020).

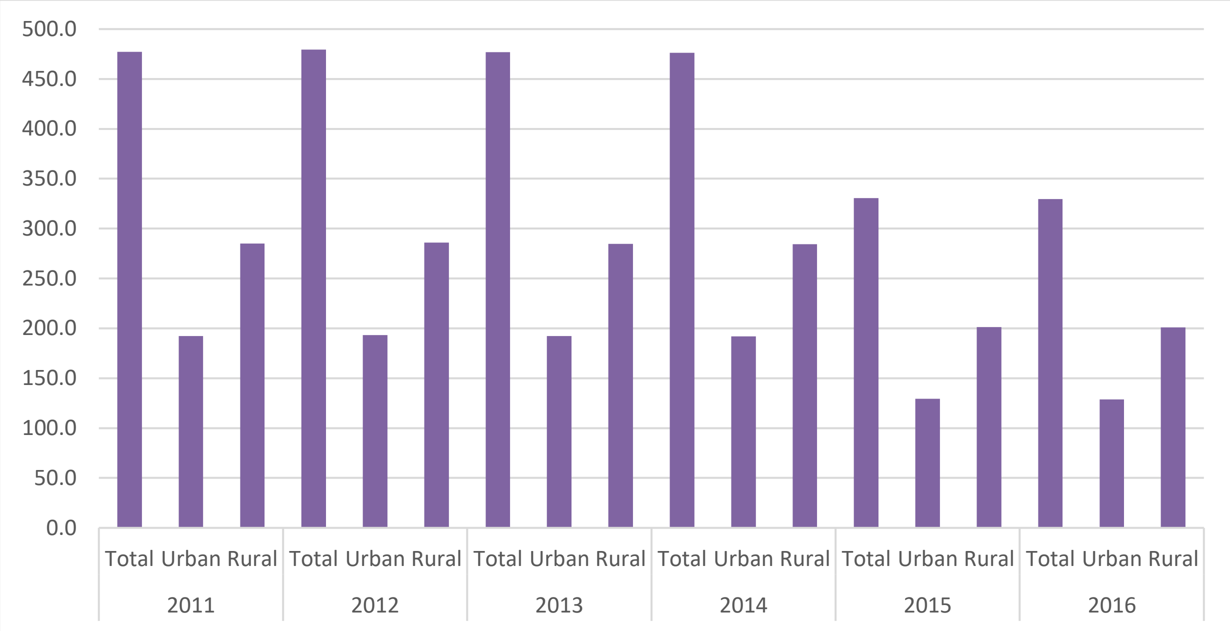



*Figure 6-42 – Population of Samegrelo-Zemo Svaneti (the scale is reported in thousand people, 2011-2016 ). Source: National Statistics Office of Georgia.*

The Samegrelo-Zemo Svaneti region includes 497 settlements: 8 towns, 2 urban settlements and 487 villages. Most of the population, according to the last census (2014), lives in rural areas (60.9 %) compared to urban areas (39.1 %).

Natural population growth rate has been decreasing in the region since 2010 and it has been fluctuating at about -350 / -360 people per year. A positive increase was recorded in 2013 and 2014 for the rural population of the region.

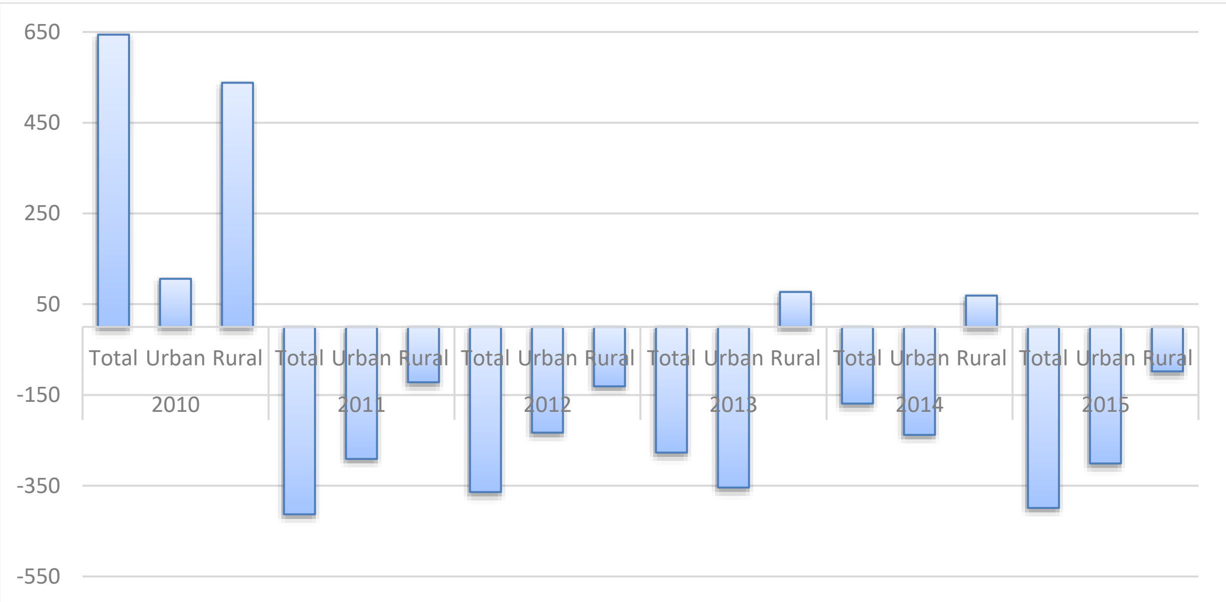


*Figure 6-43 – Natural Population Growth in Samegrelo-Zemo Svaneti (people, 2011-2015). Source: National Statistics Office of Georgia.*

According to the 2020 estimate, the municipality of Tsalenjikha has approximately 23,658 inhabitants distributed over an area of 656.4 km². The estimated population density is of 36.04 people/km² (State Department for Statistics of Georgia). In 2014, 51.5% of the population was female and 48.5 % was male, 16.4% falling in the age group between 0 and 14 years old, 65.4% between 15 and 64 years old and 18.2% were in the age group 65+ years old. According to the last census (2014), the majority of the population (82.4%) lives in rural areas whilst 17.6 % in urban areas; the internally displaced population counts 3,600 people (Tsalenjikha Municipality, 2014).

The town of Jvari is a high-density area in Tsalenjikha which counts 3,157 people, the majority being females (52.9%).

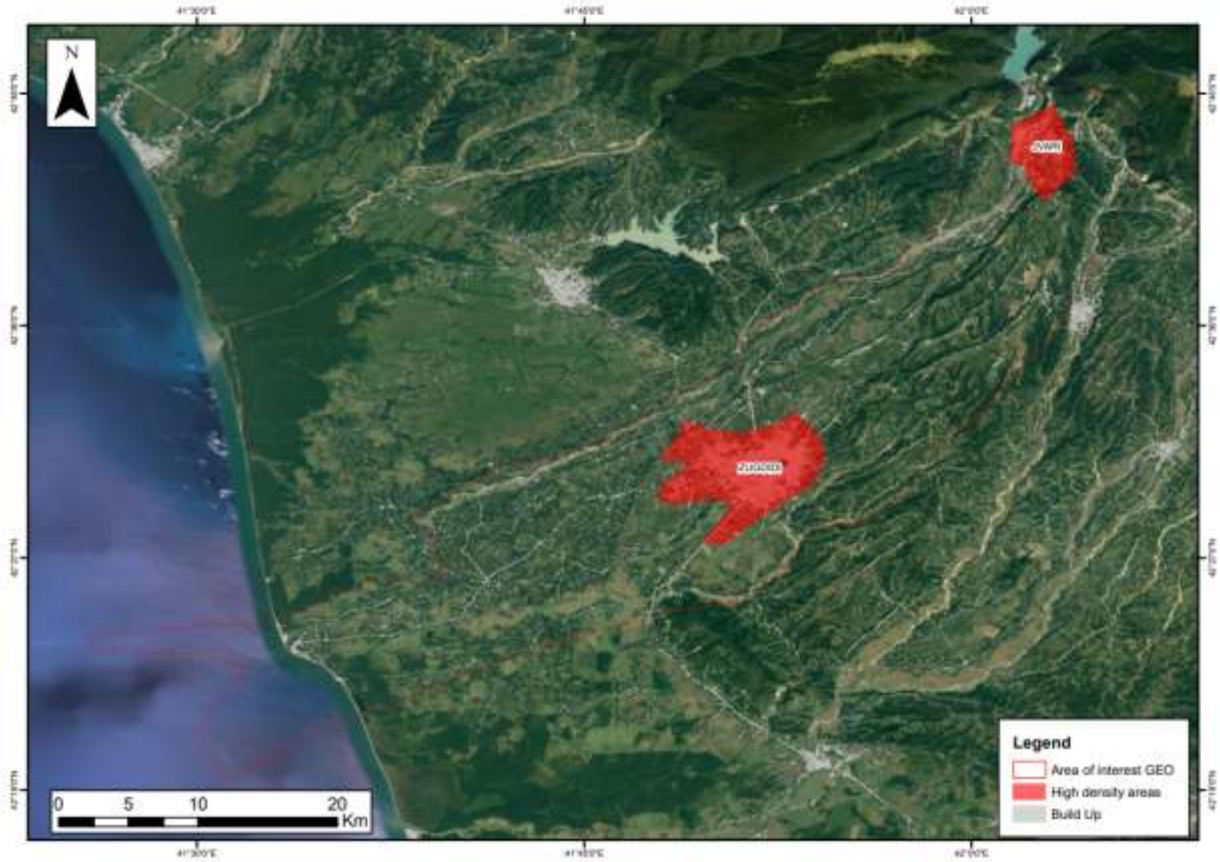



*Figure 6-44 – High density areas on the main OHL area of interest.*

The 2020 population estimate for the Municipality of Zugdidi reports 100,184 people distributed in an area of 702.0 km², with an estimated density of 142.7 people/km² (State Department for Statistics of Georgia). In 2014, 52.3% of the population was female and 47.7% was male, with 17.1% falling in the age group between 0 and 14 years old, 67% between 15 and 64 years old, and the 15.9% was in the age group of 65+ years old. As for the other municipalities, also in Zugdidi Municipality the majority of the population lives in rural areas (59.2%), compared to urban areas (40.8%). According to the last census (2014), the internally displaced population counts 21,400 individuals (Ibid.)

#### 6.2.1.1.2 Additional OHL AoI

The Additional OHL AoI is also partly located in the Samergelo-Zemo Svaneti region, nearby the high-density areas of the cities of Khobi in Khobi Municipality and Senaki in Senaki Municipality, and partly located in the Imereti region, which includes the cities of Tskaltubo, Khoni and Kutaisi in their respective municipality.

The description of the population structure for the Samergelo-Zemo Svaneti region has been included in the previous paragraph 6.2.1.1.1.

Imereti is an important historical-geographical region of western Georgia. The region is bordered by Likhi ridge on the East, the river Tskhenistskali on the West, the Caucasus ridge on the North and Meskheti Mountains on the South. Imereti has an estimated population of 486,983 inhabitants distributed over an area of 6.380 km². According to 2020 data, the estimated population density is of 76.59/km² (State Department for Statistics of Georgia). According to the last census, the 51.6% of the population was living in the rural areas compared to the 48.4% of the population, that was living in urban areas. In 2014, 19,000 internally displaced people were present in the entire region.

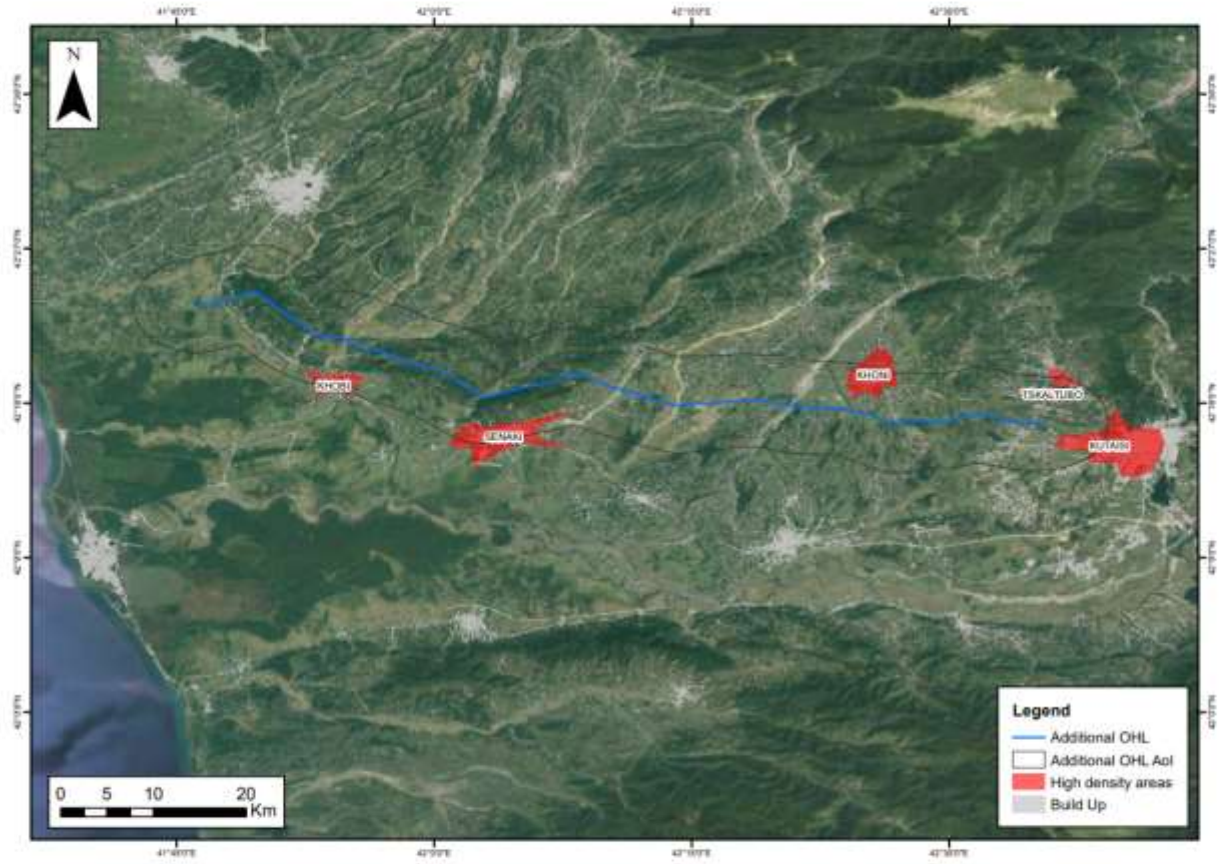



*Figure 6-45 – High density areas on the additional OHL area of interest.*

According to the 2020 Khobi Municipality's estimate of the population, the municipality counts a population of 28,182 inhabitants, distributed over an area of 682.4 km² with a density of 41.30 people/km² (Khobi Municipality). In 2014, 50.9% of the population was female and 49.1% was male with 16.4% falling in the age group between 0 and 14 years old, 66.4% between 15 and 64 years old, whilst the 17.2% was in the age group of 65+ years old. According to the 2014 census, the internally displaced population counts 2,700 people (Ibid.). The population of Khobi city in 2014 was of 4,242 people.

The last census in Senaki Municipality dates to 2014 and it counts 39,652 people. The estimate of the population in 2020 in Senaki Municipality is of 35,022 people in 515.0 km², with a density of 68.01 people/ km ² (Senaki Municipality, 2020). The population of Senaki city in 2014 reports 21,596 people.

The estimated population for the Tskaltubo Municipality in 2020, reports 47,867 people living in an area of 692.6 km², with a density of 69.11 people/km² (State Department for Statistics of Georgia). In 2014, the 50.2 % of the population was female and the 49,8 % was male. In 2014, 66.3 % of the population was in the age group between 15 and 64 years old, whilst the 17.6 % was in the age group of 65+ years old. The internally displaced population according to the last census (2014) was of 4,100 people (Ibid.). 80.2 % of the population in 2014 was living in rural areas, whilst 19.8 % in urban areas. The population of Tskaltubo town in 2014 counted 11,281 people (Tskaltubo Municipality).

The last census in Khoni Municipality dates back to 2014, reporting 23,570 people. The estimate of the population in 2020 in Khoni Municipality is of 21,436 people in 397.5 km², with a density of 53.92/km² (Khoni Municipality, 2020). In the municipality in 2014, the 51.3% of the population was female and the 48.7% was male, with 15.4% falling in the age group between 0 and 14 years old, the 65.2% in the age group between 15 and 64 years old, whilst the 19.4% were in the age groups of 65+ years old. The internally displaced population according to the last census (2014) was of 1,200 people (Ibid.). 61.9% of the population in 2014 was living in rural areas whilst 38.1% in urban areas. The population of Khoni city in 2014 was of 8,987 people (Khoni Municipality).

The estimated population for Kutaisi Municipality in 2020 was of 135,201 people in an area of 56.92 km². The estimated population density is of 2,375/km² (State Department for Statistics of Georgia, 2020). In 2014 the 53.1% of the population was female and the 46,9% was male. In 2014, 20.3% of the population fell between the age of 0-14 years old, 66.8% was in the age group between 15 and 64 years old whilst 12.9% was aged 65+ years old. The internally displaced population according to the last census (2014) was of 4,100 people (Ibid.). At the time of the census (2014), all the population was living in the urban area (Kutaisi Municipality).

### *6.2.1.2 Potential municipalities and affected settlements (vulnerable groups)*

#### *6.2.1.2.1 Internally displaced persons*

The first and the largest wave of internal displacement in Georgia took place at the beginning of 1990s as a result of armed conflict, followed by the displacement consequent to the Russian-Georgian war in 2008. Most internal migrants consist of internally displaced persons (IDPs) from the Abkhazia and South Ossetia/Tskhinvali areas as well as people who relocated to improve their socioeconomic conditions.

As previous reported, more than 20% of the Georgian territory is occupied and in October 2017 around 277,403 people were registered as IDPs (89,169 families) (IDFI, 2018). The Government of Georgia provides IDPs with long-term accommodation since the Georgian laws on “Internally Displaced Persons – Persecuted from the Occupied Territories of Georgia” ensure provision of housing solutions to IDPs. According to the Article 12 (c) IDPs have right to receive adequate housing in Georgia until return to the place of permanent residence. For achieving abovementioned objective, from 2013, there have been adopted several Action Plans, the most recent one covers 2017-2018.

In 2017, most of the IPDs lived in Tbilisi, about 25 % in Samegrelo – Zemo Svaneti (approximately 85,000 IDPs) and 10 % in Imereti (55,228 IDPs DG Consulting Ltd, 2019), as shown in the following figure.

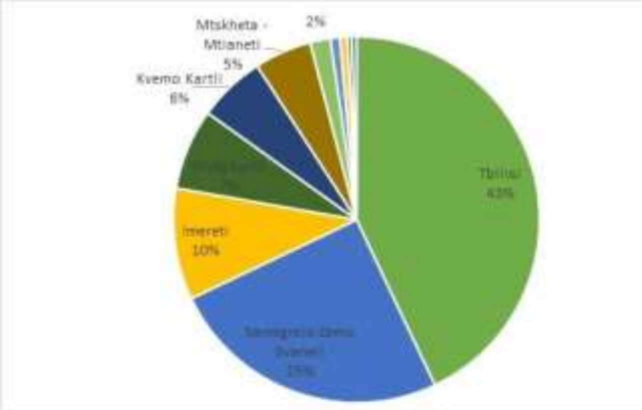



*Figure 6-46 – Distribution of IPD in Georgia in 2017. Source: Environmental Impact Assessment Report of the 500Kv Jvari-Tskaltubo Transmission Line and Tsaltubo Substation, DG Consulting Ltd, 2019.*

Most IDPs are from Abkhazia who have been living in the region for more than 25 years; relatively few are from the Tskinvali region, also known as South Ossetia, and have been living in the region since 2008. The majority of IDPs had been resettled in collective centers, some of which are located in Tsalenjikha, Zugdidi, Senaki, and Khobi municipalities.

Between 2013 and 2015, a total of 8,730 IDP families were identified living in 444 settlements in the Samegrelo- Zemo Svaneti region (Transparency International Georgia, 2015). Detailed information on some of the municipalities identified for the Project in the region, is presented in the table below:

*Table 6-22 – Number of settlements of IDPs per Municipality and number of families in the settlements. Source: Local consultants.*

| Municipality | Settlements | Families in the settlements |
|---|---|---|
| Zugdidi | 207 | 4,273 |
| Senaki | 55 | 1,331 |
| Tsalenjikha | 35 | 504 |
| Khobi | 48 | 353 |

No specific information about the number of settlements or families in Imereti has been retrieved.

Even though the Georgian government made significant progress in renovating IDP collective centers over the years, many issues remain due to the scale of the overall problem. Renovation works are often of low quality due to lack of oversight; consequently, most collective centers are still in need of renovation.

Among the challenges confronted by the residents of these communities the most important ones are deteriorating infrastructures and compromised water and sewage systems, all contributing to a hazardous living environment. Furthermore, there is a deficiency in heating systems and a notable absence of outpatient clinics.

No concentrations of IDPS were identified in the areas near the transmission line corridor.

#### 6.2.1.2.2 Women

Georgia has committed to gender equality and women's empowerment since regaining its independence almost three decades ago, and significant progress has been made towards these issues. However, there are still significant gaps in most aspects of gender equality. These gaps can usually be explained by the existing patriarchal structure and prevalent traditional attitudes towards gender equality and women's empowerment.

The overview of the gender equality situation in this profile demonstrates the need for further improvements in national legislation and frameworks. The Government of Georgia needs to continue working on ratifying fundamental international conventions (such as ILO conventions) and improving mechanisms for the effective implementation of existing obligations. In addition, it is essential that adopted SDG indicators be regularly revised to ensure that selected indicators are relevant for the Georgian context.

In addition, it is critical that all stakeholders, including state agencies and NGOs, have the proper capacity in SDG methodology, starting from identifying data needs, planning data collection, collecting, reporting and publishing the data. More coordinated efforts are needed to establish a system of standardized data collection disaggregated by gender and other underrepresented groups across different administrative bodies. Such an approach will minimize the risks of incorrectly calculated and misleadingly interpreted indicators and will contribute to the creation of a more comprehensive data ecosystem in Georgia, providing the possibility of in-depth cross-sectional and longitudinal analysis.

There is relatively little information on gender at a more local level, however some information exists that is useful for the analysis. As noted, there are approximately equal numbers of men and women in the regions and municipalities. Employment is not so balanced, however, with women making up only about one-third of employed people. For example, in Samegrelo-Zemo Svaneti region there are about 680-700 people employed in the governmental sector, but only 235-250 of them are women (38.4 %). The situation is different in the business sector, where over half of employed persons are women (8800 out of 16,300).

Income for men is also much higher than for women, there are no data on positions and qualifications, so no explanation for the discrepancy can be given.

### 6.2.2 Health

The demographic profile of Georgia reveals a median age of 38.6 years, with a corresponding life expectancy at birth of 74 years, according to the World Bank's data from 2021. The country experiences a modest population growth rate of 0.03%, accompanied by a total fertility rate of 1.75 children per woman. In 2018, the contraceptive prevalence rate reached 40.6%, indicating access to family planning resources. However, some critical health issues remains, particularly in women's health, as only 22% of 15-year-old girls in Georgia have coverage against HPV.

Child and maternal health indicators are a subject of concern. The neonatal mortality rate, recorded in 2020, stands at 5 per 1,000 live births, which is slightly higher than the European regional average. In 2017, Georgia reported a maternal mortality ratio of 25 per 100,000 live births, compared to the European average, signifying ongoing challenges in maternal healthcare.

In 2020, the rate of new HIV infections was 0.17 per 1,000 uninfected population, and the tuberculosis incidence was 17 per 100,000 population.

Furthermore, the financial burden of healthcare weighs heavily on households. From 2012 to 2020, a significant portion of households allocated a substantial part of their total household expenditure or income to health, with 31.2% spending more than 10%, and 9.7% spending over 25%.

Obesity is another concern in Georgia. Among children and adolescents aged 5 to 19 years old, the prevalence of obesity is 6.8%, and among adults, this figure rises substantially to 21.7%.

Additionally, the state of water, sanitation, and hygiene services plays a pivotal role in public health. In 2016, a mortality rate of 0.2 per 100,000 population was attributed to exposure to unsafe WASH services.

Georgia's healthcare infrastructure faces scrutiny in terms of availability. Between 2012 and 2020, the country maintained a density of medical doctors available per 10,000 population at 51.1, providing a reasonable level of access to healthcare professionals. At the same time, Georgia allocated a noteworthy 9.4% of the general government expenditure to domestic general government health expenditures, ensuring a relatively substantial investment in healthcare. In 2020, a considerable portion of the population had access to safely managed drinking water services (66%), although the provision of safely managed sanitation services lagged behind at 34%.

Beyond healthcare, public safety remains a consideration. In 2019, the mortality rate due to homicide was recorded at 2.3 per 100,000 population.

### *6.2.2.1 Healthcare provision & perception of the health sector*

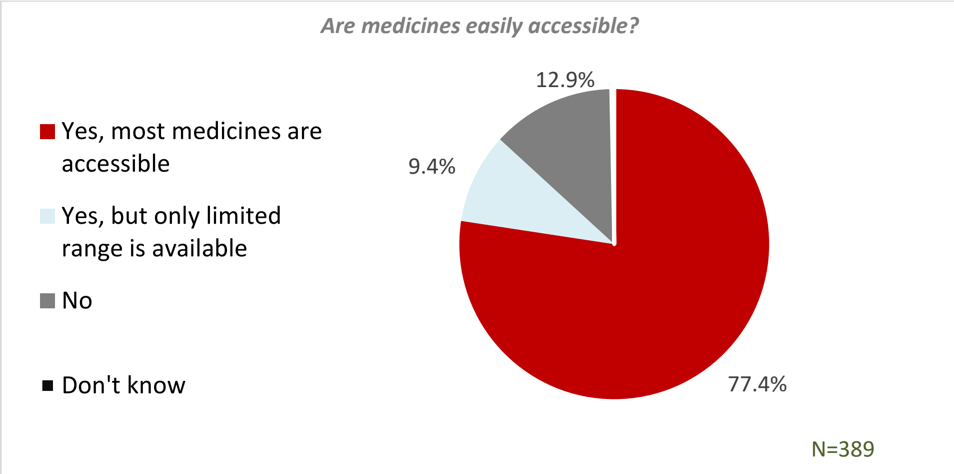
The Universal Healthcare Program was introduced in Georgia in 2013 to ensure access to medical care for the population. Private insurance is also widely prevalent, particularly among employed citizens in the country. In 2016, social assistance and/or pensions were received by 887,338 individuals, with 28 percent of the aid recipients residing in the Imereti and Samegrelo-Zemo Svaneti regions. Additionally, approximately 40,000 residents of the target regions received subsistence allowances in 2016.

The Samegrelo-Zemo Svaneti and Imereti regions offer an extensive array of medical facilities. In fact, these two regions have more hospitals and outpatient facilities than any other region. As of 2015, Imereti had 29 hospitals and 385 outpatient facilities, while Samegrelo-Zemo Svaneti had 19 hospitals and 287 establishments to serve patients.

Healthcare facilities are available in Kutaisi and Zugdidi, where the primary hospitals are located. Furthermore, healthcare facilities are also accessible in Poti and Senaki, so the maximum travel time from the target regions to the closest hospitals is approximately 1 to 1.5 hours by car (40-50 km).

The Area of Interest (AoI) is served by an ambulance service equipped with 4WD ambulance cars capable of reaching every village in the municipality. The ambulance service has seen significant improvements over the last three to four years. The country operates a centralized call center known as "112," which provides health assistance and manages ambulance services in the regions.

According to information provided by the local consultants, a study conducted in Zugdidi in 2017, more than half of the respondents believe that drugs are easily accessible (77.4 percent), while 9.4 percent think that drugs are accessible but with a limited range available. As for the affordability of medicines, only 13.7 percent find them easily affordable.



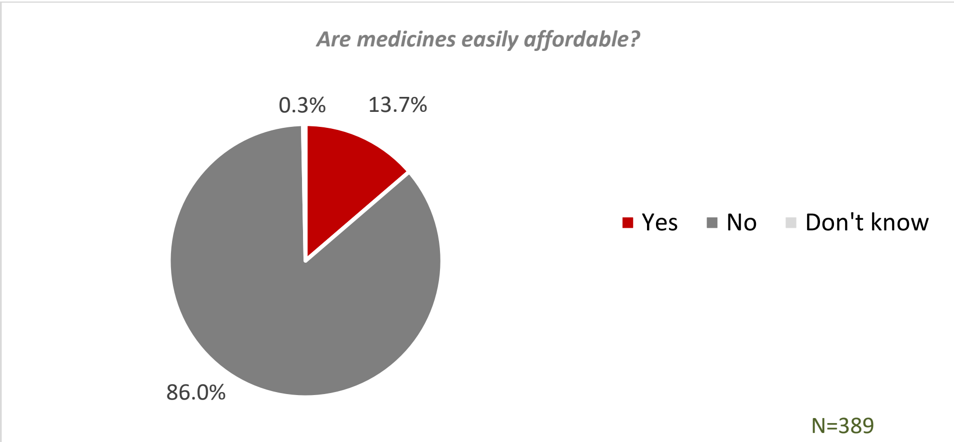




*Figure 6-47 – Accessibility and affordability of medicines. Source: local consultants.*

Half the respondents state that all their household members are covered by health insurance (49.6 per cent), while 23.0% report that none of them are.

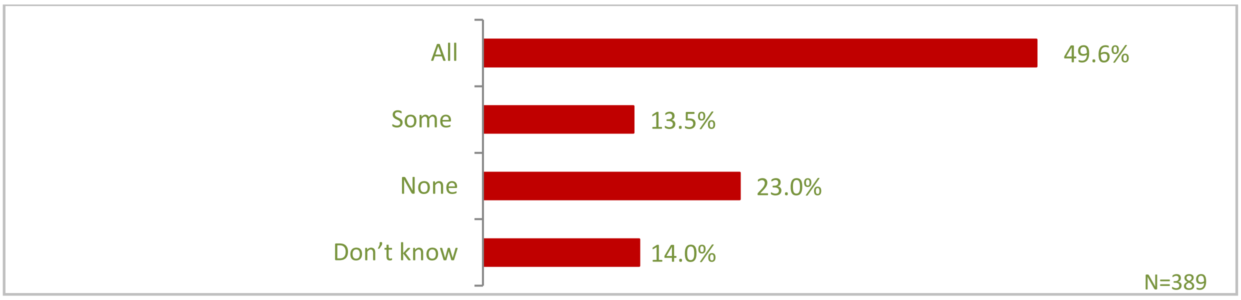



*Figure 6-48 Percentage of people covered and not covered by health insurance. Source: local consultants.*

In terms of improvements in health conditions and accessibility to health insurance, the majority reported no changes in the past five years (74.9 %). 8.8 % reported improvements (better accessibility to healthcare), while 16.3% believed that conditions had worsened, mainly due to increased medication prices.

Furthermore, research findings revealed a prevalent distrust among respondents toward medical personnel, along with numerous complaints about the lack of professionalism. According to the respondents, medical personnel often struggle to provide accurate diagnoses, leading patients to seek medical attention in Tbilisi or Kutaisi for greater reassurance. This issue is particularly common when patients have complicated diseases. Respondents also voiced concerns about inadequate in-person medical services, a lack of proper diagnostic equipment, and the inability of doctors to perform certain procedures or analyses.

According to medical professionals surveyed in the qualitative study, the general population appears somewhat unaware of their medical needs. Society seems unprepared and unaware of the importance of timely diagnosis and routine doctor visits when necessary. The study results indicate that patients tend to visit clinics only when they face medical complications, resulting in overdue visits. Based on the doctors' perceptions from the study, there has been an improvement in public attitudes toward health over the past few years due to increased advocacy efforts aimed at raising public awareness about preventive screenings and treatment.

Furthermore, in addition to the lack of awareness about the medical field, interviewed doctors recognized that the financial hardship of the population can hinder their ability to access healthcare services for timely health checks.

#### *6.2.2.2 Occupational Health and Safety Culture*

Data on Occupational Health and Safety (OHS) in Georgia are scarce. The ILO database LEGOSH does not provide an updated overview of the regulatory framework of the Occupational, Health, Safety in the country, with the information dating back to 2008.

In the early 2000s, the Government dismantled the OHS system and inspection panel, thus creating a gap in occupational health and safety legislation at workplace. It was not until 2014, when EU-Georgia Association Agreement was signed, that labor rights were brought to the agenda, leading to the adoption of an Occupational Safety and Health Law. This new law strengthened the role and mandate of labor inspections and established minimum health and safety requirements. These requirements covered the use of personal protective equipment, the operation of temporary or mobile construction sites, protection of workers from risks associated with asbestos, carcinogens, mutagens, as well as chemical, physical, and biological agents, and the provision of workplace markings and signs.

The ILO’s Database on national labor, social security and related human rights legislation (NATLEX) identifies the most recent update to the national legislation as the "Law of Georgia on Occupational Safety" (No. 4283), adopted in 2019. Whilst the right to safe and healthy working conditions was already being guaranteed by the Labour Code of Georgia, the main objective of this new law was to align national OHS regulations with the International Labour Organization standards. The law introduced measures for health protection, accident prevention, and requirements for OHS training and education. It also placed obligations on the state, including adopting a national occupational health policy and periodically reviewing the law. However, according to the new law, the primary responsibility for implementation lies with the employer, who must create a health and safety policy document and more. The law also specifies that employers should hire one health and safety professional if they have between 20 and 100 employees and two specialists or a special unit with at least two specialists if they have more workers. Another measure in the law is the strengthening of the labor inspection body, which can now inspect any workplace, compared to the previous limitation of only hard, harmful, and hazardous workplaces. This body remains the only effective mechanism for labor inspection, imposing sanctions and ensuring compliance. In 2019, the state started funding the body, and there has been a positive trend in state investment (Kazarian, 2021).

The OSH Law requires employers to create and issue a written risk assessment document (Art. 6 (2)), with general rules elaborated by the Ministry (Art. 6 (1)) based on ILO methodology (Art. 3 (u)). However, even after the amendment of the law, there is a prevailing perception that it tends to use sanctions more for prevention rather than guidance. Moreover, the private sector feels it lacks guidance in implementing preventive measures (Ibid).

The UN Universal Periodic Review (2017-2022) acknowledges recent improvements in labor rights policy and law in Georgia. However, the report highlights concerns about the weak protection of workers' rights, especially in the construction and mining industries, as well as the low effectiveness of accident investigations, which rarely lead to legal accountability for business entities (Ibid).

Between 2010 and 2018, the UN Working Group on Business and Human Rights reported 1,183 injuries and 418 deaths in the country. Other sources provide different statistics because the labor inspectorate was abolished during that period, resulting in a lack of harmonized data for the period under consideration.

For the present Project, related risks involve general occupational health and safety hazards, such as:

- use of heavy equipment,
- trip and fall hazards,
- exposure to noise and dust,
- falling objects,
- exposure to hazardous materials, and
- exposure to electrical hazards from the use of tools and machinery.

The risks are related to the type of work that will be held, such as clearance of vegetation, excavations, construction of converter station and electrical poles (e.g., working at high, electrocutions, etc.), and working on vessels (e.g, slips and falls because the deck of the vessel might be wet or coated with oil which add to the risk of slipping or during personnel boarding from other vessels, working in noise environment, etc. source: https://ec.europa.eu/taxation_customs/dds2/SAMANCTA/EN/Safety/WorkOnShipsVessels_EN.htm). Also, some works will also be held in remote locations, such as the mountain areas of the Anaklia-Tskaltubo line.

All the risks above reported could be mitigated by applying national and international standards. In fact, the Law of Georgia on Occupational Safety (2019) provides for provisions on occupational health and safety, and applies to direct and contracted workers, including foreign workers. The Georgian law (which relates to the World Bank ESF) imposes a general obligation on employers to provide employees with a safe and healthy working environment and to inform workers of the potential risks their jobs may present to their health and safety. Measures that must be taken include, but are not limited to, training and information campaigns as well as adoption of relevant preventive measures. The law includes requirements for organizing and managing health and safety programs, providing emergency care and services, and responding to accidents. Trainings on occupational health and safety are delivered at employer's expense, and the time spend in training counts as working hours.

With regard to contracted workers, the Contractors (civil works contractors, sub-contractors, as well as consultant teams and all other Employers of contracted workers in the Project) will prepare labor management plans based on this labor management procedure, and compliant with World Bank ESF and national labor code. Also, the Law on Labor Safety includes provisions that allow employee to take part in consultation process regarding health and safety issues, provide recommendations and raise concerns related to risks and hazards.

Other measures that could minimize the hazardous work are: persons under the age of 18 will not be employed under the Project, a limited duration of works (according to the Georgia low not exceed 40 hours per weeks, 48 h in specific cases) and training provided for contracted workers to explain labor and working conditions and OHS for the Project.

### *6.2.3 Education*

In 2020, education expenditure accounted for 11.2 % of the total government expenditure (UNESCO, 2022).

Georgia boasts a 100 % primary and lower secondary completion rate. However, upper secondary completion stands at just 66 %, and there are notable disparities. The highest completion rates are found in urban areas and among wealthier families, according to UNICEF (2020). Wealth and ethnicity are significant discriminatory factors, with children from affluent families twice as likely to complete school compared to their less privileged counterparts. The Azeris minority group reports a lower completion rate of 33%, while Georgians have a 69% completion rate. UNICEF's 2020 study reveals that the majority of students not completing upper education are male, of Georgian ethnicity, and the differences between urban and rural areas are minimal. Out-of-school rates are higher among poorer and rural families.

Following the COVID-19 pandemic, access to the internet and computers has become crucial for an inclusive education system. In Georgia, 94 % of students in urban areas have internet access, whereas the figure drops to 75 % in rural areas. Despite these challenges, Georgian children perform below OECD levels in reading, math, and science (UNICEF, 2020).

As of 2019/2020, Georgia had 2,313 units of general education schools, with 2,086 being public and 227 private (UNICEF, 2021). During the same period, the total number of pupils enrolled in both public and private schools was 592,883; 12,049 pupils abandoned their studies in 2018/2019.

Georgia had 19 public higher education institutions and 43 private ones in 2019/2020. In addition to secondary schools, the country operated 2,331 secondary schools, serving 553,914 students. The majority of higher education institutions are located in the capital, Tbilisi. Within the two target regions, there are 663 schools and six higher education institutions located in Kutaisi and Zugdidi.

### *6.2.4 Local Economy and Livelihoods*

#### *6.2.4.1 Georgia's economic overview*

In 2021, Georgia's GDP was $18.7 billion USD (World Bank, 2021). The poverty rate decreased from 69% in 2011 to 53% in 2021. Latest GDP data, dating back to 2016 (National Statistics Office of Georgia), indicates that the industry accounted for the largest share of GDP at 17%, followed by trade (16%), transport and communication (16%), construction (9%), and agriculture (9%) (Regional development programme of Georgia 2018-2021).

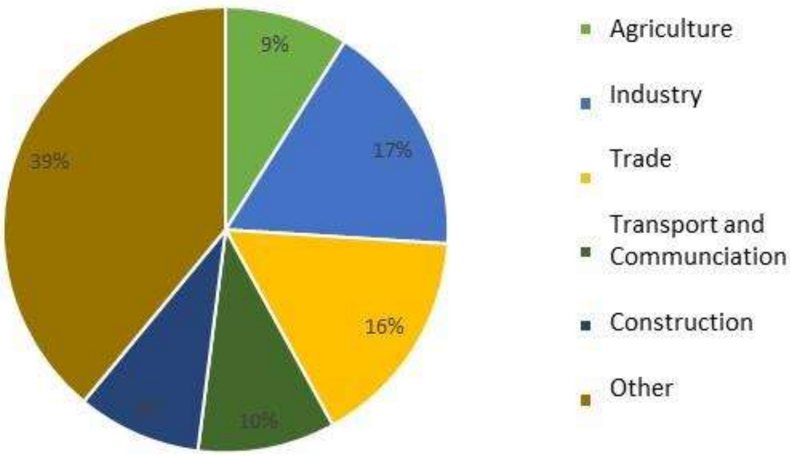



*Figure 6-49 – Georgian GDP Sectors. Source: Regional development programme of georgia 2018-2021. Source: Environmental Impact Assessment Report of the 500Kv Jvari- Tskaltubo Transmission Line and Tsaltubo Substation, DG Consulting Ltd, 2019.*

Between 2011 and 2021, Georgia experienced an average annual growth rate of 4%. In 2022, Georgia's economy was expected to grow by 10.5%, with a decrease in unemployment from 20.6% in 2021 to 18.1% in 2022. The labor force participation rate in 2021 stood at 59%. Georgia's GDP growth was projected to be 6.0% in 2023 (European Neighbourhood Policy - East - labour market statistics). In June 2022, there was a peak in inflation, which subsequently eased to 10.9% in August, primarily affecting energy and food prices.

The tourism industry saw growth after the COVID pandemic, contributing to the overall boost in the economy. Additionally, due to the Russian-Ukrainian war, there was a notable increase in the net volume of money transfers from Russia, including remittances and transfers from non-nationals.

##### *6.2.4.1.1 Main OHL*

The Samegrelo-Zemo Svaneti region accounted for 7% of Georgia's GDP in 2015 and has been a medium-sized contributor to the country's economy. Although its industrial sector was relatively underdeveloped, there has been some growth in production rates and industrial turnover since the 2008 crisis. Notably, the region recorded negative growth only in 2008, attributed to the outcomes of the war in August 2008.

From 2007 to 2011, the region experienced an average growth rate of 14.3%, and since 2010, production in the region doubled, reaching 1105.6 million GEL (Strategy for the Development of Samegrelo – Zemo Svaneti Region for 2014-2021).

Since the early 1990s, a significant downturn has been observed in Georgia's industrial sector, leading to a notable reduction in its contribution to the country's GDP. This declining trend has also been evident in the specific regions under scrutiny. Indeed, most of the region's industrial enterprises are small (37%) or medium-sized (26%) (EPCR, 2022). Key products from the region include processed nuts and timber materials. Various municipalities withing the region have specific production profiles (Local Economy Challenges During the COVID-19 Pandemic):

- Zugdidi Municipality: hazelnut and tea processing;

- in Abasha: ice cream and confectionery;
- in Tsalenjikha: timber processing and tea production;
- in Martvili: tea processing and wine production;
- in Senaki: wine production;
- in Poti: production of cod liver oil, fish powder, meat and dairy products;
- in Chkhorotsku: hazelnut production;
- in Mestia: timber processing.

In 2020, the worth products produced by economically active enterprises amounted to 2,273.3 million GEL. To assess the regional contributions to the national economy, it's important to consider the contribution to the country's added value. In 2015 (latest data available), the Samegrelo-Zemo Svaneti region accounted for 7% of the country's added value. This figure has risen alongside the growth of the national GDP. In the region from 2006 to 2015, the added value's increase in Samegrelo-Zemo Svaneti was from 918,200,00 to 1,995,100,000 GEL (DG Consulting Ltd, 2019). In 2020, the added value of the region amounted to 986,6 million GEL (EPCR, 2022). Percentage of the region's added value on the country's one has not been retrieved.

In the following figure, there is the distribution of operating business entities by economic activites in 2019 for Samegrelo-Zemo Svaneti region. The region's economy key sectors are: wholesale and retail trade, transport and storage, and manufacturing.

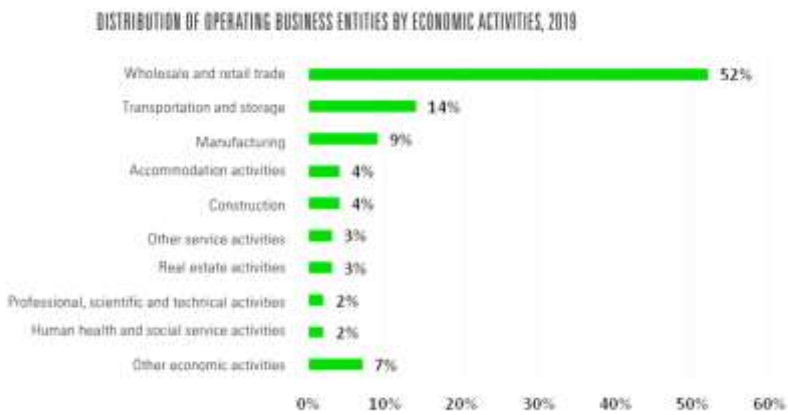



*Figure 6-50 – Distribution of operating business entities by economic activites in 2019 for Samegrelo-Zemo Svaneti region. Source: EPRC, 2022.*

In terms of international exports, Samegrelo-Zemo Svaneti primarily exports nuts and tropical fruit, wine, tea, honey, persimmons, and fish flour to the European Union, former Soviet Union countries, Asia, and the United States. Exports are on the rise, primarily driven by the growth of nut exports.

### *6.2.4.1.2 Additional OHL*

The Imereti region's leading sectors, apart from services, included agriculture, hunting, forestry, and fishing; industry; state governance; and education.

The industrial declining trend observed in Georgia has been noticeable in the Imereti region as well, however the sector has remained more developed compared to the Samegrelo Svaneti's one. Industrial activity in the Imereti region encompasses a diverse range of sectors, including metallurgy, metal products, power generation, and food and light industry. Notably, Imereti is rich in energy resources and is home to five hydropower plants (HPPs): Rioni HPP, Gumati HPP, Dzevrula HPP, Shaori HPP, and Vartsikhe HPP, with a combined installed capacity of 997.4 megawatts. This makes electricity production a pivotal aspect of the region's industrial output. Furthermore, the Zestafoni Ferroalloy Factory (metallurgy and metal products) contributes 88 percent of Imereti's industry exports. In addition, food products such as wine and spirits, tea, and herbs are exported to Europe and Russia (DG Consulting Ltd, 2019).

Imereti (including Racha-Lechkhumi and Kvemo Svaneti regions) contributed 11% to the country's added value in 2015 (latest data available). These figures have risen alongside the growth of the national GDP. The respective shares by region are provided in the following figure.

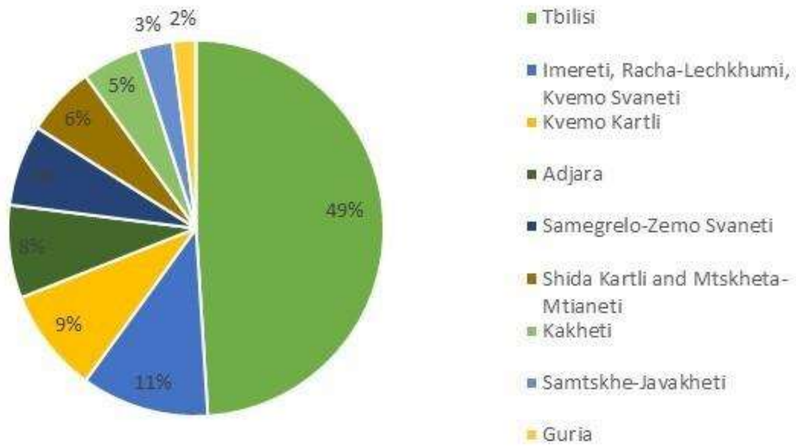



*Figure 6-51 – Value Added Contributed by Regions to National Economy (2015). Source: Environmental Impact Assessment Report of the 500Kv Jvari- Tskaltubo Transmission Line and Tsaltubo Substation, DG Consulting Ltd, 2019.*

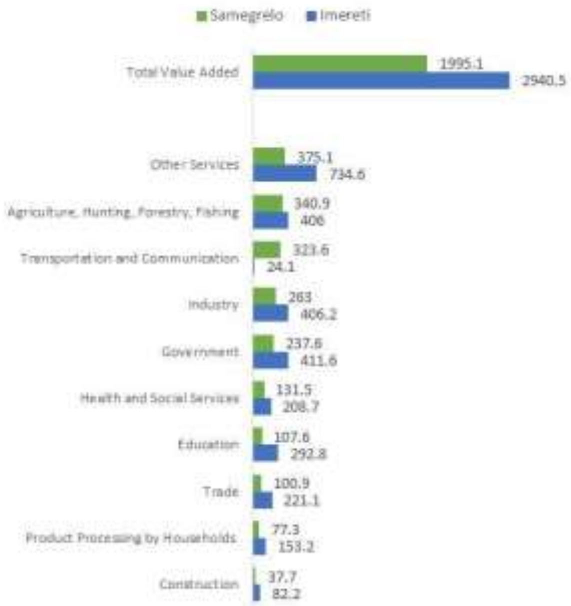



*Figure 6-52 – Added Values for Imereti and Samegrelo-Zemo Svaneti Regions 2015 (million GEL) Source: Environmental Impact Assessment Report of the 500Kv Jvari- Tskaltubo Transmission Line and Tsaltubo Substation, DG Consulting Ltd, 2019.*

The contribution of Imereti region to the country's added value has shown significant growth in the last years. Specifically, from 2006 to 2015, the added value in Imereti more than doubled, increasing from 1,288,500,000 GEL to 2,940,500,000 GEL. This growth reflects the region's increasing economic significance and its role in Georgia's overall economic landscape.

### 6.2.5 Primary Suppliers

Potential supplier for the HVDC submarine cables and electrode are Prysmian and Nexans.

Potential supplier for the converter station are Hitachi Energy, Siemens and General Electric.

### 6.2.6 Infrastructures, transport and mobility

Between 1990 and 2021, investments in Georgia's infrastructure sectors, including Airports, Electricity, ICT, Natural Gas, Ports, and Water and Sewerage, totaled 3.007 million USD, with the majority allocated to the electricity sector (World Bank, 2021).

In the 2017-2018 edition of the Global Competitiveness Index, Georgia's infrastructure was ranked 67$^{th}$ out of 137 countries worldwide, earning a score of 4.28.

Georgia has a total road length of 21,110 kilometers and 1,576 kilometers of railways, which play a crucial role in connecting the Caspian and Black Seas, thus facilitating energy exports from Azerbaijan to the European Union. The Kars-Tbilisi-Baku railway, opened in 2017, serves as a significant link between the Caucasus and Türkiye. The country is equipped with four international airports, with Tbilisi International Airport being the largest. On the Georgian coast on the Black Sea, the largest port is in Batumi.

Due to hydrocarbon production in neighboring Azerbaijan, Georgia serves as a vital transit route for several pipelines transporting these products to European and other nations. Notable pipelines in Georgia include the Baku-Supsa pipeline (also known as the Western Route Export Pipeline - WREP) for oil transport, the Baku-Tbilisi-Ceyhan pipeline for oil transport, the South-Caucasus pipeline for natural gas transport from Azerbaijan to Türkiye, and the South Caucasus pipeline for natural gas transport from Azerbaijan to Italy through Türkiye, Greece, and Albania. Natural gas holds a central position in Georgia's energy landscape, with a supply of 2.41 billion cubic meters (bcm) in 2018, primarily sourced from foreign countries. Residential consumption accounts for 20% of gas use, followed by electricity generation at the same percentage. Oil imports remain stable at 1.35 million tons (Mt), and domestic oil production is minimal, with a total capacity of 210 kilotons per year (kt/yr), representing only 2.4% of domestic energy production.

As represented in the following figure, in terms of electricity generation, Georgia relies heavily on hydropower plants, contributing 82% of the total generation capacity of 4.11 gigawatts (GW) in 2019. Coal-fired thermal plants constitute 17% of the capacity, with 231 MW from gas-fired plants and a limited contribution from wind-based electricity production (IEA, 2020).

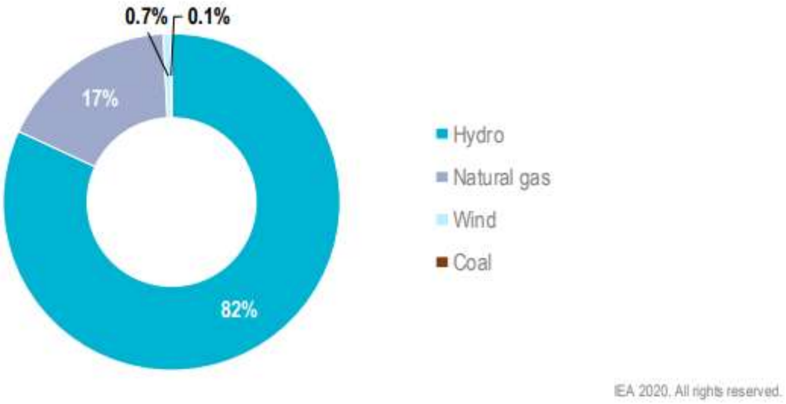



*Figure 6-53 – Electricity production in Georgia (source: IEA, 2020).*

Georgia has renovated its hydropower plants and imports natural gas mainly from Azerbaijan rather than from Russia thus avoiding the country shortages of energy or gas supply.

### *6.2.6.1 Existing infrastructures in the main OHL*

Samegrelo-Zemo Svaneti supports significant marine and land transit, with ports like Poti and Kulevi playing essential roles in regional trade. Poti port is a commercial center for the Europe-Caucasus-Asia transit corridor ("Traceka"). In Kulevi there is also an important oil terminal, major gateway for petroleum products. As a result, the transport and communication sector is the second largest contributor to the regional value added. Additionally, the future Anaklia port will significantly increase cargo turnover of the region, directly promoting business growth. Samegrelo- Zemo Svaneti also benefits from air transport from Mestia as well as well-developed rail and road systems, mostly developed in the lowlands.

As shown in Figure 6-54, within the Main OHL AoI is present one airport marked in yellow namely Zugdidi Airport (coordinates 42.488665°N 41.818213°E).

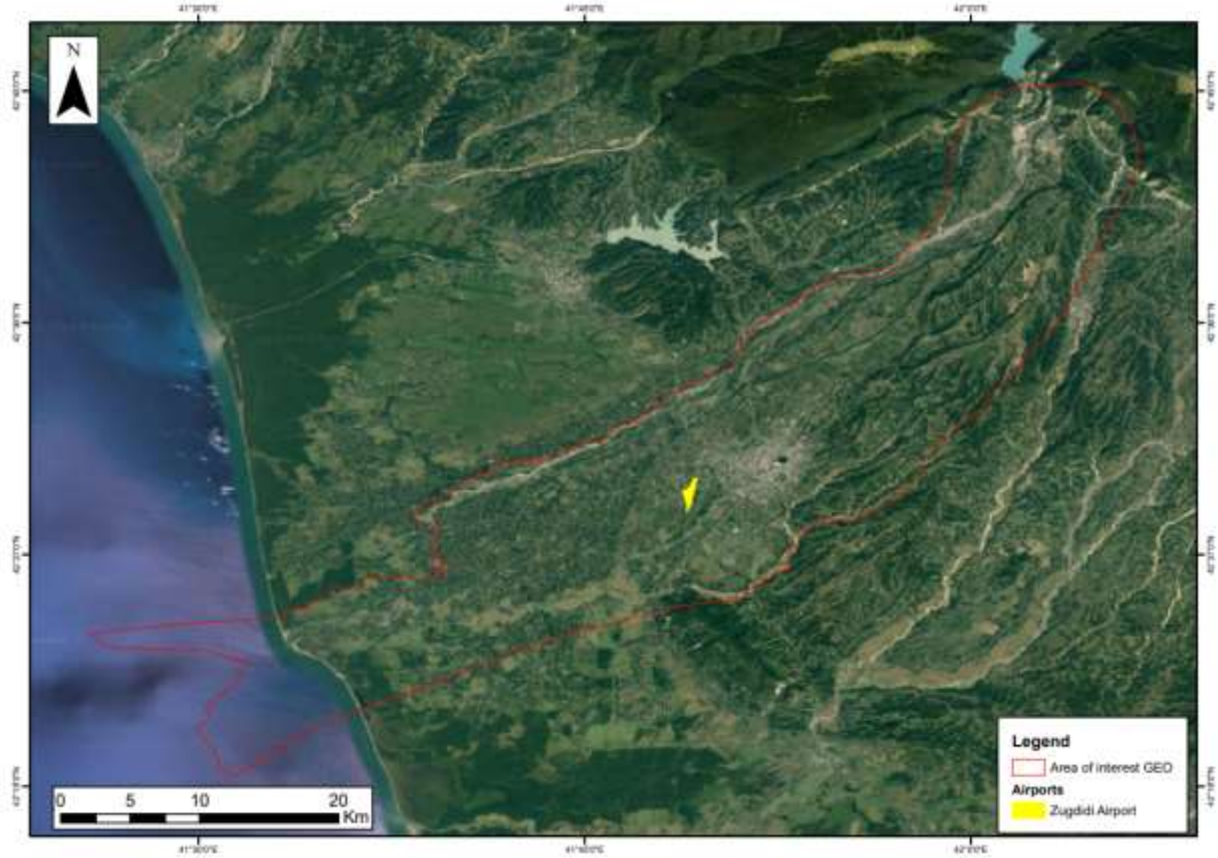



*Figure 6-54 – Airport present in the Main OHL AoI.*

As shown in the Figure 6-55, one railway is present within the Main OHL AoI and terminates in the Railway Station of Zugdidi.

The Zugdidi- Jvari- Mestia- Lasdil primary motor road is also located in the area of interest, which is marked in light yellow in the map.


*Figure 6-55 – Railways and roads infrastructure present in the Main OHOL AoI.*

Four secondary roads appear to pass into the area of interest, that are:

- Zugdidi- Anaklia;
- Basic Fifia Street;
- Zugdidi- Narazeni- Chakvinji- Khibula-Zubi;
- Zugdidi - Jigkhashkari- Chkorotskhu.

### *6.2.6.2 Existing infrastructures in the additional OHL*

The Imereti region plays a crucial role in Georgia’s transport and communication systems as well. It serves as a significant transit corridor connecting European and Asian countries. The region's administrative center, Kutaisi, is strategically located 102 kilometers from the nearest seaport and 236 kilometers from the capital city, Tbilisi. The region boasts well-developed air transport facilities, with two airports in Kutaisi, along with robust vehicular and rail transportation networks.

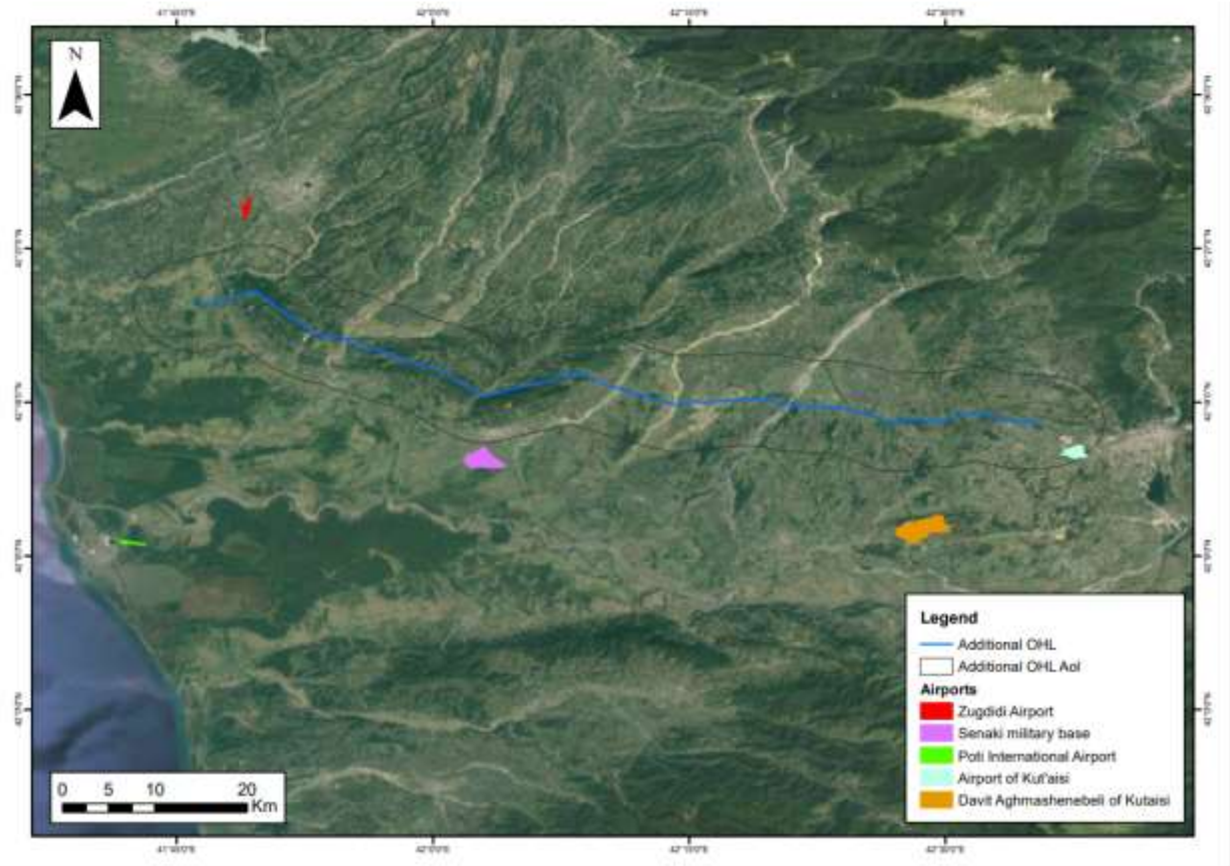



*Figure 6-56 – Infrastructures present in the Additional OHL AoI.*

As shown in the Figure 6-56, within the Additional OHL AoI is present only one airport, namely the Airport of Kutaisi.

A noteworthy facility, the Senaki military base, is present just outside the buffer.

As shown in the following Figure 6-57, within the Additional OHL AoI is present one railway, the Railway Station of Senaki (represented by the black line on the map), which crosses the OHL in two points.

The Kutaisi - Tskaltubo - Tsageri - Lentekhi - Lasdili primary motor road is also located in the area of interest, which is marked in light yellow on the map.

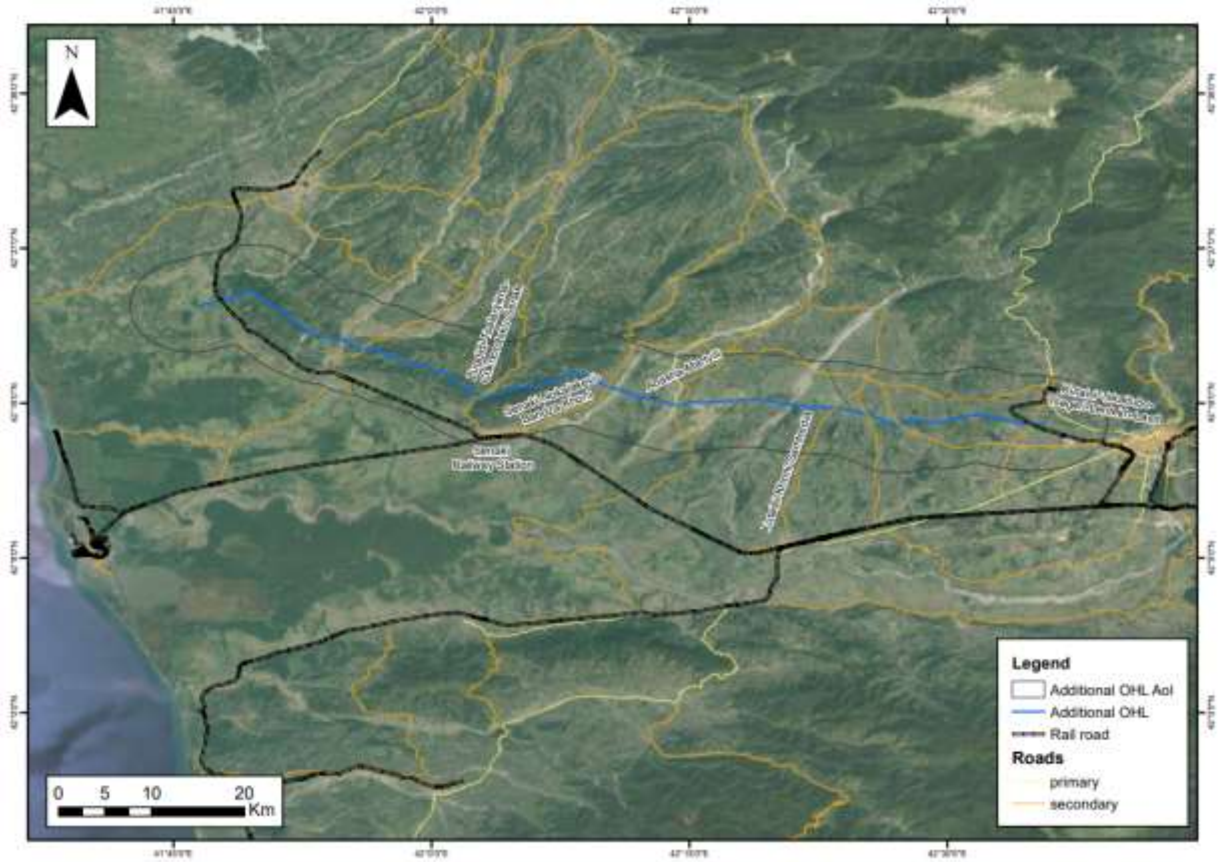



*Figure 6-57 – Railways and roads present in the AoI of the additional OHL.*

Four secondary roads appear to cross the Additional OHL (blue line), that are:

- Senaki - Chkhorotsku - Tsalenjikha Road;
- Senaki-Nokalakevi-Bandza- Khoni;
- Abasha- Martvili;
- Kutaisi-Khoni- Samitredia

### *6.2.7 Social infrastructure and Services*

#### *6.2.7.1 Georgia's social infrastructures and services framework*

In 2021, according to the Energy Progress Report 2023, Goergia achieved a remarkable 100% electricity access rate in both urban and rural areas (IEA, IRENA ,UNSD, WB & WHO, 2023).

Access to clean water, basic sanitation, and good hygiene practices, collectively known as WASH, significantly improves the quality of life and people's well-being. UNICEF has developed a ladder to assess the degree and quality of access to these services.

Firstly, regarding sanitation services, 'Safely managed' represents the highest service level, considering the safe disposal of excreta, whereas 'basic' service level requires an improved sanitation facility (such as flush toilets or a latrine with a slab) not shared with other households. 'Limited' service denotes an improved facility shared with other households. In Georgia, 24% of the population uses 'safely managed' sanitation services, 62% have access to 'basic' sanitation services, and 1% relies on 'limited' sanitation services.

Secondly, a ladder describing access to drinking water is established as well. 'Safely Managed' implies drinking water from a reliable source that is accessible on the premises, available when needed, and free from fecal and chemical contamination. 'Basic' drinking water should originate from an improved source, with a collection time not exceeding 30 minutes for a round trip, including queuing. 'Limited' access indicates that the collection time exceeds 30 minutes for a round trip, including queuing. 'Unimproved' service level is when drinking water comes from an unprotected dug well or unprotected spring. In Georgia, 69% of the population enjoys 'safely managed' drinking water services, 26% use 'basic' services, 3% rely on 'limited' services, and 2% access 'unimproved' drinking water sources.

Access to education is a crucial factor in assessing a country's social situation. In Georgia, 78% of children aged 36-59 months attend early childhood education programs. The adjusted net attendance rate is impressive, with 90% of children of the appropriate age attending the correct level of education or a higher level. For children of primary school age, the rate is 98%, and for lower school-age adolescents, it's also 98%. The adjusted net attendance rate for upper secondary school-age youth is 85%. Youth literacy is universal, with 100% of the population aged 15-24 able to read and write a simple statement about their everyday life (UNICEF, 2023).

In conclusion, access to healthcare has evolved significantly in Georgia. The country introduced the Universal Health Care program in 2013, expanding access to publicly financed health services to a majority of the population. However, despite increased public health spending, one in six households still experiences high catastrophic health expenditures. According to the Human Rights Measurement Initiative (2020), the right to health is considered fulfilled at 74.5% of its potential, based on the country's income level.

##### *6.2.7.1.1 Main OHL*

As of 2021, every household in the Samegrelo-Zemo Svaneti region has access to electricity, while natural gas supply is available to just 54% of households (Geostat, 2020). The region also encounters challenges with water supply, with only 40.7% of the population having indoor water supply systems. Additionally, 9.8% have water taps in their yards or nearby, while 47.9% rely on wells in their yards or nearby, and 1.6% utilize natural springs in their yards or nearby (EPCR, 2022).

No specific information on education and healthcare provision have been found.

##### *6.2.7.1.2 Additional OHL*

No specific information about the region is available or has been retrieved.

### 6.2.8 Tourism

In 2020, the COVID-19 pandemic triggered an unprecedented decline in international travel worldwide, and Georgia was no exception. During that year, international trips to Georgia reached a historic low of 1,747,110, returning to levels last seen prior to 2011. Furthermore, foreign exchange income associated with international travel to Georgia plummeted to $542 million, marking an 83.4% decrease from 2019. It's estimated that between 2019 and 2020, the total value added in the tourism sector contracted by

29.8%, reaching 2.55 billion GEL. Consequently, the gross value from tourism industries, as a share of GDP, fell from 8.4% to 5.9% (Georgian Tourism in Figures, 2020).

Most foreign tourists visiting Georgia arrive from Türkiye, Russia, and Azerbaijan. While travel restrictions have been gradually lifted, statistics on tourism for 2021 and 2022 are expected to reflect improvements compared to 2020. However, official reports from the Georgia National Tourism Administration for these years have not yet been released.

Tourism in the AoI is closely tied to the presence of Kolkheti National Park. The park's opening to tourists in 2007 attracted 1,000 visitors in its first year. It offers a range of activities, including boating tours on Lake Paliastomi and the Pichori River, diving, bird watching, hiking, and horse riding. Several tourist boat routes cover distances from 3 kilometers to more than 10 kilometers. Kolkheti National Park ranks as the 10th most visited park among Georgia's 20 national parks, with approximately 8,000 visitors in 2020.

Coastal tourism also thrives along the Anaklia beach and its southern vicinity, where various accommodations and recreational facilities can be found. The significance of these activities will be further elaborated in the Environmental and Social Impact Assessment (ESIA) process.

### *6.2.9 Landscape*

#### *6.2.9.1 Main OHL*

The AoI presents a varied landscape, which includes urban, agricultural and natural areas (e.g., the Kolkheti National Park), and coastal landscape. Rural and natural landscapes tend to dominate the area while large infrastructure networks or industrial facilities are generally lacking.

#### *6.2.9.2 Additional OHL*

As for the Main OHL, also for the Additional OHL rural and natural landscapes tend to dominate the area while large infrastructure networks or industrial facilities are generally lacking.

### *6.2.10 Land Use*

During the Soviet Union era, a 'large-scale socialist land-use system' was established. Following the initial phase after the Soviet Union's collapse (1991-1998), the newly formed Republic of Georgia government initiated a land privatization reform. This reform aimed to transform the previous land tenure system to create small-scale farming units. The primary objective was to provide farm households with the opportunity to establish subsistence units. However, a significant challenge of this reform was the fragmentation of agricultural lands into small family holdings, often resulting in households owning multiple parcels in different locations, which made cultivation difficult. In 1992, the land remained legally state-owned, and farmers had no legal rights over the lands. Land distribution commenced during the Civil War, with progress varying significantly across regions. Privately owned farms grew, but they couldn't replicate the agricultural production levels seen during the Soviet Union era.

In the second phase, known as the 'Later Transition' (1998-2004), the previous agricultural reforms failed to place the same emphasis on agricultural infrastructure and the availability of production resources (Nikabadze, 2018).

During the third phase, following the Rose Revolution (2004-2016), the new government aimed to privatize state-owned properties through sales or long-term leasing. Long-term trade licenses for the privatization of forests and other natural resources were also issued. Starting in 2011, the Georgian government officially recognized agriculture as one of the country's major sectors and began implementing the Strategy for the Development of Georgian Agriculture (2012-2022) (Ibid).

### *6.2.10.1 Main OHL*

Within the Main OHL AoI, most of the land is occupied by tree cover (62.9%) and 14.6% of the AoI is grassland. 7.5% in the area is cropland (in light blue in the map) and only 2.6% is occupied by buildings and human settlements. The remaining area is occupied by shrubland (1.5%), herbaceous wetland (0.7%) and bare/sparse vegetation (0.4%) and permanent water bodies.

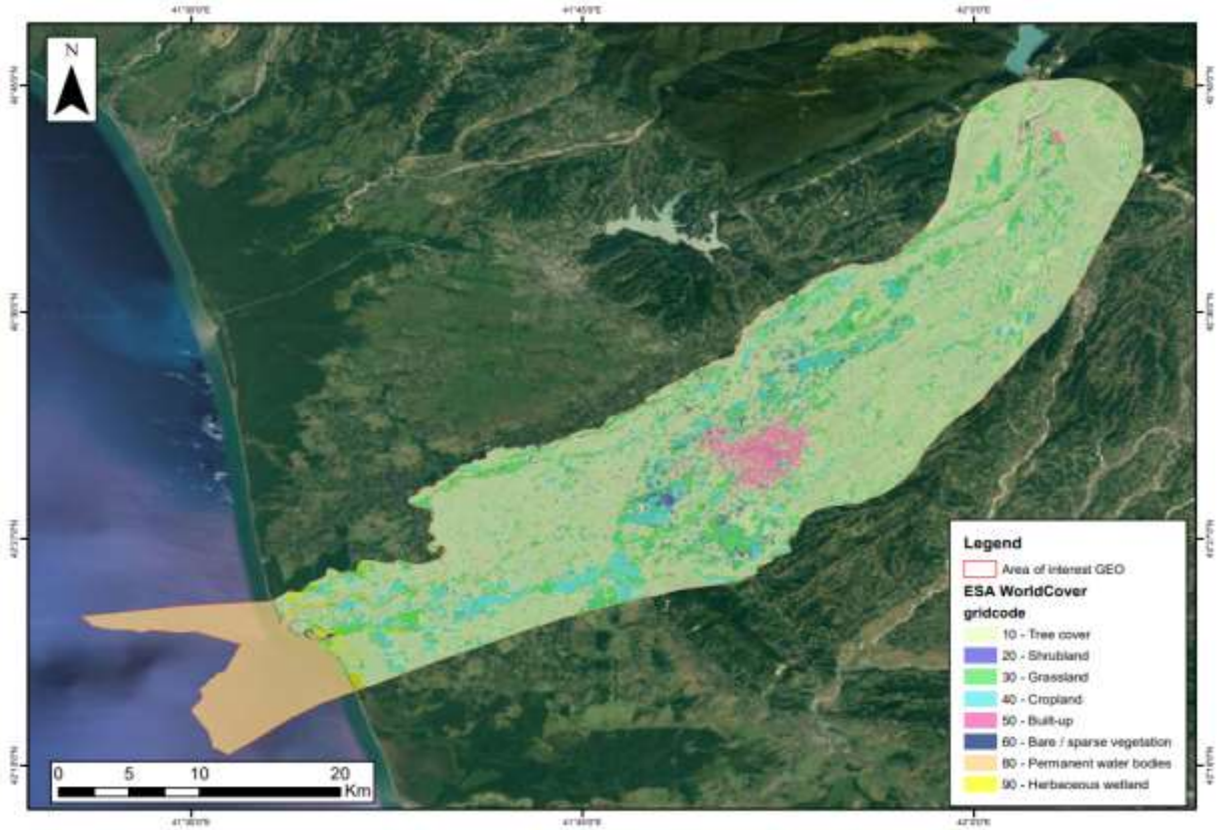



*Figure 6-58 – Land use in the area of interest of the main OHL. Tree cover (62.9%) is represented by the light green and grassland is represented in bright green. 7.5% of the area is cropland (light blue), 2.6% is occupied by buildings and human settlements (in pink), 1.5% is shrubland (purple), 0.7% is herbaceous wetland (yellow) and 0.4% is bare/sparse vegetation (dark blue).*

According to information provided by the local consultants, in a study conducted in Anaklia concerning the socio-economic background of the population, it was found that 92.5% of respondents reported owning and utilizing a land plot. When asked about the number of land plots they owned, 44.8% stated they had one, 28.2% had two, and 25.4% possessed three plots.

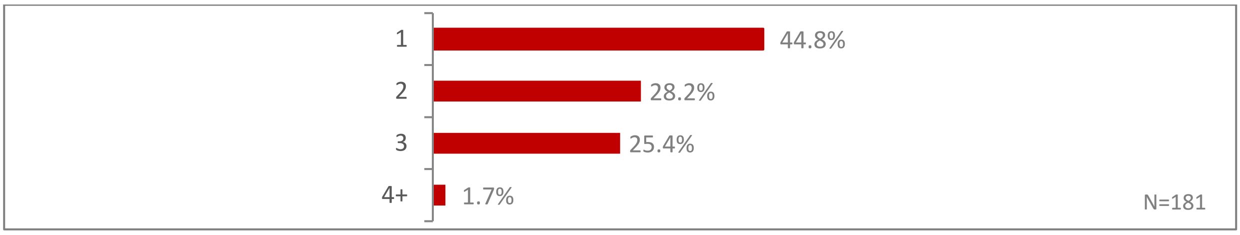



*Figure 6-59 – Percentage of ownership of land in Anaklia (Source: Local consultants)*

The majority of households also owned living areas (houses and yards/gardens), averaging 1003.8 square meters. Additionally, 76% owned vineyards, fruit gardens, or orchards, averaging 2100.59 square meters, while half of the respondents owned arable land for crops, with an average size of 3749.5 square meters.

*Table 6-23 – Land areas owned by households. Source: local consultants.*

| Land areas owned by household | | | |
|---|---|---|---|
| | Mean Value (Average, m$^2$) | Number of HHs | Share of HHs |
| Living area (house and yard/garden) | 1003.80 | 182 | 91% |
| Vineyard, fruit garden, orchard | 2100.59 | 152 | 76% |
| Arable land for crops | 3749.5 | 100 | 50% |
| Owned, but not in use | 2490.48 | 21 | 10.5% |
| Grassland / pasture | 1575.00 | 8 | 4% |
| Grassland used for hay production | 2940.00 | 5 | 2.5% |

A significant portion of households indicated they owned land plots with full registration (82%), while 10% mentioned owning land that could be registered.

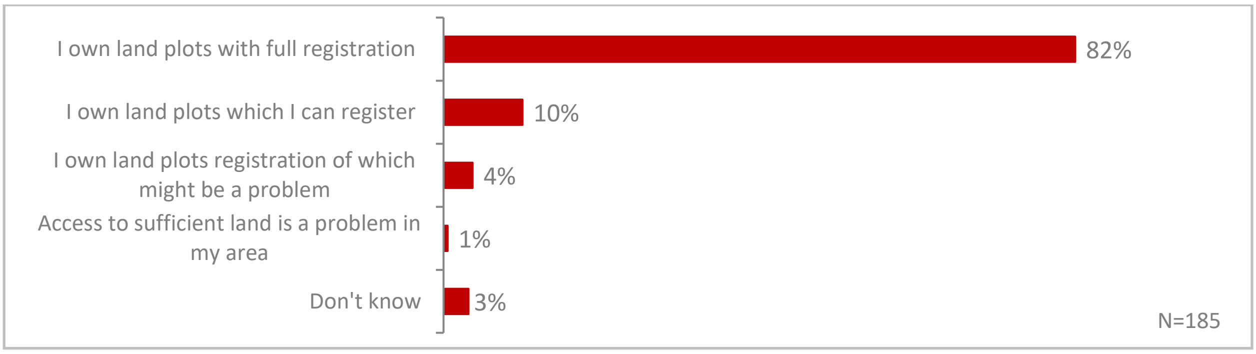



*Figure 6-60 – Percentage of land ownership registration in Anaklia (Source: Local consultants).*

Regarding the affordability of land, more than half of the respondents considered it too expensive for purchase or rent. In contrast, 23.5% found land to be reasonably priced, making it possible for them to expand their farming operations as needed.

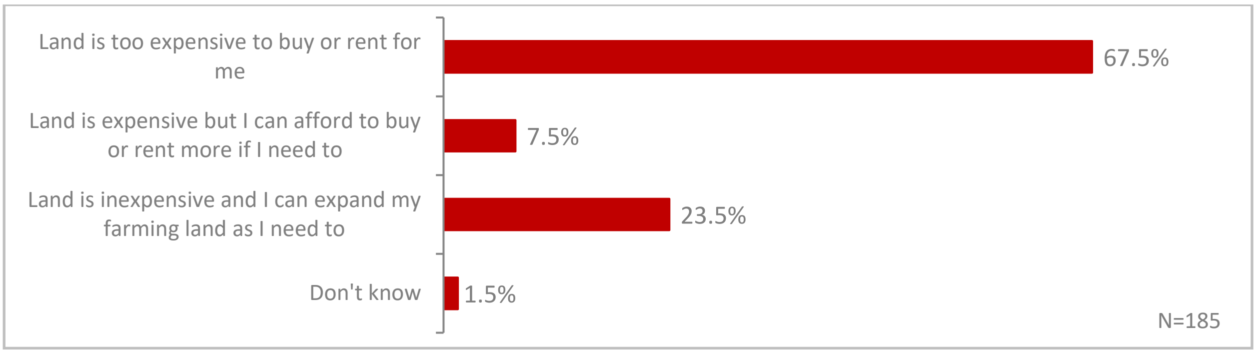



*Figure 6-61 – Percentage of perception of land cost in Anaklia (Source: Local consultants).*

Further details on land ownership include the fact that a majority of surveyed households owned poultry (84.5%) with an average of 21 poultry per household. Additionally, 74% owned cows, typically having around 3 per household, while 18.5% possessed pigs. The average number of farm animals owned was reported in the following table.

*Table 6-24 – Average number of owned farm animals per household. Source: local consultants.*

| Number of various domestic animals owned by households | | | |
|---|---|---|---|
| | **Mean Value (Average)** | **Number of HHs** | **Share of HHs that own domestic animals** |
| Poultry (chickens, geese, ducks) | 20.71 | 169 | 84.5% |
| Cows | 2.74 | 148 | 74% |
| Pigs | 1.32 | 37 | 18.5% |
| Horses | 1.82 | 11 | 5.5% |
| Bees (number of hives) | 5.60 | 5 | 2.5% |
| Sheep | 5.75 | 4 | 2% |

Approximately one-fourth of the surveyed households utilized pastures (26%), and most of them noted that these pastures remained consistent throughout the year (94%). These pastures were located within the community boundaries.

### *6.2.10.2 Additional OHL*

In the Additional OHL area of interest, the majority of land cover is tree cover. 23% is covered by grassland and 11.7% by cropland. Just the 2.1% of land in the Area of Interest seems occupied by human settlements. soThe remaining percentage of land use is occupied by permanent water bodies (0.9%), shrubland (0.5%), bare/sparse vegetation (0.4%) and herbaceous wetland (0.2%).

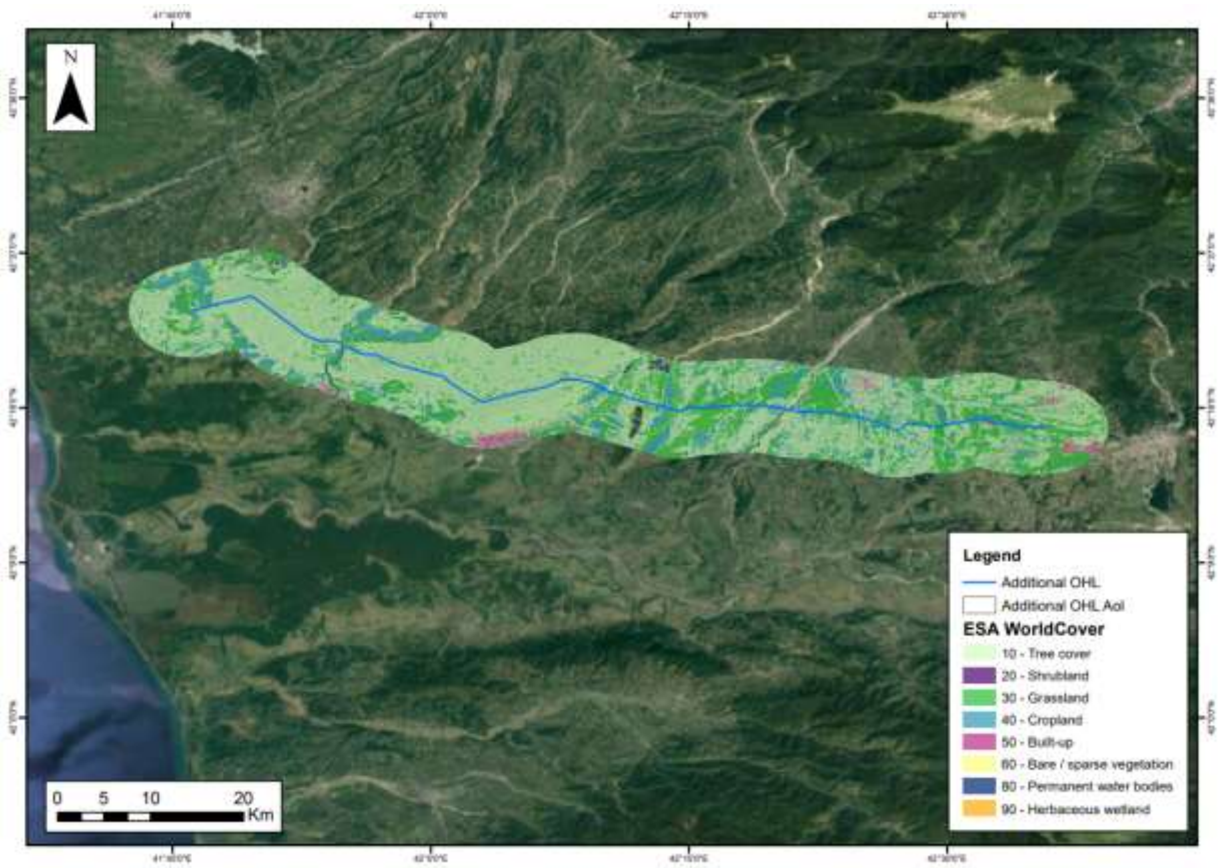



*Figure 6-62 – Land use in the area of interest of the additional OHL.*

No additional information on the Additional OHL land use, ownership of land, land cost or pastures has been found.

Relative to both Main and Additional OHL, the Project will try to avoid physical resettlement of local peoples through technical design (as reported in the figures below showing the cable/line route). However, minor land acquisition - on a temporary or permanent basis, and household resettlement, only if strictly necessary, may occur. When this is the case, Law of Georgia on the Procedure for Expropriation of Property for Necessary Public Needs (2018) and Law of Georgia on Payment of Substitute Land Reclamation Cost and Damages in Allocating Farm Land for Non-Farming Purposes (2018) will be applied, as well as a Resettlement Action Plan according to the Resettlement Policy Framework (World Bank's operational policy on Involuntary Resettlement (ESS5)).

**Underground Cable**

For what concerns the underground cable connecting the converter station to the land approach, the area is covered in crops, grassland and trees. The underground cable route has been chosen in order to follow the main road(Figure 6-63).

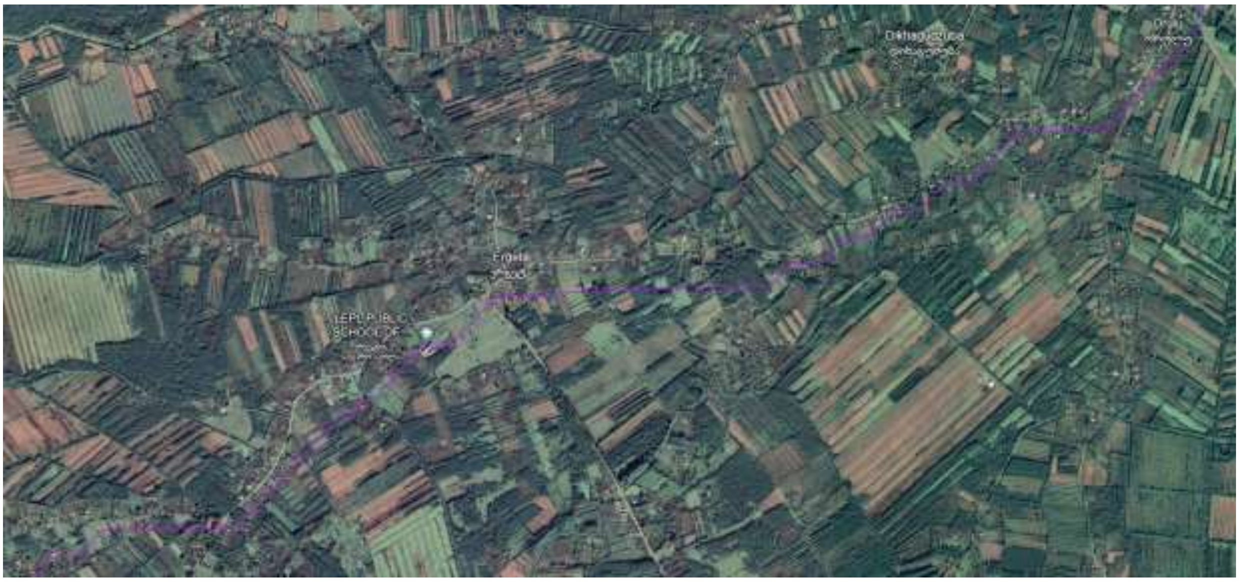


Figure 6-63 Route of the underground cable.

**Overhead transmission line**

For what concerns the Main OHL, from the converter station to the Jvari substation the area is covered in crops, grassland and trees. The only area that presents a higher density of households is localized in proximity of Zugdidi (Figure 6-64). Considering that for the transmission line the majority of actions will be relative to compensation for the permanent land acquisition and/or crop loss during construction activity. However, some minor household resettles cannot be excluded at this stage.

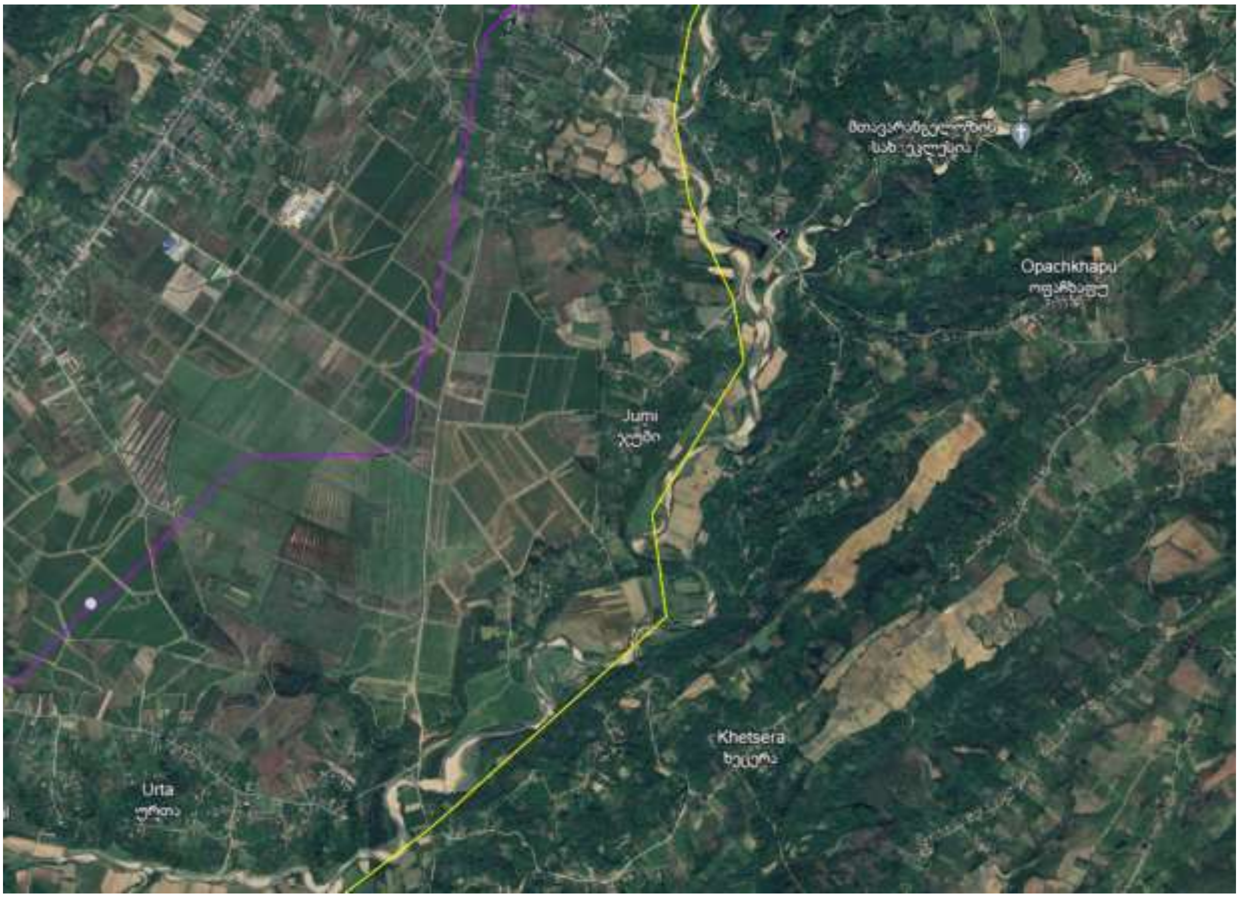

Jumi
ჯუმი
Opachkhapu
Khetsera
ხეცერა
Urta
ურთა


*Figure 6-64 Figures showing three areas of two overhead transmission line alternatives in the Main OHL. The top figure shows an area close to the converter station which is characterized mainly by crops. The central figure represents an area close to Zugdidi where the two alternatives are located in proximity of numerous households. The last picture shows an area localized between Zugdidi and Jvari covered, again, mainly by crops and trees.*

For what concerns the Additional OHL, most of the overhead transmission line is located on areas interested by tree and grassland cover (Figure 6-65). Only a small portion of the line cross croplands and it results close to some human settlements only in two points of the line. The majority of actions would involve compensation for the permanent land acquisition and/or crop loss during construction activity.

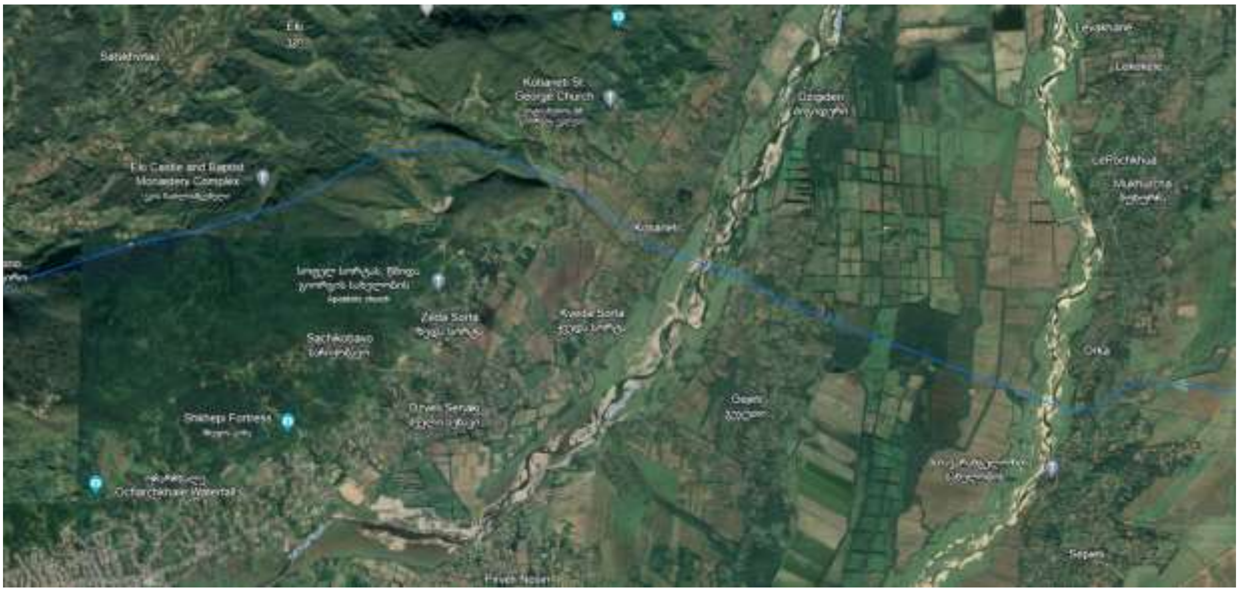


*Figure 6-65 Figures showing three areas of the overhead transmission line in the Additional OHL. Most of the area is covered in crops, grassland and trees.*

### *6.2.11 Terrestrial Cultural Heritage & cultural spaces*

Georgia places significant emphasis on protecting its cultural heritage sites and objects, both religious and secular, under the Georgian Law on Cultural Heritage.

The Law on Cultural Heritage of Georgia specifies main two types of heritage – tangible and intangible heritage that equally are protected by the relevant legislation.

The Georgian Ministry of Culture has designated a classification created for buildings, structures, or sites of paramount cultural importance at the national level which is called the “Immovable Cultural Monument of National Significance”.

This law designates various protective buffer zones, ranging from 50 meters to 1 kilometer, depending on the status of the specific site or object. Consequently, the construction of new buildings in these designated areas or within close proximity is strictly prohibited.

Recent investigations conducted by local consultants have shown that there are no UNESCO cultural heritage monuments or sites within a 1-kilometer radius of the project corridor.

As of 2020, Georgia has four UNESCO World Heritage Sites, comprising three of cultural significance and one of natural significance (UNESCO World Heritage Convention). The sites are the following:

- Gelati Monastery
- Historical Monuments of Mtskheta
- Upper Svaneti
- Colchic Rainforests and Wetlands

### *6.2.11.1 Main OHL*

The most recent addition to this list is the Colchic Rainforests and Wetlands World Heritage Site, which gained its UNESCO status in 2021. This particular site holds special significance as it is located in close proximity to the Main OHL Area, situated approximately 6 kilometers southward (with an approximate distance of 11 kilometers from the OHL).

Dedicated cultural heritage studies (both – on-shore and marine surveys) were carried out during the construction project for the Anaklia deep-water port. These studies revealed that the Anaklia area and its surroundings have a rich history dating back to the Middle Bronze Age, with several cultural heritage sites spanning different historical periods present in the region. Notable among these sites are the Jikha Castle and the Church of Saint Nicholas. Archaeological excavations performed in the 1972-1978 period at a site identified as Anaklia II unveiled a dwelling dating back to the VI-III century B.C. Subsequent archaeological investigations conducted in the 21st c confirmed the existence of a Colchis settlement, revealing artifacts such as plaster fragments and both imported and local ceramics.

The route between Anaklia and Jvari, the main OHL AoI, considering the municipalities of Zugdidi and Tsalenjikha is rich with the cultural heritage monuments having different statuses. The following sites are listed:

*Table 6-25 – Cultural heritage and cultural space in Zugdidi and Tsalenjikha.*

| Name | Year of construction | Location | Year of designation |
|---|---|---|---|
| The Dadiani Palaces and Gardens complex | 17th-19th century | Zugdidi, Zugdidi Municipality, Samegrelo-Zemo Svaneti<br><br>42.512131°N 41.874069°E | 2007 |
| Zugdidi Botanical Garden | 19th century | Zugdidi | 2007 |
| Kadar Naochwamur (chapel) | late middle centuries | Zugdidi Municipality,<br>Koki village<br>N42’28’46 E41’41’33 | 2021 |

| | | | |
|---|---|---|---|
| Tsaishi cathedral of the Dormition | 13th–14th century | Tsaishi, Zugdidi Municipality, Samegrelo-Zemo Svaneti | Tsaishi cathedral of the Dormition |
| Chakvinji fortress | -17th Century | Jikhashkari, Zugdidi Municipality, Samegrelo-Zemo Svaneti<br><br>42.490967°N 41.980569°E | |
| Tsalenjikha Cathedral of the Transfiguration | 14th century | Tsalenjikha, Tsalenjikha Municipality, Samegrelo-Zemo Svaneti<br><br>42.600465°N 42.081535°E | 2007 |
| Skuri church | 13th century | Skuri, Tsalenjikha Municipality, Samegrelo-Zemo Svaneti<br><br>42.683883°N 42.162909°E | 2007 |
| Enguri Dam | 1961–1972 | Jvari, Tsalenjikha Municipality, Samegrelo-Zemo Svaneti<br><br>42.759167°N 42.031944°E | |

#### *6.2.11.2 IAdditional OHL*

The Additional OHL Area of Interest (AoI) spans across two regions: Samegrelo-Zemo Svaneti, which includes the cities of Khobi and Senaki, and Imereti, which encompasses the cities of Tskhaltubo and Kutaisi. Cultural heritage sites are primarily concentrated in the major cities within this area, and no cultural heritage monument or site has been identified within a 1-kilometer radius of the project corridor.

One notable cultural heritage site in the Samegrelo-Zemo Svaneti region is the Khobi Monastery, situated in Nojikhevi, Khobi Municipality. Dating back to th[e] 13th century, this Georgian Orthodox monastery holds a special place in the re’ion's history. It is designated as an Immovable Cultural Monument of National Significance.

*Table 6-26 – Monuments in Senaki Municipality listed in the Immovable Cultural Monuments of National Significance and in the Real Monument List. Source: National Agency for Cultural Heritage Preservation of Georgia.*

| Name | Year of construction | Location | Year of designation |
|---|---|---|---|
| Nokalakevi historical site | Classic period | Senaki Municipality, Samegrelo-Zemo Svaneti<br>42.357222°N 42.193889°E | 2007 |
| Eki monastery of St. John the Baptist | 13th century | Eki, Senaki Municipality, Samegrelo-Zemo Svaneti<br>42.336179°N 42.115987°E | 2007 |
| Shkhepi fortress | Medieval | Dzveli Senaki, Senaki Municipality, Samegrelo-Zemo Svaneti<br>42.292451°N 42.111556°E | 2007 |
| Fortress of Sorta | IV-VI centuries. | Senaki Municipality | 2015 |

The Nokalakevi, also known as Archaeopolis, is one of the most significant archaeological sites from the Hellenistic and early Byzantine periods.

In the Kutaisi Municipality, within the Imereti region, ten monuments are listed in the Immovable Cultural Monuments of National Significance, which are reported in the table below.

*Table 6-27 – Monuments in Kutaisi Municipality listed in the Immovable Cultural Monuments of National Significance. Source: National Agency for Cultural Heritage Preservation of Georgia.*

| Name | Year of construction | Location | Year designated |
|---|---|---|---|
| Bagrati Cathedral, the domed church | 1003 | Kutaisi, Imereti 42.277211°N 42.704243°E | 2007 |
| Bagrati Cathedral, the bell-tower | Late Medieval | Kutaisi, Imereti 42.277000°N 42.704028°E | 2007 |
| Bagrati Cathedral: the Ukimerioni fortress | Medieval | Kutaisi, Imereti 42.277348°N 42.705091°E | 2007 |
| Bagrati Cathedral: the Ukimerioni church | Medieval | Kutaisi, Imereti 42.277290°N 42.705404°E | 2007 |
| Bagrati Cathedral: other structures | Medieval | Kutaisi, Imereti 42.277290°N 42.705404°E | 2007 |
| Mtsvanekvavila complex: the church of the Archangels | 11th century | Kutaisi, Imereti 42.276224°N 42.716584°E | 2007 |
| Mtsvanekvavila complex: the tower | 17th century | Kutaisi, Imereti 42.276224°N 42.716584°E | 2007 |
| Mtsvanekvavila complex: the Kvariani church | 17th century | Kutaisi, Imereti 42.276224°N 42.716584°E | 2007 |
| Okros Chardakhi mansion | Late Medieval | Kutaisi, Imereti 42.269925°N 42.700575°E | 2007 |
| Jachvis Khidi bridge | 19th century | Kutaisi, Imereti 42.273944°N 42.702256°E | 2007 |

In the Tskaltubo Municipality, situated in the Imereti region, a balneological heritage dating back to t$^{he}$ 7$^{th}$-9th centuries is preserved, and its waters are renowned as ‘he 'Waters of Immortal’ty.' Among the‘e, 'Spring N’. 6' stands as the largest thermal bath still in operation. It was constructed in 1950 exclusively for Joseph Stalin, the leader of the Soviet Union at that time. The city also retains private baths and dachas once used by Stalin and Lavrenti Beria. Notably, in 20‘9, 'Balneo Resort Tskal’ubo' attained affiliated membership with the United Nations World Tourism Organization. Additionally, in 2018, Tskaltubo, as a balneological resort, was welcomed as a member of the Association of European Historic and Thermal Towns (EHTTA).

In the Municipality of Tskaltubo, the following cultural heritage monuments and sites are reported in the Immovable Cultural Monuments of National Significance:

*Table 6-28 – Monuments in Tskaltubo Municipality listed in the Immovable Cultural Monuments of National Significance. Source: Environmental Impact Assessment Report of the 500Kv Jvari- Tskaltubo Transmission Line and Tskaltubo Substation, DG Consulting Ltd, 2019.*

| Name | Year of construction | Location | Year of designation |
|---|---|---|---|
| Palace of Geguti: the palace church | Medieval | Geguti, Tsqaltubo Municipality, Imereti<br><br>42.190350°N 42.691207°E | 2007 |
| Palace of Geguti: other structures | Medieval | Geguti, Tsqaltubo Municipality, Imereti<br><br>42.190350°N 42.691207°E | 2007 |
| John the Bap'ist's church of Derchi | High Medieval | Derchi, Tsqaltubo Municipality, Imereti<br><br>42.462856°N 42.776411°E | 2007 |
| Saint C'ril's church of Zarati | High Medieval | Zarati, Tsqaltubo Municipality, Imereti<br><br>42.354191°N 42.722696°E | 2007 |
| Namokhvani village church | Middle Centuries | Namokhvani village, Tskaltubo municipality<br>X 42.42951<br>Y 42.68518 | 2021 |
| Iveria Sanatorium | 1962 | Tsqaltubo Municipality, | 2021 |
| Gelati Sanatorium | 1964 | Tsqaltubo Municipality | 2021 |
| Imereti Sanatorium | 1961 | Tsqaltubo Municipality | 2021 |
| Medea Sanatorium | 1957-1962 | Tsqaltubo Municipality | 2021 |
| Metallurgist Sanatorium | 1957 | Tsqaltubo Municipality | 2021 |
| Bathhouse Number 6 | 1951 | Tsqaltubo Municipality | 2021 |
| Bathhouse Number 8 | 1959 | Tsqaltubo Municipality | 2021 |
| Tskaltubo<br>Railway building | XX century | Tsqaltubo Municipality | 2021 |

### *6.2.11.3 Intangible cultural heritage of Georgia*

Intangible cultural heritage are elements of the cultural heritage of Georgia which are abstract and must be learned, encompassing traditional knowledge including festivals, music, performances, celebrations, handicrafts, and oral traditions.

The list of monuments of intangible cultural heritage of Georgia includes those monuments which, based on the order of the Minister of Cultural Heritage protection of Georgia or the General Director General of the National Agency for Cultural Heritage Preservation of Georgia, were recognized as monuments of intangible cultural heritage according to the concept of UNESCO.

Starting from 2011, 50 items were inscribed on the registry of Georgia's Intangible Cultural Heritage as of March 2020. Four of them have been placed on the UNESCO Intangible Cultural Heritage Lists (Wresting in Georgia, Living culture of three writing systems of the Georgian alphabet, Ancient Georgian traditional Qvevri wine-making method, Georgian polyphonic singing).

“”“”The list of Georgian intangible cultural heritage specifies various aspects of traditional handicraft, rituals or specific cuisine traditions but specific to the surrounding regions are only:

- Tradition of the use of medicinal mineral springs in Upper Svaneti;
- Megrelian Adjika.

The both of them are affiliated to the region of Main OHL.

### *6.2.12 Agriculture*

Agriculture is a vital component of the economies in both target regions. Imereti focuses on the cultivation of maize, grapes, various vegetables, herbs, and spices, contributing to 14 percent of Ime’eti's total value-added indicator.

In Samegrelo-Zemo Svaneti, corn production plays a significant role, accounting for 27% of the total corn produced in Georgia. Fruit production is also pivotal in this region; in 2020, Samegrelo-Zemo Svaneti produced 34.6 thousand tons of fruit (EPRC, 2022). Furthermore, Samegrelo-Zemo Svaneti is the primary producer of nuts (44%) and sub-tropical fruits (37%) (EPRC, 2022). Agriculture in this region contributes 17 percent of its total value.

Imereti encompasses a total agricultural land area of 65,737 hectares, with 78% allocated to annual crops, 13%t (8,831 hectares) to perennial crops, 8% (5,410 hectares) to uncultivated arable land, and 0.7% supporting greenhouses. Similarly, the Samegrelo-Zemo Svaneti region comprises 66,662 hectares of agricultural land, with 55% (36,608 hectares) devoted to crops, including 27,003 hectares for perennial crops, and five percent (3,027 hectares) for grasslands.

As of October 2014, local farms utilize 842.3 thousand hectares of agricultural and non-agricultural land (Agriculture and Rural Development Strategy of Georgia 2021 – 2027). In Georgia, 87.2% of agricultural land is privately owned, and only 12.8% is temporarily used. Most farms own small parcels, typically less than 2 hectares of agricultural land. There are 574,100 units of agricultural lands, with the majority located in the Kakheti region, accounting for 40.1% (FAO, 2019). In 2014, agriculture contributed to approximately 7% of Georgia’s GDP (National Statistics Office of Georgia, 2014), reflecting a decline from over 10% in 2011.

The primary cultivated crops in 2021, along with their production quantities (ibid.), are as follows:

- Potatoes: 235,100 tons
- Maize: 233,000 tons
- Vegetables: 149,000 tons
- Wheat: 136,100 tons

Over the past decade, there have been some variations in the volume of production, but the overall trend remains stable.

Subsistence farming and animal husbandry are prevalent in both areas (EPRC, 2022). In Samegrelo-Zemo Svaneti, the majority of cattle are reared, contributing to 16% of the milk production in Georgia. The region also hosts the majority of pigs, accounting for 24% of all pigs registered in the country (Ibid). The region registers 10% of poultry and 20% of goats in the country.

Regarding livestock, the following numbers of animals were herded in 2021:

- Sheep and goats: 956,800
- Cows: 928,600
- Pigs: 152,900

These figures have generally remained stable over the last decade (Agenda GE, 2022).

### *6.2.13 Waste*

Waste management obligations in Georgia stem from the EU-Georgia Association Agreement, which led to the adoption of the Waste Management Code of Georgia in 2014. However, it is worth noting that this Code is not fully effective.

In Georgia, a significant portion of inert waste is generated by construction activities and is partially deposited in non-hazardous waste landfills. As per the Tbilisi Municipality City Hall, between 2018 and 2021, the inert waste deposition amounted to 780,000 tons. A recent UNDP study revealed that there are no inert waste landfills in the country that align with Georgian legislation or European standards, and there are no essential prerequisites in place for their establishment, which is crucial for collaboration with businesses and meeting the local population's needs (p.9, UNDP 2022). Additionally, there is a lack of inter-municipal cooperation in inert waste management.

Before 2017, there was no segregation of collected municipal hazardous or other types of waste (USAID, 2017). Each year, Georgia generates nearly 900,000 tons of waste, and 75% of it ends up in landfill sites, posing significant environmental and public health concerns. The Georgia National Waste Management Strategy for 2016-2030 has set specific targets, including recycling 50% of plastic waste by 2025 and 80% by 2030.

When it comes to solid waste, the average waste generation rate is 0.95 kg per inhabitant per day in urban areas and 0.54 kg per inhabitant per day in rural areas. In 2019, municipal solid waste generation reached 1,117,396 metric tons and is projected to increase to 1,252,855 tons in 2025 and 1,568,949 tons in 2040. Of the total municipal solid waste collected, transported, and disposed of at existing non-engineered landfills, 988,905 tons make up the figure. Notably, 60% of the total waste collected is concentrated in three key urban areas: Tbilisi, Imereti, and the Achara Autonomous region (The World Bank, 2021).

As of 2017, there were 56 landfills recorded in Georgia. Only four of these landfills, one private and three state-owned, complied with international standards and possessed an Environmental Impact Assessment (EIA) permit:

- Tbilisi Norio landfill
- Rustavi landfill
- Borjomi landfill
- Privately owned BP landfill

Despite some recent improvements, there is still a lack of robust waste management systems in rural areas, particularly the absence of waste collection and removal services in remote villages.

Up to 2017, three wastewater treatment facilities were operational in the country: Gardabani (serving Tbilisi and Rustavi), Adlia (serving Adjara AR), and Sachkhere (privately owned) treatment facilities (USAID, 2017).

### *6.2.14 Marine Fishery*

Small-scale vessels, demersal trawlers, purse seiners and pelagic trawlers dominate the Mediterranean and Black Sea (FAO, 2022c). The operating fleets in the Black Sea are 11,000 vessels of which the 82% are small scale vessels. The second largest fleet segment is the one of demersal trawlers (8%), followed by purse seiners and pelagic trawlers with 5%.

In the Black Sea the total fish landing from fishing activities was 446,100 tons (2018-2020). Türkiye is the largest regional producer, followed by Georgia, the Russian Federation, Ukraine, Bulgaria, and Romania.

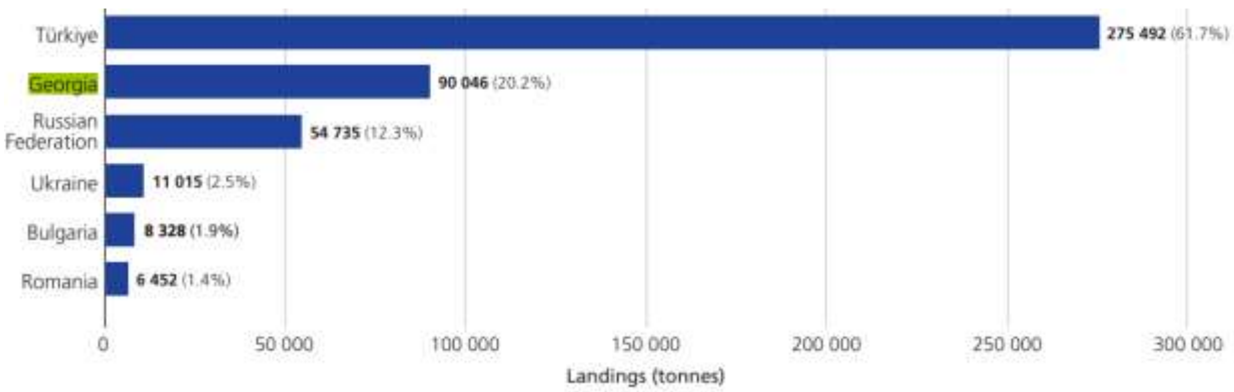



*Figure 6-66 – Average annual landings by country in the Black Sea 2018–2020 (source: FAO, 2022).*

The number of operating vessels by General Fisheries Commission for the Mediterranean (GFCM) in Georgia is of 49 with a gross tonnage (GT) of 9,184 and a total engine power of 43,264 kW. Between 2018 and 2020 in the GFCM area of application, Georgia contributed to the 20.2% of the total catch in the Black Sea which is 90,000 tons.

The International Maritime Organisation (IMO) assigned a number to each vessel in order to fight against illegal unregulated fishing. They are categorized on the basis of fishing vessels of steel and non-steel hull construction with a length overall (LOA) of 20 m or above; in Georgia these types of vessels are the 73.5% of the total number of fishing vessels.

The average landings for the years 2016-2018 for Georgia have been 90,046 tons with a negative turn of – 0.15 % variation in the 2018-2019 whilst a stable one with 0.27% variation for the years 2019-2020.

The following figure describes the total landings of main species groups by country in the GFCM area.

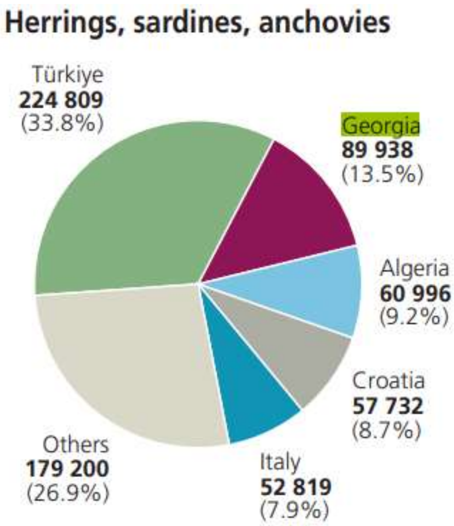



*Figure 6-67 – Total landings of main species groups by country (source: FAO, 2022).*

From the figure it can be seen that Georgia is second (with the 13.5%) for the catch of herrings, sardines, anchovies.

There are six main landing ports in the Black Sea (one Georgian and five Turkish). The port that accounts for the main landings in Georgia is Poti port with 23,035 tonnes which accounts for 5.2% of the Black Sea contribution.

| Port | Country | Landings (tonnes) | % contribution |
|---|---|---|---|
| **Samsun Merkez B.B.** | Türkiye | 31 039 | 7.0 |
| **Poti** | Georgia | 23 035 | 5.2 |
| **Terme B.B.** | Türkiye | 19 571 | 4.4 |
| **Tirebolu B.B.** | Türkiye | 15 997 | 3.6 |
| **Kandıra-Bağırganlı B.B.** | Türkiye | 15 840 | 3.6 |
| **Hopa B.B.** | Türkiye | 15 622 | 3.5 |
| **Şile B.B.** | Türkiye | 12 660 | 2.9 |
| **Demirci Köyü B.B.** | Türkiye | 11 605 | 2.6 |
| **Inebolu Gemiciler B.B.** | Türkiye | 11 540 | 2.6 |
| **Iğneada B.B.** | Türkiye | 10 364 | 2.3 |

*Figure 6-68 – Main ports in terms of landings in the GFCM area (source: FAO, 2022).*

Data concerning the Georgian socio-economic situation of fishery are or completely lacking or not up-to-date (Global fish trade database, FAO, 2022c). The few data available concern the revenue from marine capture fisheries by GFCM contracting party and cooperating non-contracting party, for which Georgia's total annual revenue accounted for 6,086,103 USD in 2016.

Total amount of imported fish for 2014-2020 period was 113,000 tons (World Health Organization, 2022c). 37,000 tons of fish were exported from Georgia during 2014-2020 period, smaller amount compared to imports (World Health Organization, 2022c).

### 6.2.14.1 Freshwater fishery

Aquaculture sector in Georgia has grown hand in hand with the development of a national food industry a decade ago. The sector can be divided into two subsectors: warmwater in the plains and cold water in the uplands. Warm waters are used for farming carp, sturgeon (not protected species) and catfish, while cold waters are utilized to farm trout; salmonids (rainbow trout) account for over half of the sector's volume in Georgia (FAO, 2022b). The sector is mostly consisting of households and small producers, in 2019 the total volume produced was 2,500 tonnes, 20% more than 2017, thus with a slight upward trend (ibid). Registered economic entities of freshwater aquaculture are in decline in Georgia: only 16.7% entities who registered in 2014 continued after 4 years (National Statistics office of Georgia).

In Georgia, various sturgeon species are present and are all officially protected. Commercial fishing in the River Rioni is strictly limited and only recreational fishing with rod and line is permitted, with the obligation to immediately release the caught species. Georgia, as member of the Council of Europe, ratified the Bern Convention on the Conservation of European Wildlife and Natural Habitats (open for signature on 19 September 1979) on 19 November 2009, as well as the Action Plan for the Protection and Restoration of the European Sturgeon and the Pan-European Action Plan for Sturgeons in 2018.

### 6.2.15 Ports and oil terminals in the OHL area

**Ports**

The Port of Poti is a commercial port with facilities designed to manage a wide range of cargo types, including dry and liquid bulk cargoes, container cargoes, general cargoes, and roll-on roll-off ferry cargoes. An addition to this port's infrastructure is the planned Multifunctional Transshipment Terminal, set to enhance its capabilities significantly. Once completed, this terminal will empower the port to handle 700,000 tons of bulk cargo, 640,000 tons (equivalent to 64,000 TEU) of container cargo, 190,000 tons of general cargo, and 30,000 tons of ro-ro cargo.

To ensure smooth navigation, the port's approach channel is deepened to approximately -9.4mBZ to -10mBZ. Vessels entering or exiting the port are subject to pilotage and tug assistance. The port has dedicated berths for various types of vessels, including container vessels (with a draught of -8.2mBZ), passenger vessels (draught -9.2mBZ), ro-ro vessels (-7.5mBZ), dry bulk/general cargo vessels (-9.25mBZ), and liquid bulk vessels such as tankers (with a draught of -10.5mBZ, a dead weight tonnage of 35,000, and an overall length of 185m).

The bulk of commercial vessel traffic follows established shipping routes to other ports within the Black Sea or, for destinations beyond the Black Sea, transits via the Bosporus channel and the Mediterranean Sea. This includes regular ferry services operating from the ports of Poti and Batumi, connecting to Constanza (Romania), Chornomorsk (Ukraine), and Samsun (Türkiye).

Notably, vessels, especially commercial ones, are prohibited from navigating within the boundaries of the Kolkheti National Park, impacting the passage of vessels arriving at or departing from Poti, Supsa, and Kulevi.

**Oil Terminals**

The Supsa marine terminal is situated along the Supsa River, south of Poti, and just beyond the Kolkheti National Park boundary. This terminal serves as the export facility for the Supsa oil terminal, which marks the western endpoint of the 833km Baku-Supsa pipeline. On the other hand, the Kulevi oil terminal is positioned on the Kulevi River between Anaklia and Poti, squarely within (but not encroaching on) the Kolkheti National'Park's boundaries. Throughout the year, the terminal accommodates a significant number of tankers, ranging from 129 to 207 in total.

### 6.2.16 Maritime traffic

The description of the maritime traffic conditions in the AoI derive from the consultation of the Marine Traffic database. The figure below provides an indication of the density of marine traffic in terms of routes travelled by ships per year. The land approach AoI is highlighted in red below. As shown in the figure below maritime traffic levels are very limited in the AoI, in the range between 1 to 10 routes per year. Marine traffic occurs in proximity to the port of Kulevi, which is used for fluvial vessels and for vessels serving industrial facilities. This port is located approx. 12 km south of the land approach site. Also, in this case the density of marine routes is relatively low. More significant marine traffic occurs in proximity to the port of Poti, which can be considered the most important port of Georgia together with Batumi. The Poti port is located approx. 26 km south of the land approach site.

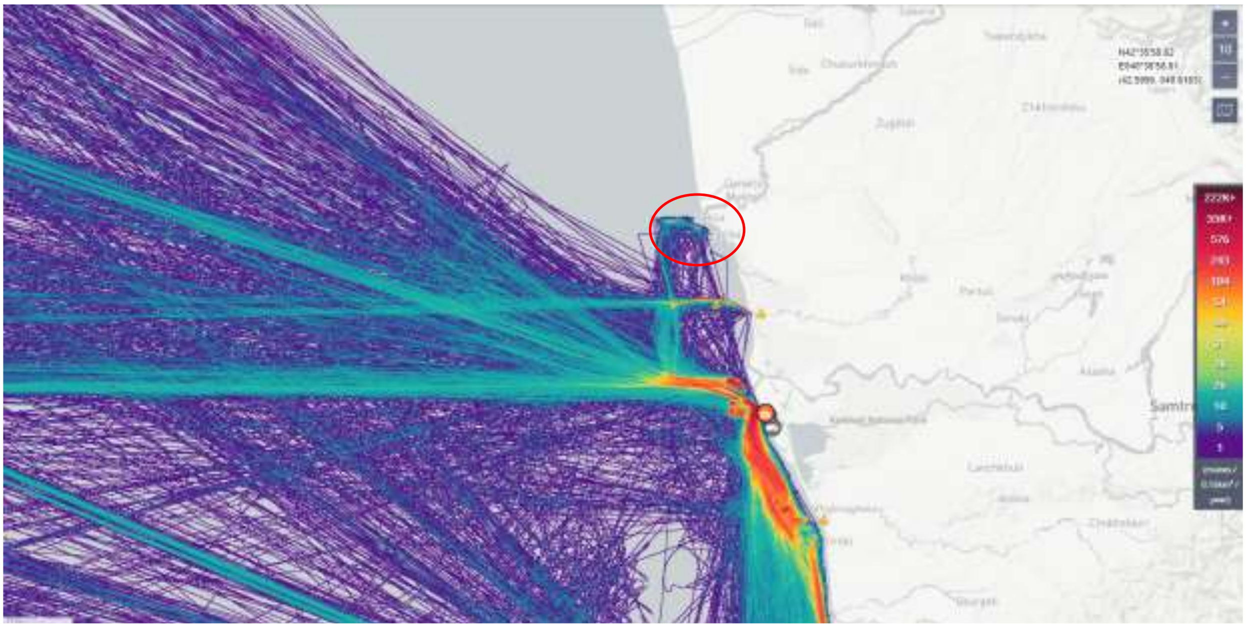


Figure 6-69 – Maritime traffic density data (source: MarineTraffic, 2023). The AoI is indicated in red.

### 6.2.17 Social gaps Information and Recommendations

The table below reports the main gaps identified in the Georgian social baseline and recommendations for filling-in the identified gaps.

*Table 6-29 – Primary gaps recommendations for the social Georgian baseline.*

| Component | Gaps | Recommendation |
|---|---|---|
| **Social components** | | |
| Population and demographics | Missing specific data on demographic statistics in the AoI. Further data necessary to identify minorities and vulnerable groups. | ▪ Additional in-depth desktop studies on demographic statistics in the AoI.<br>▪ Field survey to retrieve updated demographic data from local authorities.<br>▪ Consultation of minorities and vulnerable groups, including IDPs, are recommended to retrieve further understanding on their presence in the AoI and their demographic profile. |
| Community health and safety | Missing specific data on health conditions and healthcare facilities in the AoI. | ▪ Additional in-depth desktop studies on epidemiological data and quality level of healthcare services offered in the AoI.<br>▪ Field survey to identify healthcare facilities, access for local communities, level of maintenance and equipment present.<br>▪ Consultation of healthcare authorities and healthcare workers to retrieve further primary and qualitative data. |
| Education | Missing specific data on education levels and education facilities in the AoI. | ▪ Additional in-depth desktop studies on education levels epidemiological data and level of quality services offered in the AoI.<br>▪ Field survey to identify education facilities, access for local communities and level of maintenance.<br>▪ Consultation of education authorities and workers to retrieve further primary and qualitative data. |
| Economy and livelihoods | Missing specific data on economic and livelihood conditions in the AoI. | ▪ Additional in-depth desktop studies on economic statistical data to have a better understanding on the main economic sectors in the AoI and on the current trends.<br>▪ Consultation of local authorities are recommended to retrieve primary data on main economic trends in the AoI. |

| | | |
|---|---|---|
| | | ▪ Consultation of minorities, vulnerable groups, including IDPs, and women are recommended to retrieve further understanding on their livelihood conditions in the AoI. |
| Infrastructures, transport and mobility | Missing specific data on infrastructures in the AoI, their level of maintenance and access for local communities. | ▪ Additional in-depth desktop studies on presence and level of access to infrastructure networks in the AoI.<br>▪ Field activities to identify main infrastructures in the AoI and level of maintenance.<br>▪ Consultation of local authorities and local communities to retrieve primary data on infrastructures present in the AoI, main problems and planned development programs. |
| Social infrastructure and services | Missing specific data on social infrastructures in the AoI and role for local communities. | ▪ Field survey to identify social infrastructures present in the AoI.<br>▪ Consultation of local authorities and local communities to retrieve primary and qualitative data on social infrastructures, with a specific focus on informal networks and community self support mechanisms;<br>▪ Consultation of women, minorities and IDPs to retrieve focused information on informal networks and self support mechanisms. |
| Tourism | Missing specific data on role of tourism in the AoI and main infrastructures present. | ▪ Additional in-depth desktop studies on significance of tourism sector in the AoI.<br>▪ Consultation of workers in the tourism sector to retrieve primary and qualitative information. |
| Landscape | Missing specific identification of landscape features in the AoI. | ▪ Field survey to identify main landscape features in the AoI and to retrieve photographic material.<br>▪ Field survey to identify areas or elements of visual quality in the AoI.<br>▪ Field survey to identify sensitive viewpoints in the AoI. |
| Land use | Missing specific identification of land use and land tenure characteristics in the AoI. | ▪ Additional in-depth desktop studies to identify and map land uses in the AoI.<br>▪ Field survey to verify land uses identified from desktop.<br>▪ Consultation with local authorities and local communities to have a better understanding of the land tenure systems in the AoI. |

| | | |
|---|---|---|
| | | ▪ Consultation of women, minorities and IDP to have a better understanding of access to land and land tenure for these groups. |
| Cultural heritage | Missing specific identification on intangible cultural heritage and heritage of value to local communities. | ▪ Additional in-depth desktop studies to identify all known tangible and intangible cultural heritage (both protected and non) present in the AoI.<br>▪ Field survey to confirm the findings of the desktop research and to identify the risk of presence of unknown cultural heritage.<br>▪ Consultation of local authorities and local communities to identify elements of cultural value, both tangible and intangible.<br>▪ Consultation of women, minorities and vulnerable groups to identify elements of cultural value, both tangible and intangible. |

## 6.3 Romanian Environmental Baseline

Similar to the environmental assessment described for the Georgian area, the Romanian environmental baseline serves to evaluate the environmental conditions within the Project's designated Area of Interest (AoI), target possible key receptors present within the AoI and highlights sensitive environmental components which need particular consideration in the scope of the ESIA.

A preliminary descriptive framework of these environmental aspects is provided in the following chapters.

### *6.3.1 Historical background*

The principalities of Wallachia and Moldavia were under the Turkish Ottoman Empire until they became independent in 1856. They were formally united in 1862 and they became an independent state called Romania in 1878. Romania took part in the World War I and acquired territories after the war such as Transylvania. In 1940 Romania initially allied with the Rome-Berlin axis but then passed under the influence of the USSR. After the World War II Romania was occupied by the Soviets and following the forced abdication of King Michael I, the communist “People’s Republic” was proclaimed in 1947. In 1948, the state began to nationalise private firms and to collectivise agriculture. Nicolae Ceausescu came to power in 1965 and ruled the country until 1989. A turbulent period followed, marked by violent protests and counterprotests. Subsequently, the Romanian government undertook a programme of free market economic reforms and privatization, following a gradualist line rather than shock therapy throughout the early and mid-1990s. Economic reforms have continued, although there was little economic growth until the 2000s. Social reforms soon after the revolution included easing of the former restrictions on contraception and abortion. Later governments implemented further social policy changes.

After the end of the Cold War, Romania developed closer ties with Western Europe and the United States, eventually joining NATO in 2004, and hosting the 2008 summit in Bucharest. The country applied in June 1993 for membership in the European Union and became an Associated State of the EU in 1995, an Acceding Country in 2004, and a full member on 1 January 2007. Romania still keeps its currency which is the Romanian leu (RON).

### *6.3.2 Onshore Physical Baseline*

#### *6.3.2.1 Air Quality, Meteorology, Climate and Climate Change*

##### *6.3.2.1.1 Air Quality*

According to the AccuWeather (https://www.accuweather.com/en/ro/constanta/287719/air-quality-index/287719) website, the air quality in Constanta varies between fair to poor based on the concentration of Particulate Matter, Ozone, Nitrogen and Sulfur Dioxide and Carbon Monoxide. Particulate Matter and Ozone concentrations seem to be the parameters that affect air quality the most.

##### *6.3.2.1.2 Meteorology and Climate*

Romanian’s inland climate is typically temperate continental, while along its eastern portion an oceanic climate occurs. The AoI is located in a coastal area characterized by oceanic and semi-arid influences with hot and humid summers, and cool to mild winters. In fact, the area is classified as humid subtropical area (cfa) and temperate oceanic climate (cfb) by Köppen & Geiger climate classification system (Climate Data, 2023). Precipitation occurs throughout the year, even during driest month, with an average annual rainfall of 460 mm (Climate Change Knowledge Portal, 2023). The average monthly temperature and rainfall in Constanta region are shown in Figure 6-70.

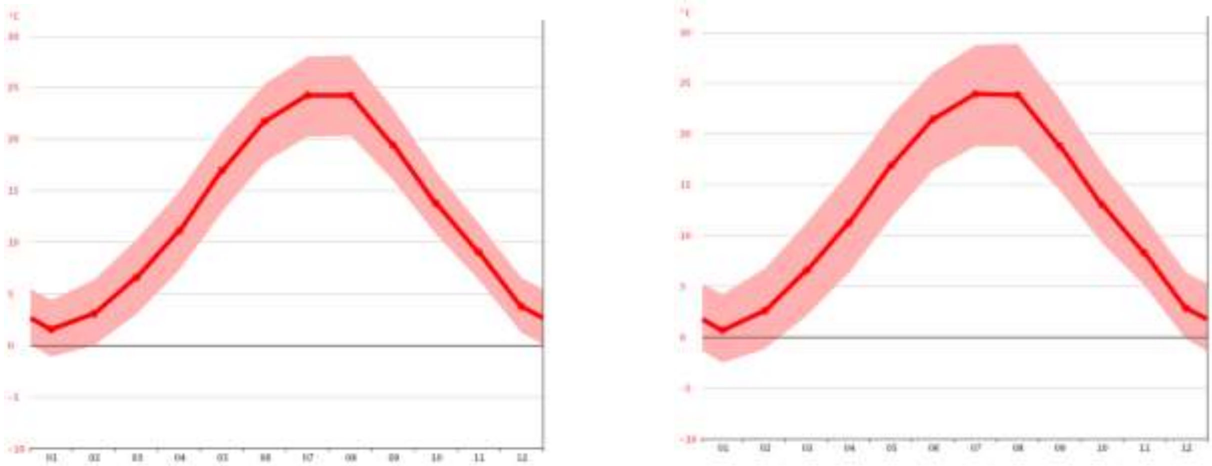


*Figure 6-70 – Average monthly temperature (°C) in Constanta (left) and Medgidia (right; source: climate-data.org).*

The temperatures range varies with the seasons, from 1 - 3 °C in winter months to 24 °C in summer. Within the AoI, the warmest month of the year is July in both Constanta and Medgidia, with an average temperature of 25 °C. The coldest month is January, with temperatures around -1,0 °C (Figure 6-70) (climate-data.org).

The driest month in Constanta is July with an average of 32 mm of precipitation, while the greatest amount of precipitation occurs in September, with an average of 55 mm of precipitation. The driest month in Medgidia is February, with an average of 34 mm of rain, while the precipitation reaches its peak in June with an average of 62 mm (Figure 6-71).

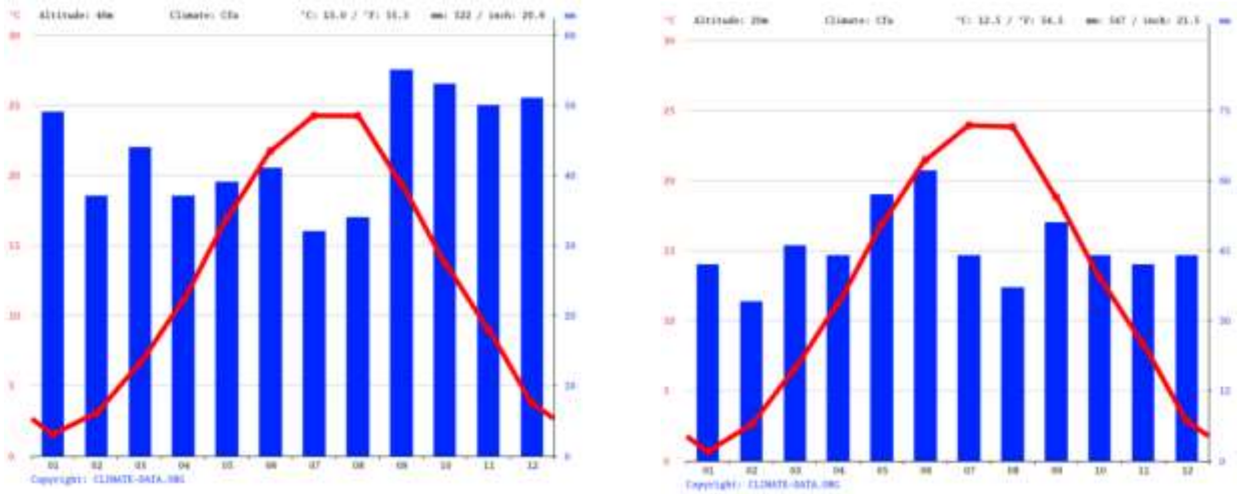


*Figure 6-71 – Average monthly rainfall (mm) in Constanta (left) and Medgidia (right; source: climate-data.org).*

The region where the Project is located is characterized by intense wind especially along the coast with an average speed of 6.17 m/s (22.2 km/h) (Figure 6-72). Within the AoI, the windiest period occurs during winter months, generally the average hourly wind speed is up to 17.7 km/h (11 mph). The Figure 6-73 shows the average annual wind speed trend in Constanta and Medgidia.

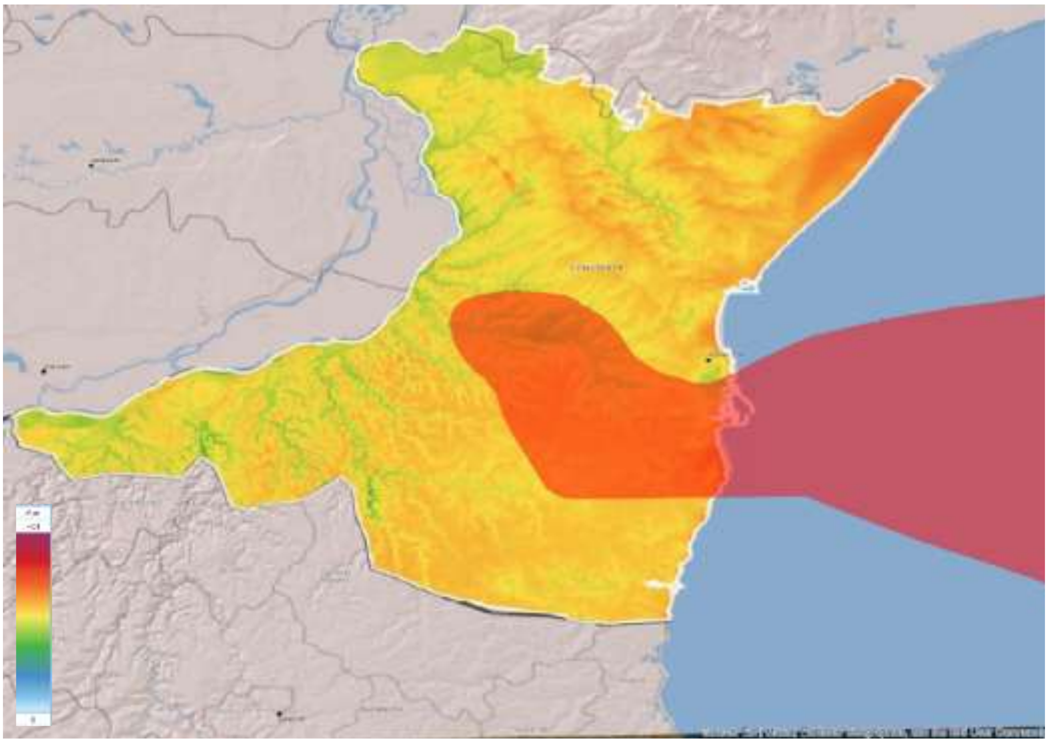


*Figure 6-72 – Average wind speed at 50 m in Romania - Constanta region (Source: Global Wind Atlas). The red polygon indicates the AoI.*


*Figure 6-73 – Average annual wind speed in Constanta and Medgidia compared (source: Weather Spark.com).*

The predominant wind direction varies throughout the year and within the AoI. In Medgidia the dominant wind blows mainly from north northeast (Figure 6-74) with gusts up to 29.6 km/h (WindFinder, 2023b). Constanta instead is sheltered from the northerly winds, and the dominant wind is from east-southeast with gusts of about 16.6 km/h (Figure 6-75) (WindFinder, 2023,a).


*Figure 6-74 – Dominant wind direction in Medgidia between 11/2014 - 02/2023 (Source: Windfinder.com).*


*Figure 6-75 – Dominant wind direction in Constanta between 05/2014 - 02/2023 (Source: Windfinder.com).*

### *6.3.2.1.3 Climate Change*

Similar to the Republic of Georgia, also Romania is vulnerable to increases in temperature and precipitation.

**Increased in temperature**

According to the Romania's 8th National Communication on Climate Change (2022), Romania will face a progressive increase in air temperature during the 21st century, for all seasons, but more pronounced in summer and winter. In the near future (2021-2050), the results of the climate models show for Romania an average monthly increase in temperature (up to 3 °C in summer) in the most pessimistic RCP scenario (RCP 8.5) with the highest global greenhouse gas concentrations (GHCs) at the end of this century (Bojariu et al, 2021). Larger differences in climate are expected towards the end of the 21st century. For the most pessimistic scenario (RCP 8.5), the increase in the average monthly temperature in Romania will exceed 6 °C during the summer, in the period 2061-2090 compared to the period 1961-1990 (Bojariu et al., 2021). Projections also show that an increase in the number of days with heat waves, especially in the southern, southeastern, and western region of the country (Bojariu et al, 2015).

**Increased Magnitude of Precipitation**

Data collected from 104 weather stations between 1961 and 2007 shows that the pattern of precipitation during the year is already changing in some regions, specifically an increase in the length of dry time have been detected in the south during winter and in the west during summer, and significant decreases in the thickness of snow layers (accumulated during winter precipitation) are characterizing most of the country.

According to projections in the Fourth IPCC Report (IPCC, 2007), Romania should expect a 10-20% reduction in mean annual precipitation by the end of the century, but this is likely to vary greatly between the north and south of the country, and between the mountains and lowland areas. The pattern of precipitation is also expected to continue to change with a greater frequency of shorter, more intense and localised rainfall events. Rainfall patterns may also become more chaotic and difficult to predict.

The future increase in temperature and intensity of precipitation can exacerbate climate change-related hazards, namely:

- **Drought:** spring drought represents the most harmful type of drought in Romania caused by limited snowfall during winter and thus low water reserves in the soil. Once a spring drought occurs, even abundant rains in later months cannot mitigate its negative consequences;
- **Soil erosion:** the increased incidence of heavy rainstorms, with high intensity and short duration, will generate increased short-term surface runoff and the risk of increased soil erosion by water on sloping land, particularly in those areas with the most vulnerable soil types;
- **Fluvial and Coastal floods:** it is expected an increased magnitude and occurrence of flooding events which can become a substantial problem for the agricultural sector. The main areas so far affected by flooding have been located along the Danube, and in the Romanian Plain (Siret, Arges, Olt and Jiu Rivers) and the Banat-Crisana Plain (Somes Cris and Mures rivers).

A changing climate will affect water and water-using activities and sectors in Romania, but there are numerous adaptation actions that make sense. Water demand for agriculture has decreased in correspondence to the long trend of reduction in irrigated areas, but water scarcity is serious in many basins during summer droughts, and climate change will threaten water availability during the primary growing months while raising irrigation water demand.

Recommendations also include encouraging windbreaks and soil management to reduce soil erosion, promoting renewable energy sources, promoting organic farming, improving good farming practices, improving awareness of climate change and the need for adaptation, and strengthening policy, and institutional capacity is vital to support the recommended interventions.

This dependence on a weather-sensitive economic sector raises the likely economic impact of a worsening climate. Romania’s sensitivity to climate compared to the EU is also indicated by air pollution (with the 6$^{th}$ worst PM10 levels in the EU) which worsens the health impact of heat waves as well as relatively low water resources per capita (with a level 2.3 times below the EU average).

**Effects of the Project on Climate change.**

- **Negative.** The Project is expected to have negative effects on climate change during the construction phase, as the use of vessels, heavy vehicles and machineries will lead to the introduction of greenhouse and climate change gases into the atmosphere.
- **Positive.** Climate change is a major risk to good development outcomes, and the World Bank Group is committed to play an important role in helping countries integrate climate action into their core development agendas.

The creation of the new underwater cable connecting Romania to Georgia will allow to integrate a growing share of renewables in Europe through electricity interconnections.

This is expected to have a considerable positive impact on climate change and emission reduction.

#### *6.3.2.2 Geology, Geomorphology and Soil*

##### *6.3.2.2.1 Geologic Activity*

The local geology of the AoI is predominantly characterized by Jurassic, Cretaceous, Sarmatian and Quaternary deposits in the form of beach sand and loamy deposits together with a limited distribution of calcareous rocks.

From a tectonic standpoint, the AoI is characterized by the presence of several fault systems with orientations NNE–SSW and WNW–ESE. These fault systems are parallel with the major Capidava–Ovidiu (Visarion et al. 1990); from north to south the faults are: Capidava–Ovidiu fault, Cernavodă–Constanța fault, Rasova–Costinești fault and Mangalia fault (Niculescu & Andrei, 2021). Among these main faults, the NNE–SSW oriented faults create an almost orthogonal network and delineate tectonic blocks with variable dimensions and uneven thicknesses (Figure 6-76; Mutihac et al. 2004; Cazacu 2015).

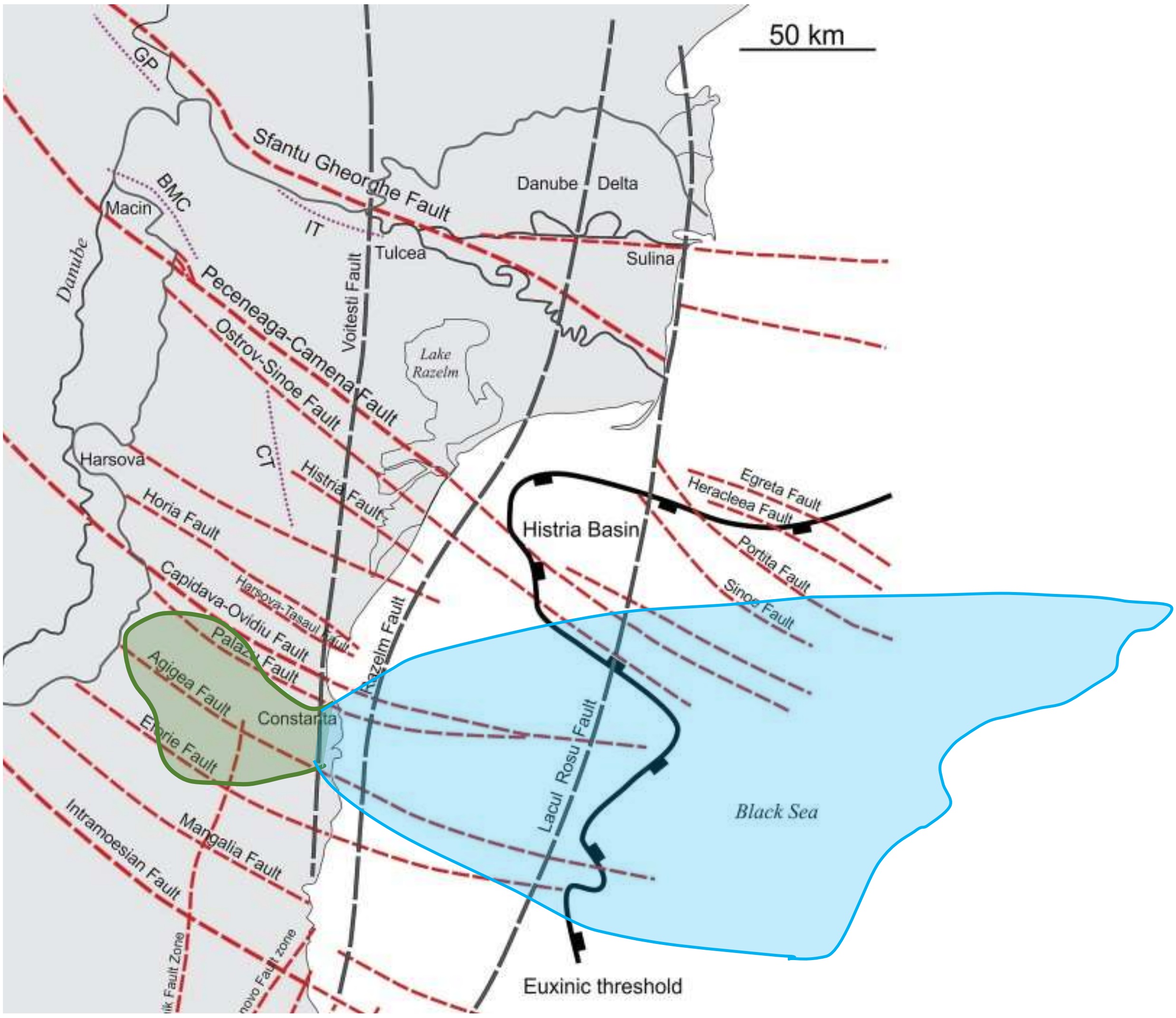



*Figure 6-76 – Major faults on the north-western Black Sea margin. Purple dotted lines are lineaments of seismic instability. Abbreviations: KRF, Kemanlar-Ruslar Fault; GP, Galaţi-Pechea line; IT, Issacea-Tulcea line; CT, Cogealac-Topolog line; BMC, Brăila-Măcin-Cerna line (Gheorghe et al., 2016). The onshore AoI is delimited in green, while the offshore one in blue.*

Romania has one of the highest seismic-hazard levels in Europe. The seismicity of Romania comes from energy released by crust earthquakes at depths lower than 40 km, and by the intermediate earthquakes coming from Vrancea region at a depth between 60 and 200 km. The study by Pavel et al. (2016) shows that around two-thirds of the country (ca 150,000 km$^2$) has an expected PGA in excess of 0.2 g (value with 10% probability of exceedance in 50 years; Figure 6-77). This is in accordance with the World Bank GFDRR hazard screening tool (thinkhazard.org), which classifies the AoI as medium in terms of earthquake hazard. This means that there is a 10% chance of potentially damaging earthquake occurring in the project area in the next 50 years.

Based on this information, the impact of earthquakes should be considered in all phases of the project, in particular during design and construction. Project planning should take into account the physical properties of the soil, typology of constructions and materials.

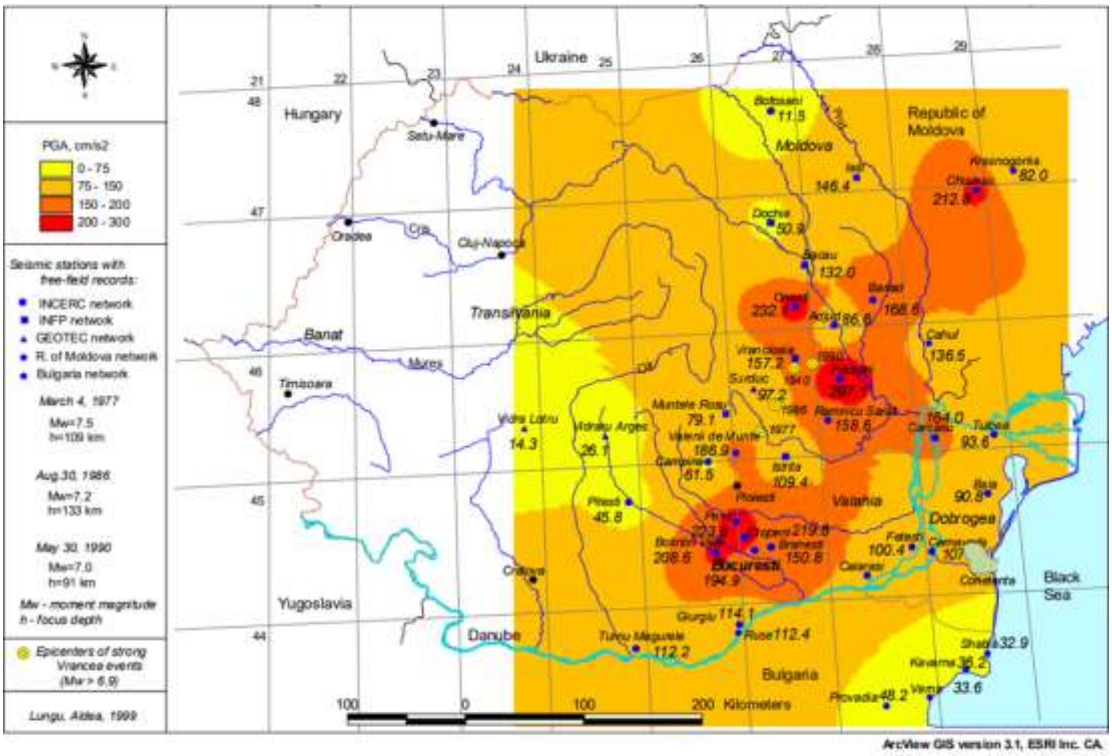



*Figure 6-77 – PGA, cm/s² recorded during 1977, 1986 and 1990 Vrancea earthquakes (Lungu et al. 2004). The area of interest is shaped in green.*

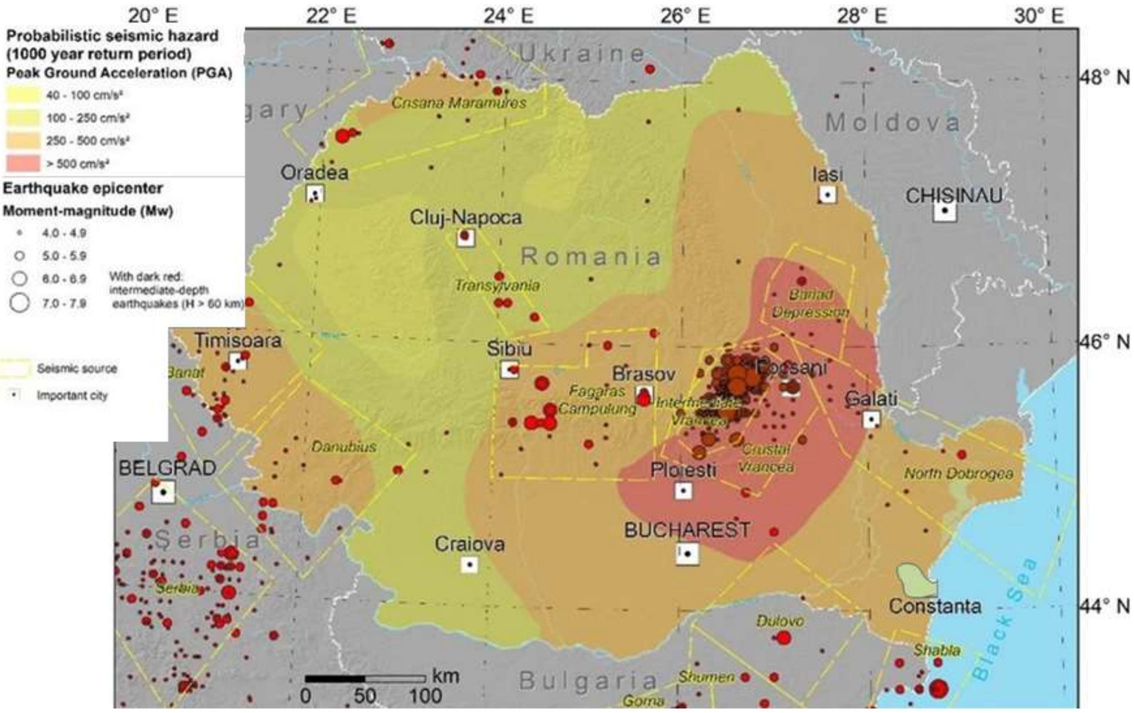



*Figure 6-78 – Seismic hazard map of Romania showing earthquakes with Mw ≥ 4 and seismic sources according to the BIGSEES Catalog (NIEP, 2017), results of the probabilistic seismic hazard analysis of the RO-RISK Project and seismic stations with real-time transmission at the Romanian Seismic Network (RSN) (Toma-Danila et al., 2018). The area of interest is shaped in green.*

### *6.3.2.2.2 Volcano Hazard*

To date, no active volcano is known in the Romanian territory (Szakács and Segedi, 2013) and no data is currently available on the volcanic hazard in the Constanta district (the World Bank GFDRR hazard screening tool, thinkhazard.org). Studies of the most recent volcanic activity in Romania shows that the last eruptive event, of explosive Plinian type, occurred at Ciomadul volcano at the south-eastern end of the Călimani-Gurghiu-Harghita volcanic range (East Carpathians), located about 300 km northwest of the AoI. Although the precise age of the said eruption is still controversial, the available data (Juvigné et al., 1994, Moriya et al., 1996, Vinkler et al., 2007, Harangi et al., 2010) suggest a very recent eruption time, in the order of a few tens of Ka (10.7-35 Ka[15]).

According to literature, Romanian volcanoes were mostly active during Miocene up to Upper Pleistocene (Pécskay et al., 1995a, 2006; Szakács and Seghedi, 1995; Segedi et al., 2004). The volcanic activity occurred in two main areas, in the Apuseni Mountains (about 500 km from the AoI) and in the East Carpathians (about 225 km from the AoI), generating large volumes of volcanic rocks of mostly intermediate calc-alkaline composition Szakács and Segedi, 2013). Smaller volumes of alkaline volcanic products resulted from small-scale activity of monogenetic volcanoes clustered in the Perşani Mountains (East Carpathians) and in Banat (South-western Romania). Neogene volcanism in Romania, which started in Miocene times, extended in time up to Pleistocene (> 2 Ma) in two areas: at the South-eastern

[15] A thousand years ago

extremity of the Apuseni Mountains (Uroiu shoshonites, 1.6-2 Ma[16], Pécskay et al., 1995b, Roşu et al., 2004) and in the South-eastern East Carpathians (Perşani Mountains and South Harghita Mountains). Of these volcanic rocks only some from the East Carpathians (in the Perşani Mountains and South Harghita Mountains) are demonstrated as having Upper Pleistocene ages. No Holocene (< 10 thousand years) eruption ages have been observed (Szakács and Segedi, 2013).

As previously stated, no active volcano is currently known in the Romanian territory; nonetheless, recording of strong heat-flux anomaly (Demetrescu and Andreescu, 1994) and intense "post-volcanic activity" (Szakács, 2010) with deep-source (mantle) $CO_2$ emanations (Vaselli et al., 2002) suggest that the Ciomadul volcano may still be active. No geophysical investigation has however been carried out to investigate the current state of activity of the Ciomadul volcanic system (Szakács and Segedi, 2013).

#### *6.3.2.3 Wildfire Hazard*

According with the hazard screening tool developed by the World Bank GFDRR (Global Facility for Disaster Reduction and Recovery), available at thinkhazard.org, the Constanta district has been classified as having a high wildfire hazard. This classification implies that there is a probability exceeding 50% of encountering weather conditions capable of supporting a significant wildfire, which is likely to cause both loss of life and property damage on an annual basis Predictive climate models indicate a probable increase in the frequency of fire-prone weather conditions in this region, which includes rising temperatures and greater rainfall variability. Areas already susceptible to wildfire hazard are likely to experience longer fire seasons and an augmented number of days characterized by weather conducive to fire spread, primarily due to extended periods without rainfall during fire seasons. Climate projections also suggest a potential escalation in fire severity.

#### *6.3.2.4 Surface and Ground Water*

In terms of **surface water**, the main freshwater body present in the AoI is a Danube channel which flows into the Black Sea. According to the World Bank GFDRR hazard screening tool (thinkhazard.org) the AoI is not subject to flood hazards.

Two major and distinct **aquifer complexes** (Ţenu and Davidescu., 1997) are present in South Dobrogea: a deep aquifer hosted in limestones and dolomites of Jurassic–Cretaceous age and a medium-depth one hosted in Sarmatian (Miocene) limestones. The latter recharges mainly from precipitations and is exploited for the supply with groundwater of the coastal settlements located south of Eforie resorts. The main discharge area of the Sarmatian aquifer is the Black Sea, through lakes located along the coast and the southern area of Constanta. An additional discharge area is represented by the Danube which intercepts the Sarmatian formations before reaching the Black Sea.

Finally, a less important, shallow-depth aquifer develops at the base of Quaternary loess deposits overlapping the Sarmatian limestones. It is recharged exclusively from precipitations and the water content can vary depending upon seasonality.

It is advisable, in the scope of the ESIA, to assess the possible impact of the Project, in all its phases, on the two aquifer complexes.

[16] A million years ago

### *6.3.2.5 Watersheds*

Watersheds in Romania have a significant presence and play a crucial role in the country's hydrological dynamics. Romania's diverse topography, characterized by the Carpathian Mountains, expansive plains, and river systems – comprising approximately 5,000 water courses spanning a total length of around 80,000 km (Chendeş et al., 2014) – gives rise to multiple watersheds across the nation (Zaharia et al., 2012). The Carpathian Mountains, which span a substantial portion of Romania, contribute to the formation of several watersheds, including those that feed into the Danube River, the country's largest river system[17]. The Danube River has a drainage area of 817,000 $km^2$ (Cosciasu et al., 1996; Ogrinc et al., 2008) and receives water from various Romanian tributaries, such as the Siret, Olt, and Prut rivers. Among these, the Prut River, the second longest (950 km) and the last major tributary of the Danube, joins the main course just upstream of the Danube Delta[18]. In addition to the Danube watershed, the Constanta region features smaller watersheds formed by local rivers and streams, that contribute to the region's hydrological dynamics. These minor watersheds, including those associated with the lakes of Siutghiol and Tasaul possess their own localized hydrological characteristics (Mateescu et al., 2007; Păsculescu, 2011).

### *6.3.2.6 Terrestrial Acoustics*

Data on the background noise of the AoI is scarce. However, information retrieved from the Copernicus project (https://land.copernicus.eu/local/urban-atlas/urban-atlas-2018) show as a relative high surface of the AoI comprises arable land, while a limited surface includes urban fabric and industrial areas (Figure 6-79). The Project site might affect residential and recreational areas when in close proximity to residential centers. Noise could be generated from the increase of traffic during the construction phase or by the presence of the energy conversion station during operation.

[17] Carpathian Mountains - Rivers, Valleys, Peaks | Britannica

[18] River Basin | ICPDR - International Commission for the Protection of the Danube River

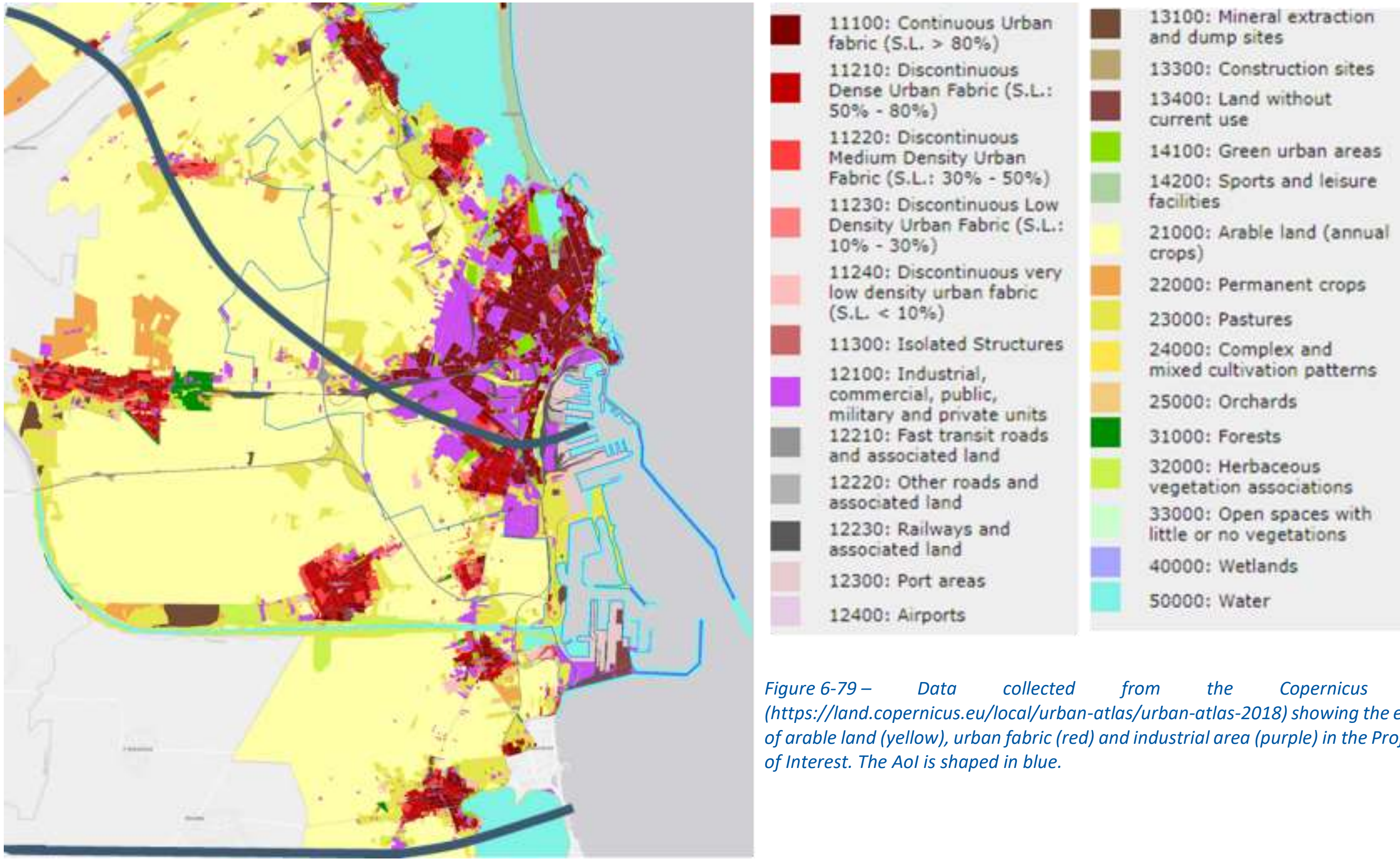



*Figure 6-79 – Data collected from the Copernicus project (https://land.copernicus.eu/local/urban-atlas/urban-atlas-2018) showing the extension of arable land (yellow), urban fabric (red) and industrial area (purple) in the Project Area of Interest. The AoI is shaped in blue.*

*6.3.2.7 Light Pollution*

As already described for the Georgian “light pollution” section, with the term light pollution we refer to any anthropogenic alteration of natural light.

In the early 2000, the first World Atlas of artificial night sky brightness was produced by Cinzano et al. (2000) using radiance calibrated high-resolution DMSP (Defense Meteorological Satellite Program) satellite data and atmospheric light propagation modeling.

Figure 6-80 illustrates the global degree of light pollution as developed by Cinzano et al. (2000). Light pollution can be visually assessed based ’n the map's color scale, with different colors corresponding to different ratios between the artificial sky brightness and the reference average natural sky brightness (approximately 21.6 V magarcsec$^{-2}$ or 252 µcdm$^{-2}$, Garstang 1986).

Based on the artificial sky brightness/natural sky brightness ratio value, the color scale is defined as follows:

- 0.11–0.33 (blue)
- 0.33–1 (green)
- 1–3 (yellow)
- 3–9 (orange)
- 9–27 (red)
- > 27 (white)

Ratios lower than 1 (colors from blue to green) indicate that the natural brightness is higher than the artificial brightness. In other words, the natural light sources in the environment, such as starlight, moonlight, or natural daylight, are more prominent or dominant compared to the artificial lighting present. Conversely, ratios above 1 (colors from yellow to white) suggest that artificial brightness surpasses natural brightness. In such cases, artificial lighting sources such as streetlights, buildings, and other man-made light sources dominate over natural light sources.

Areas where the artificial sky brightness (caused by artificial lighting) exceeds 1% of the reference natural brightness are depicted in dark grey. In these areas, despite some level of artificial lighting, the night sky can still be considered unpolluted (Cinzano et al., 2000).

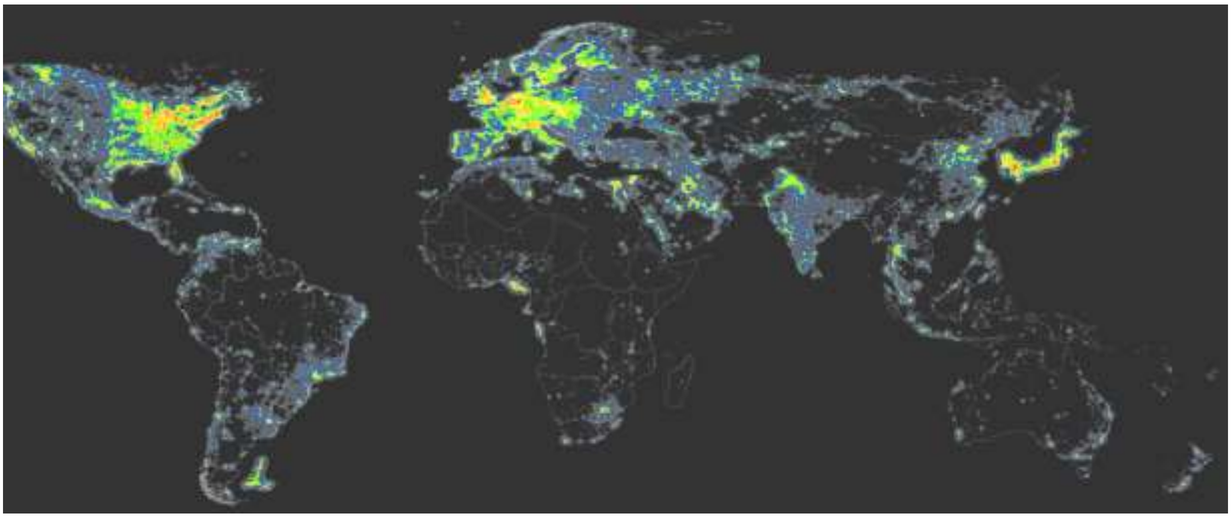


*Figure 6-80 – Global light pollution map (source: [The night sky in the World- Pierantonio Cinzano Web pages (lightpollution.it)](lightpollution.it)).*

In 2020, Lorentz conducted a re-calculation of Cinzano's initial atlas utilizing updated satellite data from the same year[19] .The revised atlas includes maps that incorporate an expanded color scale, as illustrated in Figure 6-81.

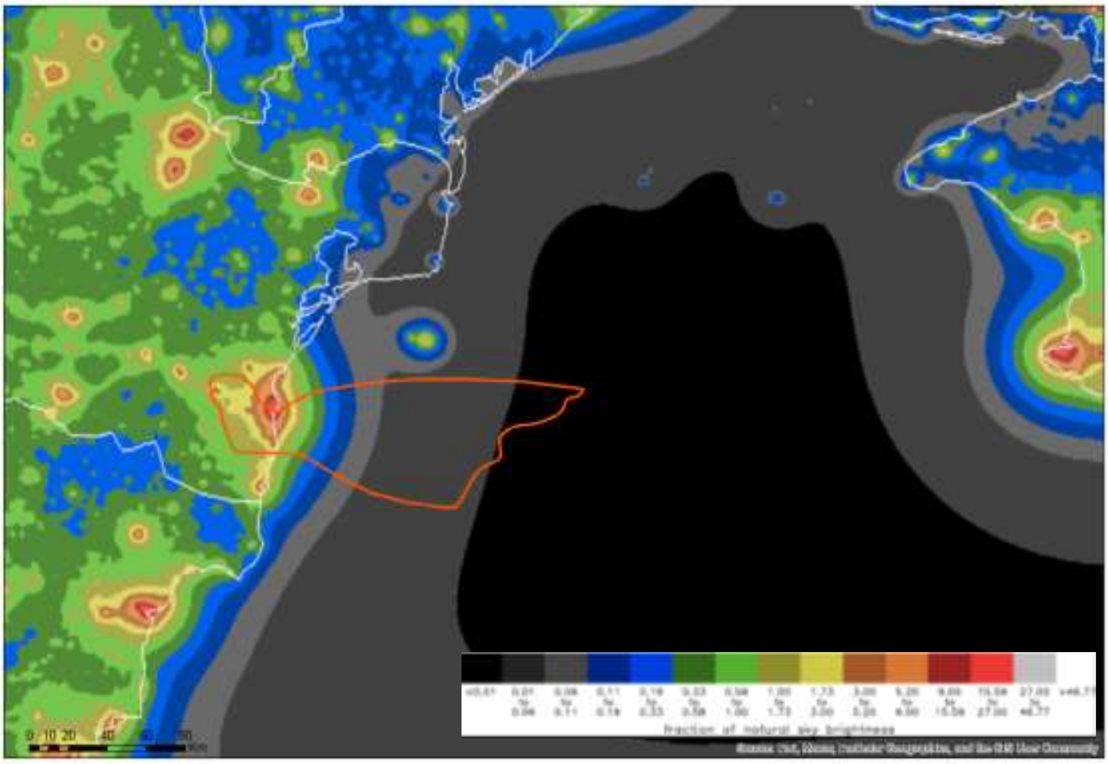


*Figure 6-81 – Global Light Pollution Atlas (source: [Light Pollution Atlas 2020 (djlorenz.github.io)](djlorenz.github.io)). The red polygon identifies the Romanian AoI.*

[19] Light Pollution Atlas 2020 (djlorenz.github.io).

As observed in Figure 6-81, a substantial portion of the offshore Romanian Area of Interest (AoI) is situated within a range characterized by artificial/natural brightness ratios from 0.01 to 1.73. Moving closer to the coastline, this ratio gradually increases to approximately 9, indicating that artificial brightness surpasses natural brightness by up to ninefold, implying a significant degree of light pollution in the vicinity. On the eastern side of the AoI, particularly in the direction of Constanta city, the artificial brightness/natural brightness ratio reaches values ranging from 9 to 15.59.

When comparing the light pollution map with the distribution of settlements in the area, it becomes evident that light pollution is primarily associated with the city of Constanta and the harbor area (Figure 6-82).

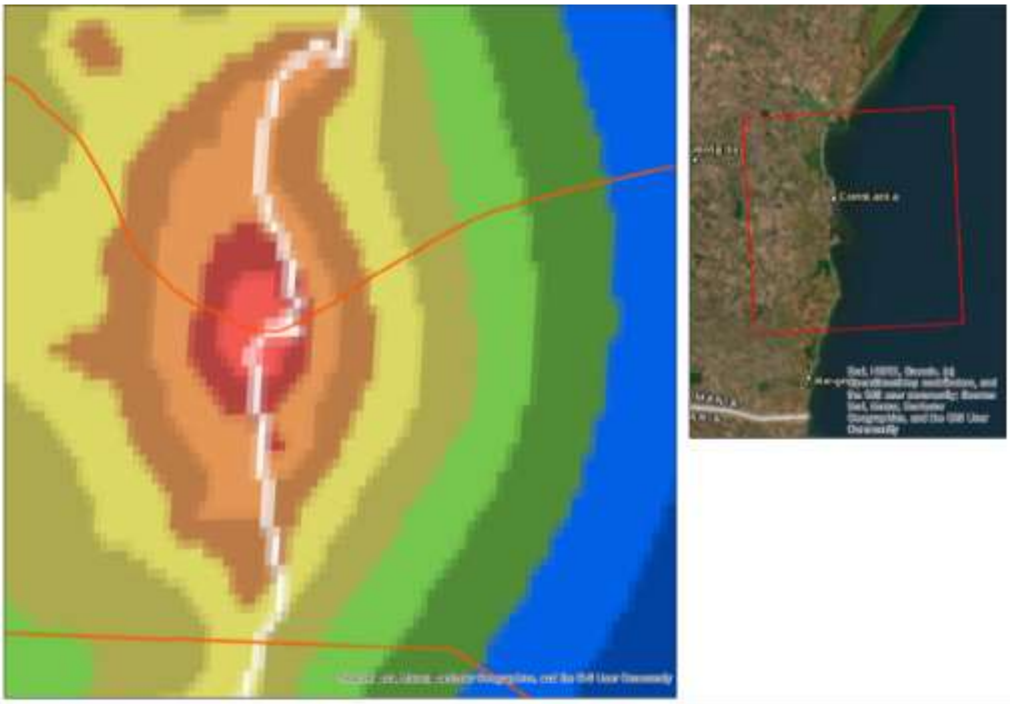


*Figure 6-82 – Detail of the light pollution map in the coastal region of AoI (red polygon).*

### *6.3.3 Onshore Biological Baseline*

#### *6.3.3.1 Terrestrial Habitats and Biodiversity*

##### 6.3.3.1.1 Terrestrial fauna species

According to literature review, 30 species potentially present within the AoI are considered threatened.

Based on the Global IUCN Red List, six species are **Critically Endangered CR** (all fish species: *Acipenser gueldenstaedtii, Acipenser nudiventris, Acipenser stellatus, Acipenser sturio, Anguilla anguilla, Huso huso*); five species are **Endangered EN** (one fish species: *Acipenser ruthenus*; 3 bird species: *Falco cherrug, Neophron percnopterus, Oxyura leucocephala;* one mammal species: *Spermophilus citellus*); nineteen species are **Vulnerable** (three mollusk species: *Plagigeyeria gladilini, Pseudamnicola bacescui,* *Sphaerium rivicola*; two fish species: *Alosa immaculata, Umbra krameri*[20]; nin bird species: *Acrocephalus paludicola, Anser erythropus, Aquila heliaca, Astacus astacus, Aythya ferina, Branta ruficollis, Clanga clanga, Melanitta fusca, Podiceps auritus*; four mammal species: *Miniopterus schreibersii, Nyctalus lasiopterus, Rhinolophus mehelyi, Vormela peregusna*). Other 15 species are Near Threatened (NT) and 11 Data Deficient (DD). All the remaining species are classified as Least Concern (LC).

Among the species potentially present, one mollusk species (*Pseudamnicola bacescui*, VU) was identified as endemic and with a range restricted to Techirghiol Lake, where it seems to be a rare species as there are only a small number of samples. Sixteen fish species (*Acipenser gueldenstaedtii*, CR; *Acipenser nudiventris,* CR; *Acipenser stellatus*, CR; *Huso huso*, CR; *Acipenser ruthenus*, EN; *Alosa immaculata*, VU; *Alosa maeotica*, LC; *Alosa tanaica*, LC; *Clupeonella cultriventris*, LC; *Babka gymnotrachelus*, LC; *Knipowitschia longecaudata*, LC; *Mesogobius batrachocephalus*, LC; *Neogobius fluviatilis*, LC; *Ponticola eurycephalus*, LC; *Ponticola ratan*, LC) are not endemic or restricted range, but individuals belonging to the Black Sea and Azov Sea subpopulation are potentially present in the area. Also, the individuals of fish species *Petroleuciscus borysthenicus* (LC) and *Rutilus heckelii* (LC) are known to belong to the Black Sea and Aegean Sea subpopulations in this area. In addition, one fish species (*Benthophilus nudus*, LC) is endemic to Black Sea basin. Lastly, one mammal species (*Mesocricetus newtoni*, NT) is endemic is endemic to eastern Romania and Bulgaria and restricted-range. No endemisms were identified among other faunal taxa (insects, amphibians, reptiles, and birds).

#### 6.3.3.1.2 Terrestrial flora species

Based on available literature information no flora species potentially present within the AoI is classified as threatened. Out of the three flora species classified as endemic, only one species has been identified as restricted range (*Colchicum arenarium*).

[20] IUCN Red List considers the species as Extinct in the AoI, but also considers it as Extant and Resident not far from the AoI. Therefore, using a precautionary approach, the species is considered as potentially present.

*Figure 6-83 – Colchicum arenarium (source: BioLib.cz).*

### 6.3.3.1.3 Terrestrial habitats and ecosystems

The AoI is located between 0 m and 120 m within the terrestrial ecoregion "**PA0814 - Pontic Steppe**"[21] which is part of the broader biome category "Temperate grasslands, savannas, and shrublands".

The Pontic Steppe ecoregion is the steppeland extending from the northern shores of the Black Sea to the northern area around the Caspian Sea. The area stretches from Dobrudja in the north-east of Bulgaria and south-east of Romania, and runs through southern Moldova, Ukraine, Russia and into north-western Kazakhstan and the Ural Mountains, while to the south the steppe's extension ends at the Black Sea except for the Crimea and the border with the Western Caucasus. The Pontic Steppe ecoregion is characterized by a temperate climate with significant winter rainfall, which generates the characteristic vegetation of the European steppe. This ecoregion is threatened by the widespread conversion to cropland which represents about 35% of total land area. Other processes which have degraded the natural landscape include the shelterbelt afforestation and irrigation aimed to enhance agricultural production. Grazing can represent a disturb where its intensity has increased or where it has been

[21] Olson, D. M., Dinerstein, E., Wikramanayake, E. D., Burgess, N. D., Powell, G. V. N., Underwood, E. C., D'Amico, J. A., Itoua, I., Strand, H. E., Morrison, J. C., Loucks, C. J., Allnutt, T. F., Ricketts, T. H., Kura, Y., Lamoreux, J. F., Wettengel, W. W., Hedao, P., Kassem, K. R. 2001. Terrestrial ecoregions of the world: a new map of life on Earth. Bioscience 51(11):933-938.

abandoned. In addition, the area of interest is included in the freshwater ecoregion "**418 - Dniester - Lower Danube**", which include encompasses basins of the Dniester and Danube rivers. Along the coasts of the Black Sea there are a large number of limans (i.e., lakes or estuaries formed at river mouths). Historically, the deltaic and liman systems include numerous interconnected water bodies, both fresh and brackish, as well as wetland areas. A wide range of ecological conditions due to different biotopes and habitats have supported high biological productivity as well as high diversity of flora and fauna.

The AoI is mostly characterized by **Modified habitats**, particularly agricultural land, as shown in Figure 6-84. The presence of natural has been identified according to the EUNIS habitat classification (level 3). The habitats likely to be present within the AoI were determined based on habitats description given in literature review, including Corine Land Cover, and through the analysis of satellite images on Google Earth.

The terrestrial Natural habitats potentially present in the AoI, their corresponding EUNIS habitat code and their main characteristics are described below.

- **Atlantic and Mediterranean high energy infralittoral rock (A3.1)**

  Rocky habitats in the infralittoral zone subject to exposed to extremely exposed wave action or strong tidal streams. Typically, the rock supports a community of kelp *Laminaria hyperborea* with foliose seaweeds and animals, the latter tending to become more prominent in areas of strongest water movement. The sublittoral fringe is characterized by dabberlocks *Alaria esculenta*.

- **Coastal stable dune grassland (grey dunes) (B1.4)**

  Fixed or semifixed dunes of the coasts of the boreal, nemoral, steppe, mediterranean and warm-temperate humid zones, with the perennial grasslands, chamaephyte-dotted grasslands, forblands, subshrub or succulent communities that stabilize them and the therophyte communities that may occupy the grassland clearings.

- **Black Sea garrigues (F6.4)**

  Shrubby formations of the Mediterranean enclaves of the Black Sea coasts, in Crimea, southern Bulgaria, Turkey-in-Europe and northern Anatolia, as well as of the Mediterraneo-steppic zone of southern Thrace. Included here are all sclerophyllous formations, regardless of substrate, except high maquis (F5.2) with *Erica arborea* and *Arbutus* spp. and *Phryganas* (F7).

- **Dobrogea Fagus forest (G1.6F)**

  Relict beech forests of the Macin Mountains, of extremely insular distribution, isolated within the steppe climate of the Romanian Dobrogea, far from the main beech regions of the Carpathians, with *Fagus sylvatica*, *Fagus taurica* (*Fagus taurica* var. *dobrogica*), *Tilia tomentosa*, *Tilia cordata*, *Fraxinus ornus*, *Fraxinus angustifolia*, *Fraxinus pallisiae*, *Carpinus betulus*, *Populus tremula*, *Ulmus glabra*, Fagetalia species and southern European species, including *Potentilla micrantha*, *Scutellaria altissima*, in the herb layer.

- **Acidophilous Quercus-dominated woodland (G1.8)**

  Forests of *Quercus robur* or *Quercus petraea* on acid soils with an herb layer mostly constituted by the ecological groups of *Deschampsia flexuosa*, *Vaccinium myrtillus*, *Pteridium aquilinum*, *Lonicera periclymenum*, *Holcus mollis*, and of *Maianthemum bifolium*, *Convallaria majalis*, *Hieracium sabaudum*, *Hypericum pulchrum*, *Luzula pilosa*, and the mosses *Polytrichum formosum* and *Leucobryum glaucum*.

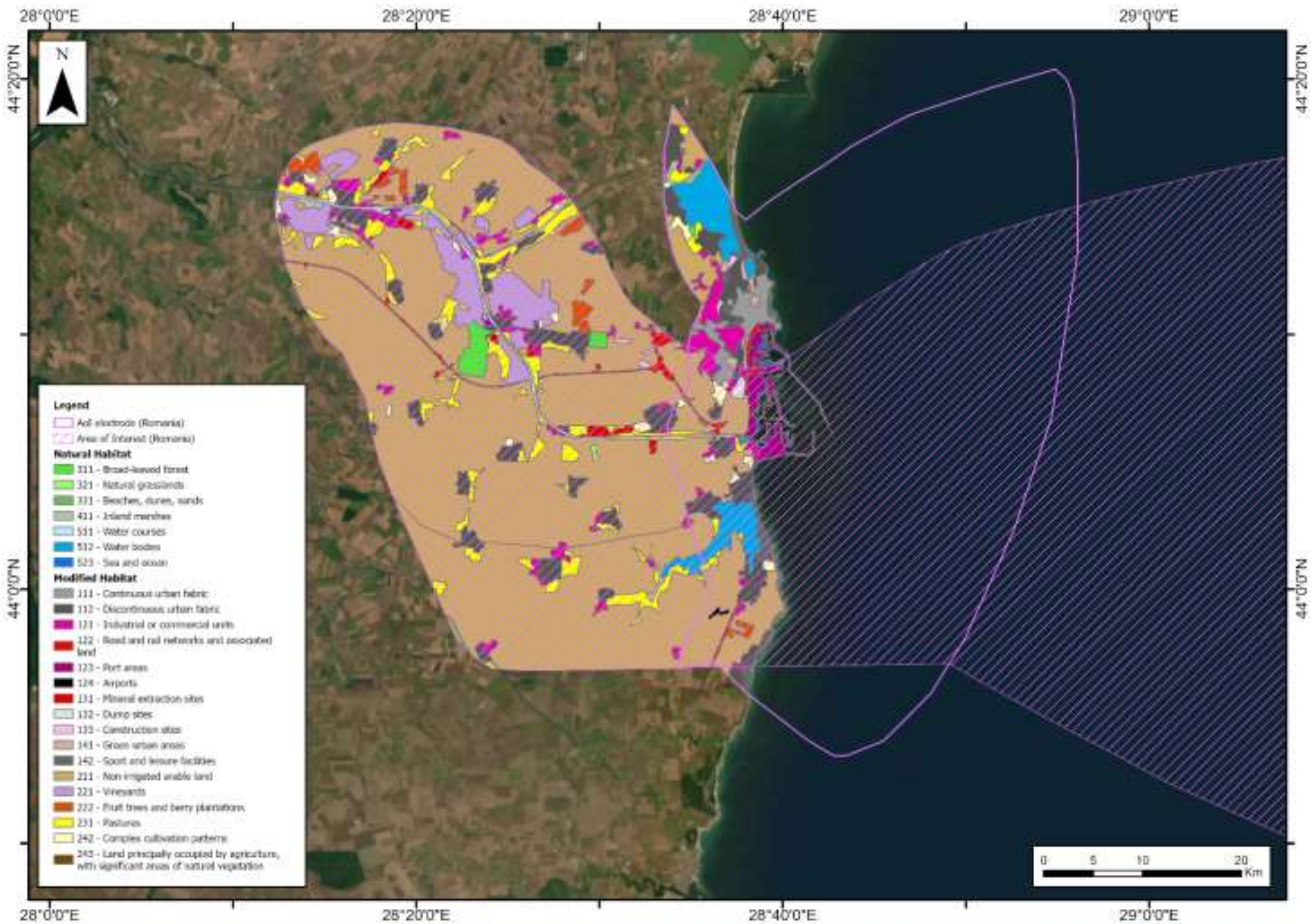



*Figure 6-84 – Habitat map based on Corine Land Cover 2018 of the terrestrial AoI.*

### 6.3.3.2 Terrestrial legally protected areas and important areas for biodiversity

One of Romania's legal obligations since joining the European Union in 2007 was to designate Natura 2000 sites (Ioja *et al.* 2010)[22], resulting in 9,700 km$^2$ of protected land in the Dobrogea region. The Natura 2000 network from Dobrogea includes 67 sites (35 Sites of Community I–portance - SCI and 32 Special Protect–on Areas - SPA, most of the SCIs and SPAs spatially overlap).

A total of 13 internationally recognized areas and important areas for biodiversity are present within the Area of Interest. Legally protected areas and internationally recognized areas important for biodiversity identified in the AoI are represented in

*Figure 6-85* and described below.

**Lacul Techirghiol (KBA, IBA, Ramsar Site, Nature Reserve and SPA)**

Lacul Techirghiol KBA and IBA is the largest salted lake from Romania with an area of 1,315 ha, a length of 7,500 m, and a maximum depth of 12 m, located in the south of the city of Constanța, in the north of the Dobruja region. The site provides a very important roosting place for waterfowl, especially geese and ducks, and at the same time the reed beds offer ideal breeding grounds for many bird species. Up to 20,000 individuals of waterbirds have been count in 1990-2006. The area overlaps with the Ramsar Site and Nature reserve and is also identified as a Special Protection Area (SPA) under the Birds Directive.

The IBA is triggered by the following bird species: white-headed duck (*Oxyura leucocephala*, EN), whooper swan (*Cygnus cygnus*, LC), red-breasted goose (*Branta ruficollis*, VU), greater white-fronted goose (*Anser albifrons*, LC), lesser white-fronted goose (*Anser erythropus*, VU), smew (*Mergellus albellus*, LC), black-necked grebe (*Podiceps nigricollis*, LC), pygmy cormorant (*Microcarbo pygmaeus*, LC), black-winged stilt (*Himantopus himantopus*, LC), little gull (*Hydrocoloeus minutus*, LC), and mediterranean gull (*Larus melanocephalus*, LC).

**Fntnița Murfatlar (SCI)**

Fntnița Murfatlar is a protected natural area and a Site of Community Importance (code ROSCI0083) located on a steep coast, crossed by narrow and shallow valleys and is home to over 500 species of plants, characteristic of the southern Dobrogea area, predominantly Pontic elements, followed by Balkan, continental, sub-Mediterranean and Eurasian. The fauna contains numerous species characteristic of the Dobrogea steppe areas.

[22] Cristian Ioan Iojă, Maria Pătroescu, Laurenţiu Rozylowicz, Viorel D. Popescu, Mircea Verghelet, Mihai Iancu Zotta, Mihaela Felciuc. The efficacy of Romania's protected areas network in conserving biodiversity, Biological Conservation, Volume 143, Issue 11, 2010, Pages 2468-2476, ISSN 0006-3207, https://doi.org/10.1016/j.biocon.2010.06.013.

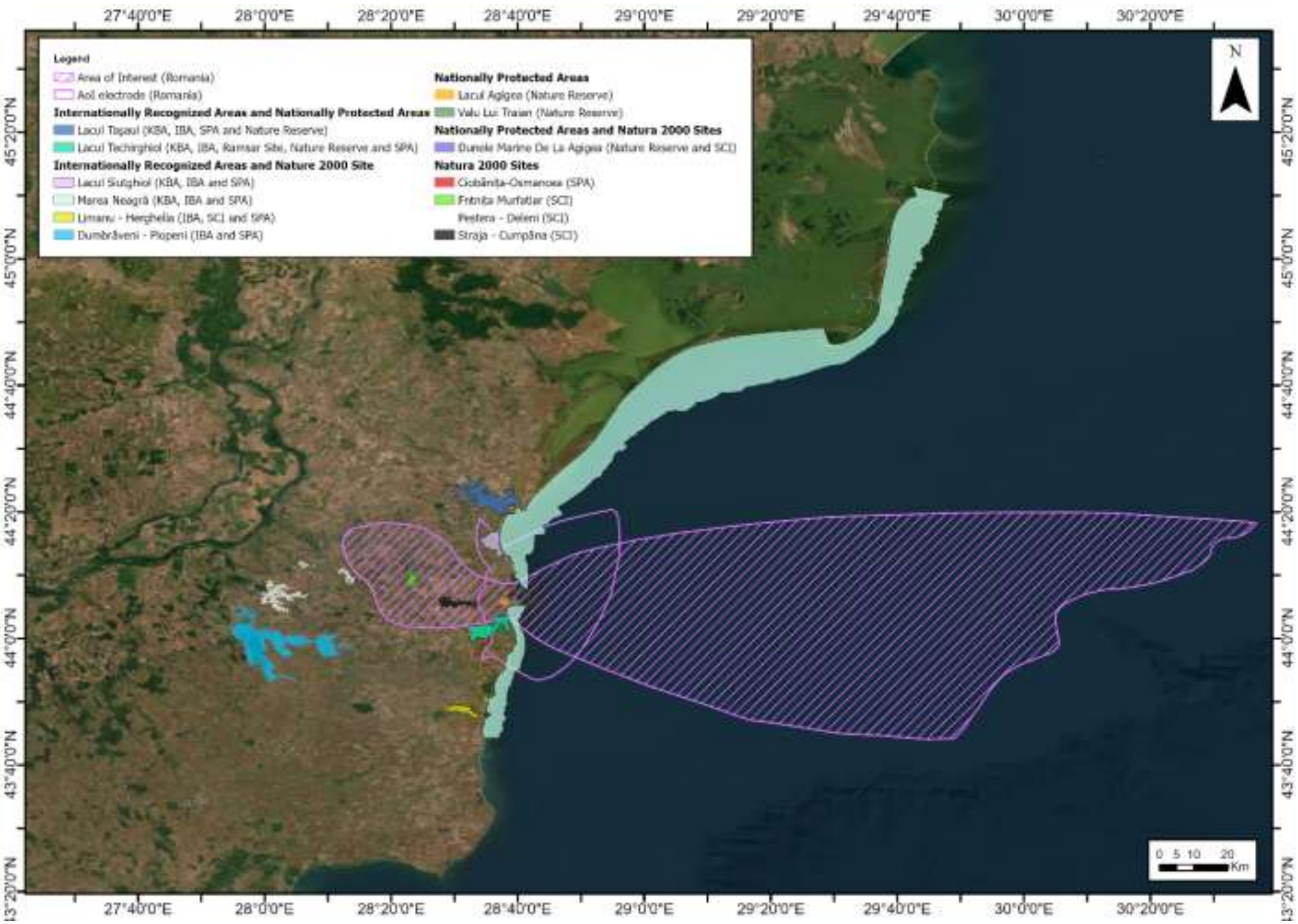



*Figure 6-85 – Romanian Protected areas and Internationally Recognized Areas of importance for biodiversity in the vicinity of the Project.*

The remarkable value of the site is given by the presence of rare species of flora, internationally protected species of birds, as well as sub-Mediterranean, Balkan and Pontic species of mammals and reptiles, and invertebrate species, especially lepidoptera.

Among the species referred to in Article 4 of Directive 2009/147/EC and listed in Annex II of Directive 92/43/EEC we can mention the eastern four-lined ratsnake (*Elaphe sauromates*, LC), the large copper (*Lycaena dispar*, NT), the Balkan pincer grasshopper (*Paracaloptenus caloptenoides*, NT), *Pontechium maculatum* subsp. *maculatum* (NE), the greater pasque flower (*Pulsatilla grandis*), the European souslik (*Spermophilus citellus*, EN), the common tortoise (*Testudo graeca*, VU), and the marbled polecat (*Vormela peregusna*, VU)[23].

**Straja - Cumpăna (SCI)**

Straja - Cumpăna is a protected natural area and a Site of Community Importance (code ROSCI0398) which covers areas of limestone plateau with steppe vegetation, deeply affected by the construction of the Danube-Black Sea canal. At present the steppe vegetation occupies two narrow strips on either side of the canal; it has recovered on the limestone substratum in the areas adjacent to the canal, which are not affected by agriculture. Although the severe disturbance made habitat restoration necessary, it still provides very good conditions for the European souslik (*Spermophilus citellus*, EN) and the marbled polecat (*Vormela peregusna*, VU). Other species reported for this area are the Mesopotamian asp (*Leuciscus aspius*, LC) and the Danube whitefin gudgeon (*Romanogobio vladykovi*, LC)[24].

**Valu lui Traian (Nature Reserve)**

Valu lui Traian is a national nature reserve located north-east of Valu lui Traian village, in the Medgidia Plateau. It is located on top of an archaeological site and houses several species of xerophilous plants and shrubs on its slopes.

The southern birch mouse (*Sicista loriger*, VU), an endemic and restricted range species, is reported for this area.

**Lacul Agigea (Nature Reserve)**

Lacul Agigea is a national nature reserve located northeast of the Black Sea Danube Channel and southwest of Agigea commune. The lake covers an area of 35 ha and its surroundings are home to 5,000-10,000 birds. The area has an altitude of 12-14 m and is situated about 200-300 m from the present sea shoreline; the substrate consists of sandy soils.

In the protected area, emblematic for the conservation of floristic diversity are *Alyssum borzaeanum* (DD), a very rare subendemic species, present in a few places in Romania, Bulgaria and Ukraine, - here in Agigea it has the largest population of it in Romania; *Convolvulus persicus*, a species present in coastal areas of Romania, Bulgaria and Türkiye, present only here and in some areas of the Danube Delta; Ephedra distachya, which has here probably the largest population in Romania, spreading over 50-60% of the reserve's surface. Among the flora species typical of sand soils, we can mention: *Silene thymifolia* (NE), *Astragalus varius* (NE), *Syrenia montana* (NE), *Leymus racemosus* subsp. *sabulosus* (NE) and the sea-kale (*Crambe maritima*, LC).

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[23] Natura 2000 Standard Data Form: https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=ROSCI0083

Fauna species of this area include the common tortoise (*Testudo graeca*, VU), the steppe ribbon racer (*Psammophis lineolatus*, LC), the European green lizard (*Lacerta viridis*, LC), the Balkan wall lizard (*Podarcis tauricus*, LC) and probably also the meadow viper (*Vipera ursinii*, VU).

The area was affected by the construction of the Danube-Black Sea canal, which destroyed the natural habitat on the northern side of the lake.

**Dunele Marine De La Agigea (Nature Reserve and SCI)**

The Agigea marine dunes are the only dunes left on the Romanian coast and the area represent the only marine dune natural reserve in the country. It covers an area of 11.80 ha and it is recognized as Site of Community Importance (code ROSCI0073). The habitat most represented are the fixed coastal dunes with herbaceous vegetation ('grey dunes'), a habitat of priority community interest whose conservation status is unknown for the Black Sea biogeographical region[25].

In the area is reported a large number of species of plants typical of sand soils, some characteristic of the Atlantic, Mediterranean and Caspian coasts, others of the whole Pontic area. Species reported include *Alyssum borzaeanum* (DD), *Ephedra distachya* (LC), *Convolvulus persicus* (NE), *Astragalus varius* (NE) and the sea-kale (*Crambe maritima*, LC). Two threatened species, the common tortoise (*Testudo graeca*, VU) and the common predatory bush-cricket (*Saga pedo*, VU), are reported for this area.

**Marea Neagră (KBA, IBA and SPA)**

See the description in 6.3.6.

**Lacul Taşaul (KBA, IBA, SPA and Nature Reserve)**

Lake Taşaul is a protected area (SPA, code ROSPA0060) belonging to the Black Sea and Steppic biogeographical regions located in Dobrogea, in the central-eastern extremity of Constanța County. The area extends for 2,732 ha and it provides food, nesting and living conditions to several bird species including a number of protected bird species listed in Annex I of the Birds Directive (Directive 2009/147/EC on the conservation of wild birds). The habitat present in the area are wetlands, sand dunes, beaches and lagoons.

The site is important for wintering of the following species: *Aythya ferina* (VU), *Fulica atra* (LC), *Larus ridibundus* (LC), and *Larus cachinnans* (LC). During the migration period, the site hosts more than 20,000 marsh bird individuals. Noteworthy species that use the site during migration period are *Falco cherrug* (EN) and *Branta ruficollis* (VU).

The species triggering IBA are the following: white-headed duck (*Oxyura leucocephala*, EN), whooper swan (*Cygnus cygnus*, LC), red-breasted Goose (*Branta ruficollis*, VU), lesser white-fronted goose (*Anser erythropus*, VU), ferruginous duck (*Aythya ferina*, VU), Dalmatian pelican (*Pelecanus crispus*, NT), great white pelican (*Pelecanus onocrotalus*, LC), Kentish plover (*Charadrius alexandrinus*, LC), Caspian gull (*Larus cachinnans*, LC), saker falcon (*Falco cherrug*, EN), red-footed Falcon (*Falco vespertinus*, VU), pied wheatear (*Oenanthe pleschanka*, LC).

[25] https://eunis.eea.europa.eu/habitats/10040

**Lacul Siutghiol (KBA, IBA and SPA)**

Lacul Siutghiol is a lagoon on the shores of the Black Sea, located in the north of Constanța County. It is closely connected with Lake Tăbăcăriei, therefore forming a lake complex which extends over an area of 1,857 ha. The site is a former marine basin now separated by a narrow sandspit. The western shores are populated with reedbeds (*Phragmites*)[26]. The area includes marine coastal and supratidal habitats such as wetlands with water fringe vegetation, sand dunes, beaches, and lagoons.

Lake Siutghiol is a Special Protection Area (code ROSPA0057) hosting several protected bird species listed in Annex 1 of the Birds Directive. Moreover, it represents an important site for passage waterbirds and migratory species. Ferruginous duck (*Aythya nyroca*, NT) and red-footed falcon (*Falco vespertinus*, VU) are among the species that use the site as a breeding site. The species red-breasted goose (*Branta ruficollis*, VU) can be found in the site during the migration period together with more than 20,000 individuals of marsh birds[27].

The IBA is triggered by the following species: red-breasted goose (*Branta ruficollis*, VU), great white pelican (*Pelecanus onocrotalus,* LC), pygmy cormorant (*Microcarbo pygmaeus,* LC), little gull (*Hydrocoloeus minutus,* LC), slender-billed Gull (*Larus genei,* LC), red-footed Falcon (*Falco vespertinus,* VU), pied wheatear (*Oenanthe pleschanka*, LC)[28].

**Peștera – Deleni (SCI)**

The area is a Site of Community Importance (code ROSCI0353) and it is located in the steppic biogeographical region in close proximity to the Black Sea biogeographical region. The site covers an area of 2,547 ha and it is home to two species listed in the Nature Directives: European souslik (*Spermophilus citellus*, EN) and Romanian Hamster (*Mesocricetus newtoni*, NT). The latter is a species of conservation interest, endemic in Romania and Bulgaria.

**Limanu - Herghelia (IBA, SCI and SPA)**

Limanu - Hergelia is a protected area (code ROSPA0066) with an area of 880 ha located in the north of Limanu village in the Constanța county. It is included in the Black Sea and Steppic biogeographical regions. The area includes habitats such as steppes, natural meadows, pastures, marshes and peatlands and it is home to several protected bird species listed in Annex 1 of the Birds Directive. Limanu - Herghelia includes three lake basins: Hagieni, Limanu and Mangalia. The Mangalia Lake has numerous springs, many of which are sulphureous mesothermal springs reaching a temperature of 22 °C.

Among the bird species present in the site, the following species use the area as a wintering site: *Anser erythropus* (VU), *Aythya ferina* (VU), *Branta ruficollis* (VU), *Falco cherrug* (VU), *Oxyura leucocephala* (EN). Additionally, together with other species listed as Least Concern, *Pelecanus crispus* (VU) use the site during the migration period[29].

The IBA is triggered by the following species: white headed duck (*Oxyura leucocephala*, EN), whooper swan (*Cygnus cygnus*, LC), red-breasted goose (*Branta ruficollis*, VU), smew (*Mergellus albellus*, LC), Dalmatian pelican (*Pelecanus crispus*, NT), pygmy cormorant (*Microcarbo pygmaeus*, LC), black-winged stilt (*Himantopus himantopus*, LC), little gull (*Hydrocoloeus minutus*, LC), slender-billed gull (*Larus genei*,

[26] BirdLife International (2022) Important Bird Areas factsheet: Lake Siutghiol.

[27] https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=ROSPA0057

[28] BirdLife International (2022) Important Bird Areas factsheet: Lake Siutghiol.

[29] https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=ROSPA0066

LC), Mediterranean gull (*Larus melanocephalus*, LC), little tern (*Sternula albifrons*, LC), calandra lark (*Melanocorypha calandra*, LC), greater short-toed Lark (*Calandrella brachydactyla*, LC)[30].

Two other protected areas overlap with this IBA: Pădurea Hagieni - Cotul Văii (318 ha) and Mlaștina Hergheliei - Obanul Mare și Peștera Movilei (103 ha).

**Ciobănița-Osmancea (SPA)**

Ciobănița-Osmancea is a Special Protection Area (code ROSPA0151) that extends over an area of 211 ha in the south of Constanța county, between the cities of Osmancea and Ciobănița. It is a hilly area with many agricultural fields with scattered meadows, steppes and rocky areas. In the site there is a large plantation of *Gleditsia triacanthos* which hosts a colony of 10-15 pairs of red-footed falcon (*Falcon vespertinus*, VU)[31].

During the winter period the area hosts the hen harrier (*Circus cyaneus*, LC) and the merlin (*Falco colombarius*, LC). Additionally, the following species use the area as breeding site: tawny pipit (*Anthus campestris*, LC), long-legged buzzard (*Buteo rufinus*, LC), short-toed Lark (*Calandrella brachydactyla*, LC), red-footed Falcon (*Falcon vespertinus*, VU), red-backed Shrike (*Lanius collurio*, LC), lesser grey shrike (*Lanius minor*, LC) and calandra lark (*Melanocorypha calandra*, LC).

**Dumbrăveni - Plopeni (IBA and SPA)**

Dumbrăveni is a special bird protection area (code ROSPA0036) extending for an area of 1,902 ha. The site belongs to the steppic biogeographical region, and it is located in Dobrogea, in the southwest of Constanța county[32].

It includes habitats such as transitional forests, deciduous forests, calcareous coasts with sub-Mediterranean vegetation, natural meadows, dry grasslands, and steppes. The flora of Dumbrăveni hosts rare species mentioned in the Habitat Directives, among them: *Androsace lactea, Ajuga chamaepitys, Anchusa ochroleuca, Astragalus ponticus, Salvia aethiopis, Galanthus elwesii, Saponaria officinalis, Centaurea cyanus, Crambe tataria, Thymus glabrescens,* and *Stipa danubialis*.

Regarding the fauna, several species of vertebrates and invertebrates specific to the heath-steppe area can be found. Moreover, the site provides favorable conditions for food and nesting for several species of migratory, passage or sedentary birds and it is home to several protected bird species listed in Annex 1 of the Birds Directive.

The site is important for the nesting populations of the following species: *Coracias garrulus, Dendrocopos syriacus, Lanius minor, Hieraaetus pennatus, Emberiza hortulana, Lullula arborea, Accipiter brevipes, Milvus migrans, Buteo rufinus*. During the migration period, the site is used by raptor species. Bird species that use the site for wintering are *Circus cyaneus* and *Phylloscopus orientalis*.

The IBA is triggered by the following species: booted eagle (*Hieraaetus pennatus*, LC), pallid harrier (*Circus macrourus*, NT), hen harrier (*Circus cyaneus*, LC), Levant sparrowhawk (*Accipiter brevipes*, LC),

[30] BirdLife International (2022) Important Bird Areas factsheet: Limanu - Herghelia.

[31] https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=ROSPA0151

[32] https://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=ROSPA0036

European roller (*Coracias garrulus*, LC), Syrian woodpecker (*Dendrocopos syriacus*, LC), lesser grey shrike (*Lanius minor*, LC), tawny pipit (*Anthus campestris,* LC), ortolan bunting (*Emberiza hortulana*, LC)[33].

### 6.3.3.3 Terrestrial Critical Habitat Screening

Similar to Georgia, a Critical Habitat (CH) screening was conducted in order to identify the potential presence of Critical Habitats within the Main OHL AoI according to the Environmental and Social Standard 6 (ESS6), whose definition is triggered by the criteria discussed in the following chapter and assessed below.

Critical Habitats are likely present in the AoI considering the threatened species, legally protected areas and important areas for biodiversity identified in the previous chapters. The likely and potential Critical Habitats identified in the AoI by the "UNEP-WCMC Global Critical Habitat Screening" are shown in Figure 6-86.

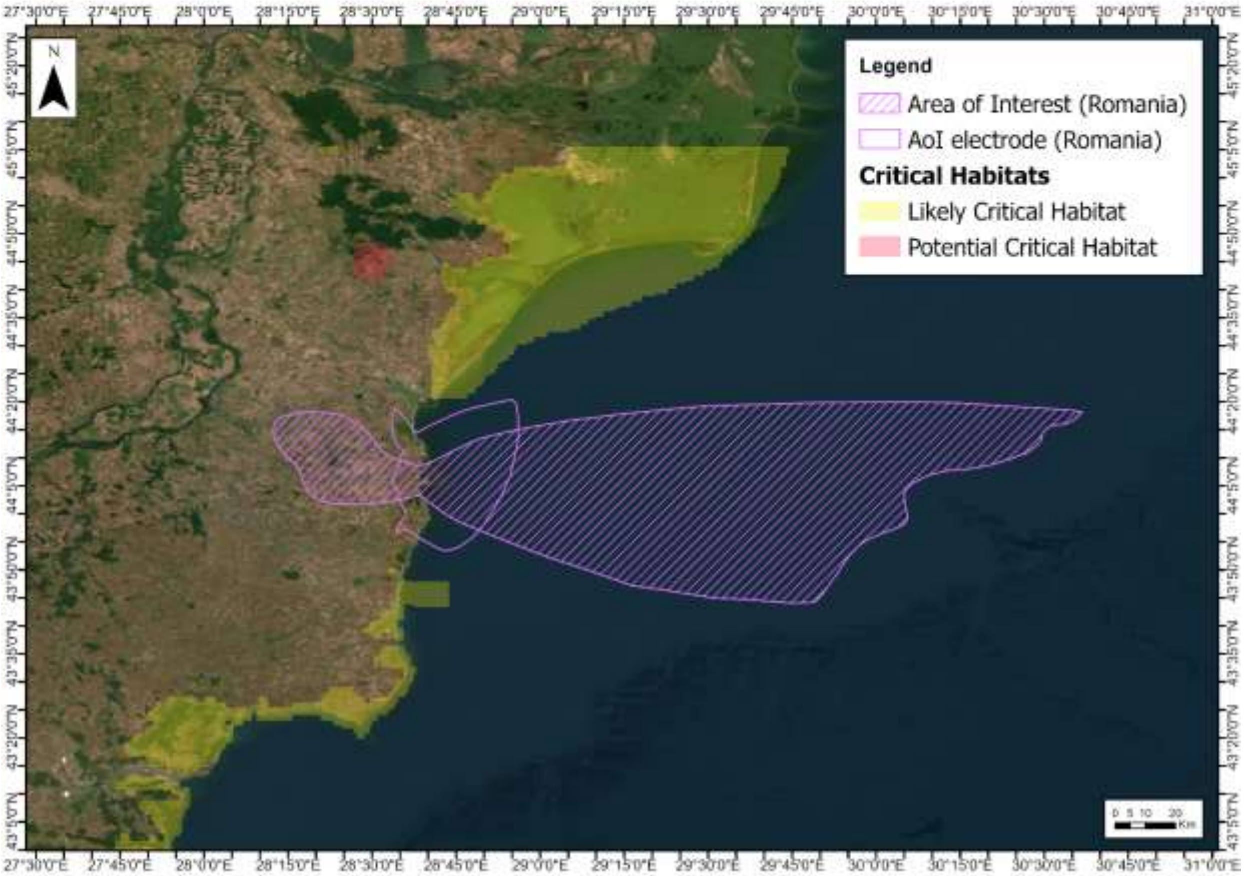


*Figure 6-86 – Likely Critical Habitat in the AoI (UNEP-WCMC Global Critical Habitat Screening, 2021).*

The areas identified as likely Critical Habitat by the UNEP are mainly coastal dune habitats. However, the presence of Critical Habitats within the AoI cannot be excluded at this point.

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[33] BirdLife International (2022) Important Bird Areas factsheet: Dumbrăveni - Plopeni.

A preliminary Critical Habitat Screening is reported below. The likelihood of impacts on transformed, natural, and critical habitats as defined in ESS 6 of the World Bank should be carefully assessed in the scope of the ESIA.

**Criterion a: Highly threatened or unique ecosystems**

None of the habitats identified within the area of interest are considered to be "highly threatened and/or unique ecosystems". In addition, the EUNIS habitats identified are not considered highly threatened (CR or EN) according to the "European Red List of Habitats".

Therefore, no Critical Habitat is expected to be present in the AoI according to this criterion.

**Criterion b: Habitat important to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches.**

The flora and fauna species listed as having Endangered (EN) or Critically Endangered (CR) conservation status according to Global IUCN are summarized in the following table.

*Table 6-30 – Flora and fauna species with Endangered or Critically Endangered conservation status according to the IUCN Red List potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | CR | - |
| | | *Acipenser nudiventris* | Barbel Sturgeon | CR | - |
| | | *Acipenser stellatus* | Stellate Sturgeon | CR | - |
| | | *Acipenser sturio* | Atlantic Sturgeon | CR | - |
| | | *Huso huso* | Beluga Sturgeon | CR | - |
| | Anguillidae | *Anguilla anguilla* | Common Eel | CR | - |
| Birds | Accipitridae | *Neophron percnopterus* | Egyptian Vulture | EN | - |
| | Anatidae | *Oxyura leucocephala* | White-headed Duck | EN | - |
| | Falconidae | *Falco cherrug* | Saker Falcon | EN | - |
| Mammals | Sciuridae | *Spermophilus citellus* | European souslik | EN | - |

No threshold is provided by ESS6 so, using a precautionary approach, all these species are considered to potentially trigger Critical Habitat under Criterion b. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion c: Habitats important to endemic or geographically restricted species**

The flora and fauna species listed as local endemic were considered as potentially triggering Critical Habitat according to these criteria, based on a precautionary approach, since they can include restricted range species.

*Table 6-31 – Locally endemic flora and fauna species potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Flora | Colchicaceae | *Colchicum arenarium* | Sand Saffron | LC | Endemic/RR |
| Mollusks | Hydrobiidae | *Pseudamnicola bacescui* | - | VU | Endemic/RR |
| Fish | Gobiidae | *Benthophilus nudus* | Black Sea Tadpole-goby | LC | Endemic/RR |
| Mammals | Cricetidae | *Mesocricetus newtoni* | Romanian hamster | NT | Endemic/RR |

Considering the typology of the study, using a precautionary approach, all these species are considered to potentially trigger Critical Habitat under Criterion c. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat

**Criterion d: Habitats supporting globally significant migratory or congregatory species**

The AoI partially overlapped with the Black Sea IBA and KBA which is on the migration path of many raptors passing through Romania. This area is recognized as a “regionally important congregations – bottleneck sites” for migrating soaring birds and cranes.

In addition, according to the IUCN Red List, eight migratory and/or congregatory fish species may potentially occur within the AoI.

*Table 6-32 – Migratory and/or congregatory fish species potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Migratory/ Congregatory |
|---|---|---|---|---|---|
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | CR | Migratory |
| | | *Acipenser nudiventris* | Barbel Sturgeon | CR | Migratory |
| | | *Acipenser stellatus* | Stellate Sturgeon | CR | Migratory |
| | | *Acipenser sturio* | Atlantic Sturgeon | CR | Migratory |
| | | *Huso huso* | Beluga Sturgeon | CR | Migratory |

| Taxon | Family | Species | Common name | IUCN status (Global) | Migratory/ Congregatory |
|---|---|---|---|---|---|
| | Anguillidae | *Anguilla anguilla* | Common Eel | CR | Migratory/ Congregatory |
| | Clupeidae | *Alosa fallax* | Twaite Shad | LC | Migratory/Congregatory |
| | | *Alosa immaculata* | Black Sea Herring | VU | Migratory/Congregatory |
| | | *Alosa maeotica* | Black Sea Shad | LC | Migratory |
| | | *Alosa tanaica* | Black Sea Shad | LC | Migratory |

Considering the typology of the study (i.e., Screening), using a precautionary approach, all these fish species are considered to potentially trigger Critical Habitat under Criterion d. In addition, based on the abovementioned considerations, the Black Sea IBA may also be considered as a potential Critical Habitat for birds under Criterion d.

Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion 5: Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).**

The AoI is not known to contain landscape feature and/or subpopulations of species with unique evolutionary history. In fact, although some endemic species are present, the AoI is not characterized by a particular level of isolation, spatial heterogeneity, and wealth of environmental gradients or edaphic interfaces. Moreover, the area is not considered to be of demonstrated importance as to climate change adaptation or as biological corridor. These considerations suggest that the area of interest does not support any key evolutionary processes.

Therefore, no Critical Habitat is expected to be present in the AoI according to this criterion.

### *6.3.4 Onshore Environmental Gaps' Information and Recommendations*

The table below reports the main gaps identified in the Romanian onshore baseline and recommendations for filling-in the identified gaps

*Table 6 35 – Primary gaps and recommendations for the onshore environmental Romanian baseline.*

| Component | Gaps | Recommendations |
|---|---|---|
| **Physical components** | | |
| Air Quality, Meteorology, Climate and Climate Change | Missing exact data on air quality within the AoI.<br><br>Lack of historical data/future forecasts related to the main climatic variables. | ▪ Perform additional in-depth desktop studies on the Romania National Dust and Air Pollution Regulation (if any) and baseline data to better address the types, levels and standards of air pollutants in the areas that may be associated with the Project activities.<br>▪ Perform a site-specific evaluation of historical climate trends and the projected changes in essential climate indicators across various emission scenarios. |
| Geology, Geomorphology and Soil | No relevant gaps- | ▪ Use the data gathered during the technical feasibility assessment and project design phases to gather the necessary information to evaluate the project's vulnerability to seismic hazard. |
| Wildfire hazard | Missing site-specific data on historical wildfires within the AoI. | ▪ Employ the data collected throughout the technical feasibility assessment and project design stages to gather essential information for evaluating the project's vulnerability to wildfire hazards. |
| Surface and Ground Water | Missing site-specific data on surface and underground water bodies. | ▪ Evaluate the existence of surface or subsurface aquifers in the construction-affected areas.<br>▪ Utilize the information gathered during the technical feasibility assessment and project design phases for a thorough assessment of the project's exposure to river flood risks. |
| Terrestrial Acoustics | Lack of on-site data regarding sensitive receptors within the Area of Interest. | ▪ Perform an in-depth desktop study on the acoustic zonation of the AoI.<br>▪ Evaluate the potential presence of susceptible receptors near the construction sites. |
| Light Pollution | No relevant gaps. | ▪ N/A |
| **Biological components** | | |
| Terrestrial Habitats and Biodiversity | Missing on-site data on the exact distribution of terrestrial habitats. | ▪ Perform field studies about the actual terrestrial habitat distribution, especially along the cable route as well as specific assessment of the suitability of such habitats for the threatened species listed in this chapter. |

| | | |
|---|---|---|
| | | ▪ A Critical Habitat Assessment (CHA) under ESS 6 is suggested to ensure No Net Loss to Natural Habitats and Net Gain to Critical Habitats. |
| Terrestrial Legally Protected Areas and Important Biodiversity Areas | Missing information regarding the actual level of protection and zoning of the identified areas. | ▪ Additional in-depth desktop studies on the true protection levels in the legally protected areas (e.g., existing zonation etc.) are suggested in the scope of the ESIA, as well as permitted and non-permitted activities within such areas.<br>▪ Consultations with the authorities on the existence of plans to create new protected areas within the AoI should be considered. |

### 6.3.5 Offshore Physical Baseline

#### 6.3.5.1 Sediments and Seafloor Morphology

A wide continental shelf occurs in the north-western Black Sea basin which extends for about 400 km between Cape Kaliakra (Bulgaria) and Cape Chersonesus (Crimean Peninsula) (Figure 6-87). It is the most prominent Black Sea shallow water area, representing about 94% of the entire Black Sea shelf zone (Panin & Jipa, 1998, Jipa & Panin, 2020). The central part of the Northwestern Shelf is the widest (about 130 km from Danube Delta to the Danube Canyon head with a maximum of 170 km off the mouth of the Dniepr River) while the extremities are narrows (18 km to Cape Chersonesus and 39 km to Cape Kaliakra) (Jipa & Panin, 2020; Popescu et al., 2004).


*Figure 6-87 – Black Sea morphology and bathymetry. The AoI is highlighted in red. A) Northwestern Shelf. B) Crimea Shelf. C) Kerch-Taman Shelf. D) Caucasian Shelf. E) Anatolian Shelf. F) Bulgarian-Western Turkish Shelf. (Source: Jipa & Panin, 2020).*

The shelf break line is generally located at water depths of -120 / -140 m southward of the Danube Canyon and up to -170 m northward of the canyon. The continental slope areas can be smooth and gentle reaching the bathymetry of -1000 m. (Popescu et al., 2004). Table 6-33 reported morphometry features of the Northwestern Shelf.

*Table 6-33 – Morphometry features (areal length and width) of the Northwestern Shelf (Jipa & Panin, 2020).*

| Northwestern Black Sea Shelf | Shelf area (sq. km) | Shelf width (km) | Shelf length (km) |
|---|---|---|---|
| Northwestern Shelf | ~8,500 | 20 - 200 | 395 |

The Northwestern continental slope is characterized by numerous canyons that end at the shelf break except for the Danube Canyon that extends basinward with a submarine channel system (with few branches) for 100 km till -1,600 m (Popescu et al., 2004).

These wide-shelf canyons are associated with large European rivers (Danube, Dniepr, Don and Kuban) and long course tributaries, providing approximately 86% of the basin freshwater inputs and about 60%

of sediment discharge into the north-western Black Sea (Jipa & Panin, 2020). Generally, about 35% of the total amount of the sedimentary material inflow is deposited in beach areas, and the remainder is accumulated in deeper water (Jaoshvili, 2002).

In particular, the Danube River, which is the second-longest river in Europe, after the river Volga, represents the main supplier of sediments along the Northwestern shelf. Moreover, the presence in the AoI of the Danube – Black Sea Canal, which flows from Cernavodă (on the Danube River) to Constanța, does not exclude the discharge not only of water and sediment, but also of pollutants that could be transported and deposited in the area.

The dispersal pattern of the Danube sediment supply revealed two main areas with different depositional processes (Panin et al., 1998) (Figure 6-88):

- The Danube sediment-fed internal shelf that is the area influenced by the Danube originated sediment drift, receiving clay and siltic sediments driven by dominant currents. This area extends along the inner shelf and littoral zone towards Constanta (close to the AoI) and further south along the Bulgarian coast (Panin & Jipa, 2002).
- The sediment-starved external shelf represented by the eastern outer shelf and the open-sea zones whose sediments supply is interrupted due to the southward currents along the coast and in the inner shelf (Panin, 2005) and because of canyons' location at more than 100 km far from the Danube mouth. For these reasons the depositional regime is exclusively hemipelagic with condensed sediment accumulation of biogenic origin (Panin & Jipa, 2002).

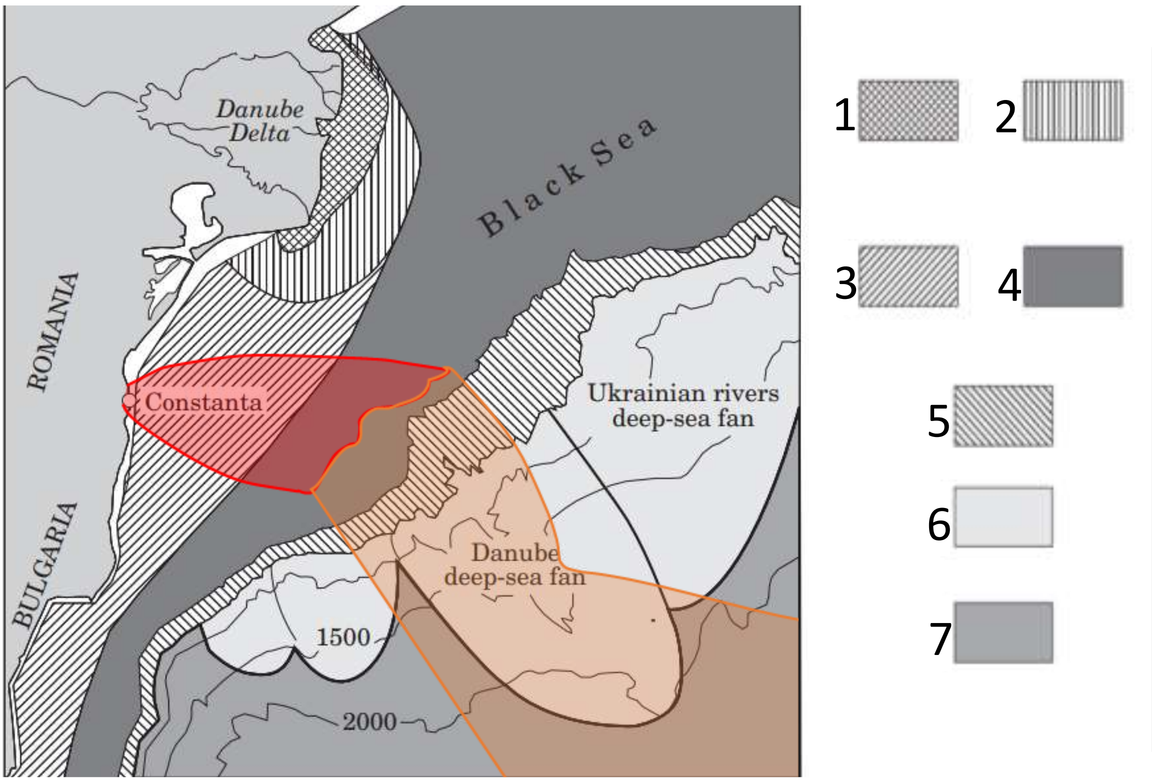


*Figure 6-88 – Main sedimentary environments in the north-western Black Sea identified by Panin & Jipa (2002) and the footprint of the Project (in red the coastal AoI and in orange the deep-sea AoI). 1, Danube delta front area; 2, Danube prodelta area; 3–4, western Black Sea continental shelf areas*; 5, shelf break and the uppermost continental slope zone; 6, deep-sea fans area; 7, deep sea floor.*These areas are characterized by different depositional processes: 3) the Danube sediment-fed internal shelf and, (4) the sediment-starved external shelf.*

At the present, the Danube sediment discharge decreased to 25 - 35 million t $yr^{-1}$, of which 4 - 6 million t $yr^{-1}$ of sandy materials (Panin & Jipa, 2002). These amounts represent one third of what estimated in 1970, thus anthropogenic alterations mainly due to dams built-up within the upper and middle section of the Danube River have drastically changed the natural flow regime and reduced the sediment discharge (please refer to chapter 6.5.1.2.1 for more details).

The type of sediment and the sedimentation pattern present along the Northwestern shelf are influenced by the littoral sediment drift system along the Romanian coastline (Figure 6-89). In general, the sediments present close to the Danube mouth are mainly fine-grained with a high sedimentation rate, while moving southward the sediments transported by the anticyclonic gyre become coarser grained (Wijsman et al., 1999).

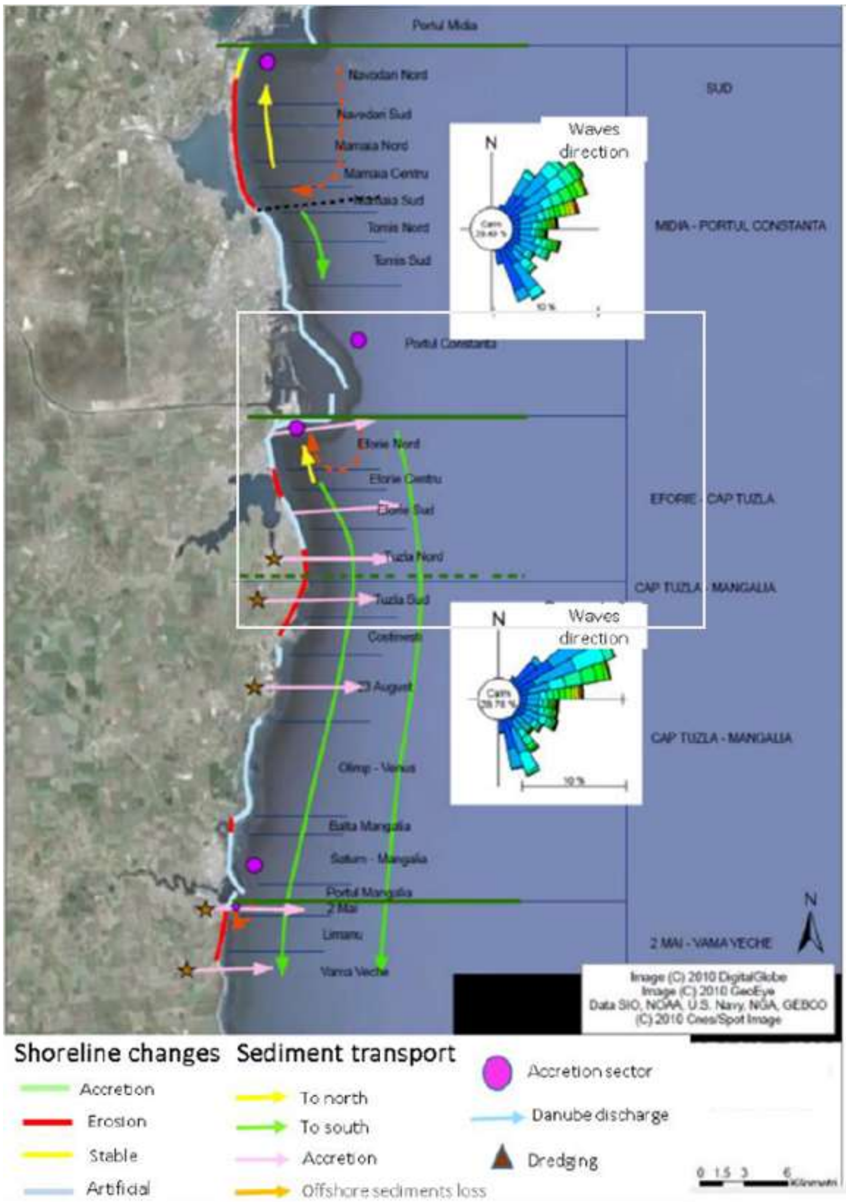


*Figure 6-89 – Direction of sediment transport along the Romanian coast and the Project Area highlighted in orange.*

The southern part of the Romanian coastline is characterized by continuous loess –liff (12 - 20 m high), interspersed with accumulative beaches. Here the influence of gravitational and erosional processes due to marine abrasion is more active (Selariu, 1971; Panin, 1996) creating a heterogeneous subtidal bottom with extensive rock blocks up to 25 m depth. This zone is also strongly influenced by the presence of coastal structures (e.g., Midia and Constanta harbors) that trap the sandy supply especially at the protective breaking wave dikes of the port of Midia, leading to sediment starvation along the entire southern Romanian coastline (Panin & Jipa, 2002). For these reasons, since there is no other source of supplying siliciclastic sand material along the shores south of Constanta, coastal deposits have an organic origin, resulting from the mechanical grinding of littoral shells (Panin & Jipa, 2002).

Analyzing the sediment composition of the shallow-water between Constanta and Cape Tuzla (AoI), it reveals the presence of mixed sediments ranging from very coarse-grained and coarse grained sediment (i.e., pebbles, cobbles and gravels) to fine-grained sediment (i.e., sands and mud composed of silt and clay), with a variable proportion between the different components. Rocky substrates extend unevenly from a few metres to a depth of about 30 m, beyond which biogenic hard substrates occur on muddy mixed sediments up to about 60 m depth. These biogenic reefs consist of *Mytilus galloprovincialis* forming an organogenic-terrigenous substrate with a $CaCO_3$ content 30-50% (Shimkus & Trimonis, 1974). In addition, the presence of caves and overhangs completely submerged have also been found in the area. Moving to the circalittoral zone, carbonate-rich shelly sediments occur ($CaCO_3$ = 50%) on sandy muds and fine muds of terrestrial origin. In deep-water the seafloor is mainly characterized by terrigenous muds, calcareous muds and biogenic detritic bottoms (Shimkus & Trimonis, 1974).

As stated before, the Danube River is the main supplier of sediments, freshwater, nutrients and also pollutants in the north-western Black Sea. Considering its sediment drift system, the influence of anthropogenic structures (e.g., Constanța port, Danube – Black Sea Canal) near the area of interest and the tendency to accumulate higher concentrations of heavy metals in fine sediments (Nicolaev et al., 2012), the presence of pollutants in the area can be assumed.

##### *6.3.5.1.1 Gas hydrates*

The semi-enclosed Black Sea basin is potentially suitable for the accumulation of free gas and gas hydrates, due to its anoxic water regime that allows the preservation of organic matter in sediments (the chemochlines are found at depths of 110 - 140 m). More precisely, the shelf and the upper slope show a high gas content in the sediments, being located outside the gas hydrate stability range (the minimum theoretical depth for methane hydrate stability corresponds to 725 m depth) (Dinu et al., 2018). Most gas seeps in the Romanian sector of the Black Sea occur along canyon flanks, crest lines, scarps, faults and in association with pockmarks and mounts (Riboulot et al., 2017).

Along the Romanian coast, the major shallow gas accumulation areas occur in shallow sediments developing along the shelf break (between the outer shelf and the upper slop down to ca. 750 m water-depth) (Popescu et al., 2007). However, some gas seeps are found close to the AoI within the Site of Community Interest (SCI) “Izvoarele sulfuroase submarine de la Mangalia” and “Cap Aurora” between 0 and 15 m depth. This zone is characterized by submarine structures interspersed with gas vents that intermittently release gas (methane) derived from the aggregation of sandstone and its subsequent consolidation by a carbonate cement resulting from oxidation by the microbial community characteristic of these areas (EEA, 2023).

In conclusion, the presence of gas seeps in the two SCI (“Cap Aurora” and “Izvoarele sulfuroase submarine de la Mangalia”) in the vicinity of the electrode location, namely on the boundary of the SIC

"Cap Aurora" and at more than 4 km from the SCI "Izvoarele sulfuroase submarine de la Mangalia", should not be affected by the presence of the Project.

### *6.3.5.2 Coastal Erosion*

Coastal erosion is a geomorphic process characterized by the removal of material from the coastline as a result of imbalances in material supply and export (Marchand, 2010). This phenomenon occurs due to the combined effects of wave action, tidal currents, and human activities, ultimately leading to the retreat of the shoreline.

The Romanian coastline has experienced a significant and rapid retreat, particularly in recent decades (Stan et al., 2019). This retreat is particularly prominent in the southern coastal region, which features various types of coastal constructions, including extensive hydrotechnical structures designed to protect tourist beaches and urban settlements from the impacts of human activities such as maritime navigation and port expansions (MSP, 2018).

The extensive development of tourist resorts along the southern coast has created a feedback loop within the coastal assets, necessitating protective measures that, in turn, have generated adverse consequences, particularly in relation to sediment dynamics (Stãnicã et al., 2013).

Two main causes of coastal erosion in the Romanian area have been identified: a deficit of sediment reaching the Black Sea and the alteration of coastal dynamics due to anthropogenic factors (Stan, 2019). Sediment supply reduction to the coast has exceeded 50% due to coastal and river modifications, including embankments along the Danube basin and river dams (Stãnicã et al., 2013).

Additionally, the construction of ports at Midia Năvodari, Constanța, and Mangalia has disrupted natural sea current patterns (Stan, 2019).

Analysis of historical maps, along with current measurements utilizing GPS and aerial photos, reveals that the shoreline in the Eforie area (which is included in the AoI) has experienced a retreat of approximately 40-50 meters over the past 75-100 years (Mateescu et al., 2014). The cliff region between Agigea and Eforie North is particularly susceptible to active abrasion processes, predominantly affecting the limestone bentonite clays and resulting in distinct erosion patterns characterized by shelf degradation and niche formation. Specifically, the erosion rate in the Eforie North area varies along the beach, averaging around 0.5 meters per year, with fluctuations attributed to the presence of coastal protection structures and interventions (Mateescu et al., 2014).

### *6.3.5.3 Oceanography and Seawater Quality*

The Black Sea water layer characteristics are described in detail in chapter 6.1.4.3, while the seawater temperature along the Romanian coastline is described below.

Along the Romanian coastline, the average seasonal water temperatures are 12 °C in winter, 13°C in spring, 25.4 °C in summer, and 21.6 °C in autumn. The minimum water temperature (9 °C) is registered in February, while the maximum (27.3 °C) in August[34].

[34] https://seatemperature.info/batumi-water-temperature.html

The strong pycnocline and water stratification of the Black Sea is reflected in the variation of salinity among the water layers. The top layer influenced by fluvial inputs and rain presents a lower salinity (17.5 - 18.5 psu) than the bottom layer (21 - 22 psu) fed by warm salty waters from the Mediterranean Sea through the Bosporus (Shapiro, 2009; Cochran et al., 2019).

#### *6.3.5.3.1 Currents and Eddies*

The Romanian coastline is influenced by the Rim Current and the anticyclonic eddies which form seasonally from the current. In particular, Kaliakra eddy seasonally forms along the coastline of Romania and Bulgaria (Korotenko, 2015), while Constant eddy seasonally forms in front of Constanta (Figure 6-90). The eddy water vertical movements allow the oxygen to reach a depth of about 150 m which marks the beginning of the oxycline; below this depth the oxygen levels significantly decline (Stanev et al., 2013).


*Figure 6-90 – The Rim Current represents a permanent feature of the Black Sea circulating in the Basin following an anticlockwise direction. Small eddies form seasonally along the coastline such the Constanta eddy between Constanta and Sulina and Kaliakra eddy between Constanta and Varna. The area of interest is circled in green.*

#### *6.3.5.3.2 Tides*

Tides in the northwestern areas of the Black Sea are nearly nonexistent, varying from 1.1 cm near the Crimean Peninsula up to 7 cm at Constanta (Rusu et al., 2011). For these reasons, tides may be considered as negligible for the AoI.

### *6.3.5.3.3 Upwelling and Downwelling Processes*

In the north-western area, the intense summer stratification of the active layer waters, combined with the relative shallowness of the upper homogeneous layer, is not affected by the wind influence. However, in the early summer when the thermocline is shallow, the wind can provide enough energy for the water to mix (Mihailov, et al., 2004). Upwelling phenomena have been recorded in the Area of Interest after several days of wind blowing from southern-southwestern or moderate to strong western. During the cold season, downwelling can occur because of the prevailing north-eastern winds (Mihailov, et al., 2004).

### *6.3.5.3.4 Tsunami*

The majority of the Black Sea tsunamis have been observed in the northeastern part of the basin and particularly in the coastal zones of the Crimean Peninsula. It is not clear if the increased tsunami reporting in Crimea is due to purely geophysical conditions or to social factors, given that Crimea has attracted attention as a settlement place since historical times, thus favouring the reporting of natural phenomena. Other regions of relatively frequent tsunami production were offshore of the Bulgarian coast and offshore of the northern Anatolian coast, while tsunami-like disturbances caused by large intermediate-depth earthquakes occurring in Vrancea, Romania, were reported in Odessus, Ukraine.

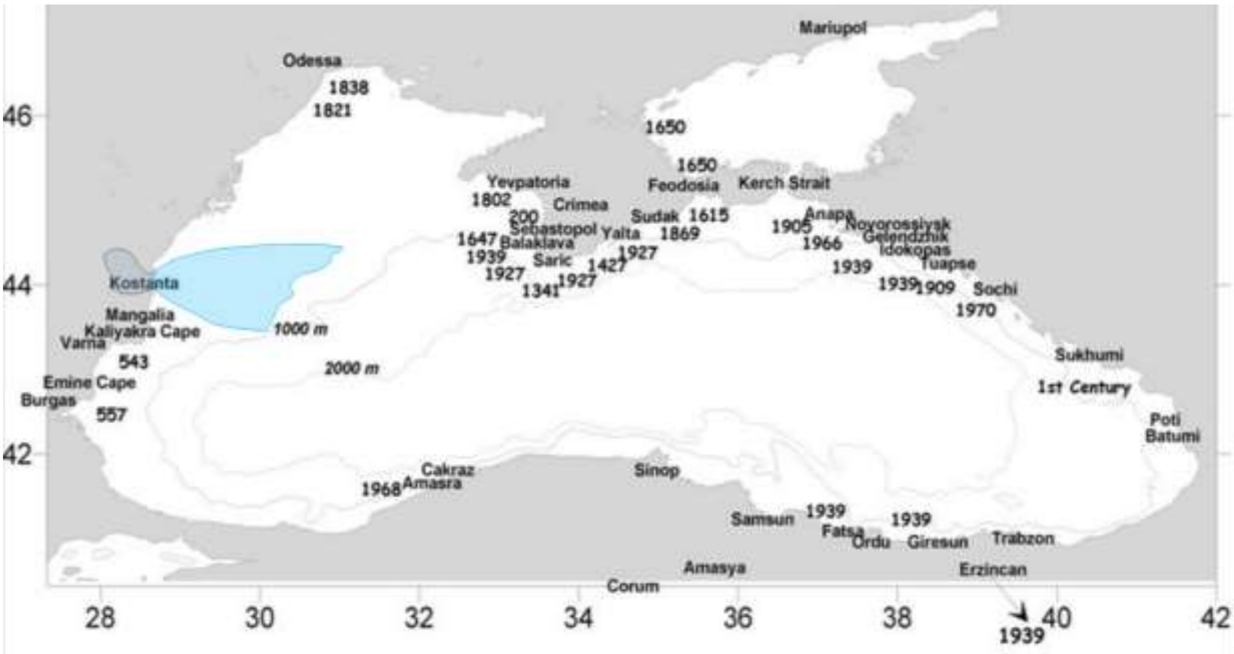


*Figure 6-91 – Locations of tsunami origin in the Black Sea represented by the name of the relative onshore town and the year (Yalçiner et al., 2004).*

### *6.3.5.4 Marine Acoustics*

As already mentioned in the Georgian "marine acoustics" chapter 6.1.4.4, sounds (i.e., its emission does not produce potential adverse effects) are omnipresent in the underwater environment and can be produced by both natural (physical and biological) and anthropogenic sources (OSPAR, 2015). Similarly, offshore noises (i.e., its emission cause specific adverse effects; Southall et al., 2009) can be produced by both natural (e.g., wind, breaking waves etc.) and anthropogenic sources (e.g., shipping, military activities, construction works, oil & gas exploitations, etc.). Concerns regarding underwater noise include fauna behaviour alteration such as foraging, migration and reproduction (Southall et al., 2009).

Despite no specific information is currently available, the underwater acoustic climate of the AoI may be primarily influenced by anthropogenic (i.e., marine traffic) and natural biological sources (i.e., marine fauna).

Among the possible **anthropogenic noise sources**, maritime traffic is certainly one of the most important sources within the AoI, which hosts the port of Constanta. Maritime traffic is a low-frequency sound source, which means that the produced sounds are at frequencies generally lower than 300 Hz and are able to propagate over long distances through the water column (Skarsoulis et al., 2017), with possible consequences on marine fauna. Large commercial vessels generally produce relatively loud, low frequency sounds. The main noise sources include propellers cavitation, vibration of engines and related facilities and water displacement caused by the moving hull. The source noise levels may range 180 dB to 195 dB re 1 µPa at 1 m with peak levels in the 10 Hz - 50 Hz frequency band. At frequencies lower than 200 Hz, the propeller systems mostly contribute to the underwater noise. Large cargo vessels may emit high frequency sounds with sound levels over 150 dB re 1 µPa at 1 m around 30 Hz. Moreover, additional noise sources may be the on-board equipment (e.g., equipment in the machine room or auxiliary systems) and the hydrodynamic flow around the vessel hull. Noise also increases with an increase in the vessel speed and the sound pressure levels depend on the vessel propeller system (McKenna et al., 2013).

The following table shows the average emission levels of the main anthropogenic sound sources potentially detectable in the AoI.

*Table 6-34 – Main anthropogenic acoustic sources present in the AoI with their relative frequency, duration and directionality (source: Prideaux, 2017)*

| Activity | Bandwidth | Intensity | Emission frequency | Directionality |
|---|---|---|---|---|
| **Constant activities for the area** | | | | |
| Small vessels | 10 kHz | 160-190 dB rms to 1 m SPL | Continuous | Omnidirectional |
| Medium sized boats | Less than 1 kHz | 165-180 dB rms to 1 m SPL | Continuous | Omnidirectional |
| Large vessels | A few hundred Hz | 180-190 dB rms to 1 m SPL | Continuous | Omnidirectional |
| **Potentially frequent activities for the area** | | | | |
| Active low frequency military sonar | <1 kHz | 240 dB re 1µPa to 1 m SPL | 600-1,000 ms | Horizontal |
| Active medium frequency military sonar | 1-5 kHz | 235 dB re 1µPa to 1 m SPL | 1-2 s | Horizontal |
| Continuous military sonar | 3 kHz | 182 dB re 1µPa to 1 m SPL | 18 s | Horizontal |
| **Occasional activities (exploration, work, etc.)** | | | | |

| Activity | Bandwidth | Intensity | Emission frequency | Directionality |
|---|---|---|---|---|
| Echo sounder Single beam | 12 kHz-700 kHz (a seconda dall'applicazione) | 240 dB re 1μPa to 1 m SPL | 0,1 ms | Vertical |
| Side Scan Sonar | 50 kHz-1600 kHz (a seconda dall'applicazione) | 240 dB re 1μPa to 1 m SPL | 0,1 ms | Vertical/ Horizontal |
| Echo sounder Multibeam | 12 kHz-500 kHz (a seconda dall'applicazione) | 240 dB re 1μPa to 1 m SPL | 0,1 ms | Vertical/ Horizontal |
| Dredging activities | 1 kHz | 150 dB rms to 1 m SPL | Continuous | Omnidirectional |

As already mentioned above, communication between marine organisms is one of the main **natural biological sources** affecting the underwater acoustic climate within the AoI.

Particularly important is the contribution of cetaceans, which produce sounds for communication, orientation and navigation purposes. These sounds may range from a low frequency value of about 10 kHz of some whales, absent in the Black Sea, to a high frequency value of 200 kHz for some dolphins. Source levels for communication sounds are around 170 dB to 180 dB re 1 μPa at 1 m, while echolocation clicks range from a source level of 175 dB re 1 μPa at 1 m in the frequency range of 125 to 200 kHz for the Black Sea harbour porpoise (*Phocoena phocoena relicta*), up to 226 dB re 1 μPa at 1 m in the frequency range of 23 kHz to 102 kHz for the bottlenose dolphin (*Tursiops truncatus*), as well as for its Black Sea subspecies (*Tursiops truncatus ponticus*) (Richards *et al.,* 2007; Southall *et al.*, 2009). Both subspecies are present in the AoI.

For all the reasons above, the underwater ambient noise of the AoI may be assumed as currently dominated by low frequency anthropogenic noises generated by vessels and high to very high frequency biological vocalizations produced by cetaceans.

Finally, it should be noted that the United Nations Convention on the Law of the Sea (UNCLOS) includes the introduction of energy (including sound) into the marine environment under the definition of pollution in Article 1 (4). The whole Black Sea and consequently the AoI is under the ACCOBAMS (Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area) that is a regional international treaty that binds its States Parties on the conservation of Cetacea in their territories. The agreement has been ratified by Tukey that has been party of the agreement since 2018.

#### *6.3.5.5 Offshore Light Pollution*

No specific data on light pollution are available regarding the offshore area of the Romanian AoI.

Based on the Global Light Pollution Atlas (see Figure 6-81), the majority of light pollution is concentrated within the first 12 kilometers from the coastline (artificial brightness/natural brightness ratios up to 1.73, chapter 6.3.2.7), whereas at greater distances from the coast the natural brightness appears to surpass artificial brightness. Based on the presence of offshore gas platforms, it can however be assumed that there may be some level of light pollution associated with these structures. Offshore gas platforms typically require illumination for safety and operational purposes, including navigation, personnel safety, and equipment maintenance. Such equipment can cause direct light emissions and light spillage.

The average lux (lumen/$m^2$) emitted by oil and gas platforms can vary depending on factors such as the lighting design, specific requirements, and regulations governing the platform. Typically, the lighting levels on oil and gas platforms are designed to meet specific standards and guidelines set by regulatory bodies or industry best practices. For example, the International Association of Oil & Gas Producers (IOGP) provides recommendations for lighting levels on offshore installations. According to IOGP guidelines, typical lighting levels for different areas of an offshore platform are as follows:

- General outdoor areas: 20-50 lux
- Work areas and walkways: 100-200 lux
- Stairways and emergency escape routes: 100-200 lux
- Control rooms and laboratories: 300-500 lux
- Living quarters and offices: 200-500 lux

### *6.3.6 Offshore Biological Baseline*

#### *6.3.6.1 Marine Habitats and Biodiversity*

##### *6.3.6.1.1 Benthic Domain*

The continental shelf along the Romanian coast is strongly influenced by the Danube River plume. In fact, it is known that the Danube River discharges a great quantity of freshwater, sediments, and organic nutrients into the sea and, consequently, influences water parameters (e.g., temperature and salinity) and marine ecosystems composition and structure in the western part of the Black Sea. Due to these terrigenous sediments input, the Romanian shelf is more extended compared to other Black Sea areas (such as the basin south-eastern part) and its benthic habitats result to be mostly characterized by soft bottom with sands, muds and mixed sediments. The bottom sediment composition and distribution is a key factor, which, together with salinity, is thought to play a decisive role in the formation of macrobenthic communities (Begun et al., 2010). The variety of biotopes present allows the development of different biocenoses dominated especially by burrowing and suspension feeder organisms such as bivalve molluscs, polychaete worm and crustaceans but also ecosystem engineers such as *Mytilus galloprovincialis*.

Nautical charts confirmed the presence of natural rocky outcrops and artificial hard substrates (e.g., breakwaters) along the coastal infralittoral area of the AoI, otherwise characterized by inconsistent seabed. These rocky benthic habitats play an important role in the ecological dynamics of sessile macrobenthic assemblages' settlement and colonization. In fact, interrupting the homogeneity of the surrounding habitat and providing numerous microhabitats and ecological niches, these hard bottom habitats (including biogenic reefs) generally host rich and well-structured macrobenthic communities that can be considered real "*biodiversity oasis*". In particular, Romanian rocky bottom benthic communities are mainly formed by suspension feeder organisms, which feed on food particles (including phytoplankton, zooplankton, bacteria, and detritus) suspended in water or near-bottom water. These organisms include bryozoans, ascidians, hydroids, anemones, encrusting sponges, mussels, some polychaetes (such as fan worms) and crustaceans (such as barnacles). However, several species of polychaetes and crustaceans are known to switch between suspension feeding and deposit feeding depending on the supply of particulate matter suspended in the near-bottom water (Hentschel &

Shimeta, 2008). Hard bottom benthic habitats also support wide infralittoral seaweed communities with various green, red, and brown algal species.

Generally, the maximum abundance of macrozoobenthos is found in the infralittoral zones, where mollusks and crustaceans dominate, while the minimum is in the circalittoral and deep-water zones, where annelids predominate (Varshanidze et al., 2021).

Cross-referencing the information from EUNIS with the MSFD (Marine Strategy Framework Directive) benthic broad habitats map provided by EMODnet (EUSeaMap 2016) it was possible to identify the predominant habitats along the Romanian AoI. The MSFD benthic broad habitat types are listed by Commission Decision EU/2017/848 Annex, Part II and equate to one or more habitat types at hierarchical level 2 of the EUNIS habitat classification 2019. The major division in the EUNIS benthic habitats classification at level 2 is based on major biological zones (related to depth) and substrate type (ANEMONE Deliverable 1.3, 2021). In addition, some MSFD/EUNIS benthic habitat types potentially present in the AoI were also identified thanks to the consultation of the "*Black Sea Monitoring and Assessment Guideline*" (BSMAG) prepared as part of the ANEMONE Project "Assessing the vulnerability of the Black Sea marine ecosystem to human pressures" (2021). All the identified benthic habitats are reported in the following Table 6-35.

*Table 6-35 – EUNIS benthic habitat types potentially present in the AoI and description of their characteristics*

| EUNIS 2019 | EUNIS 2012 | Biotope description |
|---|---|---|
| **MA14 – Black Sea littoral rock** | | |
| **MA141** – Black Sea supralittoral rock | **A1.15** – Pontic supralittoral rock | The rocky supralittoral zone (depth 0-5 m) where the upper supralittoral rock is colonized by yellow lichens and cyanobacteria such as *Lyngbia* sp. and the lower supralittoral rock is colonized by encrusting black lichens, littorinids, isopods and barnacles. In locations with freshwater runoff and where nitrate levels are elevated the rock surfaces may be coated with green algae and a film of cyanobacteria. |
| **MA24 – Black Sea littoral biogenic habitat** | | |
| **MA24** – Black Sea littoral biogenic habitat | **A2.5** – Coastal saltmarshes and saline reedbeds<br>**A2.7** – Littoral biogenic reefs | Black Sea littoral habitats formed by animals such as worms, mussels or plants (salt marshes). |
| **MB14 – Black Sea infralittoral rock** | | |
| **MB14E** – Caves, overhangs and surge gullies in Black Sea infralittoral rock | **A3.74** – Caves, overhangs and surge gullies in Pontic infralittoral rock | Caves and overhangs in the infralittoral zone are completely submerged at all states of the tide. Light conditions are generally poor. Communities of sciaphillic algae, sponges and mussels are commonly present.<br>Characteristic species: *Phyllophora nervosa*, *Lomentaria clavellosa*, *Hildenbrandia rubra*, *Zanardinia typus*, *Mytilus galloprovincialis*, erect sponges *Halichondria panicea*, *Haliclona simulans*, *Dysidea fragilis*, *Dysidea pallescensor* thin crust sponges like *Antho involvens*, *Haliclona flavescens*, *Haliclona cinerea*, *Suberites prototypus*, *Clathria cleistocheila* depending on current intensity, anemones *Actinia equina*, red mysid shrimp *Hemimysis pontica*, *Hemimysis serrata* and turf hydrozoans. |

| | | |
|---|---|---|
| **MB24 – Black Sea infralittoral biogenic habitat** | | |
| **MB241** – Polychaete worm reefs in the Black Sea infralittoral zone | **A5.61** – Polychaete worm reefs in the Pontic infralittoral zone | Biogenic circalittoral reefs formed by a variety of polychaete worms. In more sheltered and freshwater-influenced environments the non-native serpulid tubeworm *Ficopomatus enigmaticus* is the most common reef building species. In moderately exposed environments reefs formed by the serpulid *Vermiliopsis infundibulum* are present. Finally, on lower infralittoral rock serpulids form massive reefs in collaboration with bivalves (i.e. *Ostrea edulis, Mytilus galloprovincialis*). These reefs are an important component of the Black Sea ecosystem and are characterised by high biodiversity. |
| **MB242** – Mussel beds in the Black Sea infralittoral zone | **A5.62** – Mussel beds in the Pontic infralittoral zone | Beds of *Mytilus galloprovincialis* found in a variety of habitats ranging from sheltered estuaries and marine inlets to open coasts and offshore areas they may occupy a range of substrata, although due to the stabilising effect such communities have on the substratum muddy mixed sediments are typical. A diverse range of epibiota and infauna often exists in these communities |
| **MB44 – Black Sea infralittoral mixed sediment** | | |
| **MB44** – Black Sea infralittoral mixed sediment | **A5.13** – Pontic infralittoral mixed substrata | The substrate is often patchy and is comprised of a mix of cobbles, pebbles, shelly gravels and silted cobbles. The effects of currents and wave action are varied and influences the type of substrate present and whether it is overlain by silt. These different substrates can support a diverse range of faunal communities. These include spirorbid worms, crustaceans, and ascidians. |
| **MB54 – Black Sea Infralittoral sand** | | |
| **MB542** – Black Sea infralittoral sands and muddy sands without macroalgae | **A5.237** – Pontic infralittoral sands and muddy sands without macroalgae | Sandy habitats dominated by faunal species occurring in the infralittoral zone down to 20m depth with many variations. This ranges from medium to coarse grained sands on exposed beaches to offshore infralittoral fine sand banks and includes many types of surface features at different scales (banks, ripples, mounds and burrows of infauna). The depth and waves or current exposure are important elements in defining the species composition. |
| **MB543** – Black Sea infralittoral muddy sand | **A5.24** – Pontic infralittoral muddy sand<br><br>(**A5.24A** – Pontic lower infralittoral thalassinid-dominated muddy sands with *Upogebia pusilla* and sparse macrofauna) | Non-cohesive muddy sand (with 5% to 20% silt/clay) in the lower infralittoral zone. The habitat is dominated by faunal species including ghost shrimps and bivalves.<br><br>Characteristic species: *Upogebia pusilla*, *Mya arenaria*, *Anadara inaequivalvis*, *Abra alba*, *Spisula subtruncata* and *Pitar rudis*. |
| **MB64 – Black Sea Infralittoral mud** | | |
| **MB642** – Black Sea infralittoral terrigenous muds | **A5.33** – Pontic infralittoral terrigenous muds | Infralittoral coastal terrigenous muds are characterized by mud and sandy mud with a terrestrial origin. There are two distinct sub habitats which are characterized by the dominant faunal communities. The first is dominated by polychaets, whilst the second is dominated by mussels (this one does not occur in Marmara Sea). |

| | | |
|---|---|---|
| | | <u>Characteristic species</u>: *Melinna palmata*, *Heteromastus filiformis*, *Aricidea claudiae*, *Mytilus galloprovincialis* and *Mytilaster lineatus*. |
| **MC24 – Black Sea circalittoral biogenic habitat** | | |
| **MC241** – Mussel beds on Black Sea circalittoral terrigenous muds | **A5.62** – Mussel beds on Pontic circalittoral terrigenous muds | Mixed circalittoral sediments (20-45 m depth) with terrigenous mud mixed with variable amounts of recent or subfossil shells, mainly belonging to the mussel *Mytilus galloprovincialis*. This species forms biogenic reefs through the mussel shells accumulation and aggregation. Over time, a hard substratum is formed on which living mussel colonies attach themselves. The reef is formed of numerous elongated patches and/or continuous ridges, always transverse to the prevailing bottom currents (which bring food to the filter-feeders).<br><br><u>Characteristic species</u>:<br>▪ Cnidarians: *Sagartia undata*<br>▪ Sponges: *Dysidea* sp.<br>▪ Molluscs: *Abra alba*, *Calyptraea chinensis*, *Nassarius nitidus*, *Gouldia minima*, *Pitar rudis*, *Acanthocardium paucicostatum*, *Rapana venosa*<br>▪ Polychaetes: *Terebellides stroemi*, *Melinna palmata*, *Capitella capitata*, *Glycera alba*, *Hediste diversicolor*, *Heteromastus filiformis*, *Nephtys hombergii*, *Polydora* spp.<br>▪ Crustaceans: *Ampelisca diadema*<br>▪ Echinoderms: *Amphiura stepanovi, Leptosynapta inhaerens*<br>▪ Tunicates: *Ascidiella aspersa*, *Ciona intestinalis* |
| **MC44 – Black Sea circalittoral mixed sediment** | | |
| **MC44** – Black Sea circalittoral mixed sediment | **A5.44** – Circalittoral mixed sediments | Mixed (heterogeneous) sediment habitats in the circalittoral zone (generally below 15-20 m) including well mixed muddy gravelly sands or very poorly sorted mosaics of shell, cobbles and pebbles embedded in or lying upon mud, sand or gravel. Due to the variable nature of the seabed a variety of communities can develop which are often very diverse. |
| **MC54 – Black Sea Circalittoral sand** | | |
| **MC541** – Black Sea circalittoral muddy sand | **A5.26** – Pontic circalittoral muddy sand | Non-cohesive muddy sand (with 20% to 80% silt/clay) in the circalittoral zone. The habitat is characterised by low light and low energy conditions. Species include bivalve and polychaete worms.<br><br><u>Characteristic species</u>: *Mya arenaria*, *Cerastoderma glaucum*, *Abra alba*, *Parvicardium exiguum*, *Spisula subtruncatra*, *Pitar rudis* and *Aricidea claudiae*. |
| **MC64 – Black Sea Circalittoral mud** | | |
| **MC641** – Black Sea circalittoral terrigenous muds | **A5.3** – Sublittoral mud | Circalittoral mud of terrestrial origin, the fauna varies depending on the mechanism and rapidity of deposition of the sediments. |

| | | |
|---|---|---|
| | | Characteristic species: *Abra alba*, *Acanthocardium paucicostatum* and *Papillicardium papillosum* |
| **MC643** – Black Sea upper circalittoral sandy mud | **A5.35** – Pontic upper circalittoral sandy mud | Sandy muds in the upper circalittoral zone found all around the Black Sea coast. The habitat is characterised by faunal communities dominated by bivalve molluscs and polychaete worms.<br><br>Characteristic species: *Heteromastus filiformis*, *Dipolydora quadrilobata*, *Nephthys hombergii* and *Spisula subtruncata*. |
| **MC644** – Black Sea upper circalittoral fine mud | **A5.36** – Pontic upper circalittoral fine mud | Fine muds in the upper circalittoral zone below the photic zone at depths between 20 and 50 meters. The habitat is characterised by faunal communities dominated by bivalves and polychaete worms.<br><br>Characteristic species: *Mya arenaria*, *Spisula subtruncata*, *Melinna palmata*, *Heteromastus filiformis* and *Aricidea claudiae*. |
| **MC645** – Black Sea lower circalittoral mud | **A5.37** – Pontic lower circalittoral mud | Terrigenous muds (mud of terrestrial origin), calcareous muds and biogenic detritic bottoms at depths of 60-180m. The benthic fauna is dominated by bean mussels *Modiolula phaseolina*, polychaetes and solitary ascidians. At the greatest depths the environment becomes hypoxic. Here the sediment consists of periazoic calcareous white muds and faunal communities become impoverished.<br><br>Characteristic species: *Modiolula phaseolina*, *Amphiura stepanovi*, *Terebellides stroemi*, *Pachycerianthus solitarius*, solitary ascidians (*Ascidiella aspersa*, *Ciona intestinalis*, *Eugyra*), hydrozoans, nematodes and oligochaetes. |
| **MD44 – Black Sea offshore circalittoral mixed sediment** | | |
| **MD44** – Black Sea offshore circalittoral mixed sediment | - | Offshore (deep) circalittoral habitats in the Black Sea with slightly muddy mixed gravelly sand and stones or shell. |
| **MD54 – Black Sea offshore circalittoral sand** | | |
| **MD54** – Black Sea offshore circalittoral sand | **A5.27** – Deep circalittoral sand | Black Sea sand circalittoral habitats with fine sands or non-cohesive muddy sands below the influence of wave action. Predominately oxic but can be anoxic in deeper waters. |
| **MD64 – Black Sea offshore circalittoral mud** | | |
| **MD64** – Black Sea offshore circalittoral mud | **A5.37** – Deep circalittoral mud | Mud and cohesive sandy mud in the offshore circalittoral zone of the Black Sea. Predominantly oxic but also locally suboxic and anoxic. |

Among the Black Sea infralittoral sand habitats (MB54), it is confirmed the presence in the Project area of the EUNIS (2007) sub-habitat **A5.24A** – "**Pontic lower infralittoral thalassinid-dominated muddy sands with *Upogebia pusilla* and sparse macrofauna**". This habitat is characterized by non-cohesive to cohesive muddy sand bottom (starting with 5% to 20% silt/clay and up to 80%) riddled with the deep burrows (0,2-1 m) of the thalassinid crustacean *Upogebia pusilla* (Petagna, 1792). This crustacean is clearly dominant in terms of both density and biomass, with high densities (over 100 individuals per m$^2$) over large areas. *U. pusilla* has a sizeable influence on the ecosystem for its biofiltering, bioturbation, sediment resuspension and benthic-pelagic coupling role. The dominance of filter-feeding molluscs occurring in this habitat is decreased through competition and larval predation by *U*. *pusilla*.

In the EU 28 the habitat type is assessed as **Endangered** for the Red List Criterion B1b due to its restricted geographical distribution and the threatening pollution and eutrophication processes which are likely to cause a continuing decline in quality and quantity over the next 20 years (Gubbay et al., 2016; EUNIS, 2015). Even though the extent of the of the habitat in the Black Sea is likely not changed, it results to be highly sensitive to hypoxia and a significant degradation of the habitat quality, also with *U*. *pusilla* mortality events, has been already sensed and assessed (Micu et al., 2015).

*Upogebia pusilla* is classified as endangered by the Annex 2 (Provisional List of Species of the Black Sea Importance) of the "Black Sea Biodiversity and Landscape Conservation Protocol to the Convention on the Protection of the Black Sea Against Pollution" framed in 2002.

Another habitat whose presence is confirmed in the Project area is the sub-habitat EUNIS (2019) **MC241** – "**Mussel beds on Black Sea circalittoral terrigenous muds**", former habitat A5.62 according to the EUNIS 2012 nomenclature. This habitat typically occurs at a depth of 20-45 m on mixed circalittoral sediments with terrigenous muds mixed with variable amounts of recent or subfossil shells, most of them belonging to the blue mussel *Mytilus galloprovincialis*. This species forms biogenic reefs through the shells accumulation in time and aggregation of the shells by byssal threads. Over time, a hard substratum higher than the surrounding sediment is formed, on which living mussel colonies attach themselves. *Mytilus galloprovincialis* beds have a particularly important ecological role on soft bottoms, providing hard substrates and microhabitats in otherwise muddy areas and food resources (e.g., mussel faeces and pseudofaeces) for deposit-feeding infauna living in the sediment around. Furthermore, this biogenic reef is unique through the crucial ecological role played by the great biofiltration power of the mussel beds, which ensures the benthic-pelagic coupling and provides enhanced ecosystem resilience. This habitat supports a high biodiversity and attracts a wider range of marine life (especially epibionts and infauna) than would otherwise be found there, including algae, anemones, barnacles, molluscs, crustaceans, echinoderms and polychaetes (EUNIS, 2022).

This habitat is assessed as **Endangered** under the Red List Criterion A1 and C/D1 for both the EU 28 and EU 28+. In fact, the Black Sea mussel beds has undergone a progressive decline in quantity (between 50-80%) and extension (>80%) mainly due to the last 50 years eutrophication processes (EUNIS, 2022). In the marine area of the Cape Tuzla Natura 2000 site, in addition to the presence of a rocky reef-like seabed, the presence of a sea cave is also reported. This site is the only place in Romania where the sea caves habitat (**MB14E** – "**Caves, overhangs and surge gullies in Black Sea infralittoral rock**", EUNIS 2019) is found.

The related habitat types as referred to in Annex I[35] of EU Habitats Directive (Council Directive 92/43/EEC) may be considered as:

- **1110** – Sandbanks which are slightly covered by sea water all the time;
- **1130** – Estuaries;
- **1160** – Large shallow inlets and bays;
- **1170** – Reefs;

[35] Annex I: "Terrestrial, coastal and freshwater ecosystems habitat types and groups of habitat types referred to in article 4(1) and 4(2)"

- **8330** – Submerged or partially submerged sea caves.

Focusing on the alien invasive species along the Romanian coast, the Preda et al. (2012) paper provides some important indication about the potential alien/invasive species present in the Project AoI. Studies have shown 15 different invasive species in the Romanian coast and especially close to the Constanta harbour. In fact, in marine and brackish water environments, shipping is considered the main vector of alien species introductions (Reise et al. 1999). Given that the port of Constanţa is the major Romanian transit hub, providing connections between Central and Eastern Europe, the Caucasus and Central Asia, it is not surprising that the identified alien species originate from the North Atlantic, Indo-Pacific or are cosmopolite (Preda et al., 2012). The alien species observed in Constanţa harbour are euryhaline and in the same trophic and functional groups as the native species (i.e., mainly suspension feeders) (Preda et al., 2012). The invasive species likely to be present within the AoI are resumed in Table 6-36.

*Table 6-36 – List of alien species probably present within the area of interest.*

| Phylum | Class | Species |
|---|---|---|
| **ANNELIDA** | Polychaeta | *Ficopomatus enigmaticus* (Fauvel, 1923) |
| | | *Polydora cornuta* Bosc, 1802 |
| **ARTHROPODA** | Malacostraca | *Amphibalanus improvisus* (Darwin, 1854) |
| | | *Hemigrapsus sanguineus (De Haan, 1835)* |
| | | *Palaemon macrodactylus* Rathbun, 1902 |
| | | *Rhithropanopeus harrisii* (Gould, 1841) |
| **CNIDARIA** | Anthozoa | *Diadumene lineata* (Verrill, 1869) |
| **MOLLUSCA** | Bivalvia | *Anadara inaequivalvis* (Bruguière, 1789) |
| | | *Anadara kagoshimensis* (Tokunaga, 1906) |
| | | *Mya arenaria* Linnaeus, 1758 |
| | Gastropoda | *Corambe obscura* (Verrill, 1870) |
| | | *Rapana venosa* (Valenciennes, 1846) |
| | | *Tritia neritea* (Linnaeus, 1758) |
| **CHORDATA** | Ascidiacea | *Molgula manhattensis* (De Kay, 1843) |
| | | *Styela clava* Herdman, 1881 |

Invasive species are known to have transformed marine habitats around the world. The most harmful of these invaders displace native species, change community structure and food webs, and alter fundamental processes, such as nutrient cycling and sedimentation. Alien invasives have damaged economies by diminishing fisheries, fouling ships' hulls, and clogging intake pipes (Molnar et al., 2008). For such reason, their presence in the AoI should be carefully assessed.

### *6.3.6.1.2 Pelagic Domain*

#### 6.3.6.1.2.1 Plankton

The Romanian coastal zone of the Black Sea shows seasonal dynamics in phytoplankton and zooplankton abundance, with differences in distributional patterns depending on variations of biotic and abiotic factors (Carstensen et al., 2015), such as salinity, temperature, rivers runoff, rate and ratios of nutrient supply, horizontal and vertical water movements, wind direction and intensity, anthropogenic activities, and other factors (Tilman, 1977; Cloern, 2001; Barton et al., 2014; Silkin et al., 2019).

Phytoplankton are the most important "primary producers" of the seas, base of the pelagic food chain and key component of the carbon cycle (Falkowski and Raven, 2007). Regardless of the season, phytoplankton distribution and dynamics are mainly influenced by the nutrient input of the Danube, salinity, and the direction of transport by currents (Bodeanu, 1966, 1968, 1979). In the Romanian coastal ecosystems, phytoplankton composition most includes dinoflagellates (33%; key genera are Protoperidinium, Peridinium, Glenodinium and Gonyaulax, Gymnodinium, Dinophysis, Prorocentrum, Tripos), diatoms (30%%; especially Chaetoceros, Nitzschia, Thallassiosira, Melosira, Navicula, Skeletonema genera), Chlorophyceae (20%; particularly Desmodesmus, Scenedesmus, Monoraphidium and Tetrastrum genera) and Cyanophyceae (9%). The rest of the algal groups (Chrysophyta, Euglenophyta and Cryptophyta) achieved only 8% of the qualitative composition (Boicenco et al., 2019). Commonly, during the year it's possible to observe three or four phytoplankton peaks corresponding to spring, summer, and autumn (Janelidze et al., 2011; Figure 6-92). Diatoms usually show up during spring/summer, when surface waters are rich in nitrogen and phosphorous, and autumn while, instead, dinoflagellates are dominant in higher proportions in spring when the temperature and photosynthetically active radiation (PAR) values are higher (BSC, 2019). However, some dinoflagellates species (Tripos, Protoperidinium, Prorocentrum) grow all year-round. Toxic blooms of diatoms and dinoflagellates occur rather frequently along the coasts of Romania in the NW Black Sea (Bodeanu, 1995; Moncheva et al., 1995, 2001; Bodeanu et al., 2004).

*Figure 6-92 – Phytoplankton bloom in the northwestern Black Sea region (Copernicus, 2022).*

Zooplankton, that include many different species of animals, is the major consumer of the primary production and constitute the food source of organisms at higher trophic levels. This biological component, as well as phytoplankton, is a comparatively mobile part of the ecosystem and its condition is closely connected with biotic, abiotic and, recently, anthropogenic factors (Mazmanidi & Komakhidze, 1998). As a rule, zooplankton exhibits seasonal variations in density and biomass, reaching a maximum in the summer/autumn in the transitional waters and minimum values in the spring in coastal waters. The meroplanktonic forms (eggs and larvae) and the planktonic crustaceans, especially Copepoda and Cladocera, are dominant over other mesozooplankton groups by abundance and biomass. The numerical dominance of copepods in all seasons is remarkable, with *Acartia clausi*, *Pseudocalanus elongatus*, *Calanus euxinus*, *Oithona similis*, *Paracalanus parvus* dominant in the cold season and *Centropages ponticus* in the warm season. The non-fodder zooplankton dominates in quantitative terms both in the summer and autumn seasons, as opposed to the spring season, when the zooplankton communities were dominated by the fodder species (Boicenco et al., 2019).

The maximum diversity of the gelatinous zooplankton was recorded in the summer season in the transitional waters. The scyphozoa *Aurelia aurita* dominates both during spring and summer, followed by the ctenophores *Mnemiopsis leidyi* in the transitional waters and *Pleurobrachia pileus* in coastal and marine waters (Boicenco et al., 2019).

#### 6.3.6.1.2.2 Fish

The composition of Black Sea fish fauna has changed from the 1950s until the present, due to the deterioration of environmental conditions and inadequate fisheries management (Țoțoiu et al., 2018). However, the availability of food, rocky substrate and higher salinity condition in the southern part of the Romanian coast have led to greater diversity and concentration of fish population[36]. 140 fish species have been identified along the Romanian coast (Țoțoiu et al., 2018). The area hosts several vulnerable species, listed in Annex II of Habitats Directive (92/43/EEC) (Bănărescu & Bănăduc, 2007) and several endemic species (Yankova et al., 2011). Many of the species of concern are anadromous migratory fish like the three sturgeon species (*Acipenser gueldenstaedtii*, *A. stellatus*, *Huso huso*), which are listed as critically endangered (CR) and some demersal and pelagic species, listed as vulnerable (VU) or near threatened (NT) by IUCN Red List of Threatened Species (IUCN, 2022). For some species protection at international level through legal instruments and agreements are also established (e.g., CITES, Bonn Convention).

The most important commercial species in the area are sprat (*Sprattus sprattus*, LC), whiting (*Merlangius merlangus*), anchovy (*Engraulis encrasicolus*, LC), turbot (*Scophthalmus maximus*), horse mackerel (*Trachurus mediterraneus*), Atlantic bonito (*Sarda sarda*, LC), bluefish (*Pomatomus saltatrix*) and red mullet (*Mullus barbatus*, LC).

The western coast of the Black Sea due to its geomorphological features and environmental characteristics, is an important migration area, nursery and spawning grounds for several demersal and pelagic species. The distribution of the various species in the Black Sea is shown in Figure 6-93 and the **Project Area** could fall within this area of high interest for fish resources.

The sprat (*Sprattus sprattus*) is a pelagic species widely distributed in the north-western part of the Black Sea along the coast of Romania and Bulgaria (Figure 6-93). It is known that this species undertakes

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[36] http://apepaduri.gov.ro/categorie/plan-de-amenajare-a-spatiului-maritim/426. Plan of 09/23/2022.

seasonal migration between offshore spawning ground and inshore feeding ground (STECF, 2012). Spawning occurs several times during the year, but the most intense is between November and March. Sprats go towards the littoral region in April and May and during the winter live at depth of 80-100 m (Balik, 2018).

The whiting (*Merlangius merlangus*) undertakes no long migrations. Spawning occurs during the winter season when the specie is nearby coastal area and in the other period is distributed along the shelf at depths 60-120 m and sometimes up to 150 m (STECF, 2012; Figure 6-93).

The Horse Mackerel (*Trachurus mediterraneus*) is a pelagic migratory species that spawns and feeds in the north-western and western continental shelf regions of the Black Sea during the spring season. In the autumn (September – November) they undertake seasonal migration along the coastal waters reaching wintering ground located in the coastal water of Türkiye, Georgia, Russia and the Crimea Peninsula (STECF, 2012; Figure 6-93).

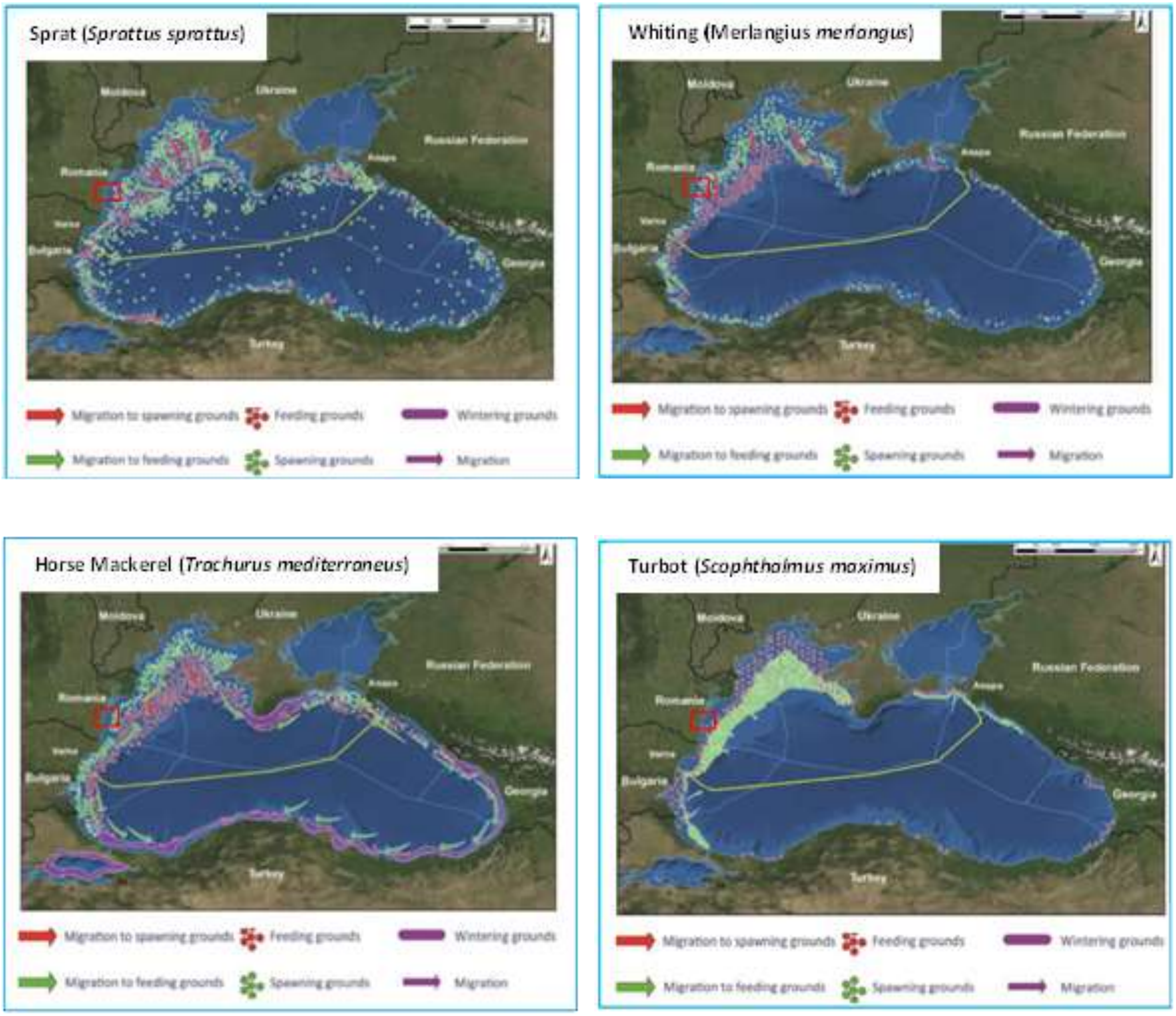



*Figure 6-93 – Spawning, feeding and overwintering grounds and migration routes of sprat (Sprattus sprattus), whiting (Merlangius merlangus), horse mackerel (Trachurus mediterraneus) and Turbot (Scophthalmus maximus) in the Black Sea (source: Nicolaev & Alexandrov, 2017).*

The Turbot (*Scophthalmus maximus*) is a demersal species widely distributed all over the shelf of the Black Sea at depths up to 100 – 140 m. Local migration to spawning ground in shallow waters takes place during the spring (STECF, 2012).

The Black Sea anchovy (*Engraulis encrasicolus*) migrates southward in winter towards the warmest waters of the southeast coast of the Black Sea to overwinter. In recent year the reproductive behaviour of some species of fish has changed (Galaţchi et al.,2019, Gucu et al., 2016). One of the main spawning grounds were represented by the north-western continental shelf (Nicolaev & Alexandrov, 2017) (Figure 6-94A). Thanks to Guraslan et al., 2017 it was found out that the migration route along the Romanian/Bulgarian coasts is not the most important route used by anchovies to reach the south-eastern part of the Black Sea for overwintering. It could be possible that a shift in temperature distribution and currents induced anchovies to migrate via open ocean pathways (Figure 6-94B).

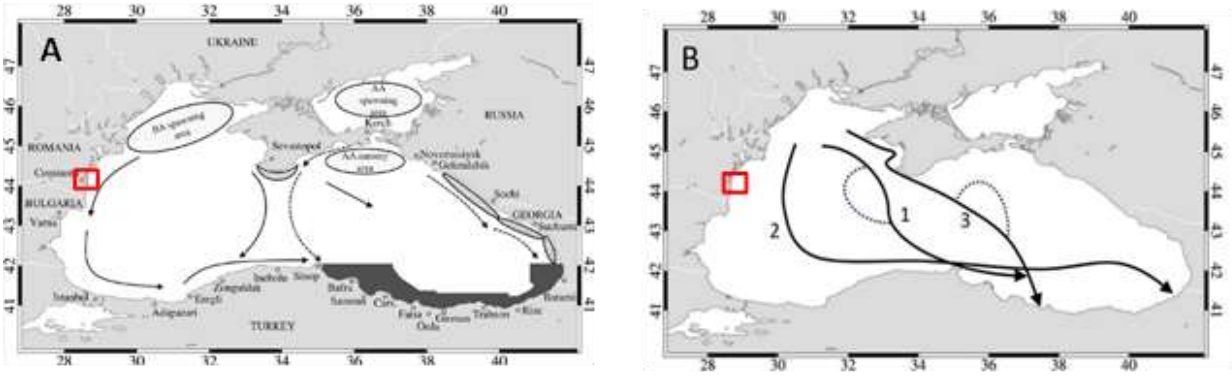



*Figure 6-94 A) Spawning, feeding and overwintering grounds and migration routes of anchovy (Engraulis encrasicolus) in the Black Sea. B) Migration pathways identified for anchovy released from the northwestern shelf (source: Güraslan et al., 2017).*

Along the Romanian coast, elasmobranchs are present as well and some species are protected and also included in the IUCN Red List as vulnerable species (e.g., Common stingray – *Dasyatis Pastinaca*, VU). Elasmobranchs are one of several groups of species that can be caught as incidental catch. They represent the main form of by-catch in the area, being caught in high numbers along with target species, as in the case of the spiny dogfish (*Squalus acanthias*, EN) and the thornback skate (*Raja clavata*, NT) (FAO, 2022). The spiny dogfish stock is declining and despite the management measures taken over the years, the situation has not changed. This is mainly due to the lack of availability of data from the Black Sea countries and the tendency of some of them (only Bulgaria at the moment) to still considered *Squalus acanthias* a species of commercial interest (FAO, 2022).

Anadromous migratory fish, spend part of their lives in salt water and return to rivers to spawn. The Black Sea herring (*Alosa immaculata*, VU), the Black Sea Shad (*Alosa tanaica*, LC), and three sturgeon species, the Beluga Sturgeon (*Huso huso*, CR), the Russian Sturgeon (*Acipenser gueldenstaedtii*, CR) and the Stellate Sturgeon (*Acipenser stellatus*, CR) are the most important anadromous species spawn in the Danube River (Hont et al., 2022). Towards the beginning of summer, the spawners appear along the Romanian coast and enter rivers, while in autumn they move to sea to overwinter.

*Figure 6-95 – Beluga (Huso hus o) (source: Jouladeh-Roudbar et al., 2020).*

However, in the last decade their spawning area has been reduced due to the construction of dams blocking and altering the environmental condition of their habitat (Billard & Lecointre, 2001; Secor et al., 2002). Overfishing and poaching have further driven sturgeon populations into decline, and now the spawning in the Danube River is considered rare (Gessner et al., 2022).

#### 6.3.6.1.2.3 Marine mammals

The Romanian coastal and shelf waters are commonly inhabited by all the three endemic marine mammals of the Black Sea:

- The Black Sea Harbour Porpoise (*Phocoena phocoena relicta*);
- The Black Sea Bottlenose Dolphin (*Tursiops truncatus ponticus*); and
- The Black Sea Common Dolphin (*Delphinus delphis ponticus*).

Other species may occasionally occur in the basin but are not considered as resident (BlackSeaWatch).

The **Black Sea Harbour Porpoise** (Figure 6-36) features have been already described in the Georgian offshore chapter 6.1.5.1.2.3. In the territorial waters of Romania, very high-density areas for harbour porpoises are the Danube Delta Marine Protected and the waters close to the Constanta harbour (Birkun et al., 2014; IUCN, 2021b). Due to the influence of the Danube River, the turbidity in this region is very high, creating a preferable habitat for harbour porpoises (Nicolae et al., 2017). The presence of harbour porpoise feeding and traveling in these areas is often associated with the migration, spawning and feeding periods of prey fish, such as horse mackerel (*Trachurus mediterraneus*), turbot (*Scophthalmus maeoticus*), sprat (*Sprattus sprattus*), Black Sea herring (*Alosa immaculata*), whiting (*Merlangius merlangus*), and anchovy (*Engraulis encrasicolus*) (Smederevac-Lalic et al., 2018; Yankova, 2011; IUCN, 2021b). The highest density of harbour porpoises is detected in the spring, however similar observations are documented in offshore waters in late autumn (Popov, 2019). The number of Black Sea Harbour Porpoises is in continuous decrease due to the entanglement in fishing gear (bottom-set gillnets), ship strikes, habitat degradation, depletion of their food source and mass mortality events. The current population numbers at least several thousand and possibly a few tens of thousands (IIUCN, 2012).

Similarly, also the **Black Sea Bottlenose Dolphin** (EN )(Figure 6-37) and the **Black Sea Common Dolphin**, (VU) (Figure 6-38) features and occurrence in the Black Sea are described in the Georgian offshore chapter 6.1.5.1.2.3.

### *6.3.6.2 Marine Legally Protected Areas and Important Areas For Biodiversity*

One of the goals of the Convention on Biological Diversity (CBD) is to conserve about 10% of coastal and marine areas through well-managed, ecologically representative and well-connected protected areas by 2020 (Manta, 2014). Along the Romanian Black Sea coast 10 Marine Protected Areas (MPAs) occurred (9 Sites of Community Importance - SCIs and 1 Special Protection Area - SPA), covering an area of 7457.66 $km^2$ (Nicolaev et al., 2018). Notwithstanding, only 37% of the Natura 2000 sites (5 SCIs and 1 SPA) have management plans.

A total of 6 legally protected areas and 4 important areas for biodiversity are present within the Area of Interest, falling completely or partially within it. These are represented in Figure 6-96 and described below.

**Marea Neagră (SPA, IBA, and KBA)**

Marea Neagră is a Special Protected Area (SPA, code ROSPA0076) according to the Birds Directive 2009/147/EC and furthermore recognized as Important Bird Area (IBA, code RO082) and Key Biodiversity Area (KBA) of international significance (BirdLife, 2022).

Marea Neagră SPA covers an area of 1491,44 $km^2$ along the entire Romanian coastline interrupting at the entrance to the port of Constanta. The IBA and KBA overlap the SPA covering an area of approximately 1428 $km^2$. The site is an important wintering and migration area for several species and hosts important populations of protected bird species. Most of them are included in the IUCN Red List of Threatened Species such as *Pelecanus crispus* and *Aythya nyroca* listed as Near Threatened (NT), and *Branta ruficollis* and *Aythya ferina* considered Vulnerable (IUCN, 2022). Given the high density of birds (more than 20.000 individuals) in the area during the migration period, the site could be designed as RAMSAR site[37]. Part of the Marea Neagră area falls mainly within the electrode **area of influence** and a small part fall within the **Project Area**.

[37] Natura 2000, 2022. Site ROSPA0076 Marea Neagră Standard Data Form. Retrieved on: N2K ROSPA0076 dataforms (europa.eu)

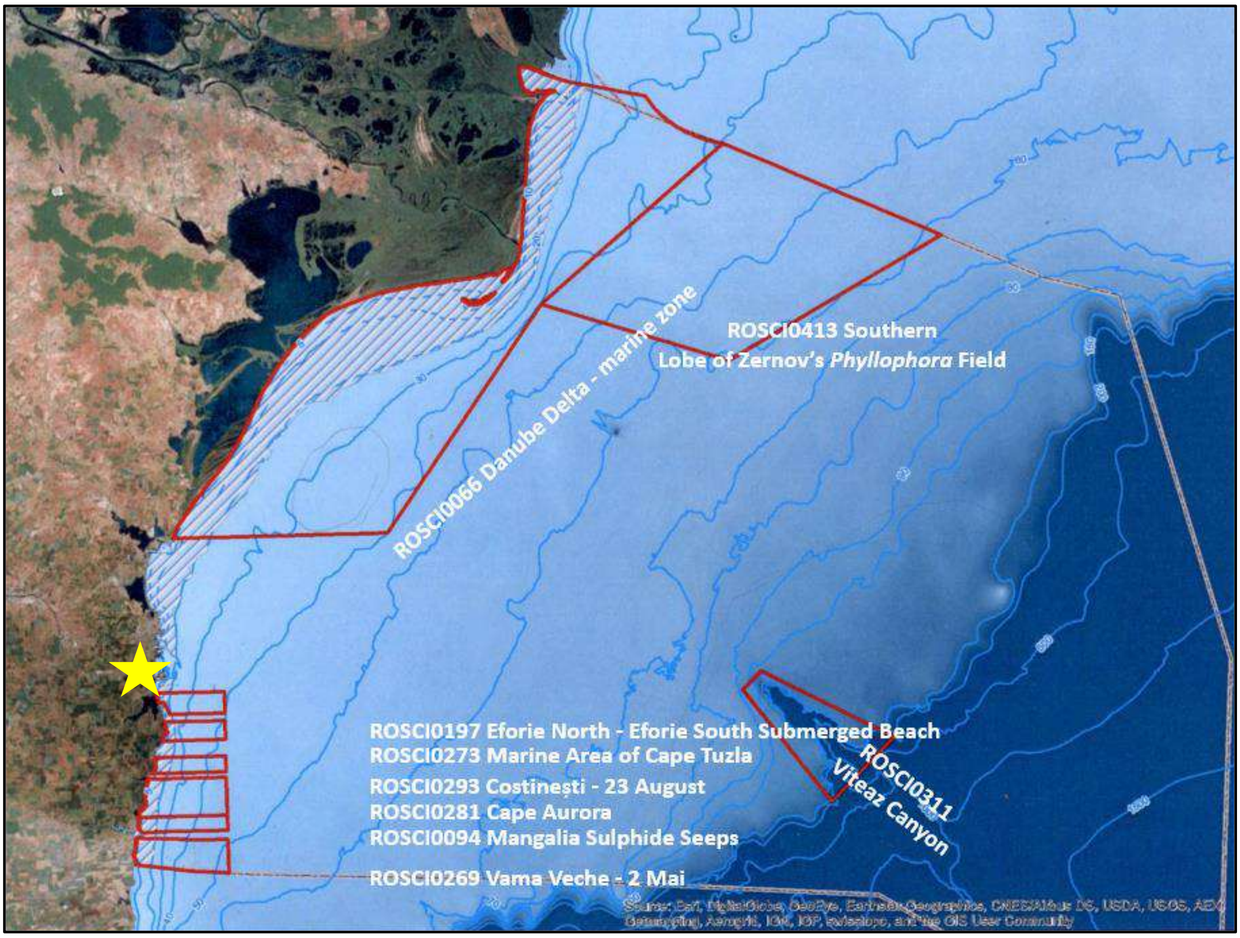



*Figure 6-96 – Map of the legally protected areas and important areas for biodiversity within the Romanian AoI.*

**Eforie North – Eforie South Submerged Beach (SCI)**

Eforie North – Eforie South Submerged Beach is a Site of Community Importance (code ROSCI0197) and represent the only beach in the southern part of the Romanian coast that preserved its characteristic as an exposed sandy beach, with its natural hydrodynamics[38]. The site covers an area of 57.17 km$^2$ and it is mainly characterized by sandbanks, mudflats and sandflats defined the intertidal zone and rocky substrates hosts biogenic concretions of *Mytilus galloprovincialis* in the south-eastern part of the area (Galatchi et al., 2014).

The fauna is diversified, composed of several species of hydrozoas, sponges, polychaetas, mollusks, crustaceans, and fish as the Black Sea herring (*Alosa immaculata*, VU) and the Black Sea Shad (*Alosa tanaica*, LC) (Zaharia et al., 2012a). In the area also occur two of the three species of marine mammals present in the Black Sea, the Black Sea bottlenose dolphin (*Tursiops truncatus ponticus*, EN) and the Black Sea harbour porpoise (*Phocoena phocoena relicta*, EN) (Galatchi et al., 2014). The site represents the only place on the Romanian coast where the bivalve mollusk, *Donacilla cornea* and *Donax trunculus,* have survived (Micu & Micu, 2005). Eutrophication and ecological decline, between 1980 and 2000, led

[38] Natura 2000, 2022. Site ROSCI0197 Eforie North – Eforie South Submerged Beach Standard Data Form. Retrieved on: N2K ROSCI0197 dataforms (europa.eu)

to the extinction of both species from the mid-littoral and infralittoral of the Romanian coast (Nicolaev et al., 2018).

The site Management and Regulation plans were approved with the Order of the Minister for the Environment, Water and Forests No 1432/2016 (ANANP, 2022). The SCI falls entirely within **the Project Area**.

**Marine Area of Capul Tuzla (SCI)**

Capul Tuzla is a Site of Community Importance (code ROSCI0273) characterized by a rocky submarine promontory, covering a total area of 49,47 $km^2$. A different range of micro-habitats of different types make it a site of conservation interest (Nicolaev et al., 2018). The rocky reef bottom has the widest extension in the central and eastern parts of the site (Zaharia et al., 2012) with the most varied and rugged relief of the Romanian Black Sea (Nicolaev et al., 2018) that hosts infralittoral rocks with *Mytilus galloprovincialis* (Galatchi et al., 2014). Sandbanks, sandflats and mudflats further characterized the site (Zaharia et al., 2012 a and b). Cape Tuzla represent the only site on the Romanian coast where submerged and partially submerged sea caves occur (Habitat 8330)[39]. Consequently, here can be encountered a very diverse and rich fauna (Galatchi et al., 2014) that include: Russian sturgeon (*Acipenser gueldenstaedtii*, CR), Stellate sturgeon (*Acipenser stellatus,* CR), Beluga sturgeon (*Huso huso*, CR), Black Sea herring (*Alosa immaculata*, VU), Black Sea shad (*Alosa tanaica*, LC), gobiid fish, long-snouted seahorses, marine mammals (*Tursiops truncatus ponticus,* EN and *Phocoena phocoena relicta*, EN), crustaceans and gastropods.

The site Management and regulation plans were approved with the Order of the Minister for the Environment, Water and Forests No 1433/2016 (ANANP, 2022). The SCI falls partly **within the AoI** and partly within the electrode **area of influence**.

**Marine Area of Costinesti – 23 August (SCI)**

Costinesti – 23 August is a Site of Community Importance (code ROSCI0293) and with Cape Aurora (code ROSCI0281) are the most recent SCIs. In 2011, the sites were declared Site of Community Interest as part of the European ecological network Natura2000. The aim is extending the protection area of some sub-types of 1170-Reef habitat not enough covered by the other sites (Begun et al., 2012). At the moment no custody of them is yet arranged. Costinesti – 23 August site covers 48,84 $km^2$ along the Romanian coast and is mainly characterized by rocky bottoms and biogenic reefs with the highest diversity and the widest range of sub-types in the site[40] (Galatchi et al., 2014). *Pholas dactylus,* bivalve mollusk protected in Annex II of Bern Convention and Barcelona Convention, inhabits the infralittoral hard clay banks, whereas *Mytilus galloprovincialis* biogenic reefs occur between 30-45 m in the offshore part of the area. The site also comprises substrates of sand, gravel and cobble considered of high conservation interest as they are rare in the Romanian coast. (Galatchi et al., 2014). The species of community interest that occur in the area are marine mammals (*Tursiops truncatus ponticus* (EN) and *Phocoena phocoena relicta* (EN), long-snouted seahorses, mollusks, different species of fish (i.e., the Black Sea herring (*Alosa* immaculata, VU) and the Black Sea shad (Alosa tanaica, LC))[40]. The SCI falls within the electrode **area of influence**.

[39] Natura 2000, 2022. Site ROSCI0273 Zona marină de la Capul Tuzla Standard Data Form. Retrieved on: [N2K ROSCI0273 dataforms (europa.eu)]

[40] Natura 2000, 2022. Site ROSCI0293 Costinesti - 23 August Standard Data Form. Retrieved on: [N2K ROSCI0293 dataforms (europa.eu)]

**Marine Area of Cap Aurora (SCI)**

Cap Aurora was declared Site of Community Interest (code ROSCI0281) in 2011 (Begun et al., 2012) and at the moment there are no Management Plans or Regulations in place. Covering an area of 135,92 $km^2$, Cap Aurora hosts different habitat-types of high conservation interest, such as the submarine structures made by leaking gases (1180) and the submerged or partially submerged sea caves (8830) habitats. The area is characterized by pebble debris, muds and sand substrates with *Donax trunculus* biocenosis, considered of particular interest as mentioned above. Rocky substrates are present and colonized mainly by *Mytilus galloprovincialis* forming biogenic reef between 30-45 m in the offshore part of the site and belt of *Cystoseira barbata* in the infralittoral zone[41]. The most relevant species that occur in the site are: the Black Sea herring (*Alosa immaculata*, VU), the Black Sea shad (*Alosa tanaica*, LC), sturgeons, long-snouted seahorses and two of the three marine mammals (*Tursiops truncatus ponticus* (EN) and *Phocoena phocoena relicta* (EN) (Galatchi et al., 2014). A small part located in the northern zone of the SCI falls within the electrode **area of influence**.

**Izvoarele sulfuroase submarine de la Mangalia (SCI)**

Izvoarele sulfuroase submarine de la Mangalia has been classified as Site of Community Interest[42] (code ROSCI0094) under the EU Habitats Directive (92/43/EEC) in 2009. In compliance with the European Directive requirements for Natura 2000 sites, the Romanian authorities approved the Mangalia SCI Management Plan and Regulations with ordinance of the Minister of the Environment, Waters and Forests n. 122 5/2016.

Despite an extension of only 57,85 $km^2$, the Mangalia SCI is known to host the greatest diversity of marine habitats and species in Romania. This site is in fact characterized by highly diversified ecosystems and different Annex I priority habitat types, such as sandbanks slightly covered by sea water all the time (1110), mudflats and sandflats not covered by seawater at low tide (1140), reefs (1170) and, particularly, submarine structures made by leaking gases (1180). These underwater formations, interspersed with gaseous vents that intermittently release gas (methane), derive from complex and long processes, which involve the aggregation of sandstone and its subsequent consolidation by a carbonate cement resulting from microbial oxidation (EEA, 2023). Moreover, this site has also a high conservation importance due to the presence on the infralittoral soft bottoms (clean or slightly muddy sands) of *Zostera* meadows (with *Zostera noltei* and *Zostera marina*, habitat 1110-1), being the last site in Romania where this seagrass still survives. In addition, the infralittoral hard substrata hosts wide belt of *Mytilus galloprovincialis* and photophilous algae, with the most relevant population of the perennial brown alga *Cystoseira barbata* in Romania. Among the most relevant species that may occur in the site it is possible to find the Black Sea herring (*Alosa immaculata*, VU), the Black Sea shad (*Alosa tanaica*, LC), the Black Sea Bottlenose Dolphin (*Tursiops truncatus ponticus*, EN) and the Black Sea Harbour Porpoise (*Phocoena phocoena relicta*, EN). This area does not fall within the AoI but, nevertheless, is very close to the **area of influence** of the electrode.

**Canionul Viteaz (SCI)**

The canyon is situated in an area with important gas-hydrate deposits and is a place of intense methane seepage in the anoxic water layer. As a result, large columnar methanogenic carbonate structures (bubbling reefs) are present throughout the canyon. In fact, the site was designated for the conservation

[41] Natura 2000, 2022. Site ROSCI0281 Cap Aurora Standard Data Form. Retrieved on: N2K ROSCI0281 dataforms (europa.eu)

[42] Natura 2000, 2023. Site ROSCI0094 Izvoarele sulfuroase submarine de la Mangalia Standard Data Form. Retrieved on: N2K ROSCI0094 dataforms (europa.eu)

of habitats 1180 (Submarine structures made by leaking gases) and 1170 (Reefs) that appear here in a unique and extremely representative combination. Worldwide, this combination of habitats is present only in the Black Sea and reaches its maximum representativeness only in two –ocations - one of them is this and the other is in the EEZ of Ukraine.

**Kaliakra to Danube Delta IMMA**

Kaliakra to Danube Delta Important Marine Mammals Area (IMMA) is located along the coastal shelf waters of Ukraine, Romania and Bulgaria. The area covers 15,455 $km^2$ and is characterized by mixed substrates (rocky, sandy and silty) and reaches 60 m in depth (Micu et al.,2007). The site is considered an aggregation and feeding area for cetaceans, in particular the Black Sea bottlenose dolphin (*Tursiops truncatus* ponticus, EN) and the Black Sea harbour porpoise (*Phocoena phocoena relicta,* EN) which are also listed as Endangered in the IUCN Red List. They are present in the area all seasons, but especially during the summer period when the largest aggregation of bottlenose dolphins occurs near the Constanta coast (Paiu et al., 2021). The coastal waters of the IMMA are considered an important feeding habitat for marine mammals[43], the presence of the two cetaceans is often associated with the migration, spawning and feeding periods of food resources such as horse mackerel (*Trachurus mediterraneus*), sprat (*Sprattus sprattus*, LC), Black Sea herring (*Alosa immaculata*, VU) (Smederevac-Lalicet al., 2018; Yankova, 2011). Part of the IMMA falls within the **Project Area**, covering both the area of interest and the electrode buffer area.

**Western Black Sea IMMA**

Western Black Sea Important Marine Mammals Area (IMMA) is located between 60 m and 2000 m depth covering an area of 43,912 $km^2$. The waters off Romania, Bulgaria and Türkiye are included in the IMMA and are frequented by all cetacean species. In the shelf slope of the IMMA are present the primary prey species for the habour porpoise (*Phocoena phocoena relicta*, EN), such as sprat (*Sprattus sprattus*, LC) and whiting (*Merlangius merlangus*) (BLASDOL, 1999; Gladilina & Gol'din, 2014). Thus, the site represents a seasonal aggregation area of Black Sea habour porpoise mainly during the summer period[44]. The northernmost portion of the IMMA falls within the offshore **Project Area**.

### *6.3.6.3 Preliminary Indication for Critical habitat Assessment*

Similar to the terrestrial baseline (chapter 6.3.6.36.1.2.3), a Critical Habitat (CH) screening was conducted in order to identify the potential presence of Critical Habitats within the offshore AoI according to the Environmental and Social Standard 6 (ESS6), whose definition is triggered by the criteria discussed in the following chapter.

A preliminary Critical Habitat Screening is reported below. <u>The likelihood of impacts on transformed, natural, and critical habitats as defined in ESS 6 of the World Bank should be carefully assessed in the scope of the ESIA</u>.

[43] IUCN-Marine Mammal Protected Areas Task Force, 2021. Kaliakra to Danube Delta IMMA Factsheet Kaliakra to Danube Delta IMMA - Marine Mammal Protected Areas Task Force (marinemammalhabitat.org). Downloaded on 17 October 2022.

[44] IUCN-Marine Mammal Protected Areas Task Force, 2021. Western Black Sea IMMA Factsheet. Western Black Sea IMMA - Marine Mammal Protected Areas Task Force (marinemammalhabitat.org) Downloaded on 17 October 2022.

**Criterion a: Highly threatened or unique ecosystems**

None of the habitats identified within the area of interest are considered to be “highly threatened and/or unique ecosystems”.

Therefore, no Critical Habitat is expected to be present in the AoI according to this criterion.

**Criterion b: Habitat important to Critically Endangered or Endangered species, as listed in the IUCN Red List of threatened species or equivalent national approaches**

For this section, a more detailed and comprehensive evaluation has been carried out by using the ESS6 with relative guidance notes which recognizes: “Areas that support species classified as Critically Endangered (CR) or Endangered (EN) according to the IUCN Red List”, “Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR” and “Areas containing important concentrations of a nationally or regionally listed EN or CR species”.

The marine species meeting the criterion “Areas that support species classified as Critically Endangered (CR) or Endangered (EN) according to the IUCN Red List” are summarized in the following table.

*Table 6-37 – Marine species with Endangered or Critically Endangered conservation status according to the IUCN Red List potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | CR | Endemic/RR |
| | | *Acipenser nudiventris* | Barbel Sturgeon | CR | Endemic/RR |
| | | *Acipenser stellatus* | Stellate Sturgeon | CR | Endemic/RR |
| | | *Acipenser sturio* | Atlantic Sturgeon | CR | - |
| | | *Huso huso* | Beluga Sturgeon | CR | Endemic/RR |
| | Anguillidae | *Anguilla anguilla* | Common Eel | CR | - |
| | Gymnuridae | *Gymnura altavela* | Spiny Butterfly Ray | EN | - |
| Marine mammals | Phocoenidae | *Phocoena phocoena relicta* | Black Sea Harbour Porpoise | EN | Endemic |
| | Delphinidae*Tursiops truncatus ponticus* | Black Sea Bottlenose Dolphin | EN | Endemic | |

Marine species meeting the criterion “Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72” (Guidance Note ESS6) are summarized in the following table.

*Table 6-38 – Marine species with Vulnerable conservation status according to the IUCN Red List, using a precautionary approach, potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Global) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Fish | Clupeidae | *Alosa immaculata* | Black Sea herring | VU | Endemic |
| | Dasyatidae | *Dasyatis pastinaca* | Stingray | VU | - |
| Marine mammals | Delphinidae | *Delphinus delphis ponticus* | Black Sea Common Dolphin | VU | Endemic |

Fauna species meeting the criterion "As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species" are summarized in the following table.

*Table 6-39 – Marine species with Endangered or Critically Endangered conservation status according to the Georgian Red List potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Georgia) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | EN | Endemic/RR |
| | | *Acipenser nudiventris* | Barbel Sturgeon | EN | Endemic/RR |
| | | *Acipenser stellatus* | Stellate Sturgeon | EN | Endemic/RR |
| | | *Huso huso* | Beluga Sturgeon | EN | Endemic/RR |
| Marine mammals | Delphinidae*Tursiops truncatus ponticus* | Black Sea Bottlenose Dolphin | EN | Endemic | |
| | Phocoenidae | *Phocoena phocoena relicta* | Black Sea Harbour Porpoise | EN | Endemic |

No threshold is provided by the ESS6, using a precautionary approach, all these species are considered to potentially trigger Critical Habitat under Criterion b. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion c: Habitats important to endemic or geographically restricted species**

The flora and fauna species listed as local endemic were considered as potentially triggering Critical Habitat according to these criteria, based on a precautionary approach, since they can include restricted range species.

*Table 6-40 – Locally endemic and restricted-range marine species potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Local) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | CR | Endemic/RR |
| | | *Acipenser nudiventris* | Barbel Sturgeon | CR | Endemic/RR |

| Taxon | Family | Species | Common name | IUCN status (Local) | Endemic/Restricted Range |
|---|---|---|---|---|---|
| | | *Acipenser stellatus* | Stellate Sturgeon | CR | Endemic/RR |
| | | *Huso huso* | Beluga Sturgeon | CR | Endemic/RR |
| | Blennidae | *Parablennius zvonimiri* | Zvonimir's Blenny | LC | Endemic |
| | Clupeidae | *Alosa immaculata* | Black Sea Herring | VU | Endemic |
| | | *Alosa maeotica* | Black Sea Shad | LC | Endemic |
| | | *Alosa tanaica* | Black Sea Shad | LC | Endemic |
| | | *Clupeonella cultriventris* | Azov Sea Sprat | LC | Endemic |
| | Gobiidae | *Knipowitschia longecaudata* | Longtail Dwarft Goby | LC | Endemic |
| | | *Mesogobius batrachocephalus* | Knout Goby | LC | Endemic |
| | | *Ponticola eurycephalus* | Ginger Goby | LC | Endemic |
| | | *Ponticola ratan* | Caspian Ratan Goby | LC | Endemic |
| | Leuciscidae | *Rutilus heckelii* | - | LC | Endemic |
| | Percidae | *Sander marinus* | Estuarine Perch | LC | Endemic |
| | Syngnarthidae | *Syngnathus schmidti* | Black Sea Pelagic Pipefish | DD | Endemic |
| | | *Syngnathus variegatus* | Thickly Snouted Pipefish | DD | Endemic |
| | Tripterygiidae | *Tripterygion tripteronotum* | Moma Nariguda | LC | Endemic |
| | Delphinidae | *Delphinus delphis ponticus* | Black Sea Common Dolphin | VU | Endemic |
| Marine mammals | *Tursiops truncatus ponticus* | Black Sea Bottlenose Dolphin | EN | Endemic | |
| | Phocoenidae | *Phocoena phocoena relicta* | Black Sea Harbour Porpoise | EN | Endemic |

Considering the typology of the study, using a precautionary approach, all these species are considered to potentially trigger Critical Habitat under Criterion c. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion d: Habitats supporting globally significant migratory or congregatory species**

Bibliographical data and habitat features suggest that a temporary presence of congregatory, migratory and wintering fauna may occur in the AoI. Consequently, using a strong precautionary approach, based on the bibliography research conducted, all species considered migratory and/or congregatory by the IUCN Red List are considered as meeting this Criterion and have been assessed as present in the AoI.

*Table 6-41 – Migratory and/or congregatory species potentially present in the AoI.*

| Taxon | Family | Species | Common name | IUCN status (Local) | Migratory/ Congregatory |
|---|---|---|---|---|---|
| Fish | Acipenseridae | *Acipenser gueldenstaedtii* | Danube Sturgeon | CR | Migratory |
| | | *Acipenser nudiventris* | Barbel Sturgeon | CR | Migratory |
| | | *Acipenser stellatus* | Stellate Sturgeon | CR | Migratory |
| | | *Acipenser sturio* | Atlantic Sturgeon | CR | Migratory |
| | | *Huso huso* | Beluga Sturgeon | CR | Migratory |
| | Anguillidae | *Anguilla anguilla* | Common Eel | CR | Migratory/Congregatory |
| | Clupeidae | *Alosa fallax* | Twaite Shad | LC | Migratory/Congregatory |
| | | *Alosa immaculata* | Black Sea Herring | VU | Migratory/Congregatory |
| | | *Alosa maeotica* | Black Sea Shad | LC | Migratory |
| | | *Alosa tanaica* | Black Sea Shad | LC | Migratory |
| | | *Clupeonella cultriventris* | Azov Sea Sprat | LC | Migratory |
| | Gasterosteidae | *Gasterosteus aculeatus* | Threespined Stickleback | LC | Migratory/Congregatory |
| | Gobiidae | *Pomatoschistus minutus* | Common Goby | LC | Congregatory |
| | | *Ponticola ratan* | Caspian Ratan Goby | LC | Migratory |
| | Leuciscidae | *Rutilus heckelii* | - | LC | Migratory |
| | Moronidae | *Dicentrarchus labrax* | Capemouth | LC | Migratory |
| | | *Morone saxatilis* | Rockfish | LC | Migratory |
| | Percidae | *Sander marinus* | Estuarine Perch | LC | Migratory |

| Taxon | Family | Species | Common name | IUCN status (Local) | Migratory/ Congregatory |
|---|---|---|---|---|---|
| | Pleuronectidae | *Platichthys flesus* | White Fluke | LC | Migratory |
| | Scombridae | *Auxis rochei* | Bullet Tuna | LC | Migratory/Congregatory |
| | | *Euthynnus alletteratus* | Little Tunny | LC | Migratory/Congregatory |
| | Syngnarthidae | *Nerophis ophidion* | Straight-nosed Pipefish | LC | Congregatory |
| | Xiphiidae | *Xiphias gladius* | Swordfish | NT | Migratory |
| Marine mammals | Delphinidae | *Delphinus delphis ponticus* | Black Sea Common Dolphin | VU | Congregatory |
| | *Tursiops truncatus ponticus* | Black Sea Bottlenose Dolphin | EN | Congregatory | |
| | Phocoenidae | *Phocoena phocoena relicta* | Black Sea Harbour Porpoise | EN | Migratory/Congregatory |

Considering the typology of the study, using a precautionary approach, all these species are considered to potentially trigger Critical Habitat under Criterion d. Specific field surveys should be performed within the scope of the ESIA to assess the confirm the Critical Habitat.

**Criterion e: Ecological functions or characteristics that are needed to maintain the viability of the biodiversity values described above in (a) to (d).**

The AoI is not known to contain landscape feature and/or subpopulations of species with unique evolutionary history. In fact, although some endemic species are present, the AoI is not characterized by a particular level of isolation, spatial heterogeneity, and wealth of environmental gradients or edaphic interfaces. Moreover, the area is not considered to be of demonstrated importance as to climate change adaptation or as biological corridor. These considerations suggest that the area of interest does not support any key evolutionary processes.

Therefore, no Critical Habitat is expected to be present in the AoI according to this criterion.

### *6.3.7 Offshore Environmental Gaps' Information and Recommendations*

The table below reports the main gaps identified in the Romanian offshore baseline and recommendations for filling-in the identified gaps.

*Table 6-42 – Primary gaps and recommendations for the offshore environmental Romanian baseline.*

| Component | Gaps | Recommendation |
|---|---|---|
| **Physical components** | | |
| Sediment and Seafloor morphology | Missing specific data on seafloor morphology in the project's AoI. | ▪ Specific field surveys on the seafloor morphology are suggested in the scope of the ESIA. Such surveys may also be completed within the scope of the Project design (e.g., MBES, SSS etc.) and will also serve in the definition of the benthic habitats of the area;<br>▪ Sediment samplings should be performed to assess the sediment typology and grain size, as well as the presence of pre-existing pollution (if any). |
| Oceanography | Missing data on currents and waves patterns in the AoI. | ▪ Additional in-depth desktop studies on the currents and waves of the AoI are suggested in the scope of the ESIA, as well as on the seawater quality (i.e., pollution etc.);<br>▪ Primary data collection on seawater characteristics, especially in correspondence of the marine electrode footprints, is recommended;<br>▪ If possible, field measurements of the coastal currents may be useful to model the possible dispersion of contaminants (if any) and sediments in the scope of the ESIA. |
| Marine Acoustic | Site specific measurements are not available. | ▪ The gaps is a minor gaps, and considering the project features it is not essential the collection of primary data in the field. Nevertheless an in-depth desktop study on the potential underwater noise sources is recommended |
| Coastal erosion | Lack of specific and up-to-date data on erosion rates and sediment dynamics in the Constanța area. | ▪ In-depth desktop study on the coastal erosion in the landing point should be carried out. |
| Offshore light pollution | No gaps. | ▪ Data on light pollution regarding the offshore area of the Romanian AoI should be collected based on desktop and in situ observations. |
| **Biological components** | | |
| Critical Habitats | Missing on-site data on the exact distribution of marine habitats. | ▪ Field studies about the actual marine habitat distribution (e.g., through SSS, sediment sampling, visual inspections etc.), especially along the cable route, are suggested in the scope of the ESIA, as well as specific assessment of the suitability of such habitats for the threatened species listed in this chapter; |

| | | |
|---|---|---|
| | | ▪ A Critical Habitat Assessment (CHA) under ESS 6 should be carried out to ensure No Net Loss to Natural Habitats and Net Gain to Critical Habitats. |
| Marine legally protected areas and important biodiversity areas | Missing information regarding the actual level of protection and zoning of the identified areas. | ▪ Additional in-depth desktop studies on the true protection levels in the legally protected areas (e.g., existing zonation etc.) are suggested in the scope of the ESIA, as well as permitted and non-permitted activities within such areas;<br>▪ Consultations with the authorities on the existence of plans to create new protected areas within the AoI should be considered. |

## 6.4 Romanian Social Baseline

the Romanian social baseline serves to evaluate the social conditions within the Project's designated Area of Interest (AoI), target possible key receptors present within the AoI and highlight sensitive social components which need particular consideration in the scope of the ESIA.

A preliminary descriptive framework of these social aspects is provided in the following chapters.

### *6.4.1 Population and demographics*

#### *6.4.1.1 Population*

In 2021, Romania had a population of 19,201,662 people, according to the CIA's 2022 report. The population density in Romania in 2019 was 82.7 individuals per square kilometer. Urbanization rates are relatively moderate because the population is evenly distributed throughout the country, although more than half of the total population, around 54.5%, resides in urban areas. The capital city, Bucharest, is home to 1,785 million people.

In terms of ethnic composition, 83.4% of the population identifies as Romanian, 6.1% as Hungarian, 3.1% as Romani, 0.3% as Ukrainian, 0.2% as German, and the remaining portion is unspecified. The primary languages spoken in the country are Romanian, the official language, which is used by 85.4% of the population, followed by Hungarian at 6.3%, and Romani at 1.2%. As for religious affiliations, the majority of Romanians, approximately 81.99%, practice Eastern Orthodox Christianity, while 6.4% are Protestant, and 4.3% are Roman Catholic.

A demographic breakdown reveals that 46.26% of the population falls within the age range of 25 to 54 years, 14.12% are aged between 0 and 14 years, 11.7% are between 55 and 64 years, and 10.3% are aged between 15 and 24 years. The median age in Romania stands at 42.5 years.

The project's location, Constanta County, is situated in the Southeast region of Romania. In terms of resident population size, Constanta Coun[ty] ranks 5th among the various counties in Romania. According to the official 2021 Census, Constanta County had a resident population of 668,065 people. However, as indicated in the table below, the population has experienced a gradual decline since 2017 (INS Constanta County Directorate of Statistics, 2021b).

*Table 6-43 – Population of Constanta County from 2017 to 2021. Eurostat, 2021).*

| Population | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| Constanta County | 678,286 | 676,095 | 673,709 | 672,142 | 668,065 |

In 2019, Constanta County had a population density of 99.9 persons per square kilometer. The majority of residents in the county are female, comprising 51.7% of the total population, which amounts to 344,331 individuals (Eurostat, 2021).

The median age of the county's population stands at 42.2 years, aligning with the national average. There are 443,909 individuals in the age range of 15 to 64 years, while those over 65 years of age are 118,969. Young people under the age of 15 account for 109,264 residents (Eurostat 2021).

In Constanta County, 91.5% of the population identifies as Romanian, followed by 3.1% belonging to the ethnic Tatar group, 2.9% being Turks, and 1.2% as Roma. Regarding religion, 89.9% of the population practices Orthodoxy, while 6.8% adhere to the Muslim faith, with the remaining population comprising Roman Catholics and Old Rite Christians.

The latest proposed cable route runs through three administrative units in Constanta County: Tuzla, with a population of 6,494 in 2021; Topraisar, with a population of 5,907 in 2021; and Baraganu, with a population of 1,916 in 2021.

*Table 6-44 – Population per administrative units in Constanta County. Source: Census Recensamantromania, 2021.*

| Community / Population | Under 20 | 20-64 | Over 65 |
|---|---|---|---|
| BARAGANU | 531 | 1095 | 290 |
| TOPRAISAR | 1537 | 3460 | 910 |
| TUZLA | 1296 | 3901 | 1297 |

In terms of demographics, Tuzla exhibits a roughly equal distribution of residents under 20 and over 65 years old, both accounting for about 20%. In contrast, the other two communes have a nearly balanced proportion of residents over 65 years old, at approximately 15%. Notably, Baraganu has a higher percentage of residents under 20 years old, nearly 28%, compared to 26% in Topraisar (Recensamantromania, 2021).

*Table 6-45 – Population per administrative units in Constanta County divided by age group. Source: Census Recensamantromania, 2021*

| Community | Resident population Total | AGE GROUP (–rs) | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 0 - 4 | 5 - 9 | 10 -14 | 15 - 19 | 20 - 24 | 25 - 29 | 30 - 34 | 35 - 39 | 40 - 44 | 45 - 49 | 50 - 54 | 55 - 59 | 60 - 64 | 65 - 69 | 70 - 74 | 75 - 79 | 80 - 85 | 85+ |
| Baraganu | 1916 | 111 | 136 | 169 | 115 | 98 | 76 | 135 | 136 | 153 | 138 | 143 | 86 | 130 | 96 | 80 | 46 | 34 | 34 |
| Topraisar | 5907 | 330 | 387 | 440 | 380 | 351 | 322 | 417 | 392 | 450 | 472 | 473 | 243 | 340 | 325 | 251 | 148 | 114 | 72 |
| Tuzla | 6494 | 253 | 301 | 374 | 368 | 332 | 286 | 377 | 390 | 508 | 587 | 674 | 328 | 419 | 450 | 411 | 204 | 153 | 79 |

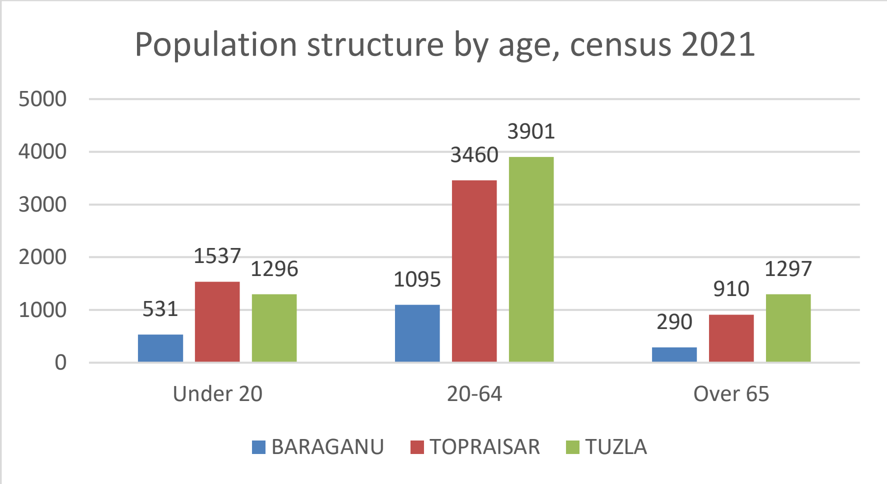



*Figure – Population structure by age according to 2021 Census. Source: Local consultants' analysis based on data from Recensamantromania, 2021.*

### *6.4.1.2 Vulnerable groups*

**Gender issue**

In Romania, 83.3% of the legal frameworks designed to promote, enforce, and monitor gender equality, particularly focusing on combating violence against women, have been established under the SDG indicators. Additionally, there has been a decline in the adolescent birth rate, which stood at 36.4 per 1,000 women aged 15–19 in 2018, down from 38.1 per 1,000 in 2017.

Nonetheless, there remains significant work to be done in Romania to attain gender equality. As of February 2021, merely 18.5% of parliamentary seats were occupied by women. Alarming statistics reveal that in 2018, 6.9% of women aged 15-49 reported experiencing physical and/or sexual violence from a current or former intimate partner within the past year. Moreover, women and girls aged 10 and above devote 17.5% of their time to unpaid care and domestic work, compared to the 9.4% contributed by men. Additionally, women of reproductive age (15-49 years) frequently encounter barriers in relation to their sexual and reproductive health and rights, with only 46.5% of women having their family planning needs met with modern methods in 2004 (UN Women, 2021).

As of December 2020, only 45.2% of the necessary indicators for monitoring the SDGs from a gender perspective were available. Furthermore, certain critical areas, such as gender and poverty, instances of physical and sexual harassment, women's access to assets (including land), and gender-related environmental considerations, lack consistent methodologies for regular monitoring. Closing these gender data gaps is essential for achieving gender-related SDG commitments in Romania.

**Vulnerable population identified in the AoI**

Considering the population structure of Constanta County, as per the 2021 Census, and the area's historical context, it is justifiable to pay greater attention for engagement to the Turkish and Tatar minorities from both a cultural and language perspective. Furthermore, it's crucial to address the Roma minority, constituting around 16% of the County's population.

*Table 6-46: Vulnerable groups in Romania (Source: National Institute for statistics, tempo-online database).*

| Ethnicity | Population | Share |
|---|---|---|
| **Total** | **655997** | |
| Romanian | 504344 | 76.88% |
| Hungarian | 313 | 0.05% |
| Roma | 6593 | 1.01% |
| Ukrainian | 133 | 0.02% |
| German | 122 | 0.02% |
| Russians - Lipoveni | 4084 | 0.62% |
| Tatars | 16918 | 2.58% |
| celebrate | 20 | 0.00% |
| Slovakia | 4 | 0.00% |
| Bulgarian | 72 | 0.01% |
| Croatian | 3 | 0.00% |
| Greek | 232 | 0.04% |
| Italians | 117 | 0.02% |
| Hebrew | 37 | 0.01% |
| Czech | | 0.00% |
| Polish | 15 | 0.00% |
| Ruthenian | | 0.00% |
| Armenians | 189 | 0.03% |
| Albanian | 28 | 0.00% |
| Macedonian | 52 | 0.01% |
| Other ethnicity | 1559 | 0.24% |
| Information not available | 105039 | 16.01% |

Situated just north of the Tuzla municipality along the Black Sea coast is the municipality of Eforie. Back in 2013, this region witnessed the forceful eviction of approximately 100 Roma individuals due to the construction of a new holiday resort. These communities had resided in this area for four decades, only to be relocated to an industrial zone along the coast, following eviction to the outskirts of the municipality near an excavation site. In 2016, the European Court of Human Rights intervened to prevent the local municipality from evicting the Roma population from their container settlement on the industrial site (Environmental Justice Atlas).

### *6.4.2 Health*

In 2019 the life expectancy at birth in Romania was 74.2 years old, the second lowest in Europe (WHO, 2020).

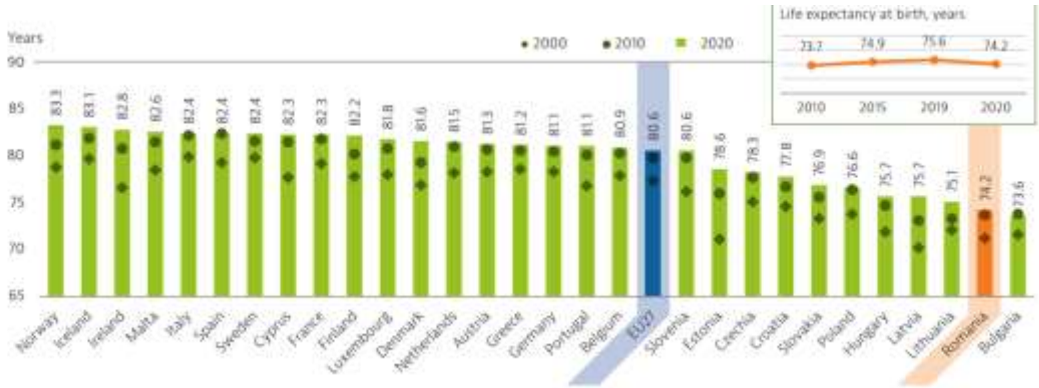



*Figure 6-97 – Life expectancy at birth in Romania. Source: Eurostat Database, OECD, 2021.*

The maternal mortality ratio was 19 per 100,000 live births as of 2017 (UNICEF, WB, UNDP, 2021[45]). In 2020, the neonatal mortality rate was 3 per 1,000 live births. There were 0.04 new HIV infections per 1,000 uninfected persons as of 2020 (UNAIDS, 2022). Tuberculosis incidence stood at 64 per 100,000 persons in 2021 (WHO, 2021b). Deaths from tuberculosis were relatively high, with 921 in Romania in 2019, compared to 3,432 deaths in the entire Europe in 2019. In 2019, 42.5% of Romania's population had a normal BMI, and only 10.5% were obese, in contrast to the European average of 45.8% for a normal BMI and 16% for obesity (Eurostat, 2019).

The European Union's (27 countries) healthcare expenditure in 2020 was 1,462,491 million euros, while Romania's healthcare expenditure in 2020 was 13,727 million euros and remains the second lowest in the EU. In 2020, 13.4% of the population in Romania had household expenditures on health exceeding 10% of total household expenditure, and 2.2% had expenditures on health exceeding 25% of their total household expenditure (WHO, 2021). Out-of-pocket payments are above the EU average (OECD, 2021)

As is the trend in Europe, the population growth rate in Romania declined to -1.09% in 2022. The birth rate was 8.76 births per 1,000 people, while the death rate was notably high, with 15.26 deaths per 1,000 people (CIA, 2022).

In 2020, Romania had 193,244 health personnel employed in hospitals and 225,582 nursing and caring professionals (Eurostat, 2020). Across Romania, the number of hospital beds in 2020 was 137,191.

In the Southeast region of Romania, where Constanta is located, in 2019, there was a crude death rate of 286.8 per hundred thousand inhabitants due to cancer, a crude death rate of 802.2 per hundred thousand inhabitants due to diseases of the circulatory system, and a crude death rate of 103.6 per hundred thousand inhabitants due to diseases of the respiratory system (Eurostat, 2019). In the region in 2019, there were 219.9 medical doctors per hundred thousand inhabitants, and in 2020, there were 14,934 hospital beds (Eurostat 2019; Eurostat, 2020).

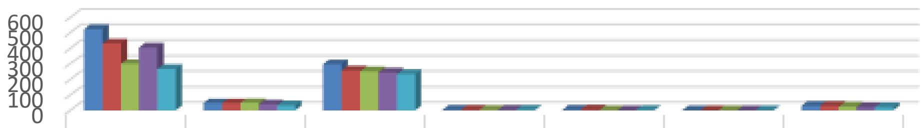
[45] Levels and trends in child mortality. Report 2021. Estimates developed by the UN Inter-agency Group for Child Mortality Estimation. United Nations Children's Fund, World Health Organization, World Bank Group and United Nations Population Division. New York: United Nations Children's Fund; 2021 (https://data.unicef.org/resources/levels-and-trends-in-child-mortality/, accessed 2 May 2022).

### 6.4.2.1 Occupational Health and Safety Culture

From a legal standpoint, the field of health and safety adheres to the national legal regulations. Specifically, Order no. 119/2014 pertains to the approval of the Hygiene and Public Health Standards concerning the living conditions of the population. This order designates a "protected territory" where the permissible levels of physical, chemical, and biological pollutants from environmental sources must not be exceeded. It encompasses residential areas, parks, nature reserves, balneo-climatic areas, leisure and recreational spaces, as well as social, cultural, educational, and medical institutions. The "sanitary protection zone" is a designated area where any activities or usage that may result in pollution or contamination of environmental factors, with potential health repercussions for the immediate resident population, are strictly prohibited. Furthermore, Law No. 319/2006 concerning occupational health and safety, along with its subsequent modifications and updates from 2012, 2018, and 2021, outlines the fundamental principles and regulations for health and safety. It is imperative to consider these principles and rules throughout the planning and execution phases of any project.

Statistical data from the Territorial Inspectorate for Work (2022) over the past five years indicates a rising trend in the number of cases of accidents or deaths in Constanta County. The data are presented in the following figure.

Heath and safety statistics - Constanta County




| | No of registered enjured person | - dead | - temporarly incapacitated | - invalid | - collective accidents, | - disapeared | • dead outside the working place |
|---|---|---|---|---|---|---|---|
| 2022 | 522 | 47 | 297 | 4 | 4 | 0 | 30 |
| 2021 | 431 | 47 | 257 | 4 | 5 | 0 | 29 |
| 2020 | 300 | 49 | 251 | 3 | 1 | 0 | 24 |
| 2019 | 405 | 39 | 243 | 4 | 0 | 0 | 19 |
| 2018 | 266 | 32 | 234 | 4 | 3 | 0 | 19 |

2022 2021 2020 2019 2018

*Figure 6-98 – Health and Safety Statistics for Constanta County. Source: Territorial inspectorate for Work 2022.*

## 6.4.3 Education

In Romania, the literacy rate (defined by the percentage of the population of a given age group that can read and write) in 2018 was 99% among young people aged 15-24 years old and adults (UNICEF, 2022). The out-of-school rate in 2016 was 8% for primary school and 10% for lower secondary, but data for upper secondary school are lacking (UNICEF 2022). The out-of-school rate is the proportion of children and young people in the official age range for the given level of education who are not enrolled in pre-primary, primary, secondary or higher levels of education (UNESCO, Institute of Statistic). In 2021, early leavers from education and training, defined as people aged 18-24 who had completed lower secondary education and were not involved in further education and training, accounted for 15.3% (Eurostat, 2022).

The percentage of the population aged 30-34 with tertiary educational attainment in Romania in 2021 was 24.8%, in contrast to the European average of 41.6% (UNICEF,2022). Moreover, the number of people aged 30-34 with tertiary educational attainment in 2021 in the Southeast region was lower compared to the country's average, accounting for 15.9% (Eurostat, 2021).

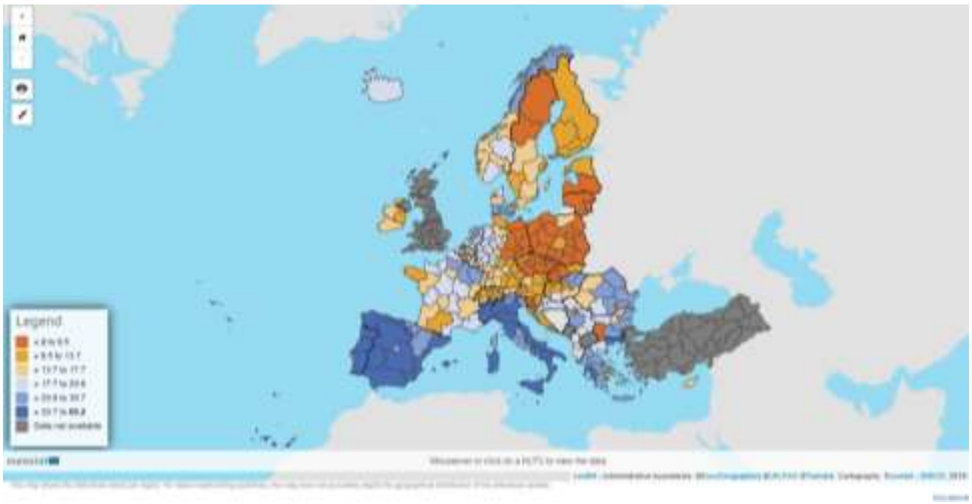


*Figure 6-99 – Percentage of education level attainment in Europe. Source: Eurostat, 2019.*

In Constanta County, of the total resident population, 39.7% have a low level of education (preschool, primary, secondary school, or no schooling), 42.1% have an average level of education (post-secondary, secondary, vocational, complementary, or apprenticeship education), and 18.3% have higher education. The educational situation varies between the sexes, with women having a higher level of education. Specifically, 19.1% of women have a high level of education, 39.2% have a medium level of education, and 41.7% have low education. In contrast, 17.4% of men have a high level of education, 45.1% have a medium level of education, and 37.5% have a low level of education (Institutul National de Statistica, 2021).

### *6.4.4 Economy and employment*

Romania entered the European Union in 2007 with an industrial economic foundation. In the aftermath of the global financial crisis of 2008, the country signed a $26 billion emergency assistance package from the International Monetary Fund, the European Union and other lenders. Anyway, the Gross Domestic Product contracted until 2011. Then in 2011 Romania's government signed a 24-month precautionary standby agreement and in 2013 a follow-on standby agreement, worth $5.4 billion (CIA, 2022). Since the first years of 2000s, the country has seen some progress but uneven and Romania has remained vulnerable to economic shock.

Romania's economic growth between 2000 and 2021 has been among the highest in the EU, followed by an aligned increase of real GDP per capita, which has overtaken the ones of Bulgaria, Croatia and Slovakia. As said though, the growth has been significant but volatile and inconsistent, making potential growth unstable (World Bank Group, 2023 update).

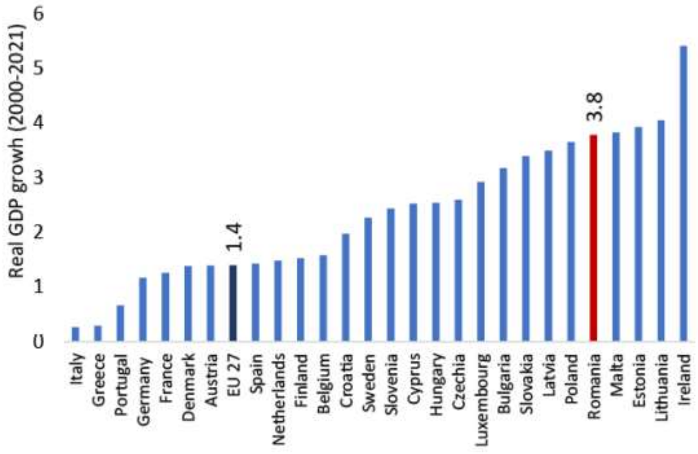



*Figure 6-100 – Romania's real GDP growth 2000-2021. Source: Eurostat, AMECO, World Bank calculations.*

Big improvements have been achieved in reducing inequality and poverty in the country, however in 2020 Romania remained the country with the highest poverty rate in the EU (based on the international poverty line of 5.5$ a day). The World Bank (2023) talks about the “tale of two Romanias” emphasizing the gap between the urban and rural areas in the country. The socio-economic situation of the population is at the opposite in rural and urban areas; Bucharest-Iflov has the highest income per person and the percentage of poor population in urban areas has reduced from 30.6% in 2015 to 28.7% in 2020, whilst the percentage of poor population in rural areas has increased from 69.4% in 2015 to 71.3% in 2020.

Looking at the more recent years, fiscal deficit expanded as the government tried to limit the impact of COVID-19 pandemic on the employment rate. In 2021, although there has been uncertainty caused by an increase in inflation and the presence of the Russian-Ukraine war, Romania’s economy performed well, increasing by 5.9% and performed better than expected at the beginning of 2022.

The private sector continues to be dominated by micro, small and medium enterprises and most of the foreign direct investments are on low innovation activities such as manufacturing, construction, and trade (World Bank, 2023).

Social spending on human capital and social services is one of the lowest in Europe, indeed in 2021, Romania had the highest share of young people (aged 15-29) at risk of poverty or social exclusion (36.1%) (WB, 2023; Eurostat, 2022).

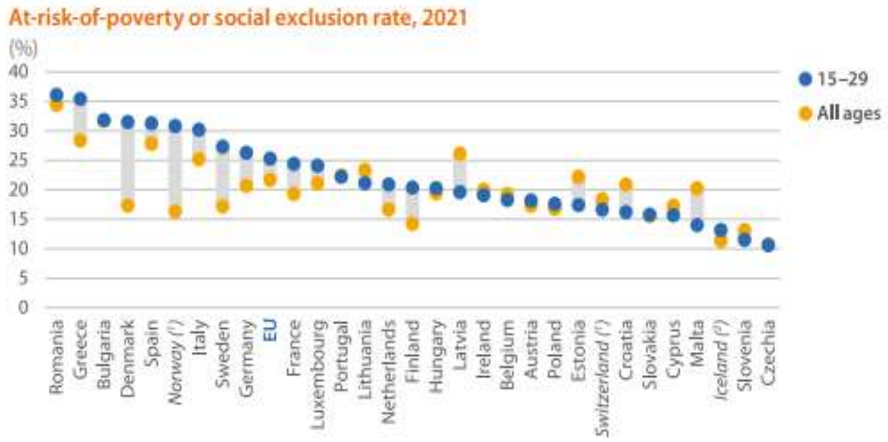



*Figure 6-101 – Young people at risk of poverty or social exclusion rate in Romania (2021). Source: Eurostat 2022).*

Furthermore, the working-age population is decreasing, and the country has one of the highest shares of emigrant population among EU countries. The youth employment rate in Romania in 2021 was of 67.1% compared to the average European percentage of 73.1% (Eurostat, 2022). On the other hand, the youth unemployment rate in 2021 was of 5.6%. Skills mismatches is indeed one of the top constraints to private sector growth in the country.

In general, in the Southeast region of Romania, where Constanta is located, the employment rate of people aged 20 to 64 years old is 63%, for people from 55 to 64 years is 40.1%, whilst the rate for people aged 15 to 24 years old is 25.2%. The youth unemployment rate of the percentage of labour force aged 15-24 is 18.3%.

Moreover, the Southeast Region of Romania confirms the national trend of significant youth unemployment. As showed in the chart below, the NEET population, which are the group of young people neither in employment, nor in education and training, aged 15-24, accounts for 22.3%, a higher percentage compared to other European counterparts (Eurostat, 2021).

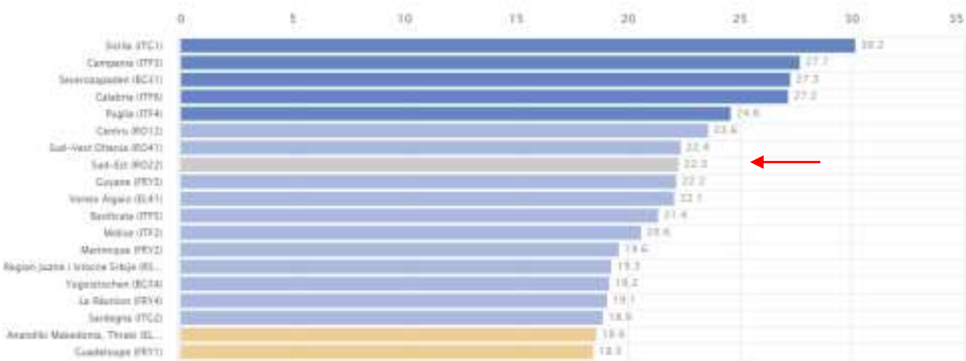


*Figure 6-102 – NEET percentage in European regions, focus on Southeast Romania region. Source: Eurostat,2021.*

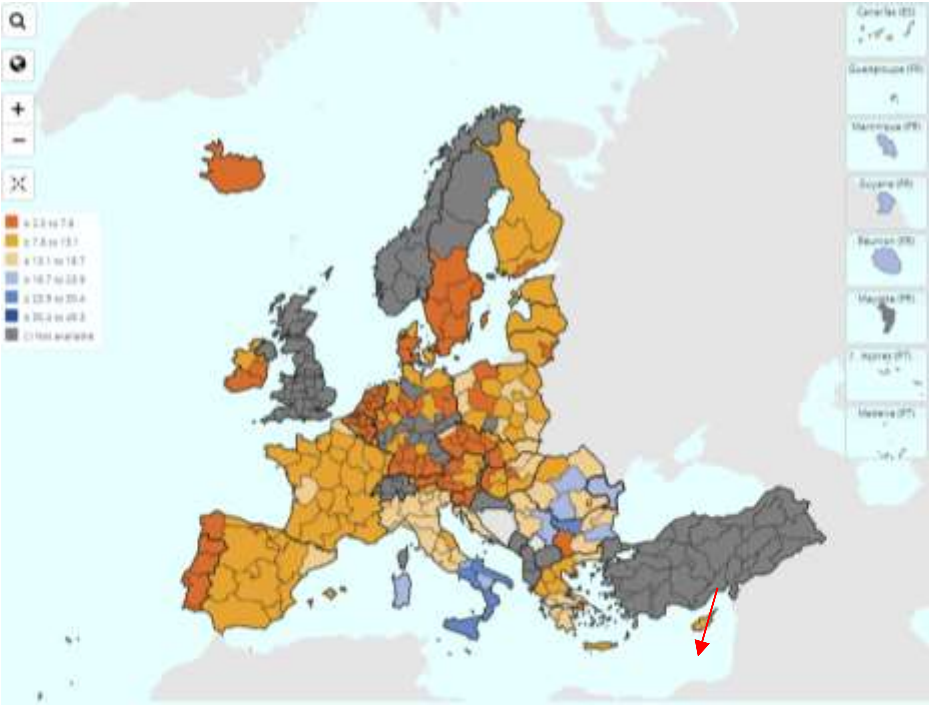


*Figure 6-103 – Map of youth NEET percentage in the European Region. Source: Eurostat, 2021.*

In Constanta County, the population below the poverty line was 23.8% and in 2019 the gross domestic product was of 23,500 euro per inhabitant (CIA, 2018; Eurostat, 2019).

The number of people employed in 2020 in Constanta County was 286,800. In 2020 in Constanta County, 54% of the population was employed in services, 16% was employed in the agriculture, forestry and fishing sector, 17% was employed in the industry sector and 13% in the construction sector (INS Constanta Conty Directorate of Statistic, 2021).

### *6.4.5 Local Economy and Livelihoods*

Local consultants have identified land-based livelihoods in the Area of Interest (AoI), which primarily revolve around farming. This is due to the fact that Dobrogea is known for its extensive cultivation of grain, rapeseed, sunflowers, and occasionally maize. When it comes to sea-based livelihoods, the stakeholder engagement process has considered the following local livelihoods:

- **Commercial fishing companies:**
  - Agigea Fishing Company SRL
  - -Pescaria Marea Neagră SRL
  - Pescaria Dobrogea SRL
  - Delta Fishing SRL
  - Prezent SRL
- **Fish/mollusk breeders:**

- Dobrogea Fish Farm
- Agigea Aquatic Farm
- Neptun Marine Farm
- The Pontica Mollusk Farm
- Aqualife Farm – Fish Farm

▪ **Fishermen's Associations:**
  - Romfish Federation
  - Pescados Association
  - Grindul Lupilor Association
  - Olimpus Association
  - Agigea Fishermen's Association

▪ **Fishermen:**
  - Ion Popescu – Professional Fisherman
  - Maria Ionescu – Amateur Fisherman
  - Gheorghe Andrei – Game Fisherman
  - Lenuta Vasiliu – Professional Fisherman
  - Constantin –tefanescu - Amateur Fisherman

▪ **Fishing Equipment Stores:**
  - Agigea Fishing Store
  - Fishing Land Constanta
  - Sport Fishing Store Dobrogea
  - The Happy Fisherman Costinesti
  - Fisherman's Paradise Constanta

▪ **Fish and Seafood Restaurants:** (some restaurants have their own fishing resources – e.g. Pescaria lui Matei)
  - Black Sea Restaurant
  - Agigea Fishermen's Inn
  - Dobrogea Fishery
  - Restaurant Pontus Costinesti
  - La Ceaun – Seafood and Fish
  - Fisherman's Bay Restaurant
  - Pescaria lui Matei Restaurant

Additional information on how these stakeholders have been engaged in the process is available in the Chapter 8.

### *6.4.6 Infrastructures, transport and mobility*

Romania has 45 airports of which 26 have paved runways. Its prominent seaports include Constanta and Midia, while notable river ports comprise Braila, Galati, and Mancanului.

In 2021, the country had a total motorway length of 931 kilometers. The cumulative road traffic for the year 2021 reached 62.161 million vehicle-kilometres (VKM). Romania's extensive railway network spans 10,764 kilometers (Eurostat, 2021).

As of 2021, Romania operates a pipeline network with a combined length of 3,112 kilometers, capable of transporting up to 49,000 tonnes per day (Eurostat, 2021).

According to the Global Competitiveness Index 2017-2018 edition, Romania's infrastructure ranked 83rd out of 137 worldwide, the lowest in Europe.

In Eurostat's "Energy, Transport, and Environment Statistics 2020," Romania displayed a significant reliance on inland waterways for freight transport, accounting for 27.1%, one of the highest shares in Europe. In 2018, Romania increased its share of port freight activity by 6.3% compared to 2017 (Eurostat, 2020).

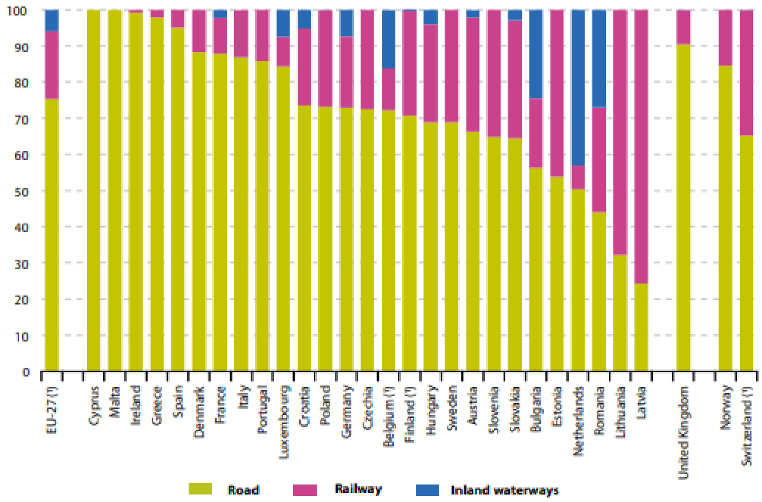



*Figure 6-104 – Shares of inland waterways in Romania. Eurostat, 2018.*

In 2020, maritime goods transport within Romania's Exclusive Economic Zone (EEZ) amounted to 12,557 million tonnes-kilometres (TKM), surpassing the European Union's total of 5,016,103 million tonnes-kilometres for the same year.

As of 2020, Romania possessed an installed electricity generating capacity of 20.528 million kW. In 2019, the country's energy consumption reached 50,039,421,000 kWh. Romania's energy trade balance in 2020 showed a net import of energy, with imports totaling 8,252 billion kWh compared to exports at 5,459 billion kWh. The main energy sources in Romania consist of fossil fuels (32.1% of total installed capacity), hydroelectricity (29.9% of total installed capacity), and nuclear power (20.4% of total installed capacity) (Eurostat, 2020).

### 6.4.7 *Social infrastructures and services*

Access to electricity in the country has been 100% in 2023 (IEA, IRENA, UNSD, World Bank, WHO, 202').

Romania's sanitation services have notable coverage, with 87% of the population having access to basic sanitation services, and 89.3% benefiting from safely managed sanitation services (The Global Health Observatory 2020). Romania stands as the sole EU country lacking universal access to water. Only 67.7% of the population, spanning both urban and rural areas, has access to water supply, 51.09% to sewerage networks, and 49.72% to wastewater treatment (World Bank, 2023 update). Safely managed sanitation services are utilized by only 83% of the population (UNICEF, 2021). The mortality rate attributed to exposure to unsafe Water, Sanitation, and Hygiene (WASH) services stands at 0.4 per 100,000 persons.

In Romania, while the rate of self-reported unmet medical examination needs had decreased by over 50% from 2011 to 2019, there was a significant increase in postponed or foregone care during the initial year of the COVID-19 pandemic; 29% reported forgone medical care during first 12 months of the pandemic. Teleconsultations were not as extensively utilized in comparison to many other EU countries; 30% reported using teleconsultation during first 12 months of pandemic compared to 39% of the EU average. In 2017, it was estimated that approximately 11% of the population lacked insurance coverage. A survey published that same year indicated that the uninsured individuals primarily included those living and working abroad, individuals with informal employment arrangements, unemployed individuals not registered for social benefits, and those who lacked identity cards, with a notable presence among marginalized groups, including Roma communities (OECD, 2021). Furthermore, Romania produces a significant number of healthcare professionals. However, the emigration of medical personnel has exacerbated workforce shortages in the country, resulting in a per capita ratio of physicians and nurses considerably below the EU averages. This situation has a detrimental impact on healthcare access and leads to extended waiting times. Additionally, the state of the healthcare workforce emerged as a critical concern during the pandemic, especially in terms of pandemic readiness (OECD, 2021).

Regarding educational access in Romania, further information is provided in the paragraph 6.4.3.

Within the Project's Area of Interest (AoI), all communities have access to electricity and most of them have access to water facilities, however not all the water supply installations have received the approval from the Health and Safety Authorities (Institute for Statistics, Public Health and Safety Authority and local knowledge, 2022; local consultants).

Concerning access to healthcare facilities, Constanta municipality serves as the central hub for the county and the surrounding region, housing five out of the 11 hospitals in the county. Emergency services are available throughout the entire county. In each administrative unit, there is access to at least one family doctor who operates within the local health center. In certain communities, the doctor is available on a rotational schedule, with prescheduled visits to each village. This arrangement ensures that individuals in need can more readily access medical advice and monitoring from the doctor (National Institute for statistics; local consultant expertise).


*Figure 6-105 – Hospitals available in the AoI, 2018 (Source: local consultants- Google Maps).*

Challenges on healthcare access affecting the communities in the AoI are the same identified at the national level, such as the decreasing number of doctors and the increase difficulty in accessing regular healthcare services (National Institute for Statistics and Local Knowledge).

Regarding education accessibility, there has been a reduction in the number of educational facilities, declining from 244 in 2014 to 226 in 2023, aligning with the decrease in the local population. Notably, the urban areas have witnessed a relatively stable representation of education infrastructure, consistently hovering around 70.5% over the past four years. Constanta municipality serves as the primary educational hub in the county. Nevertheless, every administrative unit in the rural areas, known as "Comuna," is equipped with kindergartens and at least one school, ensuring coverage up to the end of the second educational cycle (for children aged 14 - 15). Additionally, transportation services, such as buses, are in place to facilitate access to these facilities for residents in the surrounding villages (National Institute for Statistics Information, 2022; Local expert).

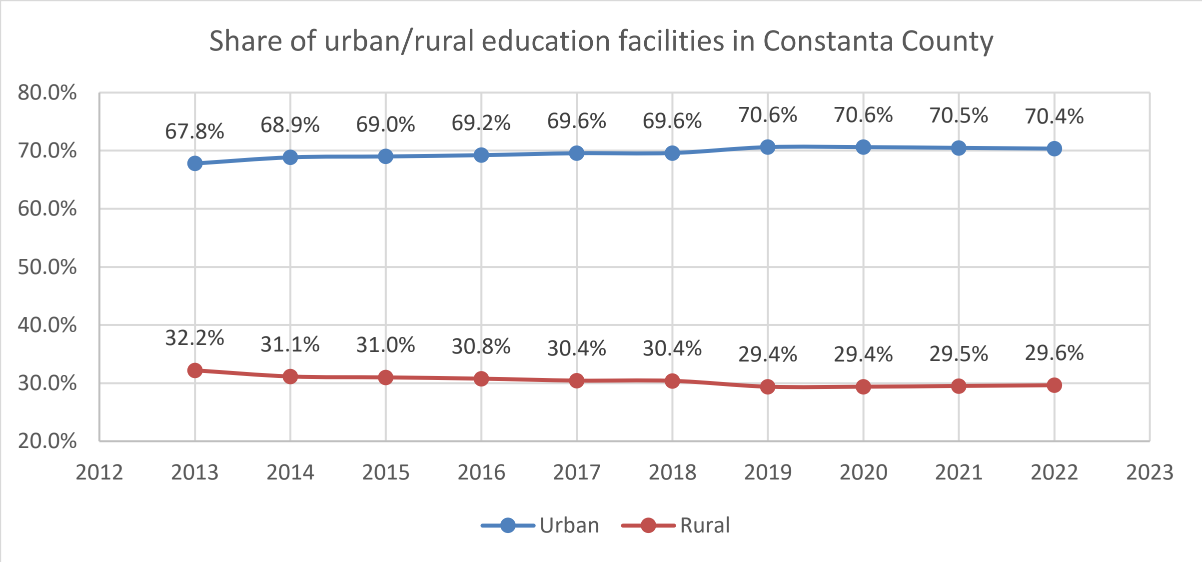



*Figure 6-106 –Share of urban/rural education facilities in Constanta County. Source of data: National Institute for statistics (tempo-online database).*

### 6.4.8 Existing Infrastructure in the AoI that the Cable is Likely to Cross

The following figures show the infrastructures present in the AoI:

- no main airports are present
- one military area is present located at approximately 3km from the OHL corridor

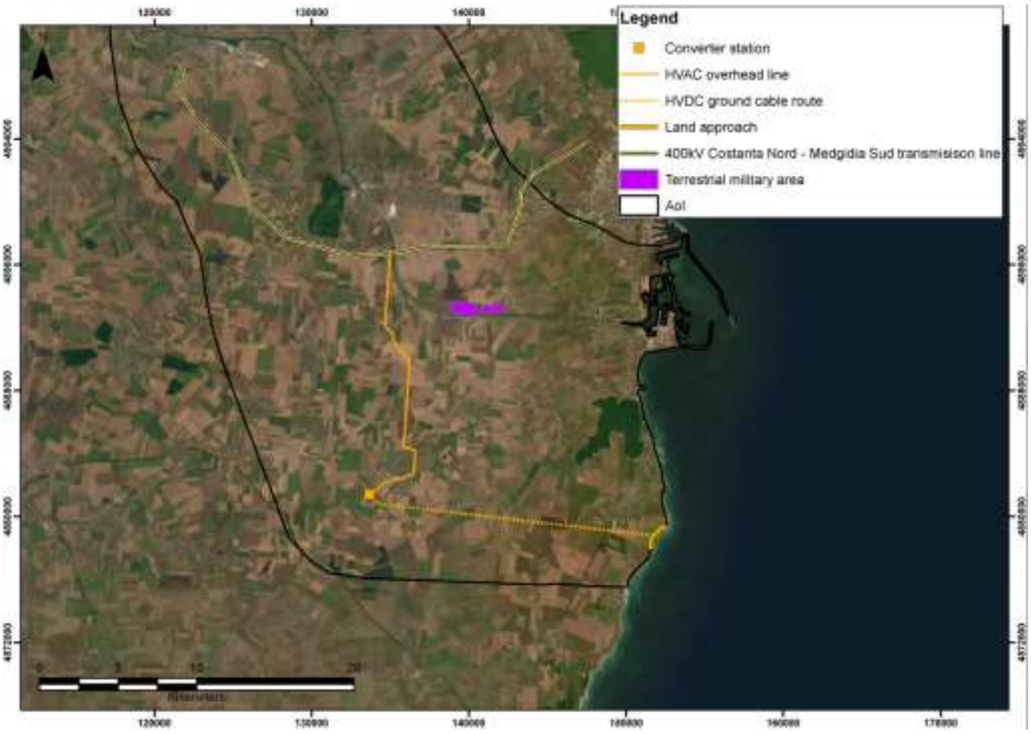



*Figure 6-107: Infrastructures present in the Romanian AoI*

According to Figure 6-108 below:

- HVDC underground cable route crosses one railway and one primary road
- HVAC OHL route crosses one primary and one secondary roads


*Figure 6-108: Railways and roads infrastructure present in the Romanian AoI*

### *6.4.9 Terrestrial ecosystem services*

### *6.4.10 Tourism*

Romania's tourism contribution to gross domestic product (GDP) in 2017 was 4,854,090 Euros (23.9 RON), equal to 2.8% of the total GDP. The tourism sector created that year 373,074 jobs. In 2018 there was an increase of 7.3% on international arrivals, that reached 11.7 million arrivals (OECD, 2020). In 2018 2.8 million tourists visited Romania, coming mostly from Germany (11.7%), Israel (10%), Italy (8.6%), France (6.1%) and the US (5.9%).

The number of overnight stays by international visitors increased by 0.7% in 2018 compared to 2017, reaching 5.3 million nights. While domestic overnight stays in accommodation units recorded an increase of 6.9% for the same period, to reach 23.1 million nights in 2018.

In 2021 the percentage of net occupancy rate of bed places in hotels and similar accommodation in Romania was respectively 30.18% and, in the Southeast region was 41.47%; whilst for bedrooms was similar, about 30.59% of net occupancy rate for Romania and 39.61% for Southeast region.

As of 2018, the number of tourist accommodation in Constanta County was 838 facilities. Below in the figure are described the type of tourist accommodation facilities available in the county.

*Table 6-47 – Tourist accommodation facilities, July 2018. Constanta county directorate of statistics, 2018.*

| Type of touristic accommodation | Number of accommodation facilities |
|---|---|
| Hotels and motels | 348 |
| Campsites and lodge-type establishments | 16 |
| Tourist villas and bungalows | 387 |
| School and pre-school camps | 3 |
| Tourist pensions | 16 |
| Agro-touristic guesthouses | 7 |
| Hostels | 59 |
| Tourist lodges | 2 |

In 2020 the most visited county in Romania was Constanta, which totaled over one million tourists.

The second most visited county was Brasov, and then as third one there is the Capital with approximately 559,000 tourists.

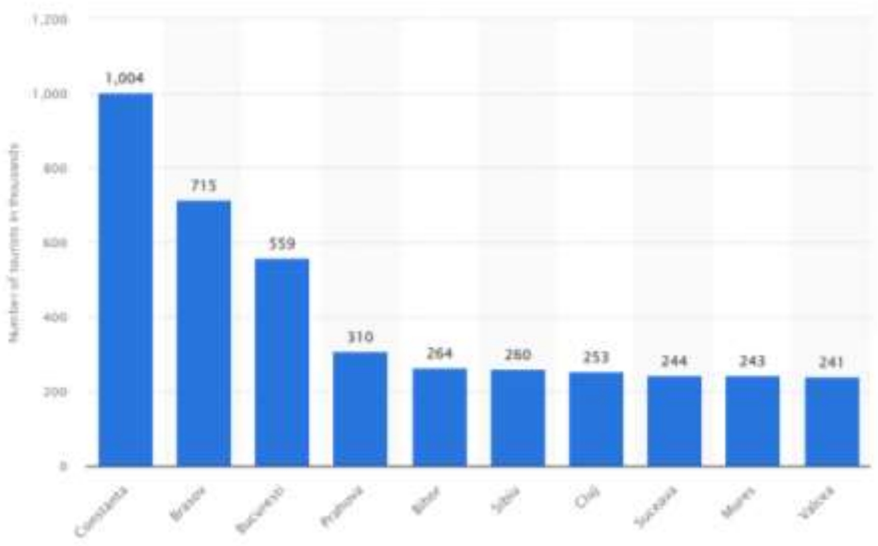



*Figure 6-109 – Most visited counties in Romania by number of tourists in 2020. Statista, 2023.*

Constanta is the most visited county because it attracts tourism for its archeological treasures and beaches. Another regional attraction in the area in the Danube Delta which is the best preserved one in Europe. Indications on marine tourism and passenger numbers have not been retrieved. It is recommended that further information is collected during the ESIA process.

### 6.4.11 Landscape

The AoI presents a varied landscape, which includes urban areas and agricultural areas. The area has a rather flat morphology and elevated areas with viewpoints are generally lacking. The presence of natural areas is limited, they are generally found along rivers and deltas present in the area. The coast also represents an important visual landscape in the area and has a relevant tourism value.

### 6.4.12 Land Use

The Communist regime in Romania fell in 1989, bringing with it many changes. The major change was the so called “decollectivization”, initiated in 1990 by the enactment of Land Law 18/1991 completed and modified by Law 169/1997, Law 1/2000 and Law 247/2005. These laws changed the social- economic organizational structure of Soviet lands management. The Soviet collective properties started to be privatized and there was an expansion of private property over agricultural and forests land (Bălteanu & Popovici, 2010). Before 1989 the most important forms of land exploitation were the “state farm”, which accounted for 29.7% of the agricultural area of the country and the “collective farms”, which accounted for 68.8% of the agricultural area; at that time private farms covered 9.5% of the total agricultural land. After 1989 the laws created an excessive fragmentation and the creation of farms often considered too small. Another problem raised from land privatization in Romania is the significance of abandoned arable lands: the cultivated area decreased from 9.6 million hectares in 1989 to 7.8 hectares in 2006. This phenomenon was caused by a negative socio-economic situation of farmers and of the population, as by the uncertainty regarding landed property and the lack of means of production.

In 2018, Romania registered 528.4 m$^2$ per capita of settlement areas, indicator that captures the amount of settlement area used for the construction of buildings, industrial and commercial areas, infrastructure and sports grounds etc. (Eurostat, 2021). In this case as described in the figure below, the settlement areas present in the territory are lower compared to other European countries.

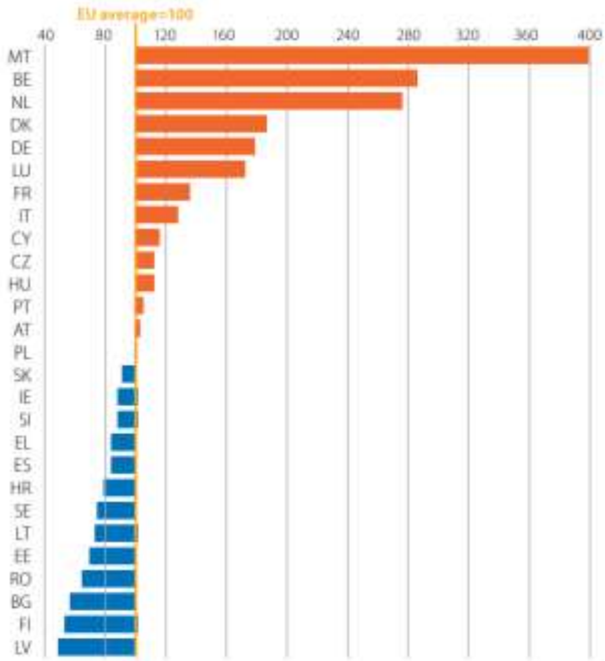



*Figure 6-110 – Romanian settlement Area per capita 2018; Source: L’CAS The EU's land use and land cover supply, 2021.*

As described in the figure below, as for 2018 in Romania, 55% of the land was used for agriculture, 33.7% was used for forestry, 5.9% of the territory was unused and abandoned areas, 2% was used for services and residential areas.

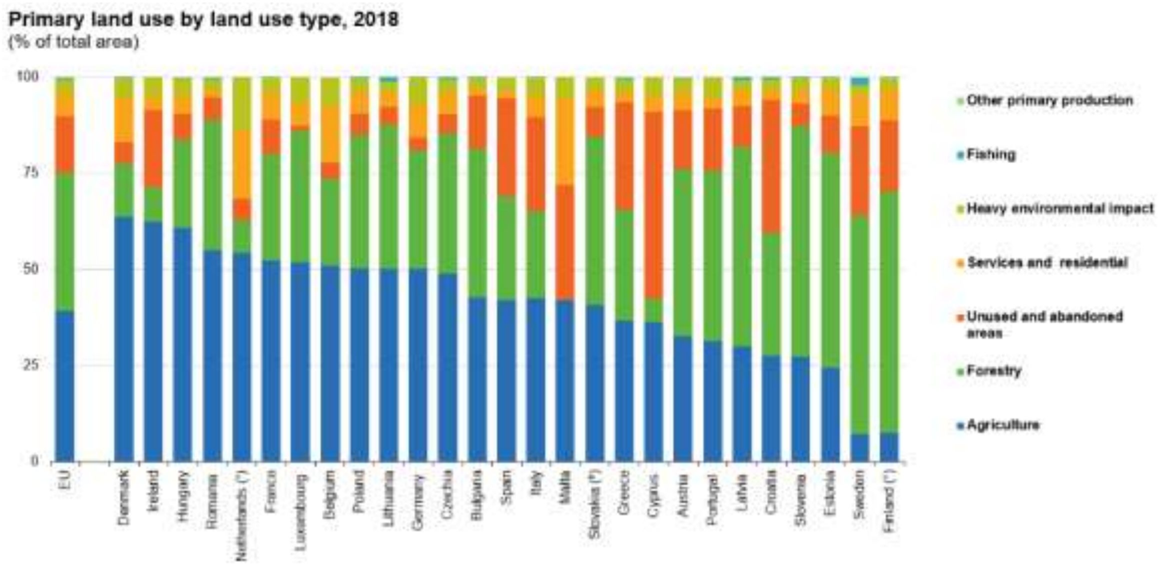



*Figure 6-111 – Romania primary land use by land use type. Eurostat, 2018.*

### *6.4.13 Agriculture*

The economic agricultural output of Romania in 2022 was of 21,400 million euros. Crop output alone in 2022 was 15,862 million euros whilst the total output of the agricultural "industry" was 23,168.06 million euros. As described in the table below, Romania has 2,887,070 hectares of farm areas in 2020, 2,014,270 hectares of arable lands, 15,930 hectares of land converted to organic farming and 984,440 hectares of permanent crops (Eurostat, 2021).

*Table 6-48 – Type of land use in Romania. Eurostat Database Main Farm Land Use Nuts 2 regions, 2020.*

| | Farm Area | Fully converted and under conversion to organic farming | Arable land | Permanent crops |
|---|---|---|---|---|
| Romania | 2,887,070 | 15,930 | 2,014,270 | 784,440 |

Data for Constanta County date back to 2018. The cultivated area in the county was 488,275 hectares of which the most common cultivated products were grain cereals with a total of 332,646 hectares and wheat with 190,849 ha (INS Constanta County Directorate of Statistics, 2021c).

*Table 6-49 – Area cultivated with the main crops. INS Constanta County Directorate of Statistics, 2021c.*

| Constanta County | 2020 (ha )[i] | % |
|---|---|---|

| | | |
|---|---|---|
| Total cultivated area | 488275 | |
| Grain cereals | 332646 | 68% |
| Beans | 16900 | 3% |
| Root plants | 441 | 0% |
| Industrial crops (including oil crops) | 118221 | 24% |
| Vegetables | 2552 | 1% |
| Forage | 18744 | 4% |

The average production per hectare for the main crops since 2018 are described in the tables below.

*Table 6-50 – Average yield per hectare of main crop in 2018,2019,2020. INS Constanta County Directorate of Statistics, 2021c.*

| Constanta County | Total 2018 (kg/ha)[i] | Total 2019 (kg/ha) | Total 2020 (kg/ha) | Percentage change |
|---|---|---|---|---|
| Wheat | 5,677 | 4,748 | 1,003 | -82% |
| Barley and barley | 4,757 | 4,399 | 1,008 | -79% |
| Oats | 2,713 | 2,658 | 1,688 | -38% |
| Grain maize | 8,124 | 5,628 | 1,485 | -82% |
| Peas, grain | 1,709 | 1,888 | 682 | -60% |
| Beans | 2,202 | 1,708 | 700 | -68% |
| Potatoes | 20,373 | 17,551 | 8,478 | -58% |
| Autumn potatoes | 21,247 | 17,953 | 8,480 | -96% |
| Sunflowers | 3,715 | 2,660 | 1,217 | -67% |
| Soya beans | 2,278 | 1,774 | 1,216 | -47% |
| Tomatoes | 19,444 | 18,982 | 11,814 | -39% |
| Dried onions | 14,272 | 15,109 | 12,873 | -10% |
| White cabbage | 14,861 | 13,664 | 13,447 | -10% |
| Watermelons and melons | 25,477 | 22,439 | 18,788 | -26% |

The data showed a sharp decline in productions from 2018 to 2020, the reason for which is not known and could be explored further in subsequent studies in the ESIA.

### *6.4.14 Terrestrial archaeology and cultural heritage*

As of 2022, there are nine UNESCO World Heritage Sites in Romania, seven of which are cultural sites and two of which are natural; additional 16 sites are on Romania's tentative list.

None of these sites are within the area of interest or in its proximity. The closest World Heritage Site of the Danube Delta, which was the first Romanian site added to the list in 1990 and is located approx. 40 km north of the AoI.

The region boasts a rich array of archaeological monuments, with a particular focus on burial mounds. These mounds which are between 50 and 60 sites and situated within approximately a 2 km radius of the proposed cable route, are prominently featured in maps accessible through pertinent National Cultural Heritage databases. It is essential to consider this aspect during the Environmental and Social Impact Assessment (ESIA).

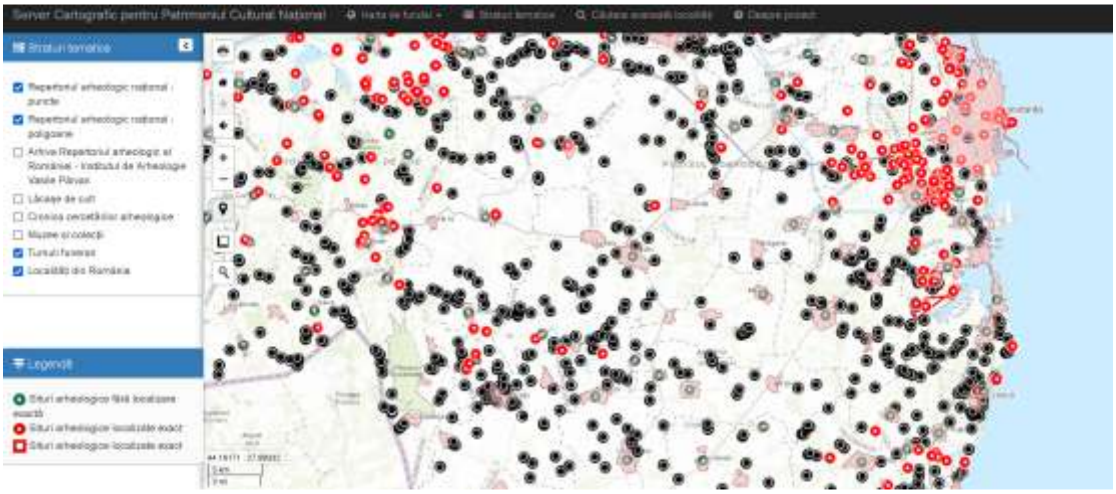


*Figure 6-112 -Archeological monuments in the AoI. Source: National Cultural Heritage database*

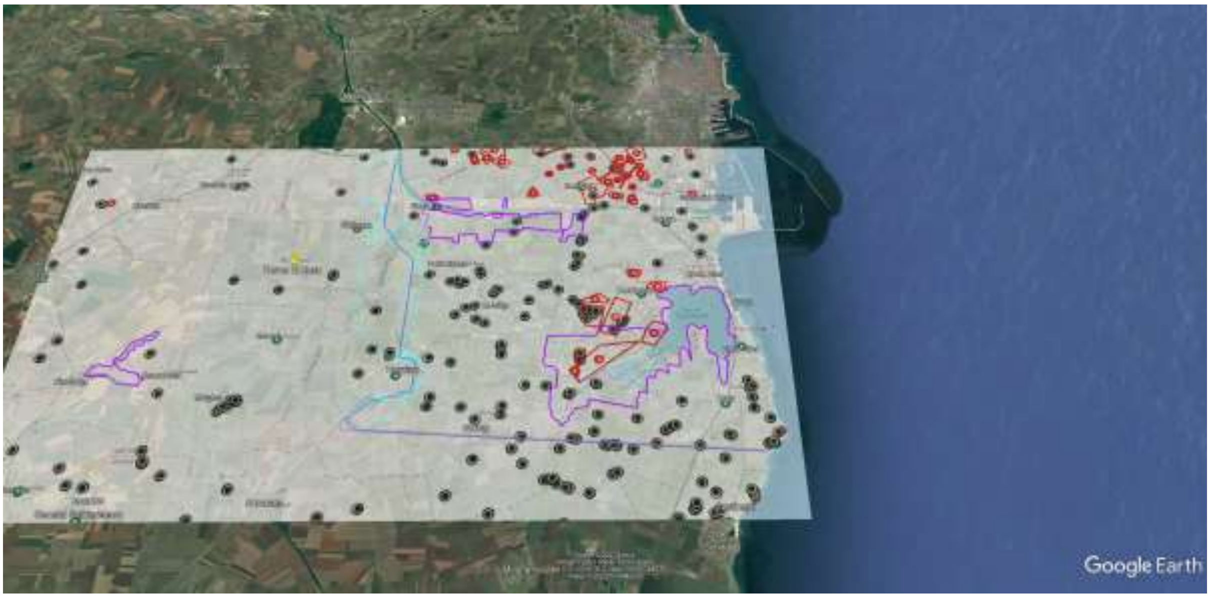



*Figure 6-113 -Archeological monuments in the AoI on Google Earth. Source: National Cultural Heritage database*

While the precise locations of the burial mounds are not currently well-defined, the forthcoming stages of the project will demand increased attention to this matter. A preliminary desk review of publicly available information suggests that the cable route could intersect with these cultural monuments. To minimize potential disturbances, it is recommended that the route aligns with existing roads.

The region also contains remnants of defensive fortifications, including trenches from both World Wars, along with historical traces of Roman settlements in proximity to Biruinta village, Topraisar, and Baraganu within the Area of Interest (AoI). In the northern part of Topraisar, it is reasonable to anticipate the presence of remains from a medieval settlement. None of these sites are registered as UNESCO sites.

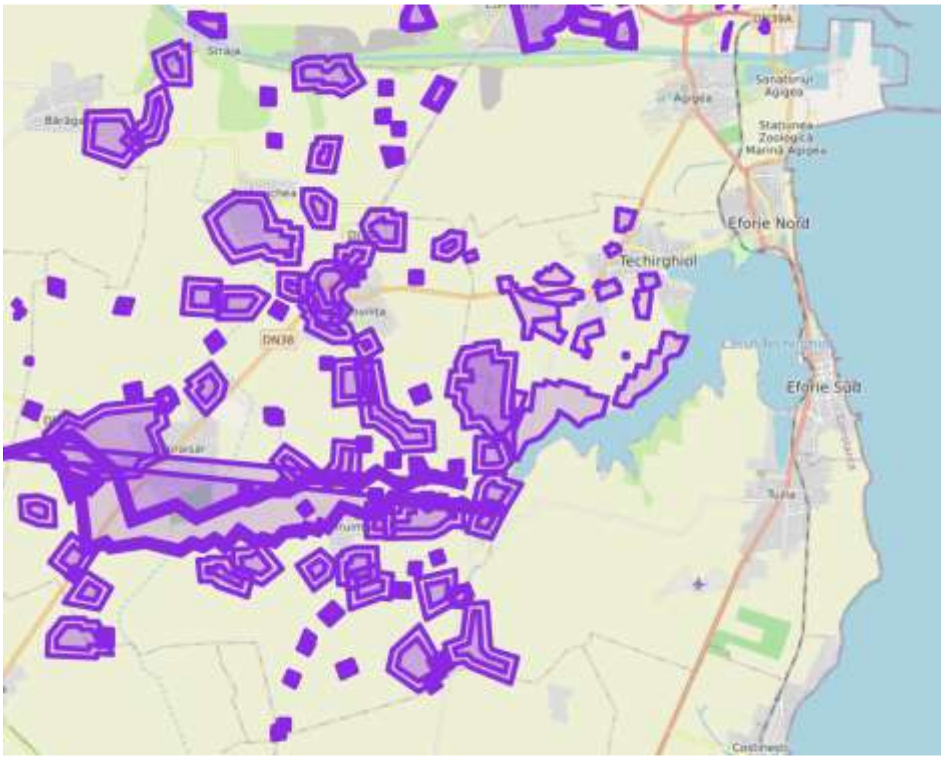



*Figure 6-114 -Remnants of defensive fortifications in the AoI. Source: ArchTerr.*

### 6.4.15 Waste

Concerning the generation of Municipal Solid Waste (MSW), Romania has the lowest value of pro-capita production in the EU, namely 302 kg per capita, compared to Austria which has the highest in EU, 834 kg per capita (Eurostat, 2021b). The Romanian MSW average per capita is below the EU average every year since 1995.

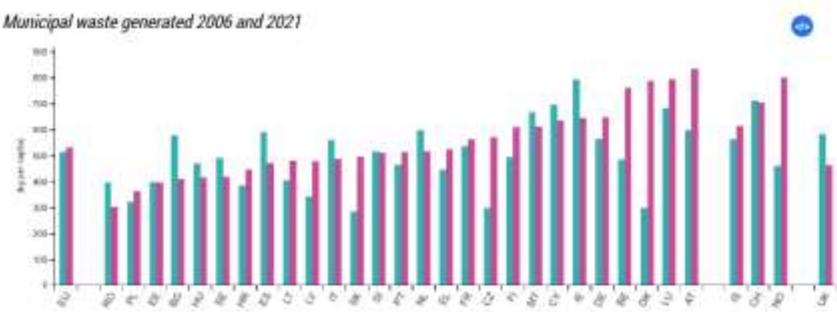



*Figure 6-115 – Municipal waste generated in selected years 2006 (in blue) compared to 2021 (in violet) (kg per capita).*

The municipal waste (kg per capita), generated from 1995 to 2021 is described in the Table 6-51 below.

*Table 6-51 – Municipal waste generated in selected years, 1995-2021 Source:Eurostat (env_wasmun).*

| Kg/per capita | 1995 | 2000 | 2005 | 2010 | 2015 | 2020 | 2021 | Change % |
|---|---|---|---|---|---|---|---|---|
| EU | 467 | 513 | 506 | 503 | 480 | 521 | 530 | 13.6 |
| Romania | 342 | 355 | 383 | 313 | 247 | 287 | 302 | -11.8 |

In Romania the generation of MSW per capita reached a maximum of 411 kg in 2008, after which the value has declined reaching 302 kg in 2021. The decrease in the MSW generation has been due to the implementation of the first waste prevention programme in 2015.

The total waste generation seems not to be linked to economic growth, indeed whilst between 2010 and 2014 total waste generation in Romania has decreased, in the same period the economy saw a significant rise.

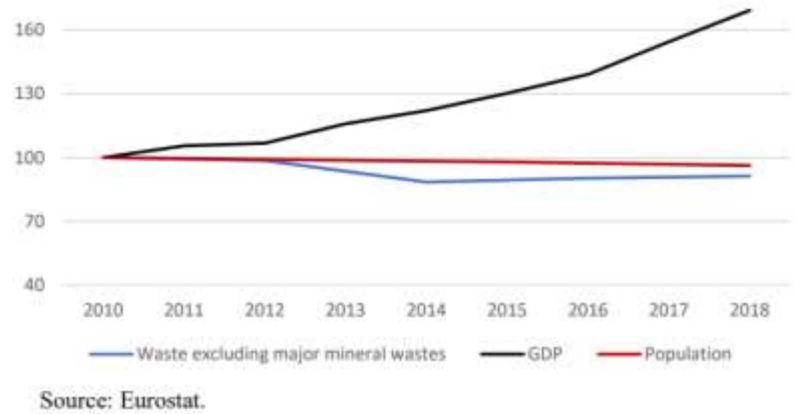



*Figure 6-116 – Growth rate of waste (excluding major mineral wastes), GDP and population in Romania 2010-2018).*

The total hazardous generation of waste in Romania has increased since 2016 from 624,979 tons to 774,611 tons in 2020. For nonhazardous waste the changes are not steady, indeed the generation of waste changed from 176,937,926 tons in 2016, to 202,280,343 tons in 2019 to 140,589,846 in 2020.

In 2020, in Romania the number of disposal- landfill (D1, D5, D12)[46] was 97 whilst in the South-East of Romania was 15 (Eurostat, 2020 Database). Romania has in total 11 landfills for hazardous waste and 83

[46] **D1**: Landfill Deposit into or on to land, (e.g., landfill, etc.).
**D5**: Engineered landfill, specially engineered landfill, (e.g., placement into lined discrete cells which are capped and isolated from one another and the environment, etc.).
**D12**: Permanent storage (emplacement of containers in a mine).
Source: EPA 2013 - [Explanation_of_Recovery_and_Disposal_Codes_TB.pdf (epa.ie)]

for non- hazardous waste. The country has 3 landfills for inert waste as well. It also has 24 incineration land facilities (D10[47]), of which 3 are in the Southeast region of Romania where the project is located. For what concerns the capacity of recovery of disposal facilities in 2020, Romania had 240 energy recovery structures (R1)[48], of which 25 in the South-East region of the country. Moreover, there are 311 facilities for recycling and backfilling (R2, R11)[49], of which 51 in South-East region (Eurostat, 2020 Database). In addition, Romania in 2020 had also 217 recovery-recycling facilities, of which 25 in the Southeast region (Eurostat, 2020 Database).

### *6.4.16 Maritime traffic*

The description of the marine traffic conditions in the AoI derive from the consultation of the marine traffic database. The figure below provides an indication of the density of marine traffic in terms of routes travelled by ships per year. The land approach area is highlighted in red below. As shown in Figure 6-117 below, marine traffic levels are limited in the Area of Interest and higher along the coast. Significant marine traffic occurs north of the AoI, in the port of Constanta, as this is the most important marine port of Romania.

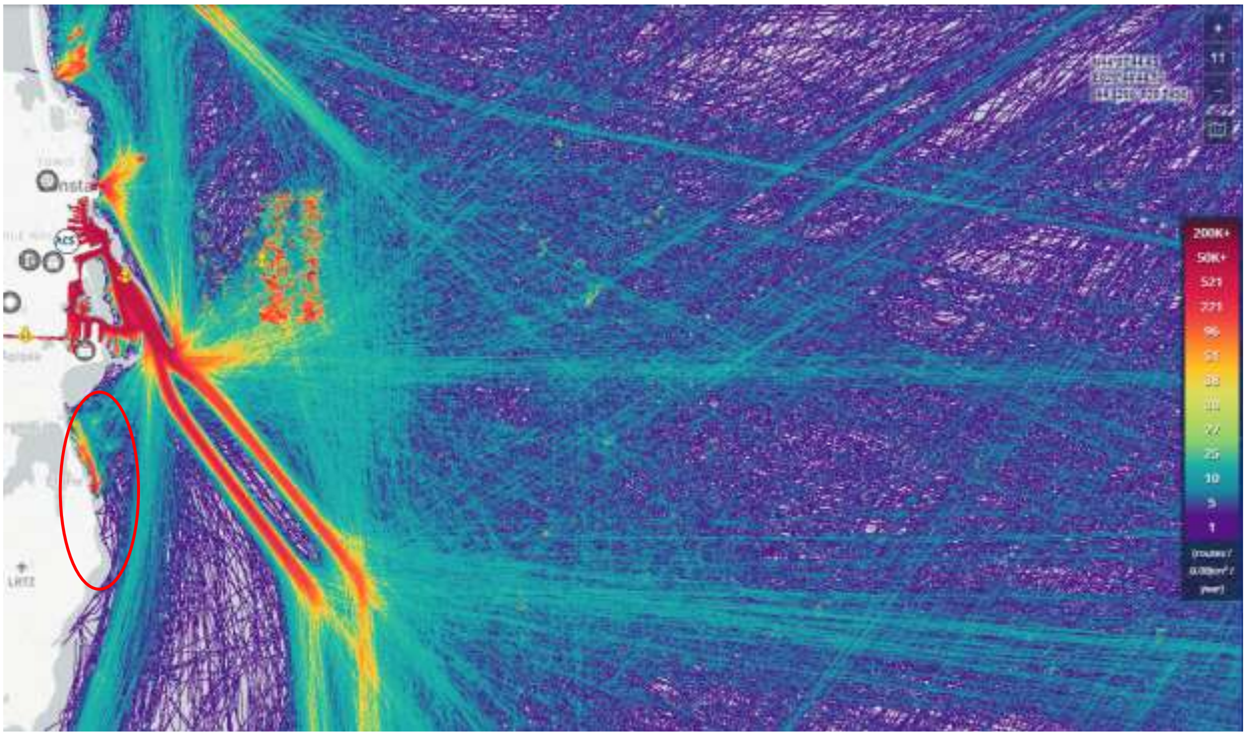


*Figure 6-117 – Marine routes back and forth Constanta port.*

[47] **D10**: Incineration on land. Source: EPA 2013 - Explanation_of_Recovery_and_Disposal_Codes_TB.pdf (epa.ie)

[48] **R1**: Use principally as a fuel or other means to generate energy. Source: Explanation_of_Recovery_and_Disposal_Codes_TB.pdf (epa.ie)

[49] **R2**: Solvent reclamation/regeneration.
**R11**: Uses of waste obtained from any of the operations numbered R1 to R10.
Source: Explanation_of_Recovery_and_Disposal_Codes_TB.pdf (epa.ie)

Quarterly data in 2021 acknowledges the arrival of 1,213 vessels into Romania's ports, of which 1,046 into the port of Constanta, highlighting the relevance of this port at a national level. Most vessels that have entered Romania were dry bulk carrier which were respectively 707 in number entering Romania and 548 entering Constanta. Below in the figure it is described the quantity and type of vessels that entered the main ports in Romania (Eurostat, 2021).

| TIME | 2021-Q4 | 2021-Q4 | 2021-Q4 | 2021-Q4 | 2021-Q4 |
|---|---|---|---|---|---|
| VESSEL | Total | Liquid bulk tanker | Dry bulk carrier | Container ship | Specialised carrier |
| REP_MAR | | | | | |
| Romania | 1 213 | 159 | 707 | 270 | 46 |
| Constanta | 1 046 | 151 | 548 | 270 | 46 |

*Figure 6-118 – Quantity and type of vessels that entered the main ports in Romania. Eurostat, 2021.*

### 6.4.17 Marine ecosystem services

### 6.4.18 Marine fisheries

The fisheries and aquaculture activities are regulated by the Government Emergency Ordinance no 23 from March 5, 2008 (with its updates and modifications).

In Romania, the overall responsibility for the design and for the development and implementation of the fisheries policy falls under the auspices of the National Agency for Fishing and Aquaculture (NAFA), which is a public institution entirely financed from the state budget. NAFA is part of the Ministry of Agriculture and Rural Development.

Other institutions with attributions regarding product quality and environment are:

- National Sanitary-Veterinary and Food Safety Authority ensures the creation of the legal framework and the regulations specific for activities in the veterinary and food safety field. This authority supervises and controls the implementation and compliance with veterinary and food safety regulations.
- Ministry of the Environment and Forests elaborates the legal framework specific for environmental protection, water management, as well as licensing procedures for all exploitation activities, including fisheries.

Fishing is a traditional activity in the communities around the Black Sea and Danube Delta and Romania used to have a significant fishing fleet.

In terms of fishing prohibition period, it is established on yearly basis though common order, by the Ministry of Agriculture and Rural Development and the Ministry of Environment and Water and Forests.

Small-scale vessels, demersal trawlers, purse seiners and pelagic trawlers dominate the Mediterranean and Black Sea (FAO, 2022c). The operating fleets in the Mediterranean Sea are 74,200 vessels and 11,000 in the Black Sea, of which the 82% are small scale vessels. The second largest fleet segment is the one of demersal trawlers (8%), followed by purse seiners and pelagic trawlers with 5%.

In the Black Sea (2018-2020), the total fish landing from fishing activities was 446,100 tonnes. Turkiye is the largest regional producer, followed by Georgia, the Russian Federation, Ukraine, Bulgaria, and Romania, which accounts for the smallest amount, as shown in Figure 6-119.

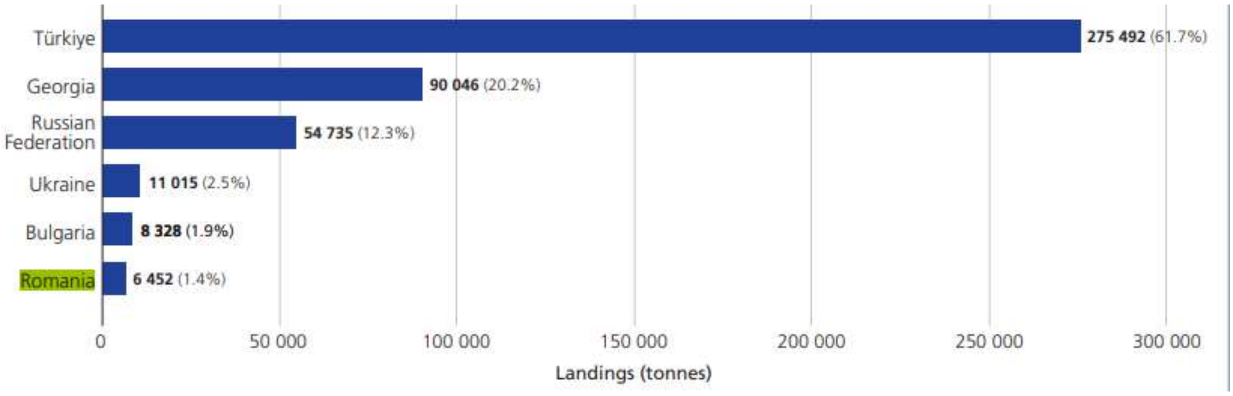



*Figure 6-119 – Average annual landings by country in the Black Sea (2018-2020). FAO, 2022*

After 2018, Romania has had the biggest decrease in catch in the Black Sea, by around 19.8 percent (a difference of 1,600 tonnes), as shown in Figure 6-120 (FAO, 2022c).

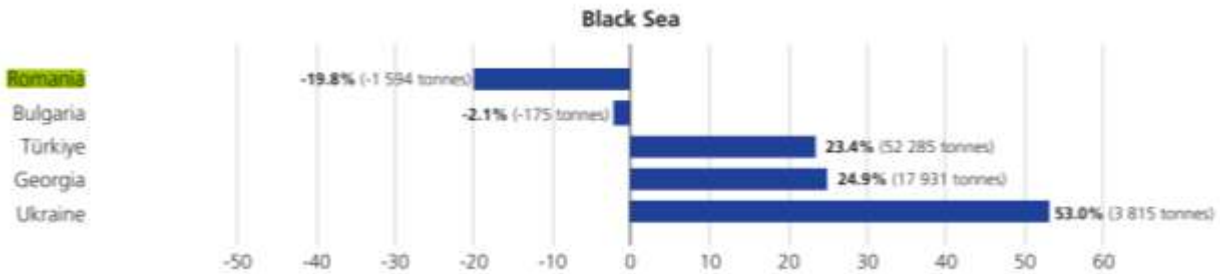



*Figure 6-120 – Total percentage variation between total landings recorded over 2016–2018 and total landings recorded in 2018-2020 in the Black Sea.*

Romania has 130 operating vessels of which 73 are small-scale vessels, 20 trawlers and beam trawlers, 18 purse seiners and pelagic trawlers and 19 other fleet segments. These account for the 1.2 % of all operating vessels in the Black Sea. The capacity is with a gross tonnage (GT) of around 1,352 and a total engine power of 5,332. The International Maritime Organisation (IMO) assigned a number to each vessel in order to fight against illegal unregulated fishing. They are categorized on the basis of fishing vessels of steel and non-steel hull construction with a length overall (LOA) of 20 m or above; in Romania these types of vessels are the 50%.

The four largest fleets in the Mediterranean and Black Seas (each over 10,000 vessels), belong to Türkiye, Tunisia, Greece and Italy, whilst the smaller fleets (under 500 vessels), belong to Romania, Montenegro, Israel and Albania.

As represented in the figure below, Romania accounts for 29% of the catch of Abalones, winkles and conchs (FAO, 2022c).

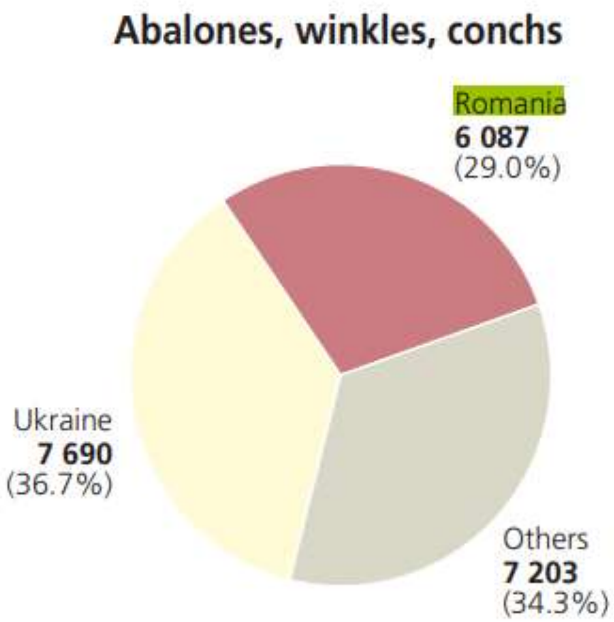



*Figure 6-121 – Total landings of main species groups by country 2019-2020. FAO, 2022.*

Romania, as member of the Council of Europe, ratified the Bern Convention on the Conservation of European Wildlife and Natural Habitats (open for signature on 19 September 1979) on 18 May 1993, as well as the Action Plan for the Protection and Restoration of the European Sturgeon and the Pan-European Action Plan for Sturgeons in 2018.

Moreover, Romania has decided to extend indefinitely the five-year temporary ban on the fishing and sale of the six wild sturgeon species and wild sturgeon products (WWF, 2021).

### *6.4.19 Social gaps Information and Recommendations*

The table below reports the main gaps identified in the Romanian social baseline and recommendations for filling-in the identified gaps.

*Table 6-**52** – Primary gaps recommendations for the social Romanian baseline.*

| Component | Gaps | Recommendation |
|---|---|---|
| **Social components** | | |
| Population and demopgraphics | Missing specific data on demographic statistics in the AoI. Further data necessary to identify minorities and vulnerable groups. | ▪ Additional in-depth desktop studies on demographic statistics in the AoI.<br>▪ Field survey to retrieve updated demographic data from local authorities.<br>▪ Consultation of minorities and vulnerable groups are recommended to retrieve further understanding on their presence in the AoI and their demographic profile. |
| Community health and safety | Missing specific data on health conditions and healthcare facilities in the AoI. | ▪ Additional in-depth desktop studies on epidemiological data and quality level of healthcare services offered in the AoI.<br>▪ Field survey to identify healthcare facilities, access for local communities, level of maintenance and equipment present.<br>▪ Consultation of healthcare authorities and healthcare workers to retrieve further primary and qualitative data. |
| Education | Missing specific data on education levels and education facilities in the AoI. | ▪ Additional in-depth desktop studies on education levels epidemiological data and level of quality services offered in the AoI.<br>▪ Field survey to identify education facilities, access for local communities and level of maintenance.<br>▪ Consultation of education authorities and workers to retrieve further primary and qualitative data. |
| Economy and livelihoods | Missing specific data on economic and livelihood conditions in the AoI. | ▪ Additional in-depth desktop studies on economic statistical data to have a better understanding on the main economic sectors in the AoI and on the current trends.<br>▪ Consultation of local authorities are recommended to retrieve primary data on main economic trends in the AoI. |

| | | |
|---|---|---|
| | | ▪ Consultation of minorities, vulnerable groups and women are recommended to retrieve further understanding on their livelihood conditions in the AoI. |
| Infrastructures, transport and mobility | Missing specific data on infrastructures in the AoI, their level of maintenance and access for local communities. | ▪ Additional in-depth desktop studies on presence and level of access to infrastructure networks in the AoI.<br>▪ Field activities to identify main infrastructures in the AoI and level of maintenance.<br>▪ Consultation of local authorities and local communities to retrieve primary data on infrastructures present in the AoI, main problems and planned development programs. |
| Social infrastructure and services | Missing specific data on social infrastructures in the AoI and role for local communities. | ▪ Field survey to identify social infrastructures present in the AoI.<br>▪ Consultation of local authorities and local communities to retrieve primary and qualitative data on social infrastructures, with a specific focus on informal networks and community self support mechanisms.<br>▪ Consultation of women and minorities to retrieve focused information on informal networks and self support mechanisms. |
| Tourism | Missing specific data on role of tourism in the AoI and main infrastructures present. | ▪ Additional in-depth desktop studies on significance of tourism sector in the AoI.<br>▪ Consultation of workers in the tourism sector to retrieve primary and qualitative information. |
| Landscape | Missing specific identification of landscape features in the AoI. | ▪ Field survey to identify main landscape features in the AoI and to retrieve photographic material;<br>▪ Field survey to identify areas or elements of visual quality in the AoI.<br>▪ Field survey to identify sensitive viewpoints in the AoI. |
| Land use | Missing specific identification of land use and land tenure characteristics in the AoI. | ▪ Additional in-depth desktop studies to identify and map land uses in the AoI.<br>▪ Field survey to verify land uses identified from desktop. |

| | | |
|---|---|---|
| | | ▪ Consultation with local authorities and local communities to have a better understanding of the land tenure systems in the AoI.<br>▪ Consultation of women and minorities to have a better understanding of access to land and land tenure for these groups. |
| Cultural heritage | Missing specific identification on intangible cultural heritage and heritage of value to local communities. | ▪ Additional in-depth desktop studies to identify all known tangible and intangible cultural heritage (both protected and non) present in the AoI.<br>▪ Field survey to confirm the findings of the desktop research and to identify the risk of presence of unknown cultural heritage.<br>▪ Consultation of local authorities and local communities to identify elements of cultural value, both tangible and intangible.<br>▪ Consultation of women, minorities and vulnerable groups to identify elements of cultural value, both tangible and intangible. |

## 6.5 Deep-Sea Environmental Baseline

The deep-sea area is here described in its physical and biological components, discussed in the optics of the project. Non-significant (if not absent) effects on the environment are expected by the project itself, because of the stratification of the water layers. The environment itself may rather have effects on the project, which should be carefully assessed in the scope of the ESIA.

### *6.5.1 Physical Overview*

#### *6.5.1.1 Bathymetry*

The Black Sea is one of the largest and deepest inland seas, with a total area of 420,325 km$^2$ (462,000 km$^2$ when including the Sea of Azov; Murray, 2005; Krivoguz et al., 2020) and an average depth of about 1,500 m (Ross et al.,1974; Özsoy & Ünlüata, 1997). Its maximum depth reaches the mark of 2,258 m (Kostianoy et al., 2008; Krivoguz et al., 2020; Figure 6-122).

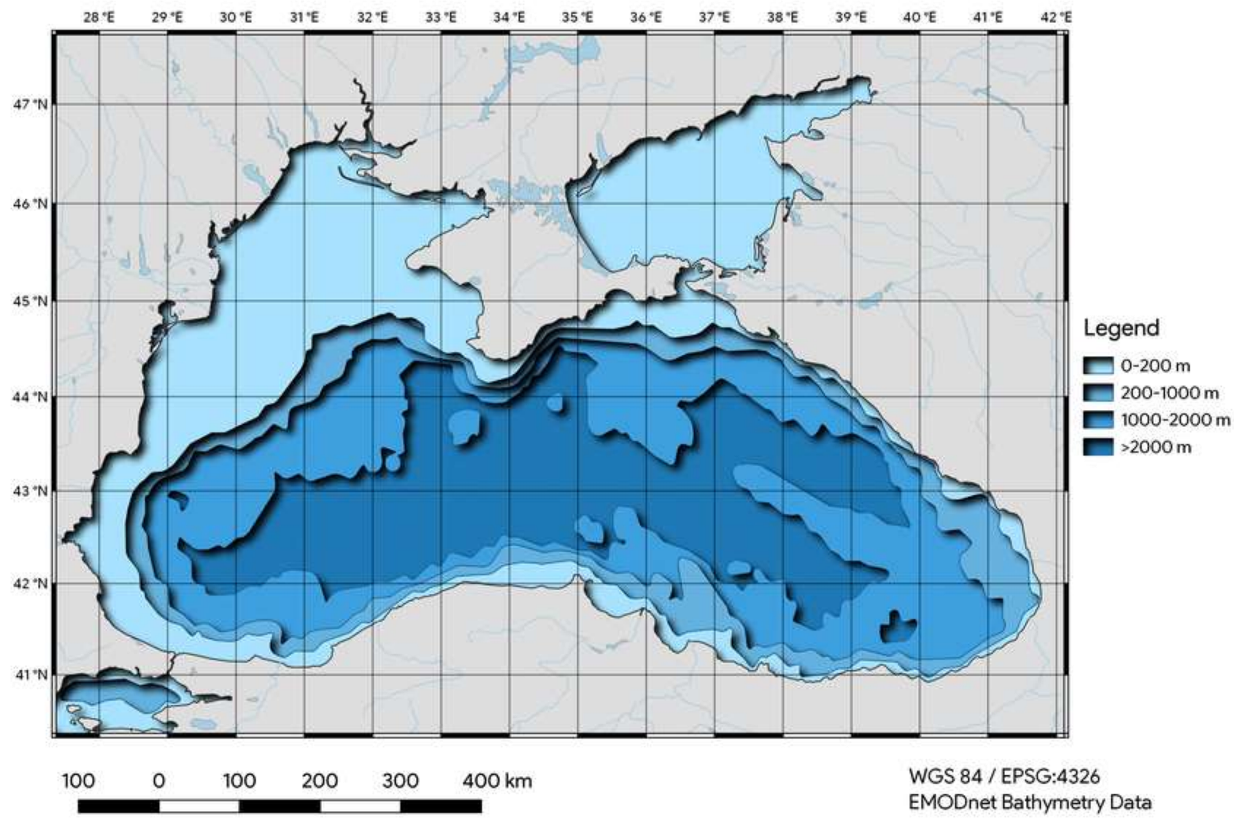



*Figure 6-122 – Bathymetry of the Black Sea. Different colors indicate different depths (Denis, 2000).*

The continental shelf of the Black Sea can vary dramatically according to the location. A wide shelf occurs in the northwestern and northern Black Sea basin, while in the eastern part of the Black Sea the continental shelf is very narrow (Özsoy & Ünlüata, 1997; Panin & Jipa, 2002; Panin, 2005).

The northwestern shelf extends for about 400 km between Cape Kaliakra and Cape Chersonesus and is the most prominent Black Sea shallow water area, representing about 94% of the entire Black Sea shelf area (Figure 6-123; Panin & Jipa, 1998, Jipa & Panin, 2020).

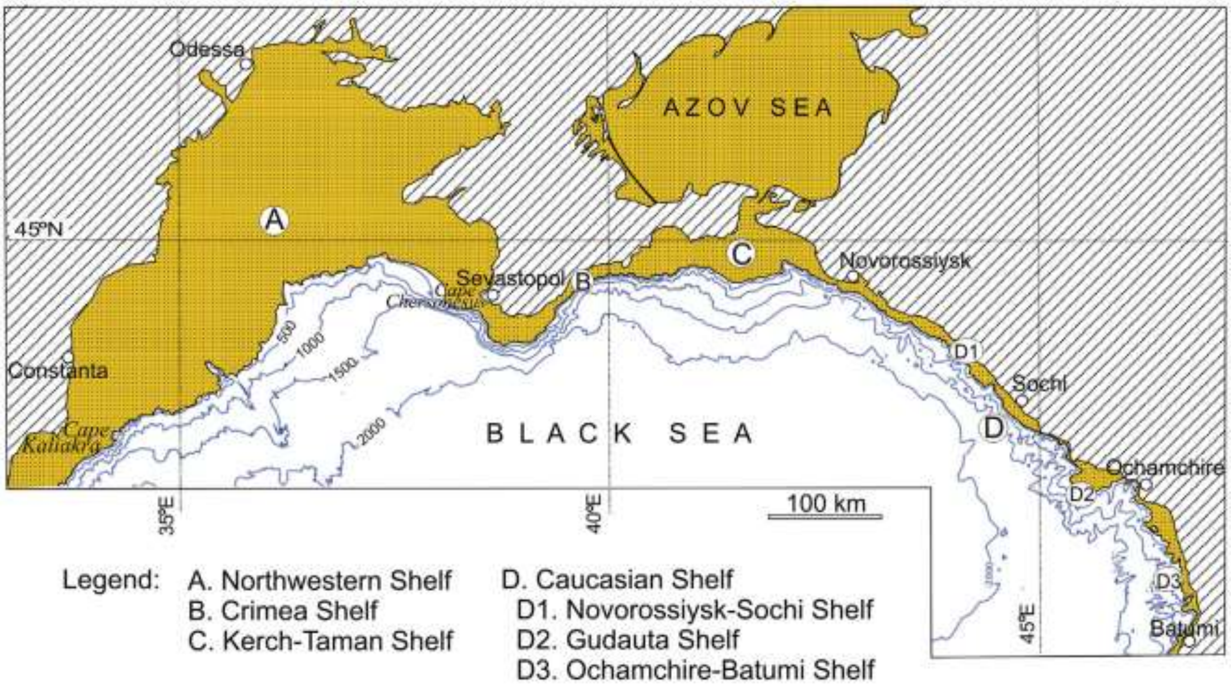



*Figure 6-123 – The continental north-western and eastern shelf areas of the Black Sea are represented (source: Jipa & Panin, 2020).*

The northeastern and eastern part of the basin is known as the Caucasian Black Sea shelf and it spans from Novorossiysk to Batum for about 490 km length. Because of its extension and width variety, it is divided into three areas. The Novorossiysk-Sochi Shelf (width 3 to 12 km) represents the northern area of the Caucasian Shelf, followed by the Gudauta Shelf (width up to 28 km near the −200 m bathymetry line) in the central area, and the Ochanchire-Batumi Shelf in the southern area. The Ochanchire-Batumi Shelf is 2 - 10 km wide in the Poti-Batumi area, but larger near Ochanchire (14 - 15 km to the −100 m bathymetry line; Jipa & Panin, 2020).

Both the shelf break line of the northwestern and eastern Black Sea shelfs are located at a depth of about -100 m. However, while the basal limit of the continental slope is around -1000 m in the north-western part of the basin and much lower (close to -2000 m) in the eastern areas. Finally, a number of studies have mentioned that some slope areas can be smooth and gentle (as in the north-western Black Sea; with a 1 - 3° average gradient), or sturdy and steep (like in the eastern part of the Black Sea with a 5 - 8° average gradient; Ross et al., 1974; Ignatov, 2008; Ivanov & Belokopytov, 2013).

#### *6.5.1.2 Submarine canyons*

Many canyons incise the Black Sea continental slope. Harris et al. (2014) recognized four zones in which large canyons (i.e., those spanning a bathymetry interval of at least 1000 m, with a channel depth reaching 100 m; Harris & Whiteway, 2011) are distributed: a northwestern area (Constanta-Odessa), a western area (Istanbul), a southern area (Samsun) and an eastern area (Batumi-Sochi) (Figure 6-124). The northwestern and the eastern ones are interested by the project.

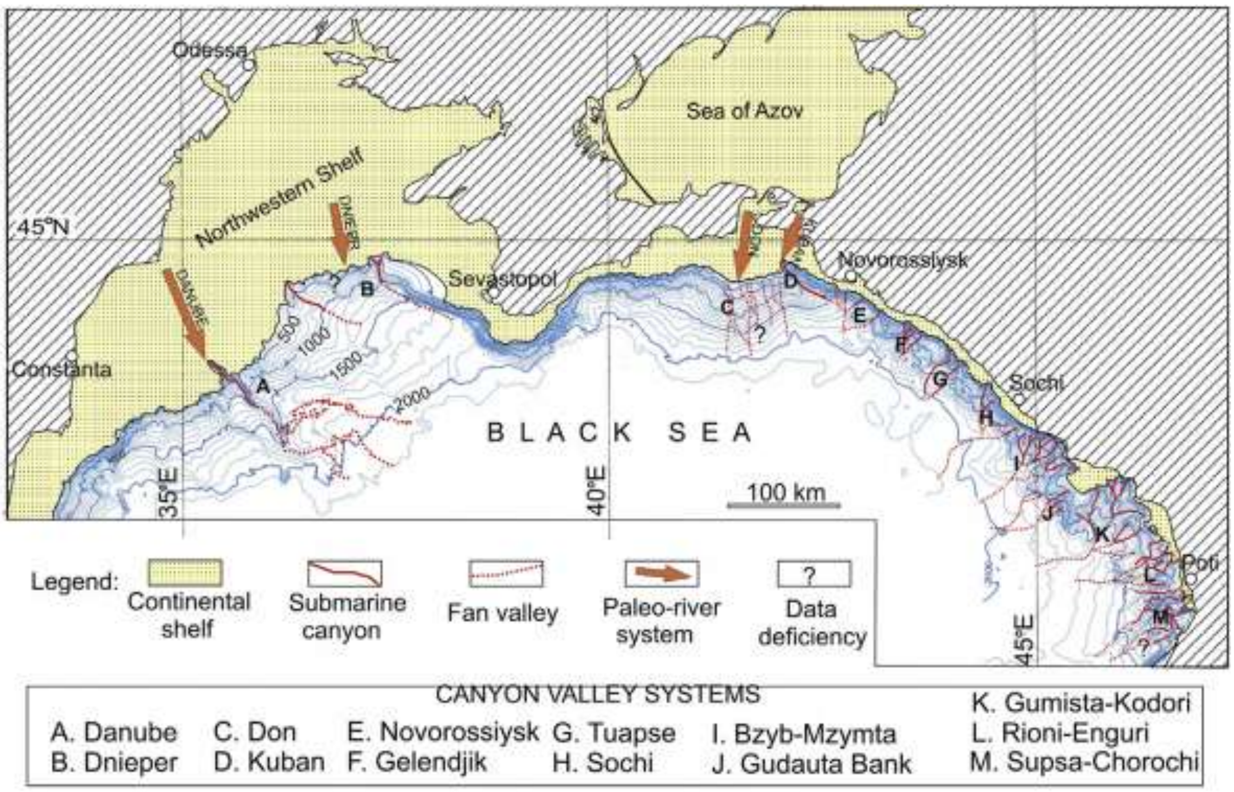



*Figure 6-124 – Canyon systems and locations in the north-western and -eastern areas of the Black Sea. The project is interested by the presence of the Danube Canyon in proximity of Constanta and the Rioni-Enguri Canyon system in proximity of Anaklia.*

### 6.5.1.2.1 Nothwestern canyons

Within the northwestern area, the Danube Canyon represents the largest submarine valley of the Black Sea (Dimitrov and Solakov, 2002). This system is located 100 km southeast of the Danube Delta and represents the major canyon system within the deep-sea area.

The name Danube Canyon refers to the first 26 km of the canyon which intercept the -100 m bathymetry line; its features are described in detail in Figure 6-125c. Below the depth of - 100 m, the Danube Channel stretches for 100 km length reaching the depth of -1,600 m; the channel is 2.4 km wide with walls 270 m deep (Lericolais et al., 2013). Finally, the Danube Distributary Complex or System is a large and intricate network of channels (Figure 6-125b) which continues the Danube deep-sea channel downstream, covering an area of 6,000 km$^2$. (Lericolais et al., 2013).

Close to the Danube Canyon and Danube Channel, to the north-east and south-west of it, there are several small submarine canyons and fan valleys (the Danuban gullies). The downslope end of some of the submarine valleys, which are in the vicinity of the Danube Canyon, appears to be very close to the Danube's main channel. All these small submarine canyons and fan valleys are located within the southwestern section of the deep-sea area.

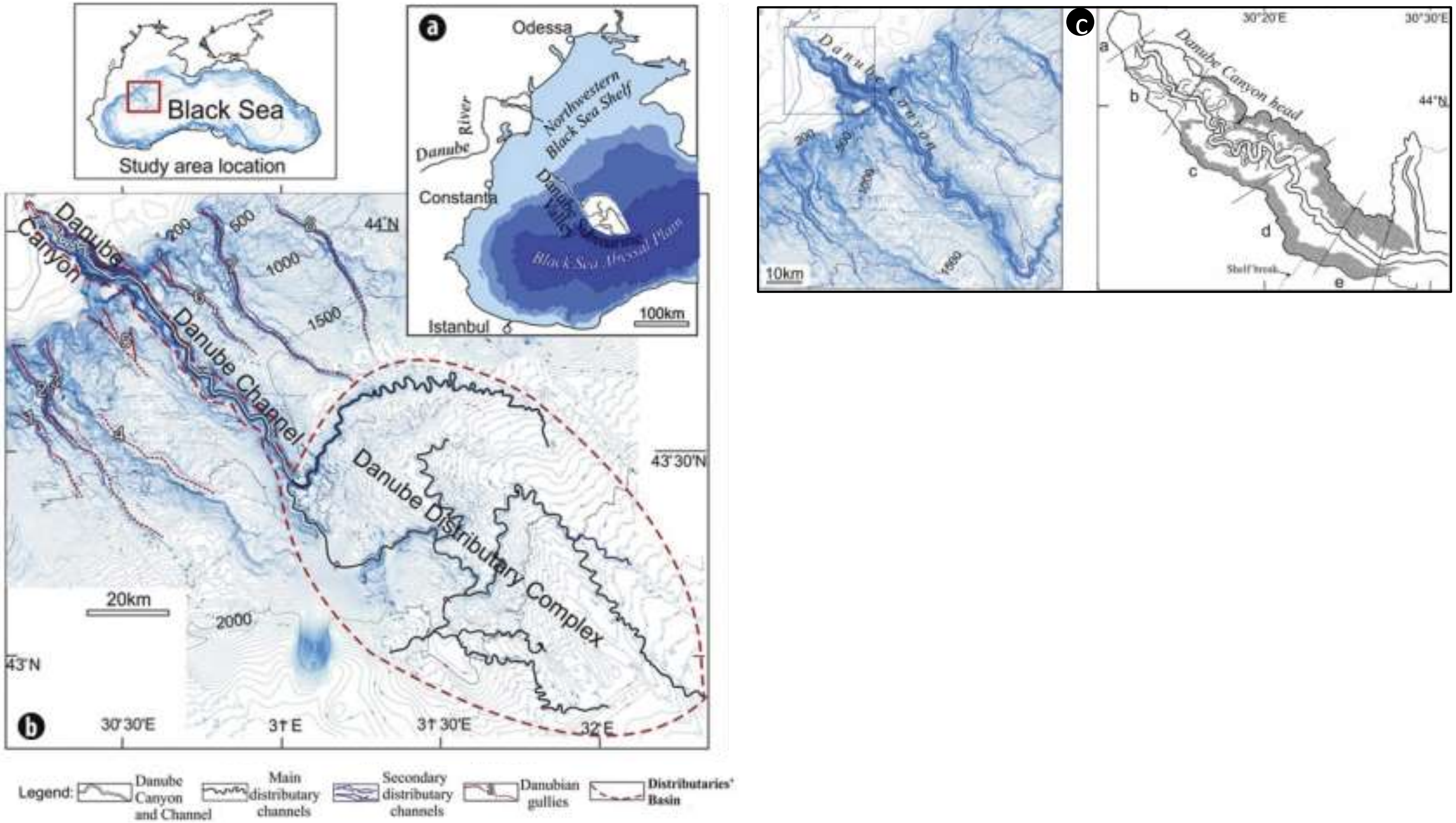



*Figure 6-125 – The Danube Canyon and its fan valley (2a) and the Danuban gullies (2b). The polygon in red represents the deep-sea area, while the red one is the AoI.*

Further south, another canyon system is present in front of Kape Kaliakra (Figure 6-126). This canyon system is located 20 km south of the deep-sea area.

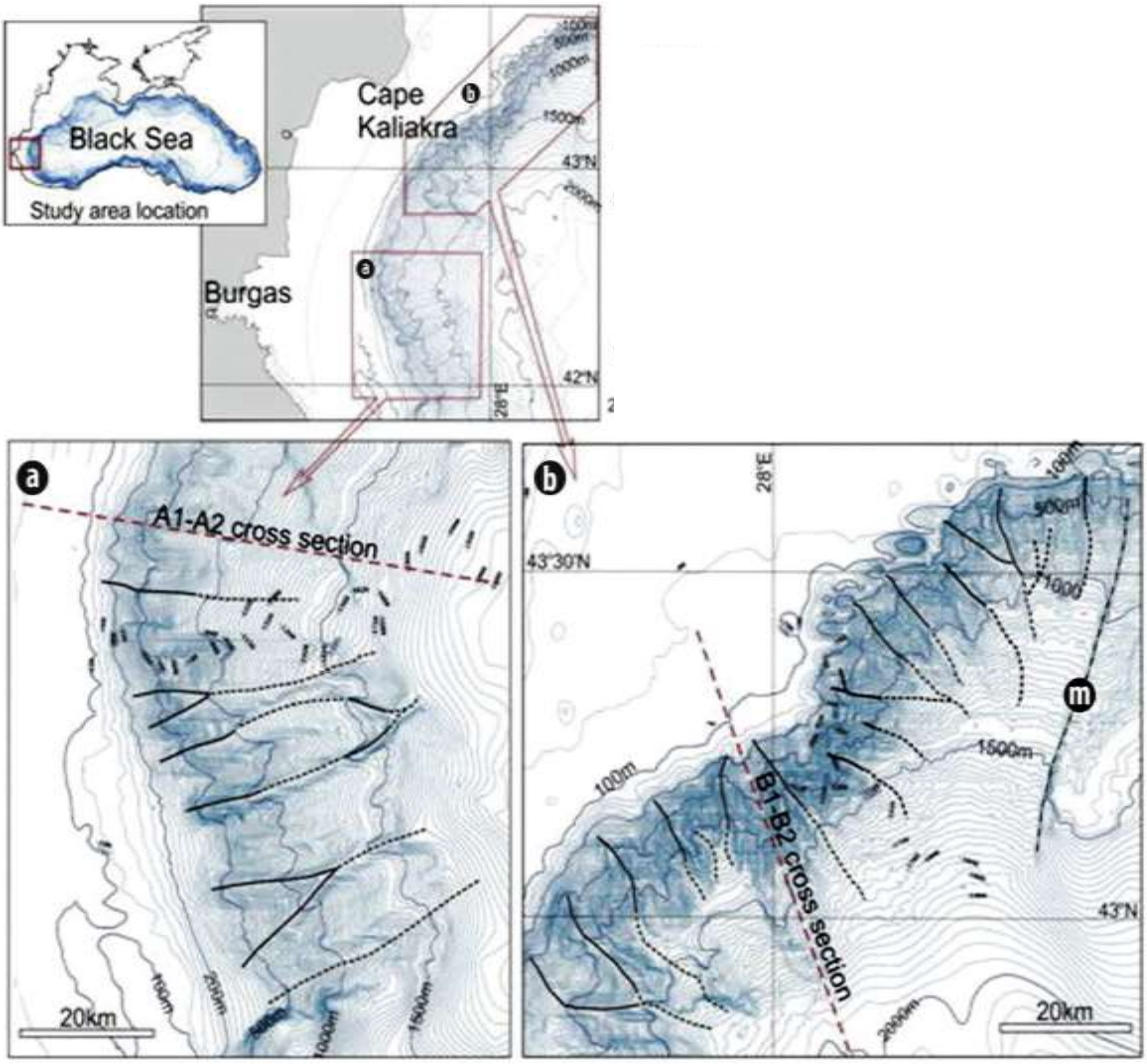



*Figure 6-126 – Canyon systems of Burgas (a) and Kape Kaliakra (b). (m) Manganary seabed morphology feature (source: EMODnet Bathymetry chart).*

### 6.5.1.2.2 Eastern canyons

Nine canyon systems have been identified in the Caucasian side (Batumi-Sochi) of the Black Sea, and each system presents more than one sub-marine canyon head. Here, the morphology of the submarine channels usually changes from upper to downstream. In the upper reach the canyons have deeper channels which decrease in the middle reach and change into a fan valley morphology with larger and shallower channels in the lower reach (Jipa & Panin, 2020).

Offshore the Georgian AoI (in proximity of Anaklia) extends the Kobi-Rioni Submarine Valley System, which is made of three branches in the upper reach (from north to the south): Anaklia - Khobi (in proximity of Anaklia), Rioni (in proximity of Poti) and Grigoleti (Figure 6-127). Their upper reach channels are steep-walled, canyon-type. Beyond the continental slope base (ca - 1,000 to - 1,200 m depth), the canyon's channels become shallower, creating upper fan valleys. At about - 1,600 m water depth, the three branches converge into a single channel (i.e., Khobi-Rioni lower fan valley), which stretches for 30 km length to the abyssal plain. Such canyon reaches the Georgian AoI just offshore Anaklia (at the project land approach).

Besides from the Kobi-Rioni canyon system, within the deep-sea area, the fan valley of Gumista- Kodori canyon system (26 Km north of Ankalia) and the Batumi canyon fan valley are also present (Figure 6-127).

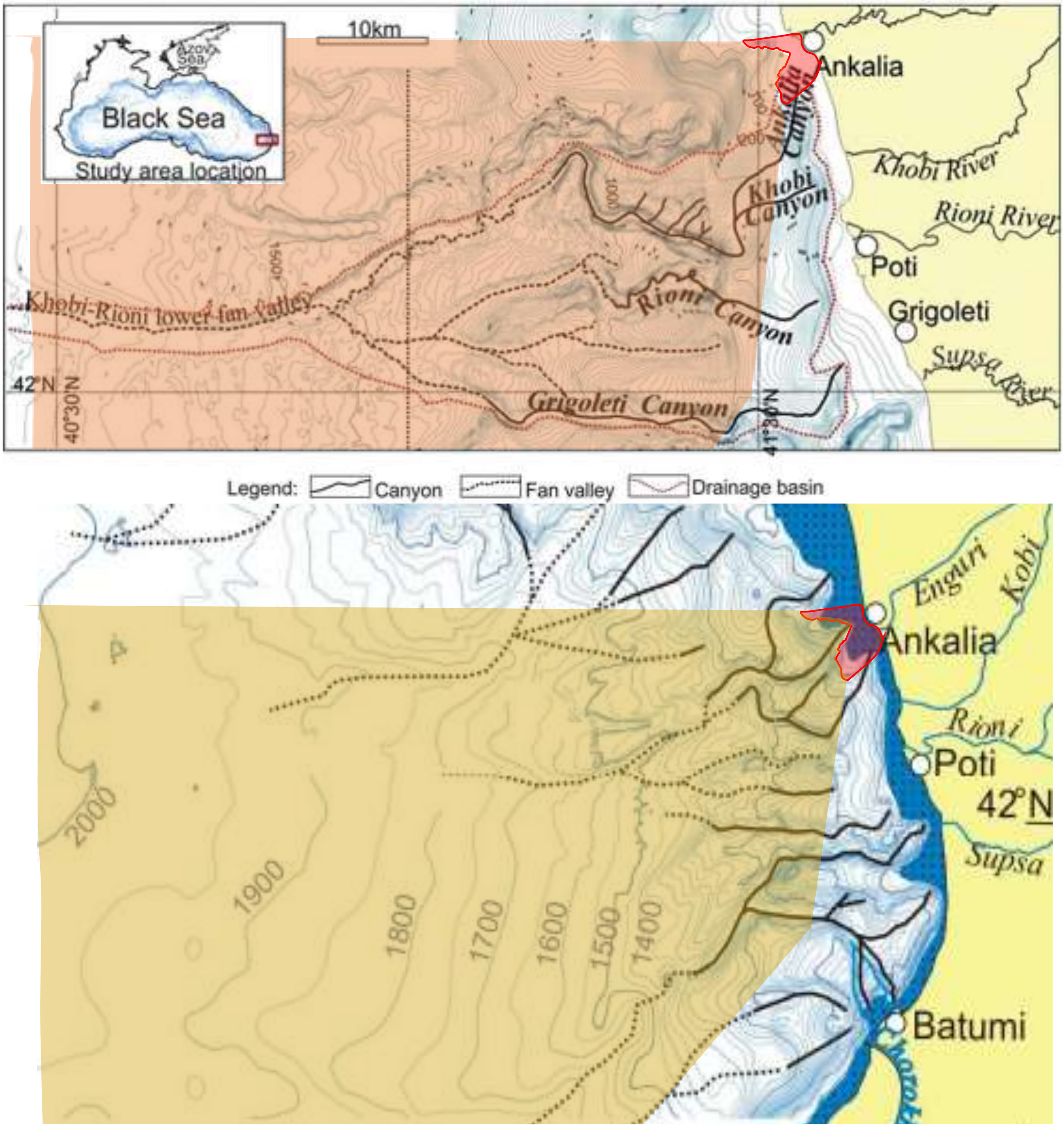



*Figure 6-127 – Complex canyon system of the eastern Black Sea with particular focus on the Anaklia Canyon, in proximity of Anaklia. The orange shape represents the deep-sea area, while the red one is the Georgian AoI (see document C2011431).*

### 6.5.1.3 Canyon Hazards

Canyons in different areas of the Black Sea vary in terms of morphology, system, energy, and transport of sediment from the shoreline, as reported in Table 6-53.

*Table 6-53 – Main differences in terms of morphology, energy and sedimentation between Canyons in the Northwestern and Northestern Black Sea.*

| Criterion | Canyons in the N and NW Black Sea | Canyons in the E and NE Black Sea |
|---|---|---|
| **Morphology of the associated shelf** | Wide shelf | Narrow shelf |
| **Energy relief** | Low energy relief | High energy relief |
| **Canyon system patterns** | Small number of canyon system in a large area | High density: large number of close canyon systems |
| **Canyon head to the river mouth** | Disconnected | Connected |
| **Transported sediment** | Fine-grained sediment | Coarse-grained sediment (up to gravel grade) |
| **Present-day canyon activity** | Inactive | Active |

Based on specific features, such as low sedimentation rates and patterns, the fact that the Danuban canyon head is located far (100 km) from the river mouth and it is disconnected from the latter (i.e., it is an inactive canyon), we believe that canyons located on the nortwestern Black Sea represent a low risk for the Project.

On the contrary, canyons present along the Georgian coastline may represent a high risk for this project.

In fact, the canyon's heads along the Georgian coastline incise the narrow shelf at shallow depths and in proximity of the coast, such as the Poti canyon head located at -10 m and at about 600 meters from the shoreline (Papashvili et al., 2010). These canyons, by being so close to the shoreline (especially in the area between Sochi and Batumi, which includes the AoI) can produce a geological hazard. The Georgian canyons are able to capture a significant amount of beach sediments through a processes of canyon sediment seizure when river deltas prograde toward the canyon heads (Zenkovich, 1962). It is known that although the Caucasian rivers deliver about 40% of the total Black Sea river’s sediment discharge, only between 31% and 39% of this sedimentary material is deposited in the beach zone. The rest of the sediment (about 60%) is accumulated in deeper waters and, in the Caucasian area of Georgia, about 30% of this sediment is transported through submarine canyons (Jaoshvili, 2002). It has been estimated that about two million cubic meters of the Caucasus littoral sediment is carried into deep water by submarine canyons (Jaoshvili, 2002).

Specific information on the sedimentation rates and patterns for the Anaklia canyon were not present in literature. However, based on the fact that the canyon’s head is very close to the shoreline, and by knowing that on the eastern Black Sea the canyons are active and connected to the river’s mouths, we suggest to further evaluate the risk associate with canyon sediment seizure in this AoI.

### 6.5.1.4 *Mud volcanoes*

Submarine mud volcanoes are complex seafloor structures that can vary in size, shape, and activity. About 65 mud volcanoes are currently described in the Black Sea; however, they seem to be mainly present in two areas of the Black Sea: in the central western basin (Schmale et al., 2010) and in the Sorokin Trough (Schmale et al., 2010). Many of the Black Sea mud volcanoes are active as indicated by high concentrations of gas hydrates in the sediments and elevated heat flow values. The flow systems are complex three-phase eruptions whereby mud is released together with fluids and gas bubbles.

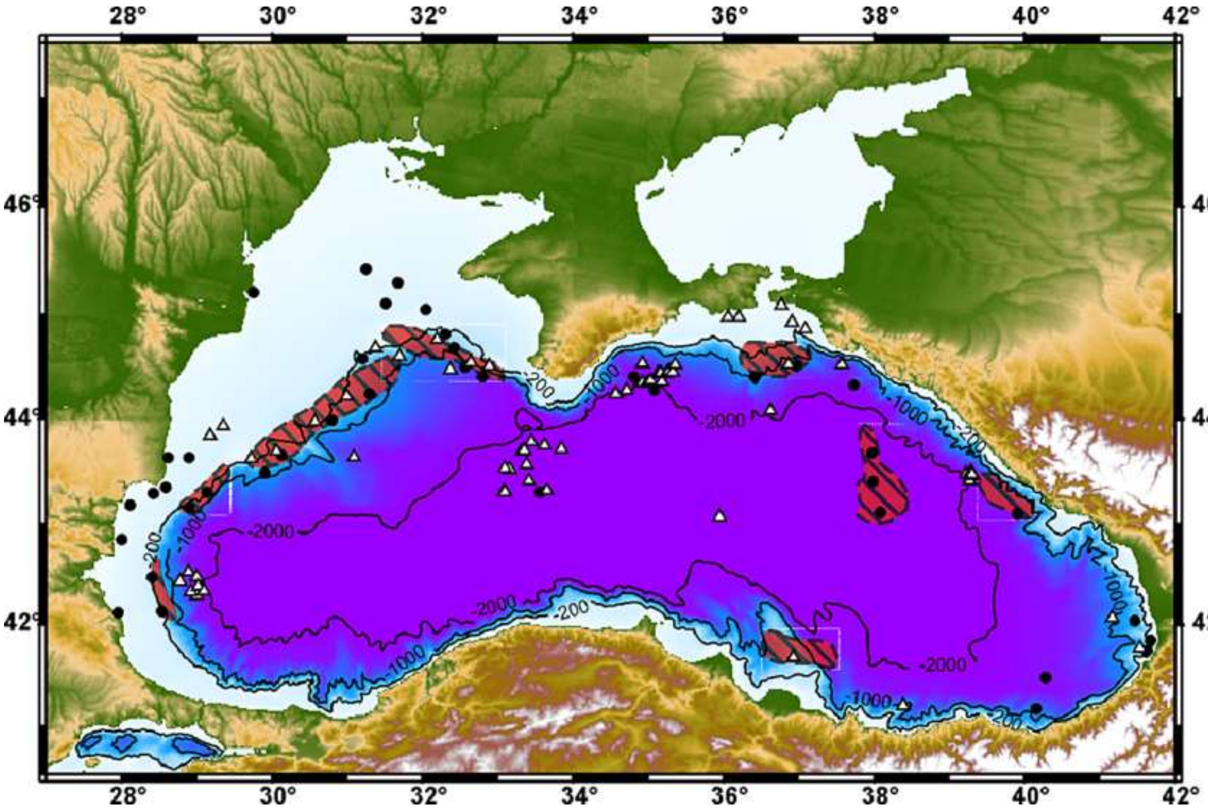



*Figure 6-128 – Location of mud volcanoes (yellow triangles) and areas of intense fluid discharge (black dots) in the Black Sea. The areas highlighted in red represent regions of gas seepage and seabed pockmarks. The map is taken by the study of Schmale et al. (2010) based on a data compilation from Kruglyakova et al. (2004) and Vassilev and Dimitrov (2002).*

Data have revealed that several gases are exhausted through bubble release, the main one being methane followed by other hydrocarbons (ethane, ethylene, propane, and carbon dioxide) which seem to have microbial origins. Methane released at the water-sediment interface can either diffuse into the surrounding water or be used by anoxic microorganisms to produce sulfides and enrich the area with hydrogen sulfides (Greinert et al., 2006).

The presence of such structures should be carefully assessed at both Georgian and Romanian land approaches.

### 6.5.1.5 *Gas seeps*

Along the shelf break and the upper slope of the Northwestern shelf, most gas seeps develop between 200 m and 800 m depth (Dinu et al., 2018). Their location corresponds to the upper limit of the gas hydrate stability zone (GHSZ), leading gas accumulation close to the seafloor (Popescu et al., 2006, 2007). Gas from the shelf break area is constitute mainly by methane (Michaelis et al., 2002), derived from organic-rich sediments with a possible contribution of thermogenic gas (Egorov et al., 2003).

In the Romanian deep-sea area, the free gas flux is controlled by the specific lithostratigraphy of the channel-levee system of the Danube River (Lüdmann et al., 2007). In fact, the Danube deep-sea fan is one of the largest sediment depositional systems worldwide and represents one of the main places where gas hydrates occur in the Black Sea (Figure 6-129). The distributional range of gas hydrates is between 650 m and 1450 m depth (Dinu et al., 2018), indeed the anoxic conditions, the presence of organic matter and the high sediment accumulation rate led to hydrate accumulations in the sediments (Zander et al., 2017) not allowing the migration of gas to the seabed and the consequent leakage (Popescu et al., 2006). However, an increase of water temperature could induce hydrate dissociation and lead methane release in the water column (Ruppel & Kessler, 2017).

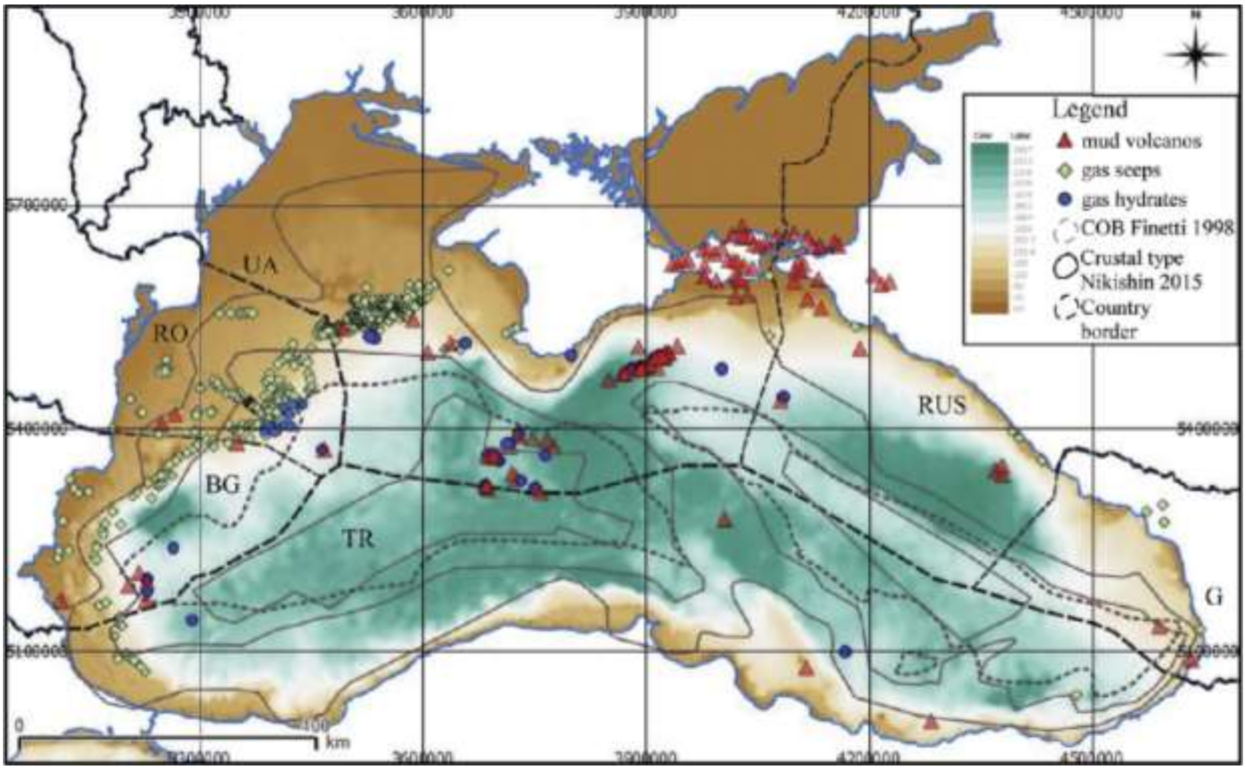



*Figure 6-129 – Distribution of gas seeps, gas hydrates and mud volcanoes in the Black Sea (Dinu et al., 2018).*

Gas seeps are not expected to pose a threat to the project. However, their distribution should be carefully assessed at the Romanian land approach.

### *6.5.2 Biodiversity Overview*

Due to its peculiar morphological and physico-chemical features, the biodiversity of the Black Sea is much lower than that of the Mediterranean Sea (Zaitsev et al., 2002). As in all seas, even the Black Sea species diversity and richness follow spatial gradients defined by the overall interaction of the environmental conditions and the biological dynamics.

The Black Sea pelagic ecosystem, defined as the water column of the open ocean, is a complex *bio-interactome* formed by multi-trophic biota. Organisms of different communities are highly connected via food web, with both inter- and intra-community interactions (Zhang, et al., 2020). Nevertheless, the presence of a permanent pycnocline and unique hydrochemical conditions over 150 - 200 m of depth, in particular anoxia and high levels of hydrogen sulphide ($H_2S_2$) (Konovalov et al., 2005; Zaitev & Mamaev, 1997), contribute to a strong diversification in the composition of trophic communities. Due to these environmental conditions, it's possible to divide the water column into two zones: a "living" one, situated on the surface and going down up to the pycnocline depth, and an "azoic" (i.e., "dead") one, located at a considerable depth. At a great depth, the accumulation of a significant quantity of $H_2S_2$ produces a completely anaerobic environment, inhabited exclusively by anaerobic bacteria (such as *Microspira acestuarii* and *Desulfovibrio desulfuricans*) that turn sulphates into $H_2S_2$ (Mustata et al., 2002).

The anoxic and anaerobic conditions in the deeper zones of the Black Sea appear to be inhospitable to most marine biota (Callieri et al., 2019). Consequently, while the neritic zone and the shallow waters (continental shelf waters) host a great species abundance and diversity (IUCN, 2012; Almpanidou et al., 2021), towards the oceanic zone it's possible to observe a sharp decrease in species richness (Figure 6-130).

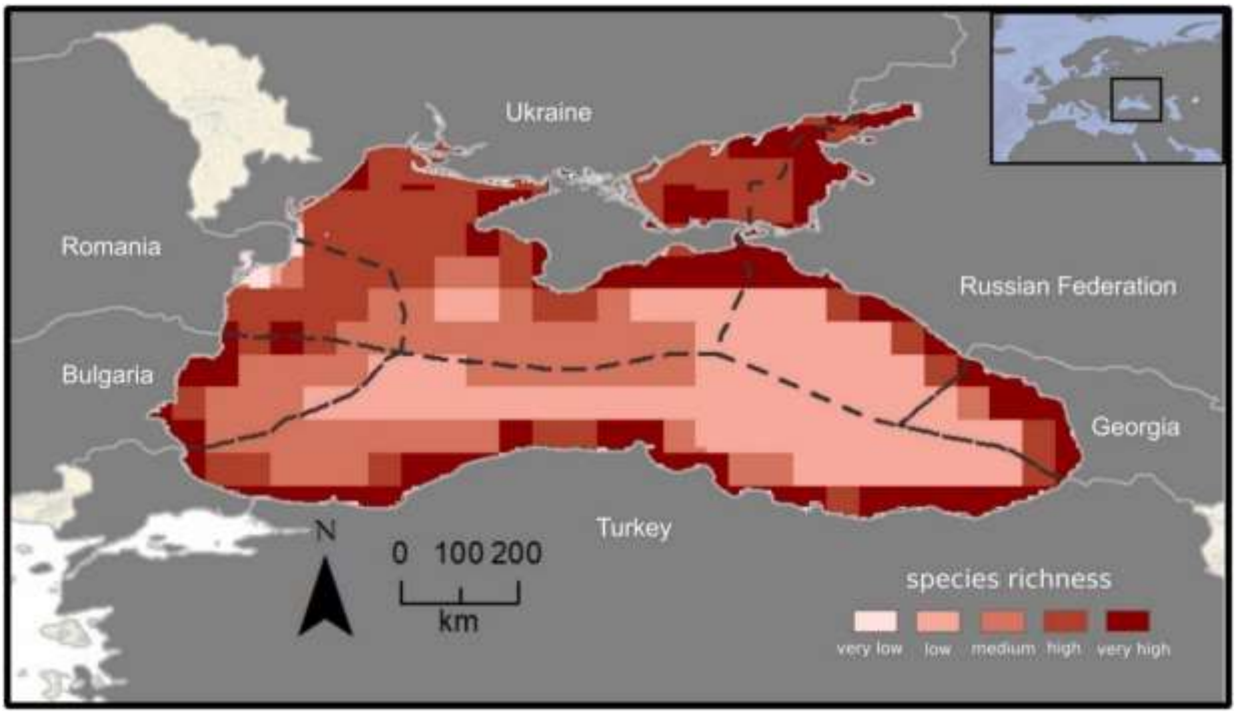



*Figure 6-130. Species richness in the Black Sea based on the spatial distributions of species from AquaMaps (Kaschner et al., 2019). Exclusive Economic Zones are delineated by black dashed lines.*

Pelagic biodiversity is mainly composed of phytoplankton, zooplankton and protozoa, which form the lower trophic communities, and also of fish and marine mammals, which form the higher trophic communities. Different fish species (e.g., *Engraulis encrasiculus*) use the open waters of the central part of Black Sea as pathway for their overwintering migrations (Guraslan et al., 2017). The offshore area is used as annual migratory path also by the three endemic and protected marine mammals of the Black Sea (*Tursiops truncatus ponticus*, *Delphinus delphis ponticus* and *Phocoena phocoena relicta*), the only cetaceans widespread in the basin (IUCN, 2012). Instead, for all the reasons mentioned above, the benthic component is completely absent in the Black Sea oceanic zone (Mustata et al., 2002).

The pelagic ecosystem of the Black Sea is fragile and severely impacted by anthropogenic pressures, such as pollution from agriculture (i.e., pesticides washed into the sea), urbanization and industry (Ludwig et al., 2009) and overexploitation of fish stocks (Figure 6-131).

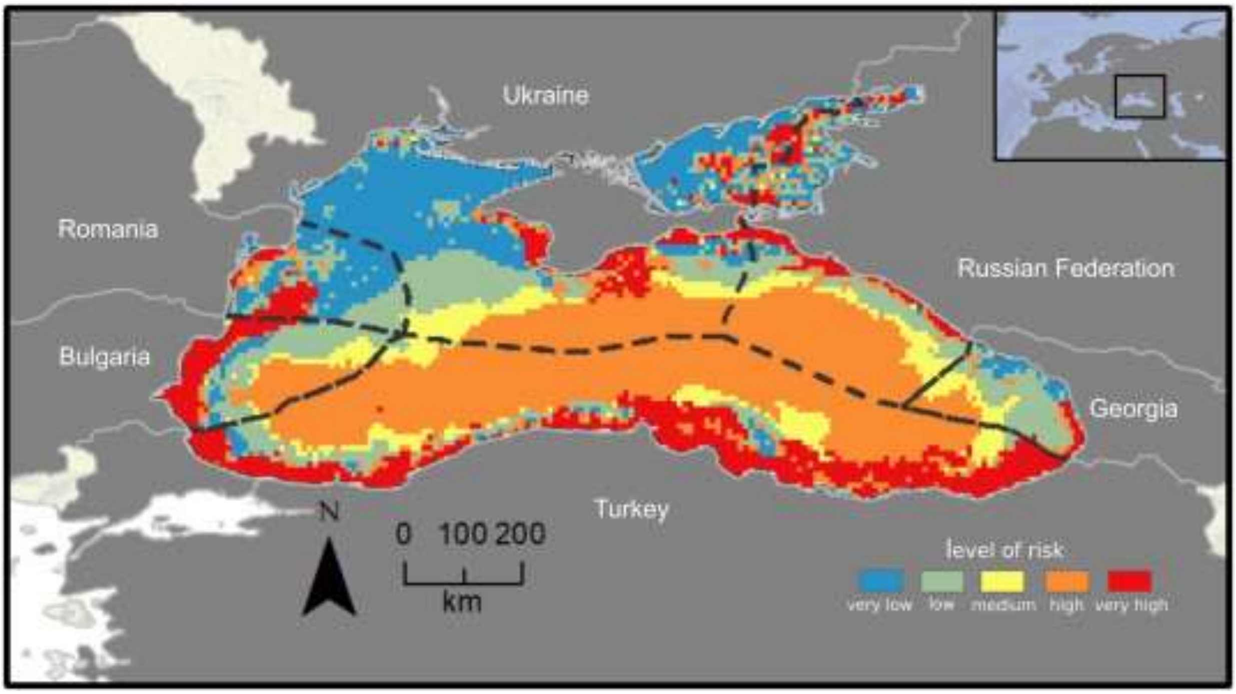



*Figure 6-131 – Cumulative risk derived from anthropogenic pressure related to fisheries and pollution across the Black Sea (source: Almpanidou et al., 2021). Exclusive Economic Zones are delineated by black dashed lines.*

### 6.5.3 *Offshore Deep-sea Infrastructures and artifacts*

As mentioned in 3.1.3, the deep-sea area was configured to avoid the Russian and Ukrainian Exclusive Economic Zones (EEZs) and the Turkish and Bulgarian territorial waters (i.e., within 12 nautical miles from the coast), while encompassing parts of Türkiye's and Bulgaria's Exclusive Economic Zones.

Both the Deep-sea AoI and the LCA (Least Cost Area; namely, the area of least environmental cost within which the cable can be allocated) traverse a series of infrastructures and artifacts, such as wrecks.

In particular, as shown in Figure 6-132, both the Deep-sea AoI and LCA partly intersect:

- 8 Oil & gas pipelines for the AoI, 4 for the LCA, all falling within the Turkish EEZ;
- 3 Submarine cables for the AoI, 2 for the LCA, falling within the Turkish EEZ and the Georgian EEZ and territorial waters;
- 4 Oil & Gas reservoirs for the AoI, all falling within the Romanian EEZ.

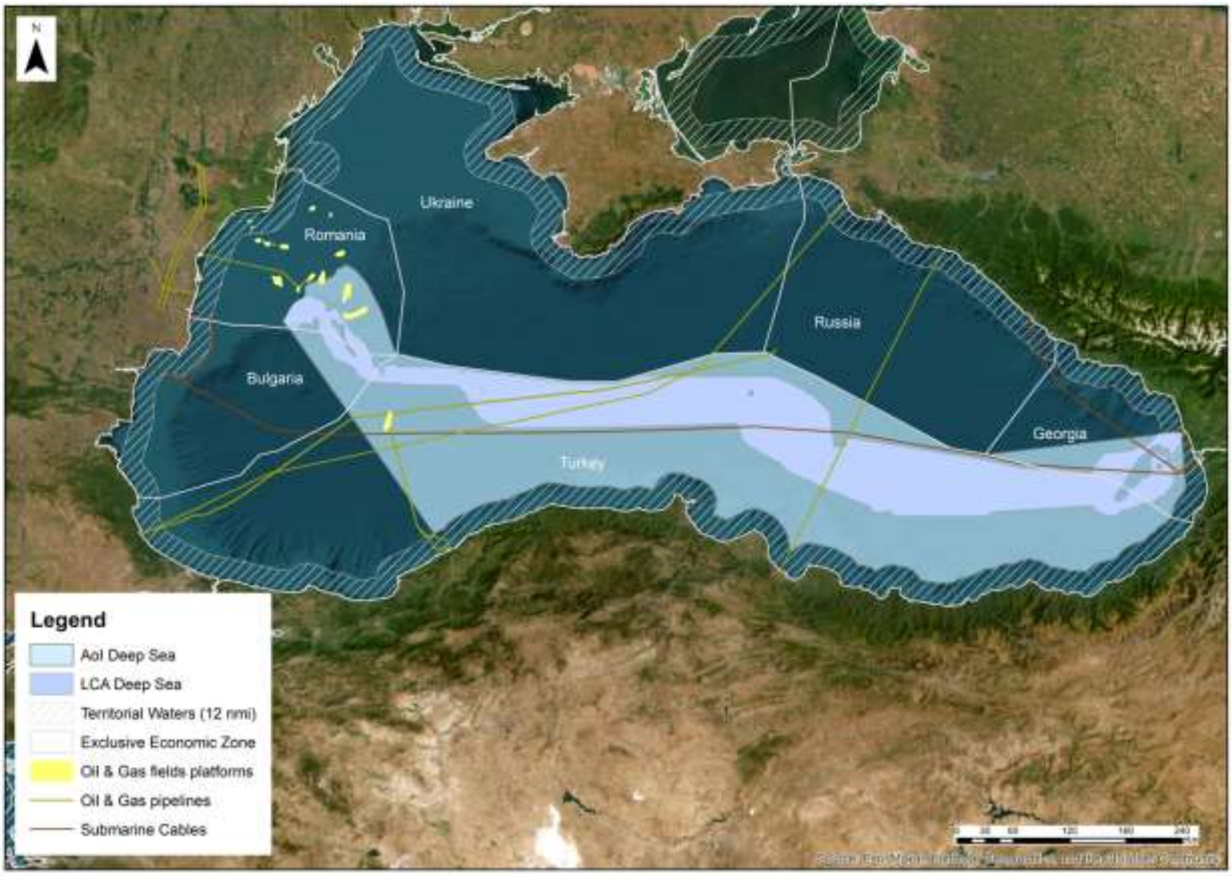



*Figure 6-132 – Infrastructures in the deep-sea area crossed by the Deep-sea AoI and LCA.*

Wrecks are not directly crossed by the LCA; in fact, where a wreck is present, the LCA narrowly avoids it. However, 4 known wrecks are intersected by the Deep-sea AoI, as shown in Figure 6-133.

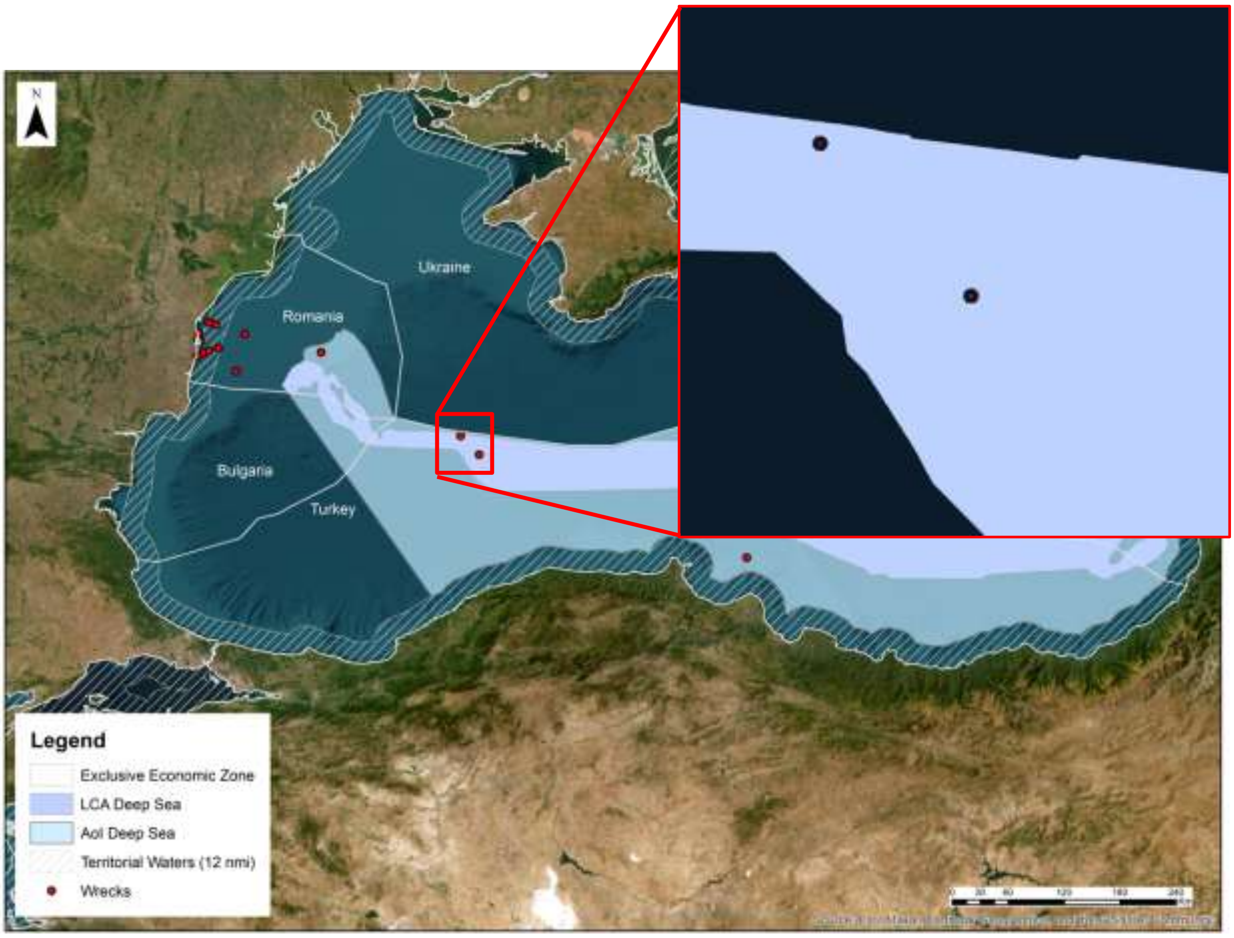



*Figure 6-133 – Wrecks in the Deep-sea area crossed by the AoI. On the right, a detail depicting the absence of interaction between LCA and wrecks.*

### *6.5.4 Environmental Gaps' Information and Recommendations*

The table below reports the main gaps identified in the Romanian offshore baseline and recommendations for filling-in the identified gaps.

*Table 6-54 – Primary gaps and recommendations for the offshore Deep-sea baseline.*

| Component | Gaps | Recommendations |
|---|---|---|
| **Physical components** | | |
| Physical overview | Lack of primary data on the physical feature of the provisional cable routing withing the LCA. | ▪ Use data gathered within the geophysical, sediment benthic/chemical characterization and geotechnical marine surveys conducted as part of the Project's design. |
| **Biological components** | | |
| Biodiversity overview | Missing precise data on cetacean' migration routes. | ▪ Collect information concerning the migration patterns of cetaceans in the offshore part of the Black Sea and the areas most frequently used for their movements. |
| **Offshore Deep-sea Infrastructures and artifacts** | | |
| Infrastructures | Possible lack of updated information regarding the presence of infrastructures and artifacts. | ▪ Conduct an in-depth desktop study to assess the presence of additional infrastructure and artifacts, incorporating supplementary data sources alongside nautical charts. |

# 7 PRELIMINARY IMPACT ASSESSMENT AND RISKS

## 7.1 Georgia

A preliminary impact assessment for social and environmental components is conducted below separating the onshore AoI from the offshore AoI.

## 7.2 Onshore area

An interrelation matrix crossing the main sources of potential impact and the main environmental and social components was produced to preliminarily identify the interactions of the project on the environment and the society.

The potential impacts of the Project have been classified into two levels, based on the project description and the baseline conditions:

- **Non-significant** (green in the matrix);
- **Potentially significant** (orange in the matrix).

The symbol "+" indicates the presence of a potentially positive impact.

For the impacts classified as potentially significant, a preliminary impact assessment was conducted (chapter 7.2.1) according to the methodology indicated in 3.5.

Non-significant impacts are briefly discussed here below.

*Table 7-1 – Interrelation matrix between impact factors generated by the project and the onshore environmental and social components (green: non-significant impacts; orange: potentially significant impacts; +: positive impact).*

| Project Phase | ONSHORE Impact Factors / ONSHORE Env. Comp.. | Air and climate | Surface and ground water | Terrestrial acoustics | Geology, geomorphology and soil | Terrestrial Habitats and Biodiversity | Legally Protected Areas and Important Areas for Biodiversity | Landscape | Infrastructures, Transport and Mobility | Population and public health | Economy and employment | Agriculture | Ecosystem services | Terrestrial Archaeology and Cultural Heritage | Land Use |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Construction phase | Consumption of water | | | | | | | | | | | | | | |
| | Emission of anthropogenic noise | | | | | | | | | | | | | | |

| Project Phase | ONSHORE Impact Factors / ONSHORE Env. Comp.. | Air and climate | Surface and ground water | Terrestrial acoustics | Geology, geomorphology and soil | Terrestrial Habitats and Biodiversity | Legally Protected Areas and Important Areas for Biodiversity | Landscape | Infrastructures, Transport and Mobility | Population and public health | Economy and employment | Agriculture | Ecosystem services | Terrestrial Archaeology and Cultural Heritage | Land Use |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Emission of air pollutants and chemicals | | | | | | | | | | | | | | |
| | Emission of dust | | | | | | | | | | | | | | |
| | Emissions of greenhouse gases | | | | | | | | | | | | | | |
| | Emission of light | | | | | | | | | | | | | | |
| | Interaction with the existing structures and new traffic flows | | | | | | | | | | | | | | |
| | Occupation of land | | | | | | | | | | | | | | |
| | Production of waste | | | | | | | | | | | | | | |
| | Removal of soil and subsoil | | | | | | | | | | | | | | |
| | Removal of vegetation | | | | | | | | | | | | | | |

| Project Phase | ONSHORE Impact Factors / ONSHORE Env. Comp.. | Air and climate | Surface and ground water | Terrestrial acoustics | Geology, geomorphology and soil | Terrestrial Habitats and Biodiversity | Legally Protected Areas and Important Areas for Biodiversity | Landscape | Infrastructures, Transport and Mobility | Population and public health | Economy and employment | Agriculture | Ecosystem services | Terrestrial Archaeology and Cultural Heritage | Land Use |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand for goods and services | | | | | | | | | | + | | | | |
| | Demand for labor | | | | | | | | | | + | | | | |
| | Occupational Health and Safety Risks | | | | | | | | | | | | | | |
| Operation phase | Presence of the new infrastructures | | | | | | | | | | | | | | |
| Operation phase | Emission of electromagnetic fields | | | | | | | | | | | | | | |
| Operation phase | Interaction of the marine electrode with existing structures (i.e., stray current emission) | | | | | | | | | | | | | | |
| Operation phase | Demand for labor | | | | | | | | | | + | | | | |
| Operation phase | Transfer of energy and broadband data | | | | | | | | | | + | | | | |

***Air and climate***

Possible impacts on the air quality and climate during the Project's **construction** phase could occur during the cable's landing, construction of the converter station, the HVDC cable laying and HVAC overhead line construction. These working activities may lead to an increase of the local traffic and heavy vehicles, with consequent boost of air pollutant, dust and greenhouse gas emissions in the area. Air pollution generated from vehicle emissions includes primary (e.g., carbon dioxide, benzene, PAHs, nitrogen oxides etc.) and secondary (e.g., ozone, sulphur acid, sulphates, nitric acid etc.) pollutants.

However, no significant impacts are expected on air and climate during this Project's phase as a light increase of the vehicle's number and local traffic should not affect the local air quality. Moreover, the quantity of pollutants emitted by a vehicle depends on specific factors, such as vehicle weight, speed and age; fuel-related factors such as fuel type (petroleum or diesel), fuel formulation (oxygen, sulphur, benzene and lead replacement agents) and environmental factors such as altitude, humidity and temperature. A temporary reduction in air quality could be minimised by the use of properly maintained engines, even more, by the use of new engines with advanced low emission diesel technology.

During the **operational** phase, no significant impact is expected.

***Surface and ground water***

During the Project's **construction** phase, the demand for freshwater and the construction of work sites may have an impact on the surface and groundwater quality. For example, consumption of surface water may occur for the cooling of machinery's systems during working activities or because it is used at a project's camp site. Also, drinking water for personnel at a work site may be supplied from groundwater wells if present in the area. Domestic wastewater will be also generated by the workmen at the camp site. Moreover, potentially contaminated surface runoff water from the campsite could introduce pollutants in the surrounding environment, including surface and ground water. In particular, contamination of surface water is especially relevant for the Additional OHL AoI due to the presence of a high number of rivers (chapter 6.1.1.4.2) and wetlands potentially used by birds as foraging ground during their seasonal migrations and the presence of the Kobi River KBA (chapter 6.1.2.2.2).

However, all these activities are expected to have a non-significative (negligible to low) impact on the surface and ground water when a number of mitigation measures are in place. For example, it is recommended to collect the wastewater from work sites by sewage infrastructure and treat contaminated water in wastewater treatment plants. It is also advisable to design a drainage system within the construction camp and construction facilities to collect the runoff water in order to minimize possible impacts on the local freshwater bodies.

During the **operation** phase, no significant impact is expected.

***Terrestrial acoustics***

A potentially significant increase in terrestrial acoustic climate is expected during the **construction** of the HVDC converter station, the trench for the cable's landing, the HVDC cable laying and the HVAC overhead line construction. In fact, anthropogenic (human-generated) noise can be produced onshore due to site works and, particularly, by pneumatic drills and hammers, air compressors, bulldozers and trucks. However, given its potentially significance, this impact is discussed in more detail in chapter 7.2.1.1.1.

No significant impact is expected during the **operation** phase.

***Geology*, *geomorphology and soil***

During the **construction** phase, the impacts generated on geology, geomorphology and soil are expected to be both non-significant (negligible to low) and potentially significant (medium to high).

Non-significant impacts could arise from the removal of vegetation for the development of the HVDC converter station, the trench for the cable landing and the excavation for the onshore cable's installation. Specifically, the construction of the HVDC converter station will involve the vegetation clearing of an area of approximately 60,000 - 70,000 $m^2$, while the depth of the OHL transmission tower foundations may vary from 1.5 to 3.5 meters. Given the importance of natural vegetation for the soil stabilization and the organic matter and nutrient's cycles, this activity could potentially lead to a reduction of soil quality, in addition to terrestrial habitat fragmentation and/or loss in the specific case of the converter station. However, it can be expected that the removal of natural vegetation may not significantly affect this component when adopting the same mitigation measures reported for the Terrestrial Habitats and Biodiversity (chapter 7.2.1.1.3) in order to minimize impacts and, if possible, restore areas once the end of the works.

Potentially significant effects of soil removal may be expected in terms of alteration of soil quality which are discussed in more detail in chapter 7.2.1.1.3.

During the **operation** phase, no significant impact is expected.

***Terrestrial Habitats and Biodiversity***

Both non-significant and potentially significant impacts are expected to occur on this environmental component during the **construction phase**. Non-significant impacts, such as those related to consumption of water, emission of air pollutants, chemicals, dust and light, occupation of land and production of waste, are briefly assessed below.

Consumption of water and subsequent changes on water hydrology could affect fauna - especially freshwater species - by reducing the canopy cover from riparian vegetation, possibly interfering with spawning conditions (Pusey et al., 200). Moreover, water withdrawal could reduce the availability of such areas, especially during dry seasons, negatively affecting birds during their seasonal migrations which use these areas as foraging grounds. While the Main OHL AoI is characterized by a high density of cropland and bush vegetation (i.e., heavily anthropized), the Additional OHL AoI presents a high cover in forest and wetlands (i.e., less anthropized). Therefore, the component *Terrestrial Habitats and Biodiversity* is expected to be more impacted in the Additional OHL AoI compared to the Main OHL AoI. Nevertheless, such impacts can be mitigated and managed by limiting or ceasing the collection of water during dry seasons.

Air pollutants (such as $SO_2$ and $NO_x$), can penetrate leaf stomata undermining $CO_2$ diffusion (Gheorghe & Ion, 2011), affecting the growth rate of plant species. The emission of air pollutants could also affect fauna species, either by direct exposure or indirect contact through the intake of contaminated food or water (Newman et al., 1992), leading to disorders such as damages to their reproductive system (Newman et al., 1992). Air pollution can be however managed and mitigated through the use of well-maintained, low-emission engines and the use of vehicles equipped with low Sulphur fuels.

Emission of dust and particulate matter and its consequent fall to the ground has been proven to negatively impact flora both directly, by covering leaf surface, and indirectly, through impacts on soil composition and structure (Farmer, 1993). Dust can clog stomata on the leaf surface, affecting photosynthesis, respiration and transpiration processes. Effects on fauna species could also occur through inhalation or ingestion of soil particles. Again, given the substantial difference between the vegetation present within the Main OHL AoI (chapter 6.1.2.1.3.1) and the Additional OHL AoI (chapter 6.1.2.1.3.2), this impact is expected to be higher for the Additional AoI. Such impacts can however be reduced by taking appropriate mitigation measures, such as moisturizing and covering stockpiles and unpaved surfaces to prevent dust dispersion and reducing or cease dust-generating work under strong winds.

Nocturnal light emission is known to affect many wildlife species by interacting with reproductive, migratory, foraging, and parental activities (Montevecchi, 2006), with effects that tend to be greater for species with crepuscular and nocturnal habits (Wang et al., 2021). Considering what reported above, it is expected to encounter a higher density of nocturnal wildlife during working constructions in the Additional OHL AoI due to the presence of extended broadleaf and needle-leaf forests. Such impacts can however be minimised through the use of screens and shields to reduce light spills and trough suspensions or reductions of activities during ecologically sensitive periods (such as wintering periods).

Land occupation can cause adverse effects on biodiversity mainly through the removal of flora species, leading to habitat loss and fragmentation (Elmqvist et al., 2015). Such impacts are generally greater against native species, modifying habitat configuration and individuals' connectivity (Bierwagen, 2007), and creating ecological niches conducive to the introduction of alien species (McKinney, 2006, 2008). Again, this impact is expected to be more significant in the Additional OHL AoI because of possible major clearance of natural vegetation, however, the land surface occupied during the Project construction activities (i.e., area of excavation for the transmission tower foundations and temporary working site) is not expected to create an adverse effect on biodiversity. Moreover, these impacts can be managed and mitigated by organizing the working areas so as to occupy soil only where strictly necessary. Furthermore, reinstatement of construction areas can be put in place to enhance natural habitat restoration.

Production of waste materials such as chemicals and liquids can lead to soil and water contamination with possible indirect effects on fauna and flora species. Chemicals like heavy metals can, for instance, cause growth reduction in plant species as a result of changes in physiological and biochemical processes (Chibuike & Obiora, 2014), and toxic effects on fauna through the accumulation of these contaminants in organs and tissues (De Vries et al., 2007). Nonetheless, potential impacts can be managed and mitigated through the implementation of an appropriate Waste Management Plan. Temporary waste storage areas can be also designed to avoid potential contamination of the surrounding environment.

Construction activities may also lead to potentially significant impacts due to the emission of anthropogenic noise, the removal of soil and subsoil and the removal of natural vegetation. These impacts are discussed in more detail in chapter 7.2.1.

In general, non-significant impacts on Terrestrial Habitats and Biodiversity may occur during the **operation** phase due to the presence of the new Project infrastructure when implementing a number of mitigation measures. However, given the importance of the Additional OHL AoI for seasonal bird flows and that overhead lines may pose a risk (e.g., electrocutions) to bird life, potentially significant effects of the presence of new infrastructure for this component are discussed in more detail in chapter 7.2.1.2.1.

Non-significant impacts on Habitats and Biodiversity may also occur during the **operation** phase due to the emission of electric, magnetic and/or electromagnetic fields (EMF). Biological effects of EMF have been studied across taxa. Many species (including migratory birds, fish, mammals, bats, insects and mollusks) use in fact information about the Earth's natural fields for migration, mating, food-finding, homing, nesting, and numerous other activities (Levitt et al., 2022). EMF-sensing species can be therefore impacted by unnatural (i.e., anthropogenic) electromagnetic fields (Levitt et al., 2022). The use of shielding structures made of materials such as aluminum, the burial of cables and the use of cable sheathing should however be sufficient to mitigate impacts to non-significant levels.

Although the impacts discussed above are likely not-significant, during both the Project phases, it is highly recommended to pay particular attention to the potential Critical Habitats identified in the baseline (chapter 6.3.3.2). Critical Habitats may, in fact, be potentially present in the AoI according. According to WB ESS6, if Critical Habitats were to be identified by field observations, the “No Net Loss and Net Gain” criteria must be met in order to satisfy the WB ESF requirements.

***Legally Protected Areas and Important Areas for Biodiversity***

Both non-significant and potentially significant impacts are expected to occur on Legally Protected Areas and Important Areas for Biodiversity during the **construction phase**. Non-significant impacts, which could result from consumption of water, emission of air pollutants and chemicals, dust, light, occupation of land and production of waste can be assumed to be the same as those potentially insisting on the Habitats and Biodiversity component. For this reason, please refer to the previous paragraph for a description of the potential impacts and possible mitigation measures.

Impacts potentially generated by the removal of vegetation and soil are also considered not significant. It is in fact possible to assume that no work will be carried out within legally protected areas, therefore no potentially significant impact is expected.

However, construction activities may lead to potentially significant impacts due to the emission of anthropogenic noise. This impact is discussed in more detail in chapter 7.4.2.1.1.

Non-significant impacts on Legally Protected Areas and Important Areas for Biodiversity may occur during the **operation** phase due to the emission of electric, magnetic and/or electromagnetic fields (EMFs) and the presence of new infrastructures. For the emission of electromagnetic fields, please refer to what already described for Habitats and Biodiversity component. In regard to the presence of new infrastructures , no potentially significant impacts are expected since the Project’s related infrastructures will avoid protected areas and/or areas important for biodiversity.

***Landscape***

Both non-significant and potentially significant impacts are expected to occur on this component during the **construction** phase. Non-significant effects, expected from the occupation of land, the removal of soil and of subsoil and the emission of light are briefly assessed below.

In regard to the landscape, the impact is expected to be similar to those of normal construction activities: setting up of construction sites, the occupation of construction site spaces and the presence of vehicles and machinery. Some fixed construction sites are expected to be set at the points where the cable duct will be installed. The presence of these construction sites and machineries will therefore cause a change in the landscape context, but this impact will be temporary with effects similar to those of any construction site for civil works. Moreover, these impacts can be reduced by carefully selecting the construction location, in order to limit the visibility from human receptors (e.g., from houses or from public spaces) and by occupying soil just where strictly necessary for the construction requirements. In addition once all the construction sites are removed and the areas are restored to their previous condition, impact will be completely reduced.

The removal of soil due to construction activities may also cause a change in the morphology of the area and hence an alteration of the current landscape features. During construction, the removal of soil and subsoil will occur along the cable duct, at landing and converter station locations and during the HVDC cable laying and HVAC overhead line construction. In terms of mitigations, care should be placed in limiting excavations only where strictly necessary and by ensuring that all construction areas are restored to the previous conditions at the end of construction. However, the HVDC cable laying and HVAC overhead line construction activities may cause the removal of a significant amount of vegetation and hence generate a significant effect on landscape. This is especially related to the need for a vegetation-free area in order to excavate the transmission tower foundations and to proceed with the line construction. This potentially significant impact is discussed in more detail in chapter 7.2.1.1.4.

The emission of lights during construction might have some visual impacts at nighttime, but it will be limited only to the area where construction activities are occurring. In terms of mitigation of light emissions, lights are recommended to be used only when necessary and for the time required, directing them towards the construction areas, so to avoid glare and light spills.

A significant impact on landscape derived from the presence of new infrastructures may occur during the **operation** phase. This impact is discussed in more detail in chapter 7.2.1.2.1.

***Infrastructures, Transport and mobility***

The impact on infrastructures, transport and mobility is expected to be non-significant and mainly related to the **construction** activities. Non-significant effects are expected from the interactions with the existing infrastructures and new traffic flows, production of waste and consumption of water which are briefly assessed below.

With regards to interactions with existing infrastructures, the Project can cause interferences with roads and traffic during the construction phase. Based on the provisional corridor/s (chapter 3.1.1 and 5.2) of the Main OHL AoI underground and overhead lines, the Project may cross, or be located along, existing roads. On the contrary, this impact is expected to be less significant for the Additional OHL AoI because of the reduced number of roads and infrastructures present in the AoI. For the Main OHL AoI, this impact may cause temporary closures of roads, deviations or limitations to the use of the roads, with impacts on the normal use of the roads. In addition, the construction activities are expected to lead to an increase of traffic, particularly of trucks and heavy goods vehicles, overall affecting the normal traffic along the roads. However, all the above are expected to have a non-significative impact when a number of mitigation measures are in place. For example, if road closures are required, arrangements should be made with the municipality and the authorities concerned, and the interruption will be signaled in advance and in an appropriate manner. Also, the pedestrian access to private lands/houses should always be guaranteed, also using bevels and driveway walkways placed over the road excavation. The activity of cable laying under the roadbed should be carried out regulating the traffic through traffic lights and using all safety measures necessary. If the cable trench crosses important roads or railways, the use of the HDD technique will be considered; this technique allows to avoid any interferences with roads or railways, hence removing any potential impacts on these infrastructures. At the end of the construction activities, all roads impacted should be restored to allow regular traffic flows. Due to the adoption of measures to avoid road closures and limit interferences with mobility, impacts due to construction activities are expected to be limited in time and restricted to specific road sections.

The route of the cable may in some cases interfere with existing infrastructure including underground utilities (underground cables, drinking water pipes, sewage pipes) and agricultural irrigation canals. Again, this impact is expected to be more significant for the Main OHL AoI given it is a heavier anthropized area compared to the Additional OHL AoI. Before starting any construction activities, the Proponent (GSE) should contact various infrastructures operators to verify any overlaps between the cable route and the existing networks in order to avoid any damage or impact. It may be necessary to temporarily interrupt the normal operations of the networks or move some sub-services. Any interruptions should be agreed upon with the operators and communicated in advance to the users so as to minimize inconvenience. In the case of more complex sub-service crossings, the use of the HDD technique will be considered to avoid damage or impact to existing networks. In the case of crossings of canals and irrigation ditches, temporary diversions or alternative channels should be implemented to ensure normal water flow. In some cases, short interruptions in water flow may be necessary during specific construction activities. Upon completion of construction activities, all canals and irrigation channels will be restored to their normal function. Based on these indications provided, the impacts on existing infrastructure networks are expected to be reduced.

Waste generated by land-based construction activities is expected to be limited in quantity and to consist mainly of packaging, construction waste and any materials from minor demolition. The waste produced will be managed in accordance with current Georgian regulations (Annex 1) by authorized companies. The project should follow a circular economy approach with the objective of reducing the amount of waste sent for disposal as much as possible, favoring recycling and recovery when possible (ESS3). Besides being negligible, this type of impacts could be further mitigated by reusing excavated materials on site and by selecting waste management facilities located in proximity of the place of generation, to also reduce the impact of waste transport activities.

Finally, the construction work may cause an additional demand for water that can potentially place a burden on the existing water resource. However, it is worth emphasizing that the impact will be temporary and will be completely reduced at the end of the works, and the situation of the existing water resource will return to normal.

Significant impacts on infrastructures, transport and mobility may occur during the **operation** phase. The interaction of the marine electrode with existing structures (i.e., stray current emission) is discussed in more detail in chapter 7.2.1.2.3.

***Population and public health***

The impact on the population and public health is expected to be non-significant and related mainly to **construction** activities. Impacts are expected from the emission of anthropogenic noise, emission of pollutants and chemicals and emission of dust, and they are briefly assessed below.

A temporary and limited increase in the emission of anthropogenic noise is expected during the **construction** phase activities. An increase in anthropogenic noise can disrupt concentration and sleep, potentially generating long-term effects on human health. Noise activities associated with the construction site are due to the construction activities and the induced traffic.

Noise will be generated during:

- Construction of the converter station: the noise of this construction activity will eventually affect human receptors located in proximity to this construction site;
- HVDC cable laying and HVAC OHL construction: the noise of this construction activity will eventually affect human receptors along the cable route.

Impacts on population and public health can be managed and mitigated by avoiding unnecessary noise and well-maintained engines and machinery and by building each section of the cable trench separately, thus limiting the environmental impacts for a given period.

The emission of pollutants, chemicals and dust are expected during the construction phase. These emissions can directly impact human receptors' health, causing acute and chronic illnesses, particularly affecting the respiratory system. Emissions of pollutants will mainly be due to the use of machinery and to the Project induced traffic. The impacts will be limited in time and similar to routine civil construction work. This impact can be managed and mitigated by using low-emission fuel (low-sulfur diesel), well-maintained equipment, and vehicles that comply with atmospheric emission standards.

Significant impacts on population and public health may occur during the **operation** phase. The emission of electromagnetic fields produced by the cables and the substation might affect public health. This potentially significant impact is discussed in more detail in chapter 7.2.1.2.2.

***Economy and employment***

A positive impact on the economy and employment is expected, mainly related to **construction** activities. The anticipated effects from the labor and goods requirements are briefly assessed below.

Direct and indirect employment along the extended supply chain is expected, and local companies from various backgrounds will be involved in the Project. To date, it is unknown how many workers or what skills will be required during the construction phase, some estimates are reported in chapter 2.4.1. The Project implementation will increase the demand for local labor, thereby increasing local benefits and economic development. s. Moreover, this positive impact on the demand for labor could be enhanced by, for example, cooperating with the local Chambers of Commerce or employment agencies in order to employ as many local workers as possible.

Sourcing goods and services can have positive economic impacts during the construction phase. The Project might put in place a production chain for the cable and the substation, as far as possible. To date, it is not known what material will be sourced locally or internationally. However, locally sourced goods, services, and materials enhance the Project's positive impacts, it is then suggested that local Chambers of Commerce and industry associations be involved in this process.

In terms of negative impacts, the Project can lead to occupational health and safety (OHS) risks for the workers involved (chapter 6.2.2.2). Although the *Law of Georgia on Occupational Safety* introduces measures for health protection, accident prevention, and requirements for OHS training and education (chapter 6.2.2.2), these risks are generally high for infrastructure projects in Georgia and increase parallel to the number of workers involved, as it is expected for the Project. In addition, OHS risks could occur along the large supply chain, where the control over contractors and subcontractors is more complex.

Positive economic and employment impacts may also occur during the **operation** phase through long-term direct employment and transfer of energy and broadband data Direct employment activities linked to the operation and maintenance of the converter station and the cables will include:

- Routine and extraordinary maintenance of the cable (in case of a cable damage), converter stations (one week a year or every two years has to be considered for maintenance purposes), and other related works:
- Some inspection shall be envisaged to verify the status of the cable on/under the seabed;
- The maintenance of the pond electrodes;

- The maintenance of HVAC overhead lines;
- Operations related to the operational and administrative management of the energy hub.

Moreover, the Project will generate economic benefits for Georgia by exporting energy to Romania and South-Eastern Europe (SEE) Countries, considering the favorable energy prices over a large part of the year, reducing the dependency on expensive electricity imports and thermal generation. Security of supply will be enhanced by importing affordable electricity in winter when Georgian demand is high and hydroelectric production in the South Caucasus countries is low. In the event of a major failure, such as a network or substation outage, this supply will provide a power reserve.

The Project is therefore expected to strengthen the power sector in Georgia and encourage the production of energy from renewable sources. The Project has the potential to act as a driver to attract people and investments in renewable energy and channel human capital development in the direction of renewable energy, which will be a fundamental economic and technical growth sector in the future.

***Agriculture***

The impact on agriculture is expected to be non-significant and largely related to the **construction** activities. Impacts are expected from water consumption and land occupation, especially for the Main OHL AoI, and are briefly assessed below.

A temporary and limited water consumption increase may occur during the construction phase due to an additional demand for water. This could burden the existing water resource and create potential competition for other water uses, such as the irrigation of agricultural fields. However, it is worth emphasizing that the water demand during the construction phase is expected to be limited and that the impact will be temporary and completely reduced at the end of the works when the situation of the existing water resource will return to normal. Given those considerations, such alteration may be considered non-significant. Developing specific measures for wise water use and creating a water management plan can mitigate the potential impacts.

During construction, excavations for cable passages and converter station construction may encroach on agricultural land. In such cases, construction activities will interfere with agricultural activities. The agricultural areas will be restored and returned to their previous uses at the end of the construction activities. This impact could be managed and mitigated by establishing a calendar of activities, avoiding planting and harvesting periods, and constructing in the autumn and winter seasons, if feasible. Moreover, before construction starts, site activities should be discussed with farmers to identify measures to minimize impacts on farming activities.

Potential compensatory measures will be agreed upon with those whose land was affected during the construction phase. A Resettlement Action Plan must be developed and implemented to address the economic displacement and associated compensation aspects for project-affected people. If the mitigation measures discussed above are implemented, potential project impacts may be significantly reduced and leave no significant adverse residual impacts on agricultural production and associated activities.

During the **operation** phase, the impact on agriculture is expected to be negligible, as the infrastructure will be underground or overhead, and normal agricultural activities will essentially continue. There may be some limitations on the planting of trees and clearance of vegetation in proximity of the electric towers. Potential impacts on agricultural activities previously occurring in the substation area are expected to be mitigated through the implementation of the Resettlement Action Plan. The residual impact is not likely to be significant if the mitigation measures are implemented robustly.

***Ecosystem services***

The impact on ecosystem services is not expected to be significant and related mainly to **construction** activities. Potential project-related impacts are anticipated on water consumption, potentially impacting freshwater fisheries, land occupation, and tourism.

The water consumption necessary for construction activities can potentially cause potential impacts on freshwater fishery during the construction phase. The withdrawal of water, particularly if taken directly from rivers, can reduce the availability of the resource and potentially affect freshwater fishery occurring on the rivers. These impacts may be more significant in dry periods when the water flow in the river is reduced. This impact can be mitigated by identifying alternative water resources that would not affect freshwater fishery activities and provide sufficient water in dry periods. It is worth emphasizing that the water demand during the construction phase is expected to be limited and that the impact will be temporary and cease at the end of the construction works. The water resource scenario will return to normal.

Regarding tourism, potential impacts on tourism activities could occur around the cable landing site. Some tourism activities have been identified along the coast of Anaklia, where accommodation and recreational activities are found. The cable landing site should be selected to avoid these areas. In addition, mitigation measures to reduce potential impacts on tourism could include performing construction activities during periods of the year when tourism is limited. By applying these measures, it is expected that the impacts on tourism can be significantly reduced.

During the **operation** phase, no impacts are expected.

***Terrestrial Archaeology and Cultural Heritage***

The impact on Terrestrial Archaeology and Cultural Heritage is expected to be non-significant (negligible to low) and related mainly to the removal of topsoil and subsoil connected to the **construction** activities. The effects are briefly assessed below.

The type of structures and works that will be carried out, whose impact is limited to the trenches for the laying of cables, the creation of infrastructures for energy storage and transformation of electric voltages (i.e., converter station), and excavation for the electric tower foundations, do not involve deep excavations. Therefore, the risk level related to the Project is also to be considered low, even though the risk of chance finds cannot be excluded. In any case it is expected that during the ESIA process a full reconnaissance of cultural and archeological sites within the footprint of the corridor will be performed, to ensure that the cable duct avoids known cultural heritage elements or that appropriate mitigation measures are set up. Given those considerations, impacts on cultural and archaeological elements such be avoided or mitigated by carefully assessing during the construction activities if any archaeological finds might be discovered. In that case, it is expected that a Chance Find Procedure will be implemented and will entail that the works will be stopped, and the competent authorities will be informed in order to define the necessary actions to safeguard and protect the discovered finds.

During the **operation** phase, no impacts are expected.

***Land Use***

Potentially significant impacts are expected to occur on this social component during the **construction** phase. Impacts are expected from the occupation of land during the construction activities which are discussed in more detail in chapter 7.2.1.1.2.

The presence of the new infrastructures and the interaction of the marine electrode with existing structures may generate potentially significant effects during the **operation** phase (if any). These potentially significant impacts are discussed in more detail in chapter 7.2.1.2.1.

### *7.2.1 Preliminary assessment and mitigation measures for the potentially significant impacts*

Impact factors that may have a potentially significant effect are described here below, split into the project phases (i.e., construction and operation).

#### *7.2.1.1 Construction phase*

The impact factors that may induce potentially significant impacts during construction phase are described below.

##### *7.2.1.1.1 Emission of anthropogenic noise*

The effects that this impact factor may have on the environmental and social components are shortly described below.

***Terrestrial acoustics***

Potentially significant impacts (medium to high) are expected on the terrestrial acoustics during the construction phase mainly due to the development of the HVDC conversion station, the submarine cable landing trench and the terrestrial HVDC cable laying and HVAC overhead line construction.

In general, the construction activities of an HVDC converter station are not different from those of large AC substations. These activities involve civil works, excavation of foundations, and erection of steel structures and heavy equipment. For the terrestrial cable laying and the OHL construction the main activities involve excavation and erection of the transmission towers. Common sources of noise include pneumatic drills and hammers, air compressors, bulldozers and trucks. Anthropogenic noise emitted at frequencies that are similar to those used by animals in vocalisations may interfere with their communication, thus negatively impacting the pairing success, fitness and/or inducing physiological stress. Moreover, it can also represent a source of stress for the population (for more details, refer to chapters 6.1.2.1and 6.2.2). This may be of particular importance when implementing the Project in the Additional OHL AoI whereby the local fauna is expected to be less acquaintance with anthropogenic noise.

In addition, it's important to note that some anthropogenic noise could also be generated during the operation phase due to the HVDC converter station activity (Main OHL AoI). The continuous noises (24h-cycle) produced by the converter station could result from a wide variety of noise-generating equipment, such as the converter transformer, smoothing reactor, cooling fan, filter reactors, high voltage shunt capacitors and reactors, valve cooling tower equipment. However, although most of the sound sources will be located inside the station buildings or protected by audible noise enclosures, an increase in the terrestrial acoustic level may potentially occur in the area surroundings the converter station due to the presence of external devices (i.e., transformers, shunt reactor and cooler fans in the valve cooling system). Therefore, based on the sound level and frequency produced by the different devices (Table 7-2), it is possible to foresee a potential interference on both the local fauna and human activities.

*Table 7-2 – Major HVDC converter station noise sources, their noise level and frequency during activity.*

| Equipment | Noise level (dB(A)) | Frequency range |
|---|---|---|
| Converter transformer | 118 | 100 - 2,000 Hz |
| Cooling fan of converter transformer | 90 | 50 - 10,000 Hz |
| Smoothing reactor | 92 | 50 - 10,000 Hz |
| Filter reactors 80-85 | 100 - 2,000 Hz | |
| Shunt capacitors and reactors | 84 | 100 - 2,000 Hz |
| Valve cooling tower | 90 | 50 - 1,0000 Hz |

Since some important design details (location of the HVDC conversion station and onshore working plan) have not yet been defined at this stage, it was preferred to adopt a strongly precautionary approach to assess the significance of this impact. However, such assessment could be remodeled (and possibly reduced) in the scope of the ESIA after the gathering of the primary data (chapter 6.1.2.3). Primary data to be collected include:

- Terrestrial acoustic environmental levels.

Moreover, it is advisable to follow specific mitigation measures to minimize the potential impacts of noise pollution, such as:

- Choose a proper location (as far as possible form sensitive areas);
- Insulating the area containing noisy instruments;
- Adopt noise barriers;
- Avoid, as much as possible, any type of anthropogenic noise not necessary for work activities;
- Monitor the noise pollution level in the surroundings in order to reach the appropriate noise threshold goal according to the noise WHO Europe guidelines (chapter 4.1).

***Terrestrial Habitats and Biodiversity***

Anthropogenic (human-generated) noise is expected to be produced during the construction of the HVDC converter station and for cable's (both HVDC and HVAC) landing operations. Many species depend on sound for survival and reproductive success, using acoustic signaling for a variety of activities, including defence of the territory, detection of prey and predators and attraction of potential mating partners (Catchpole & Slater, 2008; Bradbury & Vehrencamp, 1998). Any changes in the environment that prevents acoustic signals from reaching the desired receptors or distorts the information content can negatively affect species fitness and population persistence (Barber et al., 2009). In the terrestrial environment, acoustic masking generally occurs when background noise and species acoustic signals overlap in the frequency spectrum (Brumm & Slabbekoorn, 2005). Because anthropogenic noise is mainly composed of frequencies in the range between 0 and 3 kHz (Skiba, 2000; Goodwin & Shriver, 2011) one of the strategies to overcome the effect of acoustic masking is to emit signals at higher frequencies (Slabbekoorn & Peet, 2003; Slabbekoorn et al., 2019). This strategy may however require a high energy expenditure, leading to negative effects on the survival and reproductive ability of individuals, increasing the risk of predation or decreasing the attractiveness of males to females. Prolonged exposures to anthropic noise can also lead to physiological stress, while exposure to acute and extreme sounds can have lethal effects through physical damage such as organ ruptures and internal bleeding (Kight & Swaddle, 2012; Slabbekoorn et al., 2019). Impacts of anthropogenic noise may negatively affect wintering species, given the high cost associated with the disturbance (Wiącek & Polak, 2015). Considering the Main OHL AoI proximity to the Kolkheti National Park, with the HVDC underground cable (chapter 6.1.2.2.1), and the Main and Additional OHL AoIs proximity to several KBAs (chapters 6.1.2.2.2 and 6.1.2.2.1), areas known to host numerous wintering bird species, particular attention should be paid to this impact factor. Nevertheless, emission of anthropogenic noise can be considered temporary and reversible, since the ambient noise is expected to return to normal once construction activities are completed. Furthermore, potential impacts could be mitigated by adopting the following **mitigation measures**:

- Select low-noise vehicles and equipment;
- Reduce noisy activities as far as practicable and limit their simultaneous occurrence;
- Perform particularly noisy activities during the day at regular times to promote the habituation of the local fauna to noise and avoid disturbances in critical hours (dusk and dawn);
- Avoid night works (from 8 pm to 6 am), as far as practicable, to reduce impacts to nocturnal species;
- Suspend or reduce activities during ecologically sensitive periods (such as wintering periods).

***Terrestrial Legally Protected Areas and Important Areas for Biodiversity***

Impacts on Legally Protected Areas and Important Areas for Biodiversity due to emission of anthropogenic noise can be considered the same as those potentially insisting on the Habitats and Biodiversity component. The mitigation measures already described in the previous section can therefore be considered effective for this component too.

#### *7.2.1.1.2 Occupation of land*

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Land Use***

As previously stated, potentially significant impacts on land use may occur during the construction phase due to land occupation. The excavation of the ground for the cable passage and its laying, the construction of the converter station and electric towers for the OHL, might occupy public and private land, leading to economic and potentially physical displacement. At the end of the construction activities, the areas where the cable duct is located will be restored and returned to their previous uses, while the land selected for the converter station and the OHL towers will be occupied during the Project implementation. Where avoidance is not possible, compensation will be paid to the affected households.

For example, for local people who lose part of their land permanently as a result of the construction of the converter station and/or transmission line, compensation payment will be made in accordance with the Resettlement Policy Framework and national regulation.

Considering the scope of this document (preliminary assessment of main impacts), the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.2.17) are gathered, namely:

- Type of occupied land (if public or private);
- If any, specific data on the physical displacement.

In addition, this impact could be managed and mitigated by adopting the following **mitigation measures**:

- Place the Project onshore components in order to avoid or minimize as much as possible physical displacement and reduce economic displacement to the possible extent.
- When working in urban and agricultural areas develop a Project schedule to avoid or minimize impacts on busy periods or agricultural operations.
- Consult with local authorities before construction starts in order to identify measures to minimize impacts as much as possible.

Develop and implement a Resettlement Action Plan (RAP) compliant with Georgian legislation (chapter 4.3.2) and international standards (chapter 4.1.1). The Plan will determine the losses suffered by the project-affected people and the required mitigation measures, including economic or in-kind compensation. Special attention in the Plan should be placed towards vulnerable groups, including women and IDPs, to ensure that they are not disproportionately affected by land acquisition due to their status.However, as already described (chapter 6.2.10), we mainly expect compensation for land acquisition and crop loss and, only on a minor extent, household resettlement.If the measures mentioned above are implemented, it is expected that the Project impacts might be significantly reduced.

#### *7.2.1.1.3 Removal of soil and subsoil*

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Geology, geomorphology and soil***

Potentially significant impacts (medium to high) on geology, geomorphology and soil are expected during the construction activities due to the development of the HVDC converter stations, the burial of the HVDC cables and the development of the HVAC overhead transmission line.

As a rule, the removal of soil and subsoil mainly affect the upper layer of vegetable and fertile soil, usually defined "*topsoil*", and the first 20-30 cm of underlying soil. In particular, the topsoil is characterized by the presence of numerous plants roots and living organisms, a high richness in humus, that lead this layer the most fertile, and a porous consistence, that traps air and holds more water.

Usually, soil deterioration can be chemical or physical in nature. Chemical deterioration can, for example, lead to the addition of heavy metals, fluorine and organic substances that are difficult to degrade, thereby reducing soil fertility and polluting surface water and groundwater. Otherwise, physical deterioration can result in erosion and soil compaction, causing the reduction of soil wounding, changing soil structure and blocking of important soil functions (e.g., drainage and aeration).

According to the planned project actions (chapter 2.3.1), the landing of the marine cables could potentially lead to a limited removal of soil and subsoil in the coastal area related to the use of either the horizontal directional drilling (HDD) or open-cut trench technique. The burial of the cables, generally carry out by trenching, results instead to be a more impactful activity due to the greater quantities of soil and subsoil removed and the greater alterations on soil structure and features.

Nevertheless, the Project action for which is foresee the greatest handling and removal of soil and subsoil is expected to be the HVDC station construction. In fact, given the significant size of the working area (about 60,000-70,000 $m^2$), the construction of the converter station will involve a wide soil occupation and, consequently, potentially significant impacts may be expected on a larger portion of soil. Furthermore, in addition to the possible alteration on soil features and quality, this project activity could also lead to a significant habitat loss and fragmentation, influencing local flora and fauna.

Generally, the soil and subsoil removed are temporarily shelved and, if considered suitable after an appropriate characterisation, reused at the end of the works in order to restore, as much as possible, the original state of the working sites. Where it is planned to bury the cable duct under existing road, not involving any removal of soil, an appropriate pavement will be reconstructed at the end of the work. Anyway, it is highly suggested to develop a proper management plan for the restoration and restoration of occupied areas (chapter **Error! Reference source not found.**).

However, it must be noted that, at this stage, no definite details are yet available neither on the techniques that will be used to burying cables nor on the path that will be carried out from the landing point to the junction site and, subsequently, from the junction site to the converter station. Besides, also the details on the exact location of the converter station are not yet defined (chapter 5.2). Accordingly, considering both the purpose of this document and the absence of some fundamental design details, it was preferred to adopt a strongly precautionary approach to assess the significance of this impact. Nonetheless, it is important to highlight that all currently missing information will have to be taken into account in the scope of the ESIA to properly assess the entity of this impact factor. Furthermore, such assessment could be also remodeled (and possibly reduced) after the collection of the primary data recommended in the baseline (chapter 6.1.2.3). Primary data to be collected include:

- Soils structure, features and sensitivity (e.g., composition, stratification, porosity, etc.);
- Soil and subsoil quality and status (e.g., presence of contaminants, degree of stress, etc.);
- Topographic and geological analysis;
- Land use;
- Identification of geological and hydrogeological risk zones.

Potential impacts on geology, geomorphology and soil due to removal of soil and subsoil can be mitigated by adopting the following **mitigation measure**:

- Reduce the surfaces occupied and the removal of soil to the minimum necessary for the realization of the Project;

- Temporary storage of the soil removed over clean surfaces (with possible laying, if necessary, above a protective cloth) and creating heaps distinguished according to the material typology (topsoil, subsoil, deep mineral layers and possible plant cover);
- Define sediment and erosion control measures;
- Reinstatement of topsoil (verifying the absence of any contamination) in the construction area to enhance, as much as possible, the natural habitat restoration;
- Properly redistribute the soil horizons in order to limit the alterations in soil characteristics and not compromise the establishment of new vegetation cover;
- Limit the set-aside soil period to the minimum necessary for carrying out the restoration (preferably within 6 months after removal) and, in case of prolonged storage, move periodically the heaps to ensure the degree of oxygenation and thus avoid their impoverishment from the point of view of fertility.

***Terrestrial Habitats and Biodiversity***

The removal of soil and subsoil could have an impact on terrestrial species characterized by a hiding strategy to escape predators and on the soil fauna (such as terrestrial invertebrates), adversely affecting its density and diversity (Battigelli, 2000). Soil fauna plays a variety of functional roles in soil processes, such as controlling bacterial and fungal biomass via grazing, thus liberating immobilized nutrients and stimulating plant growth (Parkinson, 1988; Setälä, 1995). Furthermore, soil fauna contributes to the development of the soil structure and humus formation through the deposition of fecal pellets (Pawluk, 1985; Hendrix et al., 1990). Therefore, potential impacts on soil fauna could affect the soil structure and its chemical properties, the nutrient cycle, vegetation growth and ultimately herbivorous organisms (Battigelli, 2000). Impacts of removal of soil and subsoil may be grater for threatened flora species or endemic species characterized by restricted ranges (like the ones potentially triggering Critical Habitat described in chapter 6.1.2.3). Particular attention must therefore be paid to this impact factor in areas where the presence of these species is established.

Considering the scope of this document, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.1.2.3) are gathered, namely:

- Field surveys of fauna and flora (e.g., freshwater fauna, birds, steppe flora species).

Potential impacts due to removal of soil and subsoil can be mitigated by adopting the following **mitigation measures**:

- Reinstatement of topsoil in the construction area to enhance natural habitat restoration;
- Define sediment and erosion control measures.

#### *7.2.1.1.4 Removal of vegetation*

The effects that this impact factor may have on the environmental and social components are shortly described below.

***Habitats and Biodiversity***

Removal of natural vegetation can cause direct habitat loss and habitat fragmentation. Flora species present in the area could be directly impacted by vegetation clearing at the beginning of construction during ground preparation works. Furthermore, fauna species with a hiding strategy to escape predators might also be accidentally killed during the construction operations. Besides direct mortality, the removal of natural vegetation can cause habitat fragmentation, a process by which large and contiguous habitats get divided into smaller, isolated patches of habitats (Öckinger et al., 2010). Species with poor dispersal capacity are predicted to be more strongly affected by reduction in habitat area and connectivity (Lomolino, 1984; Öckinger et al., 2009). Conversely, species with high dispersal capacity can move between habitat patches and more efficiently utilize a fragmented resource, making them less sensitive to geographical isolation (Hanski & Ovaskainen, 2000). Removal of natural vegetation cover and soil disturbance could also facilitate the spreading of invasive alien (non-native) species accidentally introduced by cars, trucks and other heavy machinery used during construction. Invasive alien species tend to have an advantage in disturbed ecosystems, and if they penetrate into a habitat, they can potentially change its functionality and species composition, including priority biodiversity species. Impacts of removal vegetation may be grater for threatened flora species or endemic species characterized by restricted ranges (as the ones potentially triggering Critical Habitat described in chapter 6.1.2.3). Particular attention must therefore be paid to this impact factor in areas where the presence of these species is established and to the Additional OHL AoI characterized by the presence of a less anthropogenic habitat (e.g., broadleaf and needle-leaf trees) compared to the Main OHL AoI (e.g, crops, grassland and sparse vegetation).

Considering the scope of this document, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.1.2.3) are gathered, namely:

- Field surveys of fauna and flora (e.g., freshwater fauna, birds, steppe flora species).

Potential impacts due to vegetation clearing can however be mitigated by adopting the following **mitigation measures**:

- Define limits of clearing around construction areas to avoid impacts outside these areas;
- Provide specialist training to operators and key personnel involved in activities such as land clearance, materials handling and transport activities which may impact terrestrial biodiversity;
- Removal of structures and service roads built for only for construction purposes only in previously vegetated areas, to allow for vegetation recovery;
- Check of vehicles and machinery for evident foreign plant material, soil and seeds on their first entry on site;
- Develop an appropriate eradication program if spreading of invasive species is observed;
- Design the positioning of onshore works in order to remove as little natural vegetation as possible.

***Landscape***

As previously stated, potentially significant impacts on landscape may be expected during the construction phase due to the removal of vegetation.

During the construction phase it is expected to remove the vegetation present in the areas destined for the land installations and for the HADC cable laying and the HVAC overhead line construction. Vegetation is one of the elements that characterises a landscape and its removal therefore alters the appearance of the visual context in which a project is carried out.

Within the Main OHL AoI, ground construction activities are expected to be generally carried out in agricultural, urbanised areas with limited permanent vegetation. The removal of vegetation will therefore mainly consist of mowing lawns or cutting back shrubs present on the edges of fields or roads crossed by the pipeline. In most cases, this is spontaneous vegetation in residual areas, therefore without any naturalistic characteristics.

Compared to the Main OHL AoI, the Additional OHL AoI shows a higher cover in deciduous forest and a higher probability of cleaning broadleaf trees for the installation of the Anaklia- Tskaltubo OHL.

Therefore, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.2.17) are gathered, namely:

- Type of vegetation removed;
- Exact location of the Project components;
- Minimize the vegetation-clear buffer around the transmission towers in proximity of the Additional OHL.

Impacts on the land use could be mitigated by adopting the following **mitigation measures**:

- It is suggested that vegetation is removed just when strictly necessary for site requirements;
- Restoration of vegetation through grassing and replanting of removed trees or shrubs might be planned at the end of construction activities if deemed necessary.

#### *7.2.1.2 Operation phase*

The impact factors that may induce potentially significant impacts during operation phase are described below.

##### 7.2.1.2.1 Presence of the new infrastructures

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Habitats and Biodiversity***

The presence of permanent facilities (such as the converter station) can lead to the loss of available natural habitat during the entire operation phase, that will directly and indirectly affect habitats, flora and fauna species. It is expected that the electrical substation will subtract a portion of land between approximately 60,000 and 70,000 $m^2$. Similarly, the maintenance of a vegetation-free buffer in close proximity of the overhead transmission line infrastructures can lead to the loss of available natural habitat during the entire operation phase. Also, the presence of new infrastructures may cause habitat degradation, habitat fragmentation and habitat loss, making unviable areas previously colonized by faunal and floral species. Smaller habitat patches can lead to population declines (Bender et al., 1998) because resources in smaller patches may be more limited (Zanette et al., 2000). In addition, habitat sub-division can negatively affect day-to-day movements of a given species (e.g., between nesting and foraging resources; Saunders, 1980; Luck & Daily, 2003). The extent to which landscape modification results in habitat isolation depends on the interaction between a given species' habits, dispersal behavior and scale of movement (Fisher & Lindenmayer, 2007). Besides the HVDC converter station, the presence of overhead transmission lines could affect bird and bat species by increasing individuals' mortality due to collision and electrocution. Larger species are generally exposed to a greater risk of colliding with power lines due to their morphology and behavior (Janss and Ferrer, 1999). Nonetheless, potential impacts due to the presence of new infrastructures can be mitigated by adopting the following **mitigation measure**:

- Line marking devices (e.g., marker balls, spirals, and other hanging devices) of the earth wire is recommended to increase its visibility of the line,
- Avoiding as much as possible siting the power lines near or crossing flyways used by birds.

***Landscape***

As previously stated, potentially significant impacts on landscape may be expected during the operation phase due to the presence of new infrastructures.

During operation, some of the onshore Project components are expected to be underground and might therefore not be visible, however, the visible components will be the converter station and the overhead transmission lines.

The visual impact at this stage for the onshore component is expected to be determined by the new substation and the OHL. These project elements are predicted to introduce new anthropic elements and will modify the current landscape context.

Considering the scope of this document, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.2.17) are gathered, namely:

- Precise location of the new substation.

Impacts on the landscape could be mitigated by adopting the following **mitigation measures**:

- All construction site areas and underground work areas are expected be restored to their previous condition;
- Siting the substation in an area far from human receptors, public spaces and recreational areas to the extent possible;
- Planting trees and shrubs around the Site can be useful to create a vegetation screen that reduces the visibility of the substation.

***Land Use***

As previously stated, potentially significant impacts on land use may be expected during the operation phase due to the presence of new infrastructures. During operation, the presence of the electrode onshore means that within a radius around the connection point, certain structures or installations cannot be built, so permanent restrictions are expected to be placed on specific land uses.

Considering the scope of this document, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.2.17) are gathered, namely:

- The precise location of the electrode and the substation;
- Distance from settlements;
- Typology of occupied land (if public or private).

Impacts on land use could be mitigated by adopting the following **mitigation measures**:

- Economic compensation for the restricted land may be implemented if necessary;
- A Resettlement Action Plan may be implemented to define how compensation and land acquisition have to be handled (chapter 4.3.2).

*7.2.1.2.2 Emission of electromagnetic fields*

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Population and public health***

Potentially significant impacts on population and public health may be expected during the operation phase due to the presence of emission of electromagnetic fields coming from the converter station and the cable. From the moment that the converter station location is still under evaluation (chapter 5.2) and the lack of information about possible sensitive receptors present in proximity of the converter station, it is not possible to estimate the impact of these emissions yet. It is recommended that at the ESIA stage, a specialist study on the electromagnetic fields generated by the Project is carried out to understand the emission level. Should the interference with human receptors be confirmed, specific mitigation measures indicated below may be implemented.

Although the significance of this impact is assessed using a strongly precautionary approach, such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline are gathered, namely:

- Precise location of the substation;
- Distance from settlements and human receptors.

Impacts on population and public health could be mitigated by adopting the following **mitigation measures**:

- If necessary, site-specific mitigation measures will have to be implemented, including placing screen systems to reduce the magnetic field emissions;

- Specific stakeholder engagement activities on this subject will have to be performed to ensure that this impact is clear to local communities and potentially impacted individuals and to ensure that concerns and perceived impacts are addressed.

##### *7.2.1.2.3 Interaction of the marine electrode with existing structures*

The effects that this impact factor may have on the environmental and social components are shortly described below.

***Infrastructures, Transport and mobility***

As already mentioned, potentially significant impacts on infrastructures, transport and mobility are expected during the operation phase due to the interaction of the pond electrode with existing structures in the Main OHL AoI. See also the Table within the chapter 7.3.1.3.

The most significant problem related to the presence of a pond electrode as low resistance current return path is the corrosion risk or the electrical interference with existing or new infrastructures. In fact, it is generally acknowledged that the electrical current flowing between the cathode and anode, taking the least resistance path, may occasionally cause the flow of stray current in other metallic structures, such as pipelines, large metallic structures in contact with the ground as electrical substations with grounded neutral transformers, transmission lines with grounded shield wires, communication cables, bridges, railway tracks, fences and other large facilities such as harbor infrastructures (CIGRÉ, 2017; Molfino et al., 2019). The magnitude of this current will depend on the size and orientation of the metal object and the local electric field intensity, which is related to distance from the sea electrode (Sutton et al., 2017). The most impacted infrastructures are usually the "longer" ones, where the length must be compared with the minimum distance from the electrode: in other terms, cables and pipelines (especially methane and oil pipelines due the dangerous nature of the material they carry). However, it should be noted that normally ground pipelines are already protected by corrosion with active and passive cathodic protection (Molfino et al., 2019). Despite this, if the magnitude of the current exiting the object is greater than a particular threshold, electrolytic corrosion (at the theoretical Faraday corrosion rate) and interference on AC power networks can occur (Sutton et al., 2017), causing severe damages. The problem could be even more severe if the pipe is coated with an electrically insulating material, as corrosion tends to concentrate in coating defects or damage, leading to very quick and localized pipe perforation, known as "*pitting corrosion*" (Molfino et al., 2019).

The ability to predict, assess and mitigate electrolytic corrosion issues has greatly improved due to modern modelling methods for the distribution of stray currents through the surrounding medium (Sutton et al., 2017). However, since it is not easy to model with good accuracy the evolution of corrosion on the structures in the area (depending also on widely unknown parameters), it is necessary to keep very large safety margins (Molfino et al., 2019). In particular, it is necessary keep a certain safe distance between the electrode and the onshore conversion station, since the direct current flowing through the earth could otherwise enter the transformer windings and lead to a severe magnetic core saturation (Girdinio et al., 2012).

Besides, disturbances in telecommunications circuits (e.g., railway signaling systems or telephone) and dangerous touch potentials may occur due to ground rise potentials (CIGRÉ, 2017).

Given the information currently available, a strong precautionary approach was used to assess the significance of the impact caused by the interaction of the pond electrode with the existing infrastructures. However, this assessment could be remodeled (and possibly reduced) in the scope of the ESIA. In this regard, it is suggested the collection of the following primary data:

- Perform surveys to identify objects at risk (including large metallic objects up to 50 km from the electrodes);
- Existing land use or planned infrastructure.

To reduce corrosion-related problems and mitigate potential effects on metallic infrastructure, it is strongly recommended to adopt the following **mitigation measures** (CIGRÉ, 2017):

- Perform models for the distribution of stray currents through the soil layers;
- Use Finite Element Method and/or other mathematical tools to determine possible interference effects;
- Develop a proper design for marine electrode;
- Use of proper electrode materials to ensure a very high resistance to corrosion (Mixed Metal Oxide (MMO) coated titanium is preferred);
- Keep very wide safety margins, since the corrosion risk increases very quickly as the distance between the electrode and the potentially impacted infrastructure is reduced (Molfino et al., 2019);
- Select a suitable site for electrode installation (possibly with rapid transition to deep water and direct access to the open sea), considering a minimum distance of 10 – 15 km between the electrode site and other metallic infrastructures (more details in chapter 2.2.2);
- Introduction of insulating joints;
- Add more material to sacrificial anodes;
- Provide, if possible, impressed current cathodic protection (ICCP) systems;
- Sectionalize fences or replacing steel poles with wooden poles;
- Sectionalize railway line by creating electrical isolation gaps in the railway tracks;
- Replace the metallic conductors and metallically shielded fibre optic cables with fibre optic cables having plastic shielding to reduce the disturbances in telecommunications circuits.

***Land Use***

Potentially significant impacts on land use are expected during the **operation** phase due to the interaction of the pond electrode with existing structures in the Main OHL AoI.

As previously discussed for the Infrastructures, Transport and Mobility component, the presence of the marine electrode involves compliance with some minimum safety distances (chapter 2.2.2) necessary to avoid potential corrosion-related problems on existing or new metallic infrastructures (Molfino et al., 2019). Such safety limits could significantly affect the current land use and, especially, the development of new facility in the electrode area of influence. Moreover, existing infrastructures that might potentially be impacted by stray current will still need to be secured. Therefore, it is expected that new land use constraints will be defined in order to avoid or prevent negative interaction of the marine electrode with existing or future structures.

Given the purpose of this document and the details of the information currently available, a strong precautionary approach was used to assess the significance of the impact on land use due to the interaction of the marine electrode with the existing infrastructures. However, this assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.2.17) are gathered. Primary data to be collected include:

- Objects at corrosion risk (including large metallic objects up to 50 km from the electrodes);
- Existing land use or planned infrastructure;
- Type of occupied land (if public or private)

To reduce corrosion-related problems and mitigate potential effects on metallic infrastructure, it is strongly recommended to adopt the **mitigation measures** already reported for the Infrastructures, Transport and Mobility component.

## 7.3 Offshore area

Similar to the onshore preliminary impact assessment (chapter 7.2), an interrelation matrix crossing the main sources of potential impact and the main environmental and social components was produced.

The potential impacts of the Black Sea Submarine Cable Project have been classified into two levels, based on the project description and the baseline conditions:

- **Non-significant** (green in the matrix);
- **Potentially significant** (orange in the matrix).

The symbol “+” indicates the presence of a potentially positive impact.

For the impacts classified as potentially significant, a preliminary impact assessment was conducted (chapter 7.3.1) according to the methodology indicated in chapter 3.5.

Non-significant impacts are briefly discussed here below.

*Table 7-3 – Interrelation matrix between impact factors generated by the project and the offshore environmental and social components (green: non-significant impacts; orange: potentially significant impacts; +: positive impact).*

| Project Phase | OFFSHORE Impact Factors / OFFSHORE Env. Components | Oceanography and seawater quality | Air and climate | Marine Acoustics | Sediments and Seafloor morphology | Marine Habitats and Biodiversity | Legally Protected Areas and Important Areas for Biodiversity | Infrastructures, Transport and mobility | Ecosystem services | Marine Archaeology and Cultural Heritage | Economy and employment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Construction phase | Coverage of the seabed | | | | | | | | | | |
| | Emission of underwater noise | | | | | | | | | | |
| | Emission of air pollutants and chemicals | | | | | | | | | | |
| | Emission of greenhouse gases | | | | | | | | | | |
| | Emission of light | | | | | | | | | | |
| | Handling of sediments | | | | | | | | | | |
| | Increase of marine traffic | | | | | | | | | | |
| | Production of waste | | | | | | | | | | |
| | Demand for goods and services | | | | | | | | | | + |
| | Demand for labor | | | | | | | | | | + |
| Operation phase | Emission of electric, magnetic and/or electromagnetic fields and thermal radiation | | | | | | | | | | |

| Project Phase | OFFSHORE Impact Factors / OFFSHORE Env. Components | Oceanography and seawater quality | Air and climate | Marine Acoustics | Sediments and Seafloor morphology | Marine Habitats and Biodiversity | Legally Protected Areas and Important Areas for Biodiversity | Infrastructures, Transport and mobility | Ecosystem services | Marine Archaeology and Cultural Heritage | Economy and employment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Interaction of the marine electrode with existing structures (i.e., stray current emission) | | | | | | | | | | |
| | Presence of the cables and electrodes | | | | | | | | | | |
| | Demand for labor | | | | | | | | | | + |
| | Transfer of energy and broadband data | | | | | | | | | | + |

***Oceanography and seawater quality***

The impact on oceanography and seawater quality is expected to be non-significant (negligible to low) and related mainly to the **construction** activities. The emission of chemical compounds (mainly by the vessel engines and propellers) and waste production is, in fact, expected from all the vessels mobilized for the Project. Whilst the waste production and its impacts on the seawater can be almost completely reduced by the preparation and implementation of an appropriate Waste Management Plan (chapter **Error! Reference source not found.**), a limited leakage of chemicals from the engines and propellers is a lways considered as "physiological" and inevitable, but non-significant due to its negligible amounts and the dilution power of the seawater itself. However, this could be managed and mitigated with the use of well-maintained engines and the implementation of measures, such as those provided by the Annexes I[50], IV[51] and V[52] of the International Convention for the Prevention of Pollution from Ships (MARPOL). It is therefore recommended to assess in the scope of the ESIA the risk for impacts from accidents that diesel-fueled vessels may run into the sea

[50] MARPOL Annex I "*Regulations for the Prevention of Pollution by Oil*"

[51] MARPOL Annex IV "*Prevention of Pollution by Sewage from Ships*"

[52] MARPOL Annex V "*Prevention of Pollution by Garbage from Ships*"

Possible alterations of seawater quality may also occur because of the sediment handling (i.e., during trenching/jetting/plunging for the cable burial at the land approach, chapter 2.2.1). This can cause a temporary increase of water turbidity by the resuspended sediments in the water column and a short-term alteration in the water chemical-physical quality (e.g., decrease in oxygen concentration, resuspension and solubilization of contaminants) (Lisi et al., 2017). However, due to the fact that this represents only a temporary alteration of the water quality, such modifications may be considered as non-significant and can be mitigated by reducing the jetting intensity during the cable burial operations.

During the **operation** phase, only the thermal radiation due to energy dissipation along the cables and in proximity of the electrodes may affect the physical characteristics of the seawater. However, this could be considered as non-significant because balanced by the intrinsic "restoration power" of the seawater itself (i.e., convection) and it could be further mitigated by the development of properly designed and shielded cables and electrodes as part of the Project Design (chapter 2.2.2).

***Air and climate***

No significant impacts (negligible to low) are expected on air and climate during the **construction** phase activities. Nevertheless, the combustion of diesel engines during vessels mobilization cause dust releases, emission of gaseous atmospheric pollutants ($SO_2$ and $NO_X$) and greenhouse gases ($CO_2$, $CH_4$, $O_3$ and $N_2O$) that could cause a temporary deterioration of air quality. However, this reduction in air quality could be minimised using properly maintained engines or, even more, using new engines with advanced low emission diesel technology. It is also advisable to follow the guidelines provided by MARPOL Annex VI[53] for the application of appropriate management and prevention measures for air pollution from ships.

During the **operation** phase, no significant impact is expected.

***Marine Acoustics***

A temporary and limited increase in marine acoustic may occur during the **construction phase** due to cable laying and electrodes installation activities. Based on the activities foreseen for this Project, anthropogenic underwater noise can be produced during route clearance, trenching or hydrojetting (typically with a sound source level of 178 dB re 1µPa m concentrated in the frequency range of 1 kHz to 15 kHz; Hale, 2018), backfilling and cable introduction by cable-laying vessels and other boats, sea cranes and tools used during these operations (Taormina et al., 2018). However, the main and most frequent source of underwater noise will be emitted by vessels engines and propellers action (mainly by cavitation effect) as low frequency sound waves (<1 kHz, typically with a sound source level from 155 to 170 dB re 1µPa m and peaks up to 190 dB re 1µPa a meter from the source) (Richardson et al., 1995; Hale, 2018). Intensity and propagation of underwater noise will vary according to bathymetry, seafloor characteristics (e.g., sediment type and topography), vessels and machines used, and water column properties (Taormina et al., 2018). In general, a minimal behavioral effect on marine mammals and fish is expected, such as noise source avoidance behavior. However, given the high presence of anthropogenic underwater noise sources (e.g., shipping) within the AoI, impact on marine acoustic climate is expected to be non-significant (negligible to low).

[53] MARPOL Annex VI "*Prevention of Air Pollution from Ships*"

Moreover, impacts on marine acoustic could be managed and mitigated avoiding, as much as possible, any type of anthropogenic noise not necessary during work activities, using well-maintained engines and machinery, favoring, where possible, anti-cavitation propellers.

No significant impacts are expected during the **operation** phase.

***Sediments and Seafloor morphology***

Both non-significant and potentially significant impacts are expected to occur on this environmental component during the **construction** phase. Non-significant effects (negligible to low impacts) are expected from the cable-laying vessel and guard vessels used for the submarine cable installation. As previously stated, the engines of such vessels are expected to leak negligible amounts of chemical into the seawater that may deposit onto the seabed. Despite being a non-significant impact, it could be further mitigated using vessels compliant with MARPOL.

However, the submarine cable will be buried at depth lower than 150 meters. Whilst the different techniques that can be used to bury the cables may cause a non-significant alteration of the seafloor morphology (which is expected to be temporary and completely restored once the cable is laid), the sediment mobilization (i.e., sediment handling) may generate potentially significant effects on the sediment quality due to the remobilizations of contaminants already present (if any). This potentially significant impact is discussed in more detail in chapter 7.3.1.

Non-significant impacts on sediments and seafloor morphology may occur during the **operation** phase. The presence of the cables and sea electrodes is expected to affect a limited area of the seabed. Similarly, the emission of electric, magnetic and/or electromagnetic fields is expected to have negligible effects on the seabed characteristics. On the contrary, the thermal radiation due to energy dissipation from the cables and the electrodes may modify the physicochemical proprieties of the substrate (e.g., the redox interface depth) in close proximity of these components (Taormina et al., 2018). However, considering the narrowness of the cable corridor, the expected weakness of the thermal radiation and the convection and natural marine currents capable of dissipating the generated heat into the water, the possible effects are considered non-significant. In addition, it should be mentioned that the cables will be buried, further reducing the thermal exchange and radiation.

***Marine Habitats and Biodiversity***

The impacts on marine habitats and biodiversity are expected to be both non-significant (negligible to low) and potentially significant (medium to high). Non-significant impacts are only expected during the **construction phase**, and they might arise from coverage of the seabed, increase of marine traffic, emission of underwater noise, chemicals and light. These impacts are briefly assessed below.

Seabed coverage due to underwater cable laying and electrode installation activities, even if limited in space and time, could cause unavoidable damage and/or mortality to the benthic flora and fauna and, consequently, a localized deterioration or loss of benthic habitats. In fact, motionless species that use the seabed as support might be thoroughly affected along the cable's pathway. It is therefore recommended to follow the best practice to ensure that potential habitat loss is minimised throughout the proposed works (e.g., micrositing and minimising the benthic footprint of the offshore development). Overall, it is recommend avoiding routing the cable through sensitive areas populated by endangered or hard recovering species and minimizing cable movements across the surface (Ardelean & Minnebo, 2015).

As already indicated for the Marine Acoustics component, a temporary and limited increase in the underwater noise level could occur due to the **construction** and cable-laying activities, including the use of cable-laying vessels, marine cranes and guard vessels. Anthropogenic underwater noise can affect marine life in different ways (Taormina et al., 2018). The increased marine acoustic climate can result in a temporary avoidance by fish and marine mammals of the area exposed to the source of noise until the end of the works, and alterations or disruptions of feeding, communications, breeding and/or migratory behaviour (Taormina et al., 2018). Nevertheless, it is expected that the noise emitted by the anthropogenic project-related sources (mainly vessel engines and propellers), being at low frequency (<1 kHz), should not have significantly impact neither on local ichthyofauna nor on marine mammals. In fact, based on the high (150 Hz to 160 kHz) and very high (275 Hz to 160 kHz) frequency hearing range of all three endemic Black Sea marine mammals (*Tursiops truncatus ponticus*, *Delphinus delphis ponticus* and *Phocoena phocoena relicta,* chapter 6.1.5.1.2.3) and their observed behavioral responses to continuous noise sources (Southall et al., 2019), it can be expected that the noise emitted should not overlap with the frequencies audible by marine mammals and, consequently, not cause masking effects. Furthermore, it can be expected that the potential hearing threshold shift (temporary or permanent shift) may be negligible and that the behavioral effects may be minimal (Sutton et al., 2017). However, according to the baseline, it is good to keep in mind that the AoI falls into an IMMA and a CCH and, therefore, is highly frequented by the three endemic and protected species of cetaceans widespread in the Black Sea. For these reasons, it is highly recommended to refer to the ACCOBAMS "*Guidance on Underwater Noise Mitigation Measures*" to mitigate the potential impacts especially on marine mammals. Furthermore, impacts could be further mitigated by avoiding, as far as possible, any type of anthropogenic noise not necessary for work activities, using well-maintained engines and machinery, preferring, where possible, anti-cavitation propellers and adopting reduced speed limits.

The mobilisation of vessels and cranes may increase the potentially risk of emission into the sea of chemical compounds, especially oils and hydrocarbons, by engines and propellers. The accidentally loss of these compounds, that have the capacity to bind to sediment particles and bioaccumulate in organic tissues, could affect the benthic habitats and communities. However, given the strong anthropization of the coastal marine area and, in particular, the presence of the Anaklia commercial port and the Kulevi oil terminal, it is possible to expect a certain tolerance of benthic communities to this impact factor. Besides, a limited leakage of chemicals from the engines and propellers is always considered as "physiological" and inevitable, but non-significant due to its negligible amounts and the dilution power of the seawater itself. Impacts on marine habitats and biodiversity could be managed and mitigated by adopting the same mitigation measures already mentioned for the Oceanography and Seawater Quality component.

The emission of artificial light will mainly occur during the passage of cable-laying vessels, sea cranes and other vessels used for transport of components and carrying out working activities, supposedly even at night. Lighting systems on vessels will ensure the safety of maritime navigation and the lighting required to carry out the work in the AoI. It is well known how artificial light emission, especially at nighttime, could potentially have negative effects on planktonic organisms and fishery resources. In fact, nocturnal light pollution might influence or modify planktonic migratory vertical flows, thus limiting the zooplankton nocturnal feeding at surface until the end of the light emission. On the other hand, artificial light could lead several fish species to a disorientation status, direction deviations, behavioral and feeding alterations. While some fish species are negatively affected by the presence of light, resulting more vulnerable to predation and limited in foraging activities (Sanders & Gaston, 2018; Czarnecka et al., 2019), others are advantaged in predation dynamics (e.g., cephalopods) and in their relative success. Furthermore, the presence of lighting source could also potentially impact migratory and resident seabirds, especially those with nocturnal habits. However, these impacts on marine habitats and biodiversity could be mitigated by using a light intensity that complies with and does not exceed the requirements for maritime traffic safety, anti-glare technology, shielded lighting and, if possible, flashing lights instead of fixed lights and "bird friendly" lights.

Temporary and limited increase of marine traffic could occur within the AoI due to the use of several nautical units. An increment in marine traffic may lead to a higher risk of ship strike with marine mammals. Nevertheless, impacts could be mitigated primarily by identifying vessel-specific routes and applying reduced speed limits (<14 knots) to minimize and/or avoid any risk of collision. In addition, given the high importance of this area for all three endemic Black Sea marine mammals and their high frequency within the area, it is strongly suggested to keep on board a qualified cetacean observer (such as a Marine Mammal Observer- MMO trained according to ACCOBAMS standards) as crew member responsible for the promptly detection of marine mammals on a collision course.

Whilst the impact factors described above may produce non-significant effects on marine habitats and biodiversity, the sediment handling may on the contrary cause potentially significant impact on that component during the construction phase due to the burial of the submarine cables and electrodes installation. This potentially significant impact is discussed in more detail in chapter 7.3.1.

Potentially significant impacts on marine habitats and biodiversity may also occur during the **operation phase** due to the emission of electric, magnetic and/or electromagnetic fields and thermal radiation by cables and electrodes. A more detailed assessment of this potentially significant impact is described in chapter 7.3.1.

Finally, during both the Project phases, it is highly recommended to pay particular attention to the potential Critical Habitats identified in the baseline (chapter 6.1.5.3). Critical Habitats may, in fact, be potentially present in the AoI according. According to WB ESS6, if Critical Habitats were to be identified by field observations, the "No Net Loss and Net Gain" criteria must be met in order to satisfy the WB ESF requirements.

***Marine Legally Protected Areas and Important Areas for Biodiversity***

The impact generated on Legally Protected Areas and Important Areas for Biodiversity is expected to be non-significant (negligible to low) during the **construction phase**. According to the baseline (chapter 6.1.5.2), the AoI (also considering the Area of Interest of the electrode) include one Legally Protected Area and some Important Areas for Biodiversity. Non-significant impacts, which could occur with seabed coverage, emission of underwater noise, chemicals, light and increase of marine traffic can be considered the same as those that could potentially affect the Marine Habitats and Biodiversity component. Therefore, the effects of these impacts and the recommended mitigation measures already described for Marine Habitats and Biodiversity can also be considered effective for this component as well.

Unlike the previous component, the effects of sediment handling due to cable burial (by plunging, trenching or hydrojetting) and electrode installation should not significantly influence the component under consideration. Although the AoI will partially fall within the Legally Protected Areas and Important Areas for Biodiversity mentioned above, it will occupy a restricted area compared to their extent. Therefore, the effects generated by the sediment mobilization are considered non-significant. Nevertheless, mitigation measures are recommended, please refer to Marine Habitat and Biodiversity component mentioned below for a comprehensive picture of the impact (chapter 7.3.1).

In addition, considering that the marine area of the Kolkheti National Park presents a 'Strict protection zone', which means that no human activities of any kind are permitted within and along its boundaries, no construction activities will be carried out within Protected Areas, limiting any indirect impacts through the above-mentioned mitigation measures.

During the **operation phase**, non-significant effects (negligible to low impacts) are expected on Legally Protected Areas and Important Areas for Biodiversity from the emission of electric, magnetic and/or electromagnetic fields and thermal radiation. It is possible to foresee the occurrence of minimal impacts (mainly by electric, magnetic and/or electromagnetic fields) to a limited extent in the surrounding areas, including not officially protected areas (such as the Colchis IMMA). Furthermore, the constraints arising from the presence of the marine electrode could eventually ensure greater isolation of the area from future anthropogenic impacts and improve the protection effect on transitional and marine coastal habitats. However, in order to mitigate impacts on Legally Protected Areas and Important Areas for Biodiversity, it is strongly recommended to follow the same mitigation measures mentioned below for Marine Habitats and Biodiversity (chapter 7.3.1).

***Infrastructures, Transport and mobility***

The impact on infrastructures, transport and mobility, related to the **construction** activities is expected to be non-significant (negligible to low). The non-significant impact, expected from the production of waste is briefly assessed below.

In the construction phase, a limited generation of waste is expected. It is recommended that the waste produced will be directed to the appropriate disposal and treatment destination and managed in accordance with current regulations by authorised companies.

Given those considerations, such alteration may be considered as non-significant and can be mitigated by reducing waste production to the extent possible and recycling it and recovering it as much as possible. In addition, when selecting waste management facilities, preference will be given to those closest to the place of generation, so as to reduce the impact of waste transport activities.

There is another impact on Infrastructures, Transport and mobility, which is considered significant and related to **operation** activities which is the interaction of the marine electrode with existing structures (i.e., stray current emission) discussed in more detail in 7.3.1.

***Ecosystem services***

Non-significant impact is expected to occur on this component during the **construction** phase. Non-significant effects (negligible to low impacts) expected from seabed coverage, emission of air pollutants and chemicals, emission of light, and increased marine traffic are briefly assessed below.

The first three impacts, namely coverage of the seabed, emission of air pollutants and chemicals, and emission of light, may affect the fishery. Increased marine traffic may affect navigation.

As already described in marine habitats and biodiversity components, the seabed coverage due to underwater cable-laying and electrode installation activities, even if limited in space and time, could cause unavoidable damage and mortality to the benthic flora and fauna and, consequently, localized deterioration or loss of benthic habitats. Motionless species that use the seabed as support might be thoroughly affected along the cable's pathway, which may affect local fisheries, decreasing or impacting the quantity and type of fish caught. However, although no significant impacts are expected, following the best practice indicated previously is recommended.

The mobilization of vessels and cranes may increase the potential risk of emission into the sea of chemical compounds, especially oils, and hydrocarbons, by engines and propellers. The accidental loss of these compounds could affect the benthic habitats and communities. Considering the limited volume of pollutants and chemicals released and the dilution effect in water, no significant impacts are expected on the fishery.

As previously described in the marine habitats and biodiversity component, the emission of artificial light will mainly occur due to the presence or passage of cable-laying vessels, sea cranes, and other boats for site preparation, transport of components, and carrying out work activities, even at night. Artificial light emission within the marine habitats and biodiversity component, especially at night, could potentially negatively affect planktonic organisms and fisheries resources. However, these impacts on fishery could be mitigated by using a light intensity that complies with the requirements for maritime traffic safety, anti-glare technology, shielded lighting, and, if possible, flashing lights instead of fixed lights and "bird-friendly" lights.

Temporary and limited increases in marine traffic due to using several nautical units could occur and impact maritime navigation, which takes place within the Area of Interest. Although no significant impacts are expected on navigation, an increment in marine traffic may increase vessel traffic congestion. Nevertheless, impacts could be mitigated primarily by identifying vessel-specific routes and applying reduced speed limits (< 14 knots) to minimize and avoid any risk of collision.

Non-significant impacts (negligible to low impacts) are also expected to affect the social aspects during the **operation** phase. These non-significant effects on navigation are expected due to the presence of the cables and electrodes. These are briefly assessed below.

The presence of the cables and electrodes may have impacts on ecosystem services, specifically on fishery and navigation. The presence of offshore-anthropogenic structures may impact fishing because it will prevent fishing in the buffer of at least 200 m and the precautionary buffer of 500 m from the electrodes. In the cable-laying area, the fishery may experience limitations with fishing gear interaction with the sea bottom. If necessary, these constraints may be formalized by the competent maritime authorities.

***Marine Archaeology and Cultural Heritage***

The impact on Marine Archaeology and Cultural Heritage is expected to be non-significant (negligible to low) and related mainly to the **construction** activities***.*** Non-significant effects (negligible to low impacts), expected from handling of sediments and coverage of the seabed are briefly assessed below.

During the construction phase, due to the burial of the cables (by plunging, trenching or hydrojetting) and the electrode installation, sediment mobilization and resuspension may be expected. This may bring up underwater remains and there may therefore be a risk that work may have to be stopped because of these findings. A dedicated detailed geophysical survey will be carried out along the selected corridor in order to identify any possible obstacle to the cable laying, including wrecks and other archaeological remains. Therefore, it is expected that the seabed coverage due to underwater cable laying and electrode installation activities may cause non-significant impacts on marine archaeology and cultural heritage.

During the **operation** phase, no significant impacts are expected.

***Economy and employment***

The impact on the economy and employment is expected to be positive and related to marine **construction** activities. These effects expected from the demand for goods and services and demand for labor are briefly discussed in more detail in chapter 7.2. in "Economy and employment onshore" where improvement measures could be implemented are also described. For marine activities, it is expected that the contractors will be international. Thus, the local employment and economic benefits will be more limited compared to the onshore activities.

The impact on the economy and employment is expected to be positive due to the demand for labor for the marine activities during the **operation phase**. These potential impacts are discussed in more detail in chapter 7.2, where improvement measures that could be implemented are also described.

### *7.3.1 Preliminary assessment and mitigation measures for the potentially significant impacts*

Impact factors that may have a potentially significant effect are described here below, split into the project phases (i.e., construction and operation).

#### *7.3.1.1 Construction phase*

The impact factor that may induce potentially significant impacts during construction phase are described below.

##### 7.3.1.1.1 Handling of sediments

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Sediments and Seafloor morphology***

As previously stated, potentially significant impacts on sediments and seafloor morphology may be expected during the construction phase due to the burial of the cables (by dredging, trenching or hydrojetting) and the electrode installation. All these actions, having interactions with the seafloor, are expected to cause sediment mobilization and resuspension.

Such handling of sediments (due to the burial) can lead to the alteration of the chemical and physical features of the seafloor (e.g., dissolved oxygen concentration), as well as the variation of the sedimentation rates and nature of the sediment redeposited on the seabed (Lisi et al., 2017). In addition, in case of presence of contaminants in the sediments, such as heavy metals and hydrocarbons, the resuspension of sediments can cause the mobilization and solubilization of such contaminants. The significance (i.e., extension) of the potential impact depends on the seafloor and sediment typology, presence and nature of contaminants, hydrodynamic conditions, as well as the technique used for the laying and burial of the cables.

According to the baseline (chapter 6.1.4.1 ), the Georgian seabed is mainly characterized by fine sediments, such as sands and muds. These kinds of sediments tend to remain in suspension for a longer period (up to few hours) than coarse sediments (Oertel, 1975) and have the potentiality to reach greater distances from the impact site (several hundred meters away) (Blaas et al., 2007). Based on the desktop study carried out, contaminated sediments seem not be present in the AoI. However, their presence cannot be excluded especially because the presence of two rivers flowing close to the AoI, as well as other human activities along the coastline.

Based on such statements, the impact may be considered as limited to the area affected by the laying of the cable (with a buffer of about two hundred meters around it) and temporary (the alteration typically persist from few hours to few days) since the situation is expected to return to normal once the laying and burial works are completed.

Considering the scope of this document the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.1.4.1 and 6.1.4.3) are gathered, namely:

- Sediment grain size (e.g., clays, sands, muds, etc.);
- Sediment quality (i.e., presence of contaminants);
- Hydrodynamics (i.e., currents and waves).

In addition, the significance of the possible impact may be reduced by the implementation of mitigation measures, such as the following:

- The mobilization to be minimized by reducing the power of the digging equipment, if possible, and by using techniques mobilizing limited amounts of sediments (e.g., hydrojetting), if feasible.

***Marine Habitats and Biodiversity***

As mentioned above, potentially significant impacts (medium to high) on Marine Habitats and Biodiversity are expected during the construction activities due to the burial of the cables (by dredging, trenching or hydrojetting) and the electrode installation. These activities are expected to cause sediment mobilization and resuspension, directly influencing the marine habitat and biodiversity close to the project area.

Generally, the handling of sediments may cause displacement, suffocation and destruction of the benthic and meiobenthic communities, even leading to habitat loss and alteration of the environmental chemical-physical features (e.g., decrease in oxygen concentration and pollutants resuspension) (Lisi et al., 2017). In addition, increased stress conditions generated by sediment mobilization can lead to a reduction in filtration efficiency and photosynthetic capacity, clogging of the branchial system and alteration of foraging activity due to reduced visibility (Last et al., 2011; Szostek et al., 2013; Utne-Palm, 2002). Furthermore, the remobilised contaminants (if any) could be absorbed and bioaccumulated by zooplankton and transferred to organisms of higher trophic levels, polluting the trophic food web (Taormina et al., 2018).

The extent of these biological changes depends on several factors related to the sensitivity and resilience capability of the affected species (Taormina et al., 2018). Considering the presence of threatened and/or endemic species in the area (like the ones potentially triggering Critical Habitat described in chapter 6.1.5.3) these effects could have a greater impact on them, leading to a further deterioration of benthic habitats and additional loss of biodiversity in the area.

Given those considerations, the impact caused by the cable burial activities and the electrode installation may be consider restricted to the working area and limited in time. Regarding cables installation, the impact is expected to occur within a range of influence given by the cable width itself or the size of the materials used to stabilize and protect them (where necessary) (Wilhelmsson et al., 2010). The disturbance produced could persist for few hours or days per km of cable installed (Rees et al., 2006), after which a return to a normal condition is expected.

As previously stated, a precautionary approach was used to assess the significance of the impact. Through the collection of the primary data recommended in the baseline (chapter 6.1.5.3) this assessment could be remodeled (and possibly reduced) in the scope of the ESIA.

The primary data required are shown below:

- Survey of benthic communities along the cable route

Considering the close relationship between habitats and benthic biodiversity with the seabed features, the mitigation measures already described for Sediment and Seafloor Morphology can be considered effective for this component as well.

In addition, the impact on Marine Habitat and Biodiversity could be further mitigated by:

- Planning the cable route to avoid impacts on areas with sensitive or threatened habitats and species.

Furthermore, during both the project phases, it is highly recommended to pay particular attention to the potential Critical Habitats identified in the baseline (chapter 6.1.5.3). Critical habitats are in fact likely present in the AoI. According to WB ESS6, if Critical Habitats were to be identified by field observations, the “No Net Loss, Net Gain” criteria must be met in order to satisfy the WB ESF requirements.

#### *7.3.1.2 Operation phase*

The impact factors that may induce potentially significant impacts during operation phase are described below.

##### 7.3.1.2.1 Emission of electric, magnetic and/or electromagnetic fields and thermal radiation

The effects that this impact factor may have on the environmental and social components are shortly described below.

***Marine Habitats and Biodiversity***

As mentioned above, potentially significant impacts on marine habitats and biodiversity are expected during the operation phase due to the emission of electric, magnetic and/or electromagnetic fields and thermal radiation.

When electric energy is transported, a certain amount of this energy is lost as heat by the Joule effect, leading to an increase in temperature at the cables and electrodes surface and a subsequent warming of the immediate surrounding environment (OSPAR, 2012). Generally, this heat loss can be dissipated straight away into the seawater and dispersed away by convection and natural marine currents. Nevertheless, warm-up condition could also occur in the surrounding sediments (a few degrees Celsius), modifying the development of microorganism communities and/or bacterial activity (Taormina et al., 2018). Overall, the temperature rise should not be noticeable and the impact of the heat dissipated into the adjacent seawater and/or sediments can be judged non-significant (negligible to low) (CIGRÉ, 2017).

On the contrary, the electric, magnetic, and electromagnetic fields generated at sea by the current flowing through the cables (HVDC and return cables) and between the electrodes could potentially cause significant impacts on Georgian marine habitats and biodiversity during this phase. In fact, it is known how the presence of these fields could overlap those normally detectable from the electrosensitive (elasmobranchs, bony fish, and crustaceans) and magneto-sensitive (e.g., gastropods, crustaceans, echinoderms, elasmobranchs, bony fish and marine mammals) marine species and, consequently, interfere with their biological functions (Tricas & Gill, 2011; CIGRÉ, 2017; Taormina et al., 2018).

Electric fields generally tend to drive elasmobranchs (e.g., *Squalus acanthias* – spiny dogfish) and other fish away, preventing some movement between important areas (such as feeding, mating and nursery areas) (Taormina et al., 2018). However, attraction behaviours, such as that generated by the electric fields to the electrode anodic elements, or even no apparent reaction/disturbance, such as those observed in some bottom dwelling organisms (e.g., crabs and starfish) living directly on or close to the electrodes, can also be observed.

For what concern the magnetic fields, the more relevant field is that generated by the power cable, where the current is more "concentrated". The presence of anthropogenic magnetic fields could lead to a disorientation status, causing a change of direction (Gill et al., 2005), and an alteration of the homing behaviour. Temporary or longer deviation in swimming could especially occur during the animal's migration (e.g., harbour porpoise, common dolphin and sturgeons).

The resulting electromagnetic field (EMF) could mainly affect diadromous fish, that use natural electromagnetic fields to migrate, but also benthic and demersal species (such as whiting, sole and hake) due to their necto-benthic habits. Generally, depending on the magnitude and persistence (in both space and time) of the anthropogenic EMF, the most probable effect could be a trivial temporary change in swimming speed and direction (Westerberg & Lagenfelt, 2008). However, behavioural responses may also involve the search for the field source, active foraging behaviour in the field area and escape response (Tricas & Gill, 2011). Diadromous species may encounter EMF especially during specific periods such as the reproductive season, early life stages in shallow water nurseries or migration. Risks may exist when fish are in their early life stages or on migratory routes which take them into shallow coastal waters (Gill et al., 2012).

According to the marine habitats and biodiversity identified in the baseline (chapter 6.1.5.1), it is important to take into account the presence of migratory and endangered species, such as marine mammals and especially sturgeons, in or close the Georgian AoI. In fact, based on the desktop study carried out, these species could be the most impacted by the emission of electric, magnetic and/or electromagnetic fields. Consequently, the influence on migratory magneto-sensitive species is a key consideration and should be considered in further studies (i.e., ESIA).

Considering the purpose of this document (and the absence of some important design details (which could change the features of these fields), it should be noted that the significance of this impact is assessed using a strongly precautionary approach. However, after the gathering of the primary data recommended in the baseline (chapter 6.1.5.3), such assessment could be remodeled (and possibly reduced) in the scope of the ESIA. Primary data to be collected include:

- Habitat type and overall distribution within the Area of Interest;
- Presence and ecology of migratory electrosensitive and/or magneto-sensitive species;
- Recoverability of habitat and species;

- Importance of the habitat/species (i.e., protected status);
- Use of the area for breeding, spawning, nursery, overwintering and/or feeding.

Furthermore, during both the project phases, it is highly recommended to pay particular attention to the potential Critical Habitats identified in the baseline (chapter 6.1.5.3). Critical habitats are in fact likely present in the AoI. According to WB ESS6, if Critical Habitats were to be identified by field observations, the "No Net Loss, Net Gain" criteria must be met in order to satisfy the WB ESF requirements.

Moreover, to keep these fields as low as possible and minimise the potential effects on marine habitats and biodiversity, the following mitigation measures are suggested:

- Use Finite Element Method and/or other mathematical tools to determine possible electrode interference effects;
- Develop a proper design for power cables and electrodes;
- Decrease current density in the water to avoid effects on the marine fauna by increasing electrode surface/size and burying the cables;
- Identify a burial depth appropriate to the type of substrate and, if necessary, further increase the physical distance between animals and wires to reduce exposure of sensitive species to electromagnetic fields and heat emission.
- Keep the electric field in the seawater limited to a maximum value of 2.5 V/m for continuous operating conditions and less than 15 V/m under transient fault and short-time overload conditions. The generally accepted limit for the voltage gradient on an electrode surface, accessible to marine fauna and humans, is instead 1.25-2 V/m (CIGRÉ, 2017);
- Add sheaths and protective wiry armours in the outer layer of the electrical cables;
- Secure of the active parts of the electrode;
- Avoid breeding, spawning, nursery, overwintering and/or feeding areas.

#### *7.3.1.3 Interaction of the marine electrode with existing structures*

The effects that this impact factor may have on the environmental and social component are shortly described below.

***Infrastructures, Transport and mobility***

Potentially significant impacts on infrastructures, transport and mobility are expected during the operation phase due to the interaction of the marine electrode with existing structures present within the AoI.

The most significant problem related to the presence of marine electrode as low resistance current return path is the corrosion risk or the electrical interference with existing or new infrastructures. The potential effects of this impact are already described for the interaction of the marine electrode with onshore existing infrastructures, transport and mobility (chapter 7.2.1.2.3) and can be considered effective for the offshore impact assessment as well. However, differently from the previous assessment, the metallic structures usually affected by stray current into the water are submarine pipelines, other cables, shipwrecks, oil platforms and other large facilities such as harbour infrastructures (CIGRÉ, 2017; Sutton et al., 2017; Molfino et al., 2019). Furthermore, whilst ground pipelines may be equipped with both active and passive cathodic protection, the submarine ones may already be protected by corrosion only with passive cathodic protection (Molfino et al., 2019).

In the scope of the ESIA, it is suggested the collection of the following primary data:

- Carry out seabed surveys to identify objects at risk (including large metallic objects up to 50 km from the electrodes);
- Specific stakeholder engagement activities on this subject will have to be performed to ensure that this impact is clear to local communities and potentially impacted persons and to ensure that concerns and perceived impacts that they may have are addressed.

To reduce corrosion-related problems and mitigate potential effects on metallic underwater infrastructure, it is strongly recommended to adopt the mitigation measures already listed for the onshore impact assessment (chapter 7.2.1.2.3). In this case, the suggested models for evaluating the distribution of stray currents should be perform through the seawater and seabed layers within the zone of influence to the electrode. Moreover, the siting of the electrodes was defined taking in to account minimum separation distances from other facilities. This mitigation measure, implemented as part of the Project Design, ensures the avoidance of any interaction between the electrodes and other underwater infrastructures (reported in the table below).

*Table 7-4 – Recommended minimum separation distances between electrode and other facilities.*

| Facilities | Distance (km) |
|---|---|
| Electrical substations with grounded neutral transformers | 15 km |
| Major oil and gas pipelines | 8 km |
| Urban gas, water and sewer lines | 5 km |
| Submarine cables | 5 km |
| Concentric neutral power cables | 5 km |
| Communication cables | 3 km |
| Transmission lines | 2 km |
| Railway tracks | 2 km |
| Rural power distribution | 2 km |
| Steel wharfs | 1 km |
| Bridges | 1 km |
| Buried metal tanks | 1 km |
| Large reinforced concrete structures | 1 km |

## 7.4 Romania

### *7.4.1 Onshore area*

Similar to Georgia, an interrelation matrix crossing the main sources of potential impact and the main environmental and social components was produced to preliminarily assess the effects of the Project on the environment and the society.

The potential impacts of the Black Sea Submarine Cable Project have been classified into two levels, based on the project description and the baseline conditions:

- **Non-significant** (green in the matrix);
- **Potentially significant** (orange in the matrix).

The symbol "+" indicates the presence of a potentially positive impact.

For the impacts classified as potentially significant, a preliminary impact assessment was conducted (chapter 7.4.2) according to the methodology indicated in chapter 3.5.

Non-significant impacts are briefly discussed here below.

*Table 7-5 – Interrelation matrix between impact factors generated by the project and the onshore environmental and social components.*

| Project Phase | ONSHORE Impact Factors / ONSHORE Env. Comp.. | Air and climate | Surface and ground water | Terrestrial acoustics | Geology, geomorphology and soil | Terrestrial Habitats and Biodiversity | Legally Protected Areas and Important Areas for Biodiversity | Landscape | Infrastructures, Transport and Mobility | Population and public health | Economy and employment | Agriculture | Ecosystem services | Terrestrial Archaeology and Cultural Heritage | Land Use |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Construction phase | Consumption of water | | | | | | | | | | | | | | |
| | Emission of anthropogenic noise | | | | | | | | | | | | | | |
| | Emission of air pollutants and chemicals | | | | | | | | | | | | | | |

| Project Phase | ONSHORE Impact Factors / ONSHORE Env. Comp.. | Air and climate | Surface and ground water | Terrestrial acoustics | Geology, geomorphology and soil | Terrestrial Habitats and Biodiversity | Legally Protected Areas and Important Areas for Biodiversity | Landscape | Infrastructures, Transport and Mobility | Population and public health | Economy and employment | Agriculture | Ecosystem services | Terrestrial Archaeology and Cultural Heritage | Land Use |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Emission of dust | | | | | | | | | | | | | | |
| | Emissions of greenhouse gases | | | | | | | | | | | | | | |
| | Emission of light | | | | | | | | | | | | | | |
| | Interaction with the existing structures and new traffic flows | | | | | | | | | | | | | | |
| | Occupation of land | | | | | | | | | | | | | | |
| | Production of waste | | | | | | | | | | | | | | |
| | Removal of soil and subsoil | | | | | | | | | | | | | | |
| | Removal of vegetation | | | | | | | | | | | | | | |
| | Demand for goods and services | | | | | | | | | | + | | | | |

| Project Phase | ONSHORE Impact Factors / ONSHORE Env. Comp.. | Air and climate | Surface and ground water | Terrestrial acoustics | Geology, geomorphology and soil | Terrestrial Habitats and Biodiversity | Legally Protected Areas and Important Areas for Biodiversity | Landscape | Infrastructures, Transport and Mobility | Population and public health | Economy and employment | Agriculture | Ecosystem services | Terrestrial Archaeology and Cultural Heritage | Land Use |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Demand for labor | | | | | | | | | | + | | | | |
| | Occupational Health and Safety Risks | | | | | | | | | | | | | | |
| Operation phase | Presence of the new infrastructures | | | | | | | | | | | | | | |
| | Emission of electromagnetic fields | | | | | | | | | | | | | | |
| | Interaction of the marine electrode with existing structures (i.e., stray current emission) | | | | | | | | | | | | | | |
| | Demand for labor | | | | | | | | | | + | | | | |
| | Transfer of energy and broadband data | | | | | | | | | | + | | | | |

### *Air and climate*

Possible impacts on the air quality and climate during the Project's **construction** phase due to working activities (e.g., increase of the local traffic and heavy vehicles) may lead to a boost of air pollutant, dust and greenhouse gas emissions in the local area, as described in chapter 7.2 together with relative mitigation measures (which are also briefly reported below) .

However, no significant (negligible to low) impacts are expected on air and climate during this Project's phase as a light increase of the vehicle's number and local traffic should not affect the local air quality (chapter 7.2). A temporary reduction in air quality could be minimised by the use of properly maintained engines, even more, by the use of new engines with advanced low emission diesel technology.

During the **operational** phase, no significant impact is expected.

***Superficial and underground water***

As already reported for Georgia (chapter 7.2), during the Project's **construction** phase, the demand for freshwater and the construction of work sites may have an impact on the superficial and groundwater quality (e.g., consumption of superficial water for the cooling of machinery's systems during working activities, water usage at the Project's camp site,, drinking water for personnel, potentially contaminated surface runoff water from the campsite, etc., etc.).

However, all these activities are expected to have a non-significative (negligible to low) impact on this component when a number of mitigation measures are in place. For example, it is recommended to collect the wastewater from work sites by sewage infrastructure and treat contaminated water in wastewater treatment plants. It is also advisable to design a drainage system within the construction camp and construction facilities to collect the runoff water in order to minimize possible impacts on the local freshwater bodies.

During the **operation** phase, no significant impact is expected.

***Terrestrial acoustics***

A potentially significant increase in terrestrial acoustic climate is expected during the **construction** phase linked to site works and, particularly, to pneumatic drills and hammers, air compressors, bulldozers and trucks. However, given its potentially significance, this impact is discussed in more detail in chapter 7.4.2.

No significant impact is expected during the **operation** phase.

***Geology, geomorphology and soil***

During the **construction** phase, the impacts generated on Geology, geomorphology and soil are expected to be both non-significant (e.g., vegetation removal) and potentially significant (e.g., soil removal).

As reported for Georgia (chapter 7.2) vegetation plays a pivotal role for soil stabilization and the organic matter and nutrients cycles. Construction activities (e.g., excavation for the converter station, HVDC cable laying and HVAC transmission tower's foundations) could potentially lead to a reduction of soil quality, in addition to a terrestrial habitat fragmentation and/or loss and a removal of flora and fauna species. However, it can be expected that the removal of natural vegetation may not significantly affect this component when adopting the same mitigation measures reported for the Habitats and Biodiversity (chapter 7.4.2) in order to minimize impacts and, if possible, restore areas once the end of the works. Moreover, the Romanian AoI is characterized by a high density of cropland and grassland (i.e., highly anthropogenic, chapter 6.3.3.1) and very little habitat fragmentation is expected.

Differently from the previous impact factor, the removal of soil may generate potentially significant effects on the soil quality. This potentially significant impact is discussed in more detail in chapter 7.4.2.1.3.

During the **operation** phase, no significant impact is expected.

***Terrestrial Habitats and Biodiversity***

Both non-significant (negligible to low) and potentially significant (medium to high) impacts are expected to occur on this environmental component during the **construction phase**. Non-significant impacts are related to the consumption of water, emission of air pollutants chemicals, dust, and light, occupation of land and production of waste.

All the potential impacts reported above, their effect on the environment and/or human health and mitigation measures have been described in chapter 7.2. Some of the most important mitigation measures include the use of well-maintained, low-emission engines to minimize air pollution emission, the use of screens and shields to reduce light spills and trough suspensions of activities during ecologically sensitive periods, the creation of temporary waste storage areas to minimize contamination spills and minimal land occupation to reduce adverse effects on biodiversity.

Non-significant impacts on Habitats and Biodiversity may also occur during the **operation** phase due to the emission of electric, magnetic and/or electromagnetic fields (EMF). Biological effects of EMF have been studied across taxa. Many species (including migratory birds, fish, mammals, bats, insects and mollusks) use in fact information about the Earth's natural fields for migration, mating, food-finding, homing, nesting, and numerous other activities (Levitt et al., 2022). EMF-sensing species can be therefore impacted by unnatural (i.e., anthropogenic) electromagnetic fields (Levitt et al., 2022). The use of shielding structures made of materials such as aluminum, the burial of cables and the use of cable sheathing should however be sufficient to mitigate impacts to non-significant levels.

Although the impacts discussed above are likely not-significant, during both the Project phases, it is highly recommended to pay particular attention to the potential Critical Habitats identified in the baseline (chapter 6.3.3.2). Critical Habitats may, in fact, be potentially present in the AoI. According to WB ESS6, if Habitats were to be identified by field observations, the "No Net Loss and Net Gain" criteria must be met in order to satisfy the WB ESF requirements.

***Legally Protected Areas and Important Areas for Biodiversity***

As per the Habitats and Biodiversity component, both non-significant and potentially significant impacts are expected to occur on Legally Protected Areas and Important Areas for Biodiversity during the **construction phase**. According to the baseline (chapter 6.3.3.2), the Romanian project area (also considering the area of interest of the electrode) includes a total of 13 internationally recognized areas and Important Areas for Biodiversity. Considering the footprint of the project, the closest areas are Natural Reserves and Natura 2000 sites (Lacul Agigea; Lacul Techirghiol (SPA); Dunele Marine De La Agigea (SCI); Straja - Cumpăna (SCI)). Lacul Techirghiol is also classified as a Ramsar Site, Important Bird and Biodiversity Areas (IBA), Key Biodiversity Area (KBA) and Special Protection Area (SPA).
Non-significant impacts, which could result from consumption of water, emission of air pollutants and chemicals, dust, light, occupation of land and production of waste can be assumed to be the same as those potentially insisting on the Habitats and Biodiversity component. For this reason, please refer to the previous paragraph for a description of the potential impacts and possible mitigation measures.

Unlike the previous component, impacts potentially generated by the removal of vegetation and soil are also considered not significant. In fact, despite the presence of protected areas within the area of interest, no construction work will be carried out within Protected Areas and Important Areas for Biodiversity, and therefore, no potentially significant impact is expected.

Construction activities may also lead to potentially significant impacts due to the emission of anthropogenic noise. This impact is discussed in more detail in chapter 7.4.2.

Non-significant impacts on Legally Protected Areas and Important Areas for Biodiversity may occur during the **operation** phase due to the emission of electric, magnetic and/or electromagnetic fields (EMF) and the presence of new infrastructures. For the emission of electromagnetic fields, please refer to what already described for Habitats and Biodiversity component. As regards the presence of new infrastructures (more details in chapter 7.4.2), since it is not planned to build facilities in protected areas or areas important for biodiversity, no potentially significant impact is expected.

***Landscape***

Both non-significant and potentially significant impacts are expected to occur on this social component during the **construction** phase. Non-significant effects (negligible to low), expected from the occupation of land, the removal of soil and of subsoil and the emission of light are briefly assessed below.

In terms of occupation of land, the impact is expected to be similar to those of normal construction activities: such as the setting up of construction sites, the occupation of construction site spaces and the presence of vehicles and machinery. Some fixed construction sites are expected to be set along the up at the points where the cable duct will be installed. The cable landing site will be located immediately near to the coast, covering an area with an extension of about 60x60 m, while the construction site for the substation will occupy an area of about 400x500 m. The presence of the construction sites will therefore cause a change in the landscape context, but this impact will be temporary with effects similar to those of any construction site for civil works. These impacts can be reduced by carefully selecting the construction location, in order to limit the visibility from human receptors (e.g., from houses or from public spaces). Construction activities should be carried out carefully so to occupy soil just where strictly necessary for the construction requirements. It should also be noted that the visual impact due to construction activities will be temporary because once all the construction sites will be removed and the areas are expected to be restored to their previous condition, hence the impact will be completely reduced.

The removal of soil due to construction activities may also cause impacts from a visual standpoint, as it can cause a change in the morphology of the area and hence an alteration of the current landscape features. During construction, the removal of soil and subsoil will occur along the cable duct and where the landing and substation will be located. In terms of mitigations, care should be placed in limiting excavations only where strictly necessary and by ensuring that all construction areas are restored to the previous conditions at the end of construction.

The emission of lights during construction might have some visual impacts at nighttime, but it will be limited only to the area where construction activities are occurring. In terms of mitigation of light emissions, lights are recommended to be used only when necessary and for the time required, directing them towards the construction areas, so to avoid glare and light spills.

Whilst the part of the Project that will be built by HDD will not have any major vegetation removal and therefore no significant impacts, the burying of the remaining cable may cause the removal of vegetation and hence generate a significant effect on landscape. This potentially significant impact is discussed in more detail in chapter 7.4.2.

A significant impact on landscape derived from the presence of new infrastructures may occur during the operation phase. This impact is discussed in more detail in chapter 7.4.2.

***Infrastructures, Transport and mobility***

The impact on infrastructures, transport and mobility is expected to be non-significant (negligible to low) and related mainly to the **construction** activities. Non-significant impacts, expected from the interaction with the existing structures and new traffic flows, production of waste and consumption of water, are briefly assessed below.

With regards to interactions with existing infrastructures, the Project can cause interferences with roads and traffic during the construction phase. According to the provisional corridor (chapter 3.1.2), it is expected that, in some cases, the HVDC cable laying will cross or will be located under existing roads. This is therefore expected to cause temporary closures of roads, deviations or limitations to the use of the roads, with impacts on the normal use of the roads. In addition, the construction activities are expected to lead to an increase of traffic, particularly of trucks and heavy goods vehicles, overall affecting the normal traffic along the roads. However, a number of mitigation measures can be implemented in order to minimize any potential impact on this component. A detailed list of mitigation measures is reported in chapter 7.2, the most relevant ones being traffic regulation through traffic lights, arrangements with the municipality and authorities concerning road closures, signaling of interruption in advance, always guarantee access to private lands/houses and use of the HDD technique if the cable trench crosses important roads or railways.

The route of the cable may in some cases interfere with existing infrastructure including underground utilities (underground cables, drinking water pipes, sewage pipes) and agricultural irrigation canals. This is expected to be the case for the Romanian AoI characterized by extensive croplands. Before starting construction activities, the Proponent (GSE) should contact the operators of the various infrastructures operators to verify any overlaps between the route of the cable and the existing networks, in order to define for each specific case, the most suitable design and construction solution to avoid damage or impact on these networks. It may be necessary to temporarily interrupt the normal operations of the networks or move some sub-services. Any interruptions should be agreed upon with the operators and communicated in advance to the users so as to minimize inconvenience. In the case of more complex sub-service crossings, the use of the HDD technique will be considered, if necessary, to avoid damage or impact to existing networks. In the case of crossings of canals and irrigation ditches, temporary diversions or alternative channels should be implemented to ensure normal water flow. In some cases, short interruptions in water flow may be necessary during specific construction activities. Upon completion of construction activities, all canals and irrigation channels will be restored to their normal function. Based on these indications provided, the impacts on existing infrastructure networks are expected to be reduced.

Waste generated by land-based construction activities is expected to be limited in quantity and to consist mainly of packaging, construction waste and any materials from minor demolition. The waste produced will be managed in accordance with current Romanian regulations by authorized companies. The project should follow a circular economy approach with the objective of reducing the amount of waste sent for disposal as much as possible, favoring recycling and recovery when possible. Besides being negligible, this type of impacts could be further mitigated by reusing excavated materials on site and as said previously, the majority of waste will be destined for recovery, recycling and reuse processes. Moreover, the impact derived by the production of waste can be further reduced by selecting waste management facilities which are closest to the place of generation, so as to reduce the impact of waste transport activities.

Moreover, the construction work may cause an additional demand for water that can potentially place a burden on the existing water resource. However, it is worth emphasizing that the impact will be temporary and will be completely reduced at the end of the works, and the situation of the existing water resource will return to normal.

Significant impacts on infrastructures, transport and mobility may occur during the **operation** phase. The interaction of the marine electrode with existing structures (i.e., stray current emission) is discussed in more detail in chapter 7.4.2.

***Population and public health***

The impact on the population and public health is expected to be non-significant and related mainly to **construction** activities. Impacts are expected from the emission of anthropogenic noise, emission of pollutants and chemicals and emission of dust and are briefly assessed below.

All the impacts reported above, their effects on human health and relative mitigation measures are reported in chapter 7.2. In regard to increased anthropogenic noise, it can disrupt concentration and sleep, potentially generating long-term effects on human health Most relevant mitigation measures include avoiding unnecessary noise and night time working activities, usage of well-maintained engines and machinery.

The emission of pollutants, chemicals and dust are expected during the construction phase will mainly be due to the use of machinery and to the Project induced traffic and it can directly impact human receptors' health, causing acute and chronic illnesses, particularly the respiratory system. however, the impact will be limited in time and similar to routine civil construction work. This impact can be managed and mitigated by using low-emission fuel (low-sulfur diesel), well-maintained equipment, and vehicles that comply with atmospheric emission standards.

Significant impacts on population and public health may occur during the **operation** phase. The emission of electromagnetic fields produced by the cables and the substation might affect public health. This potentially significant impact is discussed in more detail in chapter 7.4.2.

***Economy and employment***

The positive impact on the economy and employment is expected to be related mainly to **construction** activities. The anticipated effects from the labor and goods requirements are discussed in chapter 7.2 and include local employment, goods supply and positive impact on local economy. An estimated number of workers employed during the Project’s implementation is reported in chapter 2.4.

In terms of negative impacts, the Project can lead to occupational health and safety (OHS) risks for the workers involved. These risks are generally high for infrastructure projects due to problematics associated to the involvement of a high number of workers (as it is expected in the case of this Project). In addition, OHS risks could also occur along the large supply chain, where the control over contractors and subcontractors is more complex. The risks can however be mitigated through the preparation of an OHS Management Plan and a strict enforcement of mitigation and control measures, including OHS risk assessment, strong emphasis on training of workers and frequent inspections and audits.

Positive economic and employment impacts may also occur during the **operation** phase. The demand for labor and transfer of energy and broadband have been reported in chapter 7.2.

***Agriculture***

The impact on agriculture is expected to be non-significant (negligible to low) and largely related to the **construction** activities. Impacts are expected from general water consumption and land occupation and have been extensively reported in chapter 7.2 together with a number of mitigation measures. However, since the Romanian AoI is characterized by high density of croplands, particular attention should be given to possible interferences with agricultural activities and to avoid as much as possible any competition related to the water consumption with other water uses, such as the irrigation of agricultural fields. It will be of particular importance to develop specific measures for wise water use and creating a water management plan in order to mitigate the potential impacts.

During the **operation** phase, the impact on agriculture is expected to be negligible, as the infrastructure will be underground (except for the OHL), and normal agricultural activities will essentially continue. There may be some limitations on the planting of trees. In regard to the overhead transmission line, the impact will still result limited as agricultural activity will normally continue, albeit with some limitations such as the physical obstacle of the towers, in proximity of the transmission towers. Potential impacts on agricultural activities previously occurring in the substation area are expected to be mitigated through the implementation of the Resettlement Action Plan. The residual impact is not likely to be significant if the mitigation measures are implemented robustly.

***Ecosystem services***

The impact on ecosystem services is not expected to be significant and related mainly to **construction** activities. Potential Project related impacts are anticipated on water consumption, potentially impacting freshwater fisheries, land occupation, and tourism.

The water consumption necessary for construction activities can potentially cause potential impacts on freshwater fishery during the construction phase. The withdrawal of water, particularly if taken directly from the canal, can reduce the availability of the resource and potentially affect freshwater fishery. These impacts may be more significant in dry periods when the water flow in the river is reduced. This impact can be mitigated by identifying alternative water resources that would not affect freshwater fishery activities and provide sufficient water in dry periods. It is worth emphasizing that the water demand during the construction phase is expected to be limited and that the impact will be temporary and cease at the end of the construction works. The water resource scenario will return to normal.

Regarding tourism, potential impacts on tourism activities could occur around the cable landing site. Some tourism activities have been identified along the coast of Constanta, where tourism is at its highest in the country. The cable landing site should be selected to avoid these areas. In addition, mitigation measures to reduce potential impacts on tourism could include performing construction activities during periods of the year when tourism is limited. By applying these measures, it is expected that the impacts on tourism can be significantly reduced.

During the **operation** phase, no impacts are expected.

***Terrestrial Archaeology and Cultural Heritage***

Considering the Project type and depth of excavations mainly related to the removal of soil and subsoil during **construction** activities, the impact on Terrestrial Archaeology and Cultural Heritage is expected to be non-significant (please refer to chapter 7.2 for more details).

However, a comprehensive reconnaissance of cultural and archeological sites within the corridor footprint will have to be accomplished during the ESIA process.

During the **operation** phase, no impacts are expected.

***Land Use***

Potentially significant impacts are expected to occur on this social component during the **construction** phase. Impacts are expected from the occupation of land during the construction activities which are discussed in more detail in 7.4.2.

The presence of the new infrastructures (namely the new cable and substation) and the interaction of the marine electrode with existing structures may generate potentially significant effects during the **operation** phase (if any). These potentially significant impacts are discussed in more detail in 7.4.2.

### *7.4.2 Preliminary assessment and mitigation measures for the potentially significant impacts*

Impact factors that may have a potentially significant effect are described here below, split into the project phases (i.e., construction and operation).

#### *7.4.2.1 Construction phase*

The impact factors that may induce potentially significant impacts during construction phase are described below.

##### 7.4.2.1.1 Emission of anthropogenic noise

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Terrestrial acoustics***

As already mentioned (chapter 7.2.1.1.1), potentially significant impacts (medium to high) are expected on the terrestrial acoustics during the **construction phase** mainly due to the development of the HVDC converter station, the cable landing trench and the HVDC cable laying and OHL construction.

Common sources anthropogenic noise during these working activities include pneumatic drills and hammers, air compressors, bulldozers and trucks. Anthropogenic noise emitted at frequencies that are similar to those used by animals in vocalisations may interfere with their communication, thus negatively impacting the pairing success, fitness and/or inducing physiological stress. Moreover, it can also represent a source of stress for the population (for more details, refer to 6.3.3.1, 6.4.1 and 6.4.2).

In addition, it's important to note that some anthropogenic noise could also be generated during the operation phase due to the HVDC converter station activity. The continuous noises (24h-cycle) produced by the converter station could result from a wide variety of noise-generating equipment, Therefore, based on the sound level and frequency produced by the different devices (Table 7-2), it is possible to foresee a potential interference on both the local fauna and human activities. Mitigation measure to minimize this impact are reported in chapter 7.2.1.1.1.

***Terrestrial Habitats and Biodiversity***

Anthropogenic (human-generated) noise is expected to be produced for cable's landing operations, during the construction of the HVDC converter station, the HVDC cable laying and OHL line construction. As already reported (chapter 7.2.) many species depend on sound for survival and reproductive success, and any change in the environment that prevents acoustic signals from reaching the desired receptors can negatively affect species fitness and population persistence (Barber et al., 2009). As already reported for Georguia, Because anthropogenic noise is mainly composed of frequencies in the range between 0 and 3 kHz (Skiba, 2000; Goodwin & Shriver, 2011) one of the strategies to overcome the effect of acoustic masking is to emit signals at higher frequencies (Slabbekoorn & Peet, 2003; Slabbekoorn et al., 2019). This strategy may however require a high energy expenditure, leading to negative effects on the survival and reproductive ability of individuals, increasing the risk of predation or decreasing the attractiveness of males to females. Prolonged exposures to anthropic noise can also lead to physiological stress, while exposure to acute and extreme sounds can have lethal effects through physical damage such as organ ruptures and internal bleeding (Kight & Swaddle, 2012; Slabbekoorn et al., 2019). Finally, impacts of anthropogenic noise may be grater for wintering species, given the high cost associated with the disturbance (Wiącek & Polak, 2015). Considering the proximity of the Marea Neagră, an area known to host numerous wintering bird species, particular attention should be paid to this impact factor. Nevertheless, emission of anthropogenic noise can be considered temporary and reversible, since the ambient noise is expected to return to normal once construction activities are completed. Furthermore, potential impacts could be mitigated by adopting the following **mitigation measures**:

- Select low-noise vehicles and equipment;
- Reduce noisy activities as far as practicable and limit their simultaneous occurrence;
- Perform particularly noisy activities during the day at regular times to promote the habituation of the local fauna to noise and avoid disturbances in critical hours (dusk and dawn);
- Avoid night works (from 8 pm to 6 am), as far as practicable, to reduce impacts to nocturnal species;
- Suspend or reduce activities during ecologically sensitive periods (such as wintering periods).

***Terrestrial Legally Protected Areas and Important Areas for Biodiversity***

Impacts on Legally Protected Areas and Important Areas for Biodiversity due to emission of anthropogenic noise can be considered the same as those potentially insisting on the Habitats and Biodiversity component. The mitigation measures already described in the previous section can therefore be considered effective for this component too.

##### 7.4.2.1.2 Occupation of land

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Land Use***

As previously stated, potentially significant impacts (medium to high) on land use may realize during the construction phase due to land occupation. The excavation of the ground for the cable passage and the construction of the converter station and OHL transmission towers may occupy public and private land, leading to economic and potentially physical displacement. A preliminary footprint of the onshore elements has been determined, hence it is possible that the Project will lead both to physical and economic displacement. However, during the future siting activities, the footprint of onshore elements will be defined so to avoid physical displacement to the extent possible. As indicated in the baseline sections, the onshore AoI has a generally low population density with buildings generally concentrated in villages and most of the land is used for agricultural purposes, hence a careful siting should allow avoiding physical displacement.

At the end of the construction activities, the areas where the cable duct is located will be restored and returned to their previous uses.

The significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.4.8) are gathered, namely:

- Type of occupied land (if public or private);
- If any, specific data on the physical displacement.

In addition, this impact could be managed and mitigated by adopting the following **mitigation measures**:

- Locating the Project onshore elements to avoid physical displacement and reduce economic displacement to the extent possible.
- Develop a project schedule to avoid or minimize impacts on busy periods or other events in urban areas and agricultural operations.
- Consult with authorities before construction starts to identify measures to minimize impacts as much as possible.
- Developing and implementing a Resettlement Action Plan compliant with Romanian legislation and international standards. The Plan will include determining the losses suffered by the project-affected people and the required mitigation measures, including economic or in-kind compensation. Special attention in the Plan should be placed towards vulnerable groups, to ensure that they are not disproportionately affected by land acquisition due to their status.
- If the measures mentioned above are implemented, it is expected that the Project impacts might be significantly reduced.

#### 7.4.2.1.3 Removal of soil and subsoil

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Geology, geomorphology and soil***

As mentioned above, potentially significant impacts (medium to high) on geology, geomorphology and soil are expected during the construction activities due to the development of the HVDC converter stations, the burial of the cables (by trenching) and their connection from the landing site to the HVDC station.

As a rule, the removal of soil and subsoil mainly affect the upper layer of vegetable and fertile soil, usually defined "*topsoil*", and the first 20-30 cm of underlying soil. In particular, the topsoil is characterized by the presence of numerous plants roots and living organisms, a high richness in humus, that lead this layer the most fertile, and a porous consistence, that traps air and holds more water.

Usually, soil deterioration can be chemical or physical in nature. Chemical deterioration can, for example, lead to the addition of heavy metals, fluorine and organic substances that are difficult to degrade, thereby reducing soil fertility and polluting surface water and groundwater. Otherwise, physical deterioration can result in erosion and soil compaction, causing the reduction of soil wounding, changing soil structure and blocking of important soil functions (e.g., drainage and aeration).

According to the planned project actions, the landing of the marine cables could potentially lead to a limited removal of soil and subsoil in the coastal area thanks to the use of the horizontal directional drilling (HDD) technique. The burial of the cables, generally carry out by trenching, results instead to be a more impactful activity due to the greater quantities of soil and subsoil removed and the greater alterations on soil structure and features. Nevertheless, the project action for which is foresee the greatest handling and removal of soil and subsoil turns out to be the HVDC station construction. In fact, given the significant size of the working area (about 200,000 $m^2$), the construction of the converter station will involve a wide soil occupation and, consequently, potentially significant impacts may be expected on a larger portion of soil. Furthermore, in addition to the possible alteration on soil features and quality, this project activity could also lead to a significant habitat loss and fragmentation, influencing local flora and fauna.

Generally, the soil and subsoil removed are temporarily shelved and, if considered suitable after an appropriate characterisation, reused at the end of the works in order to restore, as much as possible, the original state of the working sites. Where it is planned to bury the cable duct under existing road, not involving any removal of soil, an appropriate pavement will be reconstructed at the end of the work. Anyway, it is highly suggested to develop a proper management plan for the restoration and restoration of occupied areas.

However, it must be noted that, at this stage, no definite details are yet available neither on the techniques that will be used to burying cables nor on the path that will be carried out from the landing point to the junction site and, subsequently, from the junction site to the converter station. Besides, also the details on the exact location of the converter station are not yet defined and it is uncertain whether it will be erected inland (close to a rural area) or closer to the coastal area. Accordingly, considering both the purpose of this document and the absence of some important design details, it was preferred to adopt a strongly precautionary approach to assess the significance of this impact. Nonetheless, it is important to highlight that all currently missing information will have to be taken into account in the scope of the ESIA to properly assess the entity of this impact factor. Furthermore, such assessment could be also remodeled (and possibly reduced) after the collection of the primary data recommended in the baseline (chapter 6.3.4). Primary data to be collected include:

- Soil's structure, features and sensitivity (e.g., composition, stratification, porosity, etc.);
- Soil and subsoil quality and status (e.g., presence of contaminants, degree of stress, etc.);
- Topographic and geological analysis;
- Land use;
- Identification of geological and hydrogeological risk zones.

Potential impacts on geology, geomorphology and soil due to removal of soil and subsoil can be mitigated by adopting the following **mitigation measure**:

- Reduce the surfaces occupied and the removal of soil to the minimum necessary for the realization of the project;
- Temporary storage of the soil removed over clean surfaces (with possible laying, if necessary, above a protective cloth) and creating heaps distinguished according to the material typology (topsoil, subsoil, deep mineral layers and possible plant cover);
- Define sediment and erosion control measures;
- Reinstatement of topsoil (verifying the absence of any contamination) in the construction area to enhance, as much as possible, the natural habitat restoration;
- Properly redistribute the soil horizons in order to limit the alterations in soil characteristics and not compromise the establishment of new vegetation cover;
- Limit the set-aside soil period to the minimum necessary for carrying out the restoration (preferably within 6 months after removal) and, in case of prolonged storage, move periodically the heaps to ensure the degree of oxygenation and thus avoid their impoverishment from the point of view of fertility.

***Habitats and Biodiversity***

The removal of soil and subsoil could have an impact on terrestrial species characterized by a hiding strategy to escape predators and on the soil fauna (such as terrestrial invertebrates), adversely affecting its density and diversity (Battigelli, 2000). Soil fauna plays a variety of functional roles in soil processes. Via grazing, it controls bacterial and fungal biomass, thus liberating immobilized nutrients and stimulating further fungal and bacterial activity, as well as enhancing plant growth (Parkinson, 1988, Setälä, 1995). Furthermore, soil fauna contributes to the development of soil structure and humus formation through the deposition of fecal pellets (Pawluk, 1985, Hendrix et al., 1990). Therefore, potential impacts on soil fauna could affect soil structure and its chemical properties, the nutrient cycle, vegetation growth and ultimately herbivorous organisms (Battigelli, 2000). Impacts of removal of soil and subsoil may be grater for threatened flora species or endemic species characterized by restricted ranges (like the ones potentially triggering Critical Habitat described in 6.3.3.2). Particular attention must therefore be paid to this impact factor in areas where the presence of these species is established.

Considering the scope of this document, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.3.4) are gathered, namely:

- Field surveys of fauna and flora (e.g., freshwater fauna, birds, steppe flora species).

Potential impacts due to removal of soil and subsoil can be mitigated by adopting the following **mitigation measures**:

- Reinstatement of topsoil in the construction area to enhance natural habitat restoration;
- Define sediment and erosion control measures.

#### 7.4.2.1.4 Removal of vegetation

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Habitats and Biodiversity***

Removal of natural vegetation can cause direct habitat loss and habitat fragmentation. Flora species present in the area could be directly impacted by vegetation clearing at the beginning of construction during ground preparation works. Furthermore, fauna species with a hiding strategy to escape predators might also be accidentally killed during the construction operations. Besides direct killing, the removal of natural vegetation can cause habitat fragmentation, a process by which large and contiguous habitats get divided into smaller, isolated patches of habitats (Öckinger et al., 2010). Species with poor dispersal capacity are predicted to be more strongly affected by reduction in habitat area and connectivity (Lomolino, 1984; Öckinger et al., 2009). Conversely, species with high dispersal capacity can move between habitat patches and more efficiently utilize a fragmented resource, making them less sensitive to geographical isolation (Hanski & Ovaskainen, 2000). Removal of natural vegetation cover and soil disturbance could also facilitate the spreading of invasive alien (non-native) species accidentally introduced by cars, trucks and other heavy machinery used during construction. Invasive alien species tend to have an advantage in disturbed ecosystems, and if they penetrate into a habitat, they can potentially change its functionality and species composition, including priority biodiversity species. Impacts of removal vegetation may be grater for threatened flora species or endemic species characterized by restricted ranges (as the ones potentially triggering Critical Habitat described in 6.3.3.2). Particular attention must therefore be paid to this impact factor in areas where the presence of these species is established.

Considering the scope of this document, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.3.4) are gathered, namely:

- Field surveys of fauna and flora (e.g., freshwater fauna, birds, steppe flora species).
- Pre-construction surveys in order to identify and possibly relocate flora species;

Potential impacts due to vegetation clearing can however be mitigated by adopting the following **mitigation measures**:

- Define limits of clearing around construction areas to avoid impacts outside these areas;
- Provide specialist training to operators and key personnel involved in activities such as land clearance, materials handling and transport activities which may impact terrestrial biodiversity;
- Removal of structures and service roads built for only for construction purposes only in previously vegetated areas, to allow for vegetation recovery;
- Check of vehicles and machinery for evident foreign plant material, soil and seeds on their first entry on site;
- Develop an appropriate eradication program if spreading of invasive species is observed;
- Design the positioning of onshore works in order to remove as little natural vegetation as possible.

***Landscape***

As previously stated, potentially significant impacts (medium to high) on landscape may be expected during the construction phase due to the removal of vegetation.

During the construction phase it is expected to remove the vegetation present in the areas destined for the land installations and along the route of the cable duct and overhead line. Vegetation is one of the elements that characterises a landscape and its removal therefore alters the appearance of the visual context in which a Project is carried out.

However, the Project construction activities are expected to be generally carried out in agricultural, urbanised areas with limited permanent vegetation. The removal of vegetation will therefore mainly consist of mowing lawns or cutting back shrubs present on the edges of fields or roads crossed by the pipeline. In most cases, this is spontaneous vegetation in residual areas, therefore without any naturalistic characteristics.

However, considering the scope of this document, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.3.4) are gathered, namely

- Type of vegetation removed;
- Exact location of the Project elements.

Impacts on the land use could be mitigated by adopting the following **mitigation measures**:

- It is suggested that vegetation is removed just when strictly necessary for site requirements;
- Restoration of vegetation through grassing and replanting of removed trees or shrubs might be planned at the end of construction activities if deemed necessary.

### *7.4.2.2 Operation phase*

The impact factor that may induce potentially significant impacts during operation phase are described below.

#### 7.4.2.2.1 Presence of the new infrastructures

The effects that impact factors may have on the environmental and social component are shortly described below.

***Habitats and Biodiversity***

The presence of permanent facilities (such as the converter station) can lead to the loss of available natural habitat during the entire operation phase, that will directly and indirectly affect habitats, flora and fauna species. It is expected that the electrical substation will subtract a portion of land of approximately 200,000 m$^2$. Similar to the removal of natural vegetation, the presence of new infrastructures may cause habitat degradation, habitat fragmentation and habitat loss, making unviable areas previously colonized by faunal and floral species. Smaller habitat patches can lead to population declines (Bender et al., 1998) because resources in smaller patches may be more limited (Zanette et al., 2000). In addition, habitat sub-division can negatively affect day-to-day movements of a given species (e.g., between nesting and foraging resources; Saunders, 1980; Luck & Daily, 2003). The extent to which landscape modification results in habitat isolation depends on the interaction between a given species' habits, dispersal behavior and scale of movement (Fisher & Lindenmayer, 2007). Besides the HVDC converter station, the presence of overhead transmission lines could affect bird by increasing individuals' mortality due to collision and electrocution. Larger species are generally exposed to a greater risk of colliding with power lines due to their morphology and behavior (Janss and Ferrer, 1999). Nonetheless, potential impacts due to the presence of new infrastructures can be mitigated by adopting the following mitigation measure:

- Line marking devices (e.g., marker balls, spirals, and other hanging devices) of the earth wire is recommended to increase its visibility of the line.

***Landscape***

As previously stated, potentially significant impacts (medium to high) on landscape may be expected during the operation phase due to the presence of new infrastructures.

During operation, part of the onshore Project components (i.e., HVDC underground cable) are expected to be underground and might therefore not be visible. The construction site areas required to carry out these works will be restored to their previous conditions and therefore no visual impact of these Project elements on the landscape context is expected.

The visual impact for the onshore component is expected to be determined by the new converter station that, as said before may occupy an area of around 400x500 m, and by the overhead transmission line. These Project components are predicted to introduce new anthropic elements and will modify the current landscape context.

Considering the scope of this document, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.4.19) are gathered, namely:

- Precise location of the new converter station;
- Collection of the landscape data through pictures taken along the OHL expected corridor in order to identify potential naturalistic landscape and other relevant point of views.

Impacts on the landscape could be mitigated by adopting the following **mitigation measures**:

- All construction site areas and underground work areas are expected be restored to their previous condition;
- Siting the substation in an area as far as possible from human receptors, public spaces and recreational areas;
- Planting trees and shrubs around the Site can be useful to create a vegetation screen that reduces the visibility of the substation;
- Avoiding as much as possible to cross naturalistic (e.g., forests, proximity to monuments, etc.) landcape

***Land Use***

Potentially significant impacts on land use may be expected during the operation phase due to the presence of new infrastructures. As matter of fact, specific structures or installations cannot be built at a certain distance from the electrode connection point, therefore, permanent restrictions are expected to be placed on specific land uses (see Table in Chapter 7.3.1.3).

Considering the scope of this document, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.4.19) are gathered, namely:

- The precise location of the electrode and the substation;
- Distance from settlements;
- Typology of occupied land (if public or private).

Impacts on land use could be mitigated by adopting the following **mitigation measures**:

- Economic compensation for the restricted land may be implemented if necessary;
- A Resettlement Action Plan may be implemented to define how compensation and land acquisition have to be handled.

#### 7.4.2.2.2 Emission of electromagnetic fields

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Population and public health***

As previously stated, potentially significant impacts on population and public health may be expected during the operation phase due to the presence of emission of electromagnetic fields coming from the converter station and the cable. A possible preferential corridor has just been selected in Romania for the HVDC cable and the HVAC OHL. Based on this information, it is recommended in the scope of the ESIA, to perform a specialist study on the electromagnetic fields generated by the Project components and the identification of sensitive receptors in its proximity. Should the interference with human receptors be confirmed, specific mitigation measures indicated below may be implemented.

Considering the scope of this document, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.4.19) are gathered, namely:

- Precise location of the electrode and the substation;
- Distance from settlements and human receptors.

Impacts on population and public health could be mitigated by adopting the following mitigation measures:

- If necessary, site-specific mitigation measures will have to be implemented, including placing screen systems to reduce the magnetic field emissions.

- Specific stakeholder engagement activities on this subject will have to be performed to ensure that this impact is clear to local communities and potentially impacted persons and to ensure that concerns and perceived impacts that they may have are addressed.

#### 7.4.2.2.3 Interaction of the marine electrode with existing structures

The effects that this impact factor may have on the environmental and social component are shortly described below.

***Infrastructures, Transport and mobility***

As already mentioned, potentially significant impacts on infrastructures, transport and mobility are expected during the operation phase due to the interaction of the marine electrode with existing structures in the AoI.

Most significant problem related to the presence of marine electrode as low resistance current return path is the corrosion risk or the electrical interference with existing or new infrastructures. In fact, it is generally acknowledged that the electrical current flowing between the cathode and anode, taking the least resistance path, may occasionally cause the flow of stray current in other metallic structures, such as pipelines, large metallic structures in contact with the ground as electrical substations with grounded neutral transformers, transmission lines with grounded shield wires, communication cables, bridges, railway tracks, fences and other large facilities such as harbour infrastructures (CIGRÉ, 2017; Molfino et al., 2019). As previous stated for Georgia, the magnitude of this current will depend on the size and orientation of the metal object and the local electric field intensity, which is related to distance from the sea electrode (Sutton et al., 2017). According to corrosion risk, the most impacted infrastructures are usually the “longer” ones, where the length must be compared with the minimum distance from the electrode: in other terms, cables and pipelines (especially methane and oil pipelines due the dangerous nature of the material they carry). However, it should be noted that normally ground pipelines are already protected by corrosion with active and passive cathodic protection (Molfino et al., 2019). Despite this, if the magnitude of the current exiting the object is greater than a particular threshold, electrolytic corrosion (at the theoretical Faraday corrosion rate) and interference on AC power networks can occur (Sutton et al., 2017), causing severe damages. The problem could be even more severe if the pipe is coated with an electrically insulating material, as corrosion tends to concentrate in coating defects or damage, leading to very quick and localized pipe perforation, known as “*pitting corrosion*” (Molfino et al., 2019).

The ability to predict, assess and mitigate electrolytic corrosion issues has greatly improved due to modern modelling methods for the distribution of stray currents through the surrounding medium (Sutton et al., 2017). However, since it is not easy to model with good accuracy the evolution of corrosion on the structures in the area (depending also on widely unknown parameters), it is necessary to keep very large safety margins (Molfino et al., 2019). In particular, it is necessary keep a certain safe distance between the electrode and the onshore conversion station, since the direct current flowing through the earth could otherwise enter the transformer windings and lead to a severe magnetic core saturation (Girdinio et al., 2012).

Besides, disturbances in telecommunications circuits (e.g., railway signalling systems or telephone) and dangerous touch potentials may occur due to ground rise potentials (CIGRÉ, 2017).

Given the purpose of this document and the details of the information currently available, a strong precautionary approach was used to assess the significance of the impact caused by the interaction of the marine electrode with the existing infrastructures. However, this assessment could be remodeled (and possibly reduced) in the scope of the ESIA. In this regard, it is suggested the collection of the following primary data:

- Perform surveys to identify objects at risk (including large metallic objects up to 50 km from the electrodes);
- Existing land use or planned infrastructure.

To reduce corrosion-related problems and mitigate potential effects on metallic infrastructure, it is strongly recommended to adopt the following mitigation measures (CIGRÉ, 2017):

- Perform models for the distribution of stray currents through the soil layers;
- Use Finite Element Method and/or other mathematical tools to determine possible interference effects;
- Develop a proper design for marine electrode;
- Use of proper electrode materials to ensure a very high resistance to corrosion (Mixed Metal Oxide (MMO) coated titanium is preferred);
- Keep very wide safety margins, since the corrosion risk increases very quickly as the distance between the electrode and the potentially impacted infrastructure is reduced (Molfino et al., 2019);
- Select a suitable site for electrode installation (possibly with rapid transition to deep water and direct access to the open sea), considering a minimum distance of 10 – 15 km between the electrode site and other metallic infrastructures;
- Introduction of insulating joints;
- Add more material to sacrificial anodes;
- Provide, if possible, impressed current cathodic protection (ICCP) systems;
- Sectionalize fences or replacing steel poles with wooden poles;
- Sectionalize railway line by creating electrical isolation gaps in the railway tracks;
- Replace the metallic conductors and metallically shielded fibre optic cables with fibre optic cables having plastic shielding to reduce the disturbances in telecommunications circuits.

***Land Use***

Potentially significant impacts on land use are expected during the operation phase due to the interaction of the marine electrode with existing structures in the AoI.

As previously discussed for the Infrastructures, Transport and Mobility component, the presence of the marine electrode involves compliance with some minimum safety distances (chapter 2.2.2) necessary to avoid potential corrosion-related problems on existing or new metallic infrastructures (Molfino et al., 2019). Such safety limits could significantly affect the current land use and, especially, the development of new facility in the electrode area of influence. Moreover, existing infrastructures that might potentially be impacted by stray current will still need to be secured. Therefore, it is expected that new land use constraints will be defined in order to avoid or prevent negative interaction of the marine electrode with existing or future structures.

Given the purpose of this document and the details of the information currently available, a strong precautionary approach was used to assess the significance of the impact on land use due to the interaction of the marine electrode with the existing infrastructures. However, this assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.4.19) are gathered. Primary data to be collected include:

- Objects at corrosion risk (including large metallic objects up to 50 km from the electrodes);
- Existing land use or planned infrastructure;
- Type of occupied land (if public or private).

To reduce corrosion-related problems and mitigate potential effects on metallic infrastructure, it is strongly recommended to adopt the mitigation measures already reported for the Infrastructures, Transport and Mobility component.

## 7.5 Offshore area

Such as made for the onshore preliminary impact assessment (chapter 7.4.2) an interrelation matrix crossing the main sources of potential impact and the main environmental and social components was produced.

The potential impacts of the Black Sea Submarine Cable Project have been classified into two levels, based on the project description and the baseline conditions:

- **Non-significant** (green in the matrix);
- **Potentially significant** (orange in the matrix).

The symbol “+” indicates the presence of a potentially positive impact.

For the impacts classified as potentially significant, a preliminary impact assessment was conducted (chapter 7.5.1) according to the methodology indicated in 3.5.

Non-significant impacts are briefly discussed here below.

*Table 7-6 – Interrelation matrix between impact factors generated by the project and the offshore environmental and social components.*

| Project Phase | OFFSHORE Impact Factors / OFFSHORE Env. Components | Oceanography and seawater quality | Air and climate | Marine Acoustics | Sediments and Seafloor morphology | Marine Habitats and Biodiversity | Legally Protected Areas and Important Areas for Biodiversity | Infrastructures, Transport and mobility | Ecosystem services | Marine Archaeology and Cultural Heritage | Economy and employment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Construction phase | Coverage of the seabed | | | | | | | | | | |
| | Emission of underwater noise | | | | | | | | | | |
| | Emission of air pollutants and chemicals | | | | | | | | | | |
| | Emission of greenhouse gases | | | | | | | | | | |
| | Emission of light | | | | | | | | | | |
| | Handling of sediments | | | | | | | | | | |
| | Increase of marine traffic | | | | | | | | | | |
| | Production of waste | | | | | | | | | | |
| | Demand for goods and services | | | | | | | | | | + |
| | Demand for labor | | | | | | | | | | + |

| Project Phase | OFFSHORE Impact Factors / OFFSHORE Env. Components | Oceanography and seawater quality | Air and climate | Marine Acoustics | Sediments and Seafloor morphology | Marine Habitats and Biodiversity | Legally Protected Areas and Important Areas for Biodiversity | Infrastructures, Transport and mobility | Ecosystem services | Marine Archaeology and Cultural Heritage | Economy and employment |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Operation phase | Emission of electric, magnetic and/or electromagnetic fields and thermal radiation | | | | | | | | | | |
| | Interaction of the marine electrode with existing structures (i.e., stray current emission) | | | | | | | | | | |
| | Presence of the cables and electrodes | | | | | | | | | | |
| | Demand for labor | | | | | | | | | | + |
| | Transfer of energy and broadband data | | | | | | | | | | + |

***Oceanography and seawater quality***

The impact on oceanography and seawater quality is expected to be non-significant (negligible to low) and related mainly to the **construction** activities. The emission of chemical compounds (mainly by the vessel engines and propellers) and waste production is, in fact, expected from all the vessels mobilized for the Project. Whilst the waste production and its impacts on the seawater can be almost completely reduced by the preparation and implementation of an appropriate Waste Management Plan (chapter **Error! Reference source not found.**), a limited leakage of chemicals from the engines and propellers is a lways considered as "physiological" and inevitable, but non-significant due to its negligible amounts and the dilution power of the seawater itself. However, this could be managed and mitigated with the use of well-maintained engines and the implementation of measures, such as those provided by the Annexes I[54], IV[55] and V[56] of the International Convention for the Prevention of Pollution from Ships (MARPOL).

Besides what stated above, alterations of seawater quality may occur because of the sediment handling (i.e., dredging or hydrojetting for the cable burial at the land approach). This can cause a temporary reduction in the water clarity by the resuspension of sediments in the water column and a short-term alteration in the water chemical-physical quality (e.g., decrease in oxygen concentration, resuspension and solubilization of contaminants) (Lisi et al., 2017). Given those considerations, such alteration may be considered as non-significant and can be mitigated by reducing the power of the cable burial operations.

During the **operation** phase, only the thermal radiation due to energy dissipation along the cables and at the electrodes may affect the physical characteristics of the seawater. However, this could be considered as non-significant because balanced by the intrinsic "restoration power" of the seawater itself (i.e., convection) and it could be further mitigated by the development of properly designed and shielded cables and electrodes.

***Air and climate***

No significant impacts (negligible to low) are expected on air and climate during the **construction** phase activities. Nevertheless, the combustion of diesel engines during vessels mobilization cause dust releases, emission of gaseous atmospheric pollutants ($SO_2$ and $NO_X$) and greenhouse gases ($CO_2$, $CH_4$, $O_3$ and $N_2O$) that could cause a temporary deterioration of air quality. However, this reduction in air quality could be minimised using properly maintained engines or, even more, using new engines with advanced low emission diesel technology. It is also advisable to follow the guidelines provided by MARPOL Annex VI[57] for the application of appropriate management and prevention measures for air pollution from ships.

During the **operation** phase, no significant impact is expected.

***Marine Acoustics***

A temporary and limited increase in marine acoustic may occur during the **construction phase** due to cable laying and electrodes installation activities. Based on the activities foreseen for this project, anthropogenic underwater noise can be produced during route clearance, trenching or hydrojetting (typically with a sound source level of 178 dB re 1μPa m concentrated in the frequency range of 1 kHz to 15 kHz; Hale, 2018), backfilling and cable introduction by cable-laying vessels and other boats, sea cranes and tools used during these operations (Taormina et al., 2018). Nevertheless, it is possible to hypothesize that most of the noise will be emitted by vessels engines and propellers action (mainly by cavitation effect) as low frequency sound waves (<1 kHz, typically with a sound source level from 155 to 170 dB re 1μPa m and peaks up to 190 dB re 1μPa a meter from the source) (Richardson et al., 1995; Hale, 2018). Intensity and propagation of underwater noise will vary according to bathymetry, seafloor characteristics (e.g., sediment type and topography), vessels and machines used, and water column properties (Taormina et al., 2018). Overall, given its restricted acoustic footprint and the already presence in the

[54] MARPOL Annex I "*Regulations for the Prevention of Pollution by Oil*"

[55] MARPOL Annex IV "*Prevention of Pollution by Sewage from Ships*"

[56] MARPOL Annex V "*Prevention of Pollution by Garbage from Ships*"

[57] MARPOL Annex VI "*Prevention of Air Pollution from Ships*"

AoI of anthropogenic underwater noise sources (e.g., shipping), impact on marine acoustic climate is expected to be non-significant (negligible to low). However, minimal behavioral effects on marine mammals and fish are expected, with probably noise source avoidance behavior. Impacts on marine acoustic could be managed and mitigated avoiding, as far as possible, any type of anthropogenic noise not necessary during work activities, using well-maintained engines and machinery, favoring, where possible, anti-cavitation propellers.

No significant impacts are expected during the **operation** phase.

***Sediments and Seafloor morphology***

Both non-significant and potentially significant impacts are expected to occur on this environmental component during the **construction** phase. Non-significant effects (negligible to low impacts) are expected from the cable-laying vessels, supply vessels and any other vessel used for the cable installation. As previously stated, the engines of such boats are expected to leak negligible amounts of chemical in the seawater that may precipitate to the seabed. Besides being negligible, these types of impacts could be further mitigated using vessels compliant with MARPOL. In addition to that, however, the land approach will require the burial of the cables. Whilst the dredging (or hydrojetting) to bury the cables may cause a non-significant alteration of the seafloor morphology (which is expected to be temporary and completely restored once the cable is laid), the sediment mobilization (i.e., sediment handling) may generate potentially significant effects on the sediment quality due to the remobilizations of contaminants already present (if any). This potentially significant impact is discussed in more detail in chapter 7.5.1.

Non-significant impacts on sediments and seafloor morphology may occur during the **operation** phase. The presence of the cables and electrodes, in fact, is expected to affect a limited area of the seabed, as is expected to do their emission of electric, magnetic and/or electromagnetic fields. However, the thermal radiation due to energy dissipation from the cables and the electrodes may limitedly modify the physical and chemical proprieties of the substrate (e.g., the redox interface depth) (Taormina et al., 2018). However, considering the narrowness of the cable corridor, the expected weakness of the thermal radiation and the convection and natural marine currents capable of dissipating the generated heat into the water, the possible effects are considered non-significant. In addition, it should be mentioned that the cables will be buried, further reducing the thermal exchange and radiation.

***Marine Habitats and Biodiversity***

The impacts on marine habitats and biodiversity are expected to be both non-significant (negligible to low) and potentially significant (medium to high). Non-significant impacts, only related with the **construction phase**, might arise from coverage of the seabed, emission of underwater noise, chemicals, light and increase of marine traffic and are briefly assessed below.

Seabed coverage due to underwater cable laying and electrode installation activities, even if limited in space and time, could cause unavoidable damage and/or mortality to the benthic flora and fauna and, consequently, localised deterioration or loss of benthic habitats. In fact, motionless species that use the seabed as support might be thoroughly affected along the cable’s pathway. However, although no significant impacts are expected, it is recommended to follow the best practice to ensure that potential habitat loss is minimised throughout the proposed works (e.g., micrositing and minimising the benthic footprint of the offshore development). Overall, it is recommend avoiding to route the cable through sensitive areas populated by endangered or hard recovering species and minimizing cable movements across the surface (Ardelean & Minnebo, 2015).

As already indicated for the Marine Acoustics component, a temporary and limited increase in the underwater noise level could occur due to the **construction** and cable-laying activities, including the use of cable-laying vessels, marine cranes and other vessels for site preparation. Anthropogenic underwater noise can affect marine life in different ways (Taormina et al., 2018). Generally, the increased marine acoustic climate mainly impacts marine mammals and fish behaviour, resulting in a temporary avoidance of the area exposed to the source of noise until the end of the works and an alterations or disruptions of feeding, communications, breeding or migratory behaviour (Taormina et al., 2018). Nevertheless, it is expected that the noise emitted by the anthropogenic project-related sources (mainly vessel engines and propellers), being at low frequency (<1 kHz), should not have significantly impact neither on local ichthyofauna nor on marine mammals. In fact, based on the high (150 Hz to 160 kHz) and very high (275 Hz to 160 kHz) frequency hearing range of all three endemic Black Sea marine mammals (*Tursiops truncatus ponticus*, *Delphinus delphis ponticus* and *Phocoena phocoena relicta*) and their observed behavioural responses to continuous noise sources (Southall et al., 2019), it can be expected that the noise emitted should not overlap with the frequencies audible by marine mammals and, consequently, not cause masking effects. Furthermore, it can be expected that the potential hearing threshold shift (temporary or permanent shift) may be negligible and that the behavioural effects may be minimal (Sutton et al., 2017). However, according to the baseline, it is good to keep in mind that the Romanian AoI falls within two Important Marine Mammal Areas (IMMAs) and, therefore, is highly frequented by all the three endemic and protected species of cetaceans widespread in the Black Sea. For these reasons, it is highly recommended to refer to the ACCOBAMS "*Guidance on Underwater Noise Mitigation Measures*" to mitigate the potential impacts especially on marine mammals. Furthermore, impacts could be further mitigated by avoiding, as far as possible, any type of anthropogenic noise not necessary for work activities, using well-maintained engines and machinery, preferring, where possible, anti-cavitation propellers and adopting reduced speed limits.

The mobilisation of vessels and cranes may increase the potentially risk of emission into the sea of chemical compounds, especially oils and hydrocarbons, by engines and propellers. The accidentally loss of these compounds, that have the capacity to bind to sediment particles and bioaccumulate in organic tissues, could affect the benthic habitats and communities. However, given the strong anthropization of the coastal marine area and, in particular, the presence of the Constanța commercial port and Oil Terminal S.A., it is possible to expect a certain tolerance of benthic communities to this impact factor. Besides, a limited leakage of chemicals from the engines and propellers is always considered as "physiological" and inevitable, but non-significant due to its negligible amounts and the dilution power of the seawater itself. Impacts on marine habitats and biodiversity could be managed and mitigated by adopting the same mitigation measures already mentioned for the Oceanography and Seawater Quality component.

The emission of artificial light will mainly occur due to the presence or passage of cable-laying vessels, sea cranes and other boats for site preparation, transport of components and carrying out working activities, supposedly even at night. Lighting systems on vessels will ensure the safety of maritime navigation and the lighting required to carry out the work in the project area. Within the marine habitats and biodiversity component, it is well known how artificial light emission, especially at night time, could potentially have negative effects on planktonic organisms and fisheries resources. In fact, nocturnal lighting pollution might influence and modify planktonic migratory flows along water column and, in particular, may avoid the nocturnal feeding migration of the zooplankton at surface until the end of the light emission. On the other hand, artificial light could lead several fish species to a disorientation status, direction deviations, behavioural and feeding alterations. While some fish species are negatively affected by the presence of light, resulting more vulnerable to predation and limited in foraging activities (Sanders

& Gaston, 2018; Czarnecka et al., 2019), others are advantaged in predation dynamics (e.g., cephalopods) and in their relative success. Furthermore, the presence of lighting source could also potentially impact migratory and resident seabirds, especially those with nocturnal habits. However, these impacts on marine habitats and biodiversity could be mitigated by using a light intensity that complies with and does not exceed the requirements for maritime traffic safety, anti-glare technology, shielded lighting and, if possible, flashing lights instead of fixed lights and "bird friendly" lights.

Temporary and limited increase of marine traffic could occur within the AoI due to the use of several nautical units. Although no significant impacts are expected on marine habitats and biodiversity, an increment in marine traffic may involve an increase both in underwater acoustic climate and in the potentially risk of ship strike with marine mammals. Nevertheless, impacts could be mitigated primarily by identifying vessel-specific routes and applying reduced speed limits (<14 knots) to minimize and/or avoid any risk of collision. In addition, given the high importance of this area for all three endemic Black Sea marine mammals and their high frequency within the area, it is strongly suggested to keep on board a qualified cetacean observer (such as a Highly Qualified Marine Mammal Observer (MMO) trained according to ACCOBAMS standards) as crew member responsible for the promptly detection of marine mammals on a collision course.

Whilst the impact factors described above may produce non-significant effects on marine habitats and biodiversity, the sediment handling may on the contrary cause potentially significant impact on that component during the construction phase due to the burial of the cables (by dredging, trenching or hydrojetting) and electrodes installation. This potentially significant impact is discussed in more detail in chapter 7.5.1.

Potentially significant impacts on marine habitats and biodiversity may also occur during the **operation phase** due to the emission of electric, magnetic and/or electromagnetic fields and thermal radiation by cables and electrodes. A more detailed assessment of this potentially significant impact is described in chapter 7.5.1.

Finally, during both the project phases, it is highly recommended to pay particular attention to the potential Critical Habitats identified in the baseline (chapter 6.3.6.3). Critical Habitats may, in fact, be potentially present in the AoI. According to WB ESS6, if Critical Habitats were to be identified by field observations, the “No Net Loss and Net Gain” criteria must be met in order to satisfy the WB ESF requirements.

***Marine Legally Protected Areas and Important Areas for Biodiversity***

The impact generated on Legally Protected Areas and Important Areas for Biodiversity is expected to be non-significant (negligible to low) during the **construction phase**. According to the baseline (chapter 6.3.6.2), the AoI (also considering the area of interest of the electrode) comprises six Legally Protected Area (Natura 2000 sites) and four Important Areas for Biodiversity. The Marea Neagră site is the only Special Protected Area (SPA) identified in the Romanian offshore AoI and, due to its high biodiversity and importance for different life cycle stages (e.g., migration and overwintering), it is also classified as Important Bird and Biodiversity Areas (IBA) and Key Biodiversity Area (KBA). All the other Natura 2000 sites are instead classified as Site of Community Interest (SCI). Besides, there are other two Important Areas for Biodiversity: the Kaliakra to Danube Delta and the Western Black Sea Important Marine Mammal Areas (IMMAs).

Non-significant impacts, which could be caused by seabed coverage, emission of underwater noise, chemicals, light and increase of marine traffic can be considered the same as those that could potentially affect the Marine Habitats and Biodiversity component. Therefore, the effects of these impacts and the recommended mitigation measures already described for Marine Habitats and Biodiversity can also be considered effective for this component as well.

Unlike the previous component, the effects of sediment handling due to cable burial (by dredging, trenching or hydrojetting) and electrode installation should not significantly influence this component under consideration. Indeed, although the area of interest considered for the project will partially fall within the Legally Protected Areas and Important Areas for Biodiversity mentioned above, it will occupy a restricted area compared to their extent. Therefore, the effects generated by the handling of sediments are considered non-significant. Nevertheless, some mitigation measures are recommended, please refer to Marine Habitat and Biodiversity component mentioned below for a comprehensive picture of the impact (chapter 7.5.1).

Since the actual location of the cable's landing will be defined in the scope of the ESIA, potentially different impacts are expected on Protected Areas involved, as they are characterized by different habitat types. In particular, if the Project falls within the Capul Tuzla Marine Protected Area (SCI), it is strongly recommended to consider the presence of rocky reef-like seabed and submerged and partially submerged sea caves in the area.

During the **operation phase**, non-significant effects (negligible to low impacts) are expected on Legally Protected Areas and Important Areas for Biodiversity from the emission of electric, magnetic and/or electromagnetic fields and thermal radiation. In fact, by avoiding interference between the project actions and the Legally Protected Areas (Natura 2000 sites), the impacts generated will be negligible. However, it is possible to foresee the occurrence of minimal impacts (mainly by electric, magnetic and/or electromagnetic fields) to a limited extent in the surrounding areas, including not officially protected areas (such as IMMAs). Furthermore, the constraints arising from the presence of the marine electrode could eventually ensure greater isolation of the area from future anthropogenic impacts and improve the protection effect on transitional and marine coastal habitats. However, in order to mitigate impacts on Legally Protected Areas and Important Areas for Biodiversity, it is strongly recommended to follow the same mitigation measures mentioned below for Marine Habitats and Biodiversity (chapter 7.5.1).

***Infrastructures, Transport and mobility***

The impact on infrastructures, transport and mobility, related to the **construction** activities is expected to be non-significant (negligible to low). The non-significant impact, expected from the production of waste is briefly assessed below.

In the construction phase, a limited generation of waste is expected. It is recommended that the waste produced will be directed to the appropriate disposal and treatment destination and managed in accordance with current regulations by authorised companies.

Given those considerations, such alteration may be considered as non-significant and can be mitigated by reducing waste production to the extent possible and recycling it and recovering it as much as possible. In addition, when selecting waste management facilities, preference will be given to those closest to the place of generation, so as to reduce the impact of waste transport activities.

There is another impact on Infrastructures, Transport and mobility, which is considered significant and related to **operation** activities which is the interaction of the marine electrode with existing structures (i.e., stray current emission) discussed in more detail in chapter 7.5.1.

***Ecosystem services***

Non-significant impact is expected to occur on this component during the **construction** phase. Non-significant impacts (negligible to low) expected from seabed coverage, emission of air pollutants and chemicals, emission of light, and increased marine traffic are briefly assessed below.

The first three impacts, namely coverage of the seabed, emission of air pollutants and chemicals, and emission of light, may affect the fishery. Increased marine traffic may affect navigation.

As already described in marine habitats and biodiversity components, the seabed coverage due to underwater cable-laying and electrode installation activities, even if limited in space and time, could cause unavoidable damage and mortality to the benthic flora and fauna and, consequently, localized deterioration or loss of benthic habitats. Motionless species that use the seabed as support might be thoroughly affected along the cable's pathway, which may affect local fisheries, decreasing or impacting the quantity and type of fish caught. However, although no significant impacts are expected, following the best practice indicated previously is recommended.

The mobilization of vessels and cranes may increase the potential risk of emission into the sea of chemical compounds, especially oils, and hydrocarbons, by engines and propellers. The accidental loss of these compounds could affect the benthic habitats and communities. Considering the limited volume of pollutants and chemicals released and the dilution effect in water, no significant impacts are expected on the fishery.

As previously described in the marine habitats and biodiversity component, the emission of artificial light will mainly occur due to the presence or passage of cable-laying vessels, sea cranes, and other boats for site preparation, transport of components, and carrying out work activities, even at night. Artificial light emission within the marine habitats and biodiversity component, especially at night, could potentially negatively affect planktonic organisms and fisheries resources. However, these impacts on fishery could be mitigated by using a light intensity that complies with the requirements for maritime traffic safety, anti-glare technology, shielded lighting, and, if possible, flashing lights instead of fixed lights and "bird-friendly" lights.

Temporary and limited increases in marine traffic due to using several nautical units could occur and impact maritime navigation, which takes place within the AoI. Although no significant impacts are expected on navigation, an increment in marine traffic may increase vessel traffic congestion. Nevertheless, impacts could be mitigated primarily by identifying vessel-specific routes and applying reduced speed limits (<14 knots) to minimize and avoid any risk of collision.

Non-significant impacts (negligible to low) are also expected to affect the social aspects during the **operation** phase. These non-significant effects on navigation are expected due to the presence of the cables and electrodes. These are briefly assessed below.

The presence of the cables and electrodes may have impacts on ecosystem services, specifically on fishery and navigation. The presence of offshore-anthropogenic structures may impact fishing because it will prevent fishing in the buffer of at least 200m and the precautionary buffer of 500 m from the electrodes. In the cable-laying area, the fishery may experience limitations with fishing gear interaction with the sea bottom. If necessary, these constraints may be formalized by the competent maritime authorities.

***Marine Archaeology and Cultural Heritage***

The impact on Marine Archaeology and Cultural Heritage is expected to be non-significant (negligible to low) and related mainly to the **construction** activities**.** Non-significant effects, expected from handling of sediments and coverage of the seabed, are briefly assessed below.

During the construction phase, due to the burial of the cables (by dredging, trenching or hydrojetting) and the electrode installation, sediment mobilization and resuspension may be expected. This may bring up underwater remains and there may therefore be a risk that work may have to be stopped because of these findings. Seabed coverage due to underwater cable laying and electrode installation activities may cause non-significant impacts on marine archaeology and cultural heritage, however it may be limited in space (200 m from the electrodes) and time.

During the **operation** phase, no significant impacts are expected.

***Economy and employment***

The impact on the economy and employment is expected to be positive and non-significant (negligible to low) and related to marine **construction** activities. These effects expected from the demand for goods and services and demand for labor are briefly discussed in more detail in chapter 7.4.1 where improvement measures could be implemented are also described. For marine activities, it is expected that the contractors will be international. Thus, the local employment and economic benefits will be more limited compared to the onshore activities.

The impact on the economy and employment is expected to be non-significant (negligible to low) as well by the demand for labor for the marine activities during the **operation** phase. These potential impacts are discussed in more detail in chapter 7.4.1, where improvement measures that could be implemented are also described.

### *7.5.1 Preliminary assessment and mitigation measures for the potentially significant impacts*

Impact factors that may have a potentially significant effect are described here below, split into the project phases (i.e., construction and operation).

#### *7.5.1.1 Construction phase*

The impact factor that may induce potentially significant impacts during construction phase are described below.

##### 7.5.1.1.1 Handling of sediments

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Sediments and Seafloor morphology***

As previously stated, potentially significant impacts on sediments and seafloor morphology may be expected during the construction phase due to the burial of the cables (by dredging, trenching or hydrojetting) and the electrode installation. All these actions, having interactions with the seafloor, are expected to cause sediment mobilization and resuspension.

Such handling of sediments (due to the burial) can lead to the alteration of the chemical and physical features of the seafloor (e.g., dissolved oxygen concentration), as well as the variation of the sedimentation rates and nature of the sediment redeposited on the seabed (Lisi et al., 2017). In addition, in case of presence of contaminants in the sediments, such as heavy metals and hydrocarbons, the resuspension of sediments can cause the mobilization and solubilization of such contaminants. The significance (i.e., extension) of the potential impact depends on the seafloor and sediment typology, presence and nature of contaminants, hydrodynamic conditions, as well as the technique used for the laying and burial of the cables.

According to the baseline (chapter 6.3.5.1), the Romanian seabed is mainly characterized by mixed and fine sediments, such as sands and muds, but also by natural and artificial infralittoral hard substrates. These kinds of sediments tend to remain in suspension for a longer period (up to few hours) than coarse sediments (Oertel, 1975) and have the potentiality to reach greater distances from the impact site (several hundred meters away) (Blaas et al., 2007). Based on the desktop study carried out, contaminated sediments seem not be present in the AoI. However, their occurrence cannot be excluded given the presence in the area of interest of the Danube – Black Sea Canal, which flows from Cernavodă (on the Danube River) to Constanța, and other human activities along the coastline (e.g., Constanța port).

Based on such statements, the impact may be considered as limited to the area affected by the laying of the cable (with a buffer of about two hundred meters around it) and temporary (the alteration typically persist from few hours to few days) since the situation is expected to return to normal once the laying and burial works are completed.

Considering the scope of this document, the significance of this impact is assessed using a strongly precautionary approach. Such assessment could be remodeled (and possibly reduced) in the scope of the ESIA once the primary data recommended in the baseline (chapter 6.3.5.1 and 6.3.5.3) are gathered, namely:

- Sediment grain size (e.g., clays, sands, muds, etc.);
- Sediment quality (i.e., presence of contaminants);
- Hydrodynamics (i.e., currents and waves).

In addition, the significance of the possible impact may be reduced by the implementation of **mitigation measures**, such as the following.

- The mobilization to be minimized by reducing the power of the digging equipment, if possible, and by using techniques mobilizing limited amounts of sediments (e.g., hydrojetting), if feasible.

***Marine Habitats and Biodiversity***

As mentioned above, potentially significant impacts (medium to high) on Marine Habitats and Biodiversity are expected during the construction activities due to the burial of the cables (by dredging, trenching or hydrojetting) and the electrode installation. These activities are expected to cause sediment mobilization and resuspension, directly influencing the marine habitat and biodiversity close to the project area.

Generally, the handling of sediments may cause displacement, suffocation and destruction of the benthic and meiobenthic communities, even leading to habitat loss and alteration of the environmental chemical-physical features (e.g., decrease in oxygen concentration and pollutants resuspension) (Lisi et al., 2017). In addition, increased stress conditions generated by sediment mobilization can lead to a reduction in filtration efficiency and photosynthetic capacity, clogging of the branchial system and alteration of foraging activity due to reduced visibility (Last et al., 2011; Szostek et al., 2013; Utne-Palm, 2002). Furthermore, the remobilised contaminants (if any) could be absorbed and bioaccumulated by zooplankton and transferred to organisms of higher trophic levels, polluting the trophic food web (Taormina et al., 2018).

The extent of these biological changes depends on several factors related to the sensitivity and resilience capability of the affected species (Taormina et al., 2018). Considering the presence of threatened and/or endemic species in the area (like the ones potentially triggering Critical Habitat described in 6.3.6.3) these effects could have a greater impact on them, leading to a further deterioration of benthic habitats and additional loss of biodiversity in the area.

Given those considerations, the impact caused by the cable burial activities and the electrode installation may be consider restricted to the working area and limited in time. Regarding cables installation, the impact is expected to occur within a range of influence given by the cable width itself or the size of the materials used to stabilize and protect them (where necessary) (Wilhelmsson et al., 2010). The disturbance produced could persist for few hours or days per km of cable installed (Rees et al., 2006), after which a return to a normal condition is expected.

As previously stated, a precautionary approach was used to assess the significance of the impact. Through the collection of the primary data recommended in the baseline (chapter 6.3.7), this assessment could be remodeled (and possibly reduced) in the scope of the ESIA.

The primary data required are shown below:

- Survey of benthic communities and habitats (especially habitat of priority community interest) along the cable route and close to the landing point.

Considering the close relationship between habitats and benthic biodiversity with the seabed features, the **mitigation measures** already described for Sediment and Seafloor Morphology can be considered effective for this component as well.

In addition, the impact on Marine Habitat and Biodiversity could be further mitigated by:

- Planning the cable route to avoid impacts on areas with sensitive or threatened habitats and species.

Furthermore, during both the project phases, it is highly recommended to pay particular attention to the potential Critical Habitats identified in the baseline (chapter 6.3.6.3). Critical habitats are in fact likely present in the AoI. According to WB ESS6, if Critical Habitats were to be identified by field observations, the “No Net Loss, Net Gain” criteria must be met in order to satisfy the WB ESF requirements.

#### *7.5.1.2 Operation phase*

The impact factor that may induce potentially significant impacts during operation phase are described below.

### 7.5.1.2.1 Emission of electric, magnetic and/or electromagnetic fields and thermal radiation

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Marine Habitats and Biodiversity***

As mentioned above, potentially significant impacts (medium to high) on marine habitats and biodiversity are expected during the operation phase due to the emission of electric, magnetic and/or electromagnetic fields and thermal radiation.

When electric energy is transported, a certain amount of this energy is lost as heat by the Joule effect, leading to an increase in temperature at the cables and electrodes surface and a subsequent warming of the immediate surrounding environment (OSPAR, 2012). Generally, this heat loss can be dissipated straight away into the seawater and dispersed away by convection and natural marine currents. Nevertheless, warm-up condition could also occur in the surrounding sediments (a few degrees Celsius), modifying the development of microorganism communities and/or bacterial activity (Taormina et al., 2018). Overall, the temperature rise should not be noticeable and the impact of the heat dissipated into the adjacent seawater and/or sediments can be judged non-significant (negligible to low) (CIGRÉ, 2017).

On the contrary, the electric, magnetic, and electromagnetic fields generated at sea by the current flowing through the cables (HVDC and return cables) and between the electrodes could potentially cause significant impacts on Romanian marine habitats and biodiversity during this phase. In fact, it is known how the presence of these fields could overlap those normally detectable from the electrosensitive (elasmobranchs, bony fish, and crustaceans) and magneto-sensitive (e.g., gastropods, crustaceans, echinoderms, elasmobranchs, bony fish and marine mammals) marine species and, consequently, interfere with their biological functions (Tricas & Gill, 2011; CIGRÉ, 2017; Taormina et al., 2018).

Electric fields generally tend to drive elasmobranchs (e.g., *Squalus acanthias* – spiny dogfish) and other fish away, preventing some movement between important areas (such as feeding, mating and nursery areas) (Taormina et al., 2018). However, attraction behaviours, such as that generated by the electric fields to the electrode anodic elements, or even no apparent reaction/disturbance, such as those observed in some bottom dwelling organisms (e.g., crabs and starfish) living directly on or close to the electrodes, can also be observed.

For what concern the magnetic fields, the more relevant field is that generated by the power cable, where the current is more "concentrated". The presence of anthropogenic magnetic fields could lead to a disorientation status, causing a change of direction (Gill et al., 2005), and an alteration of the homing behaviour. Temporary or longer deviation in swimming could especially occur during animal's migration (e.g., harbour porpoise, common dolphin and sturgeon).

The resulting electromagnetic field (EMF) could mainly affect diadromous fish, that use natural electromagnetic fields to migrate, but also benthic and demersal species (such as whiting, sole and hake) due to their necto-benthic habits. Generally, depending on the magnitude and persistence (in both space and time) of the anthropogenic EMF, the most probable effect could be a trivial temporary change in swimming speed and direction (Westerberg & Lagenfelt, 2008). However, behavioural responses may also involve the search for the field source, active foraging behaviour in the field area and escape response (Tricas & Gill, 2011). Diadromous species may encounter EMF especially during specific periods such as the reproductive season, early life stages in shallow water nurseries or migration. Risks may exist when fish are in their early life stages or on migratory routes which take them into shallow coastal waters (Gill et al.,2012).

According to the marine habitats and biodiversity identified in the baseline (chapter 6.3.6.1) it is important to take into account the presence of migratory and endangered species, such as marine mammals and especially sturgeons, in or close the Romanian AoI. In fact, based on the desktop study carried out, these species could be the most impacted by the emission of electric, magnetic and/or electromagnetic fields. Consequently, the influence on migratory magneto-sensitive species is a key consideration and should be considered in further studies (i.e., ESIA).

Considering the purpose of this document and the absence of some important design details (which could change the features of these fields), it should be noted that the significance of this impact is assessed using a strongly precautionary approach. However, after the gathering of the primary data recommended in the baseline (chapter 6.3.7), such assessment could be remodeled (and possibly reduced) in the scope of the ESIA. Primary data to be collected include:

- Habitat type and overall distribution within the area of interest;
- Presence and ecology of migratory electrosensitive and/or magneto-sensitive species;
- Recoverability of habitat and species;
- Importance of the habitat/species (i.e., protected status);
- Use of the area for breeding, spawning, nursery, overwintering and/or feeding.

Furthermore, during both the project phases, it is highly recommended to pay particular attention to the potential Critical Habitats identified in the baseline (chapter 6.3.6.3). Critical habitats are in fact likely present in the AoI. According to WB ESS6, if Critical Habitats were to be identified by field observations, the “No Net Loss, Net Gain” criteria must be met in order to satisfy the WB ESF requirements.

Moreover, to keep these fields as low as possible and minimise the potential effects on marine habitats and biodiversity, the following mitigation measures are suggested:

- Use Finite Element Method and/or other mathematical tools to determine possible electrode interference effects;
- Develop a proper design for power cables and electrodes;
- Decrease current density in the water to avoid effects on the marine fauna by increasing electrode surface/size and burying the cables;
- Identify a burial depth appropriate to the type of substrate and, if necessary, further increase the physical distance between animals and wires to reduce exposure of sensitive species to electromagnetic fields and heat emission.
- Keep the electric field in the seawater limited to a maximum value of 2.5 V/m for continuous operating conditions and less than 15 V/m under transient fault and short-time overload conditions. The generally accepted limit for the voltage gradient on an electrode surface, accessible to marine fauna and humans, is instead 1.25 - 2 V/m (CIGRÉ, 2017);
- Add sheaths and protective wiry armours in the outer layer of the electrical cables;
- Secure of the active parts of the electrode;
- Avoid breeding, spawning, nursery, overwintering and/or feeding areas.

#### 7.5.1.2.2 Interaction of the marine electrode with existing structures

Here below the effects that this impact factor may have on the environmental and social component are shortly described.

***Infrastructures, Transport and mobility***

Potentially significant impacts on infrastructures, transport and mobility are expected during the operation phase due to the interaction of the marine electrode with existing structures in the AoI.

As already stated, the most significant problem related to the presence of marine electrode as low resistance current return path is the corrosion risk or the electrical interference with existing or new infrastructures. The potential effects of this impact are already described for the interaction of the marine electrode with onshore existing infrastructures, transport and mobility (chapter 6.4.6) and can be considered effective for the offshore impact assessment as well. However, differently from the previous assessment, the metallic structures usually affected by stray current into the water are submarine pipelines, other cables, ship wrecks, oil platforms and other large facilities such as harbour infrastructures (CIGRÉ, 2017; Sutton et al., 2017; Molfino et al., 2019). Furthermore, whilst ground pipelines may be equipped with both active and passive cathodic protection, the submarine ones may already be protected by corrosion only with passive cathodic protection (Molfino et al., 2019).

Additionally, among the expected effects, there is also the potentially superposition between the DC magnetic field generated by the current flowing through the electrode line (and through the sea) and the earth magnetic field (Kimbark, 1971; Uhlmann, 1975). This overlap, generally limited to a relatively narrow area around the electrodes (and the cables), may in fact interfere with the magnetic compass reading and, therefore, affect the safety of navigation. However, nowadays the navigation is commonly based on other tools, insensitive to magnetic field, such as gyroscopic compass and GNSS (Global Navigation Satellite System), and, therefore, this impact can be considered negligible.

In the scope of the ESIA, it is suggested the collection of the following primary data:

- Carry out seabed surveys to identify objects at risk (including large metallic objects up to 50 km from the electrodes);
- Specific stakeholder engagement activities on this subject will have to be performed to ensure that this impact is clear to local communities and potentially impacted persons and to ensure that concerns and perceived impacts that they may have will be addressed.

To reduce corrosion-related problems and mitigate potential effects on metallic underwater infrastructure, it is strongly recommended to adopt the mitigation measures already listed for the onshore impact assessment (chapter 7.4.1). In this case, the suggested models for evaluating the distribution of stray currents should be perform through the seawater and seabed layers within the zone of influence to the electrode.

## 7.6 Potential Project-Related Hazards

In the scope of the Project, a number of mild to serious accidents can occur. These accidents, as described in the methodology section, have been grouped into 6 major categories reported in the table below.

*Table 7-7 – Potential Project-related hazards*

| Hazard Category | Event |
|---|---|
| **Antropoghenic Hazards** | Sabotage |
| | Vandalism |
| | Thefts |
| | Terrorist attack |
| | Strikes/demonstrations |
| | Shipping accidents |
| | Road transport accidents |
| | Fire accidents |
| **Technological Hazards** | No data network |
| | Lack of communications |
| | Lack of energy |
| | Mechanical failures |
| | Random failures / breakages |
| | High and/or low temperature and pressure |
| **Natural Hazards** | Floods |
| | Strong wind |
| | landslides |
| | Lightning |
| | Earthquake |
| | Tsunami |
| | wildfires |
| | Marine slides |
| **Environnemental Hazards** | Dumps into the sea |
| | Flora impact |
| | Fauna impact |
| | Soil and/or subsoil and aquifer contamination |
| | Flammable chemicals |
| | Toxic chemicals |
| | Carcinogenic chemicals |
| | Corrosive |
| | Chemicals dangerous for the environment |

| Hazard Category | Event |
|---|---|
| **Health and Safety Hazards** | Electrocution |
| | Electrical Burns |
| | Falls |
| | Indirect Accidents (due to Power Surges, Voltage Induced by Nearby Lines) |
| | Fatality |

# 8 STAKEHOLDER ENGAGEMENT DURING THE SCOPING STAGE

## 8.1 Approach to stakeholder identification and engagement

ESS10 requires the Project proponents to provide the affected communities with access to relevant and understandable information about the Project and to provide them with opportunities to express their views on the Project implementation and possible risks and impacts.

Comprehensive stakeholder identification is a crucial component of an effective and robust stakeholder engagement process. Accurate stakeholder identification reduces the risk of flaws in the stakeholder engagement process due to a lack of stakeholder representation. A broader stakeholder base will limit the risk for a narrow stakeholder group to dominate the consultation process. Stakeholder identification is an ongoing process, and thus stakeholders will continue to be identified during different stages of the Project.

Accordingly, it provides a mechanism for stakeholders to be engaged during all phases of the Project in order to address the needs of different stakeholders and stakeholder groups. The main elements of the approach to stakeholder engagement used for the preparation of the current report are described in this section. Chapter 8.2 describes the process by which various stakeholders have been identified based on the information collected during the Environmental and Social Screening Study (document C2011431); chapter 8.3 reports the preliminary results of the stakeholder engagement held during the Scoping process and discusses the ways in which stakeholders can provide feedback to the Project.

It must be taken into account that this represents a **preliminary** stakeholder engagement, preparatory to the most comprehensive one undertaken in the scope of the ESIA.

## 8.2 Preliminary Stakeholder Identification and Engagement

### *8.2.1 Georgia*

It is important to identify the Project's stakeholders and understand how they may be affected, so that engagement can be tailored to inform them and appropriately address their views and concerns. Stakeholders with an interest or an influence in the Project have been identified in several ways, which include:

- Drawing on the local knowledge of in-country environmental and social consultants;
- Desktop research including reviews of previous ESIAs for relevant (by type or location) previous projects;

- Preliminary identification of anticipated impacts and potential receptors; and
- Stakeholders identified during the Environmental and Social Screening.

In addition, stakeholder engagement activities also help to identify and engage additional stakeholders and stakeholder groups.

With particular regard to Georgia, due to the project's complexity, GSE, that has already developed a Stakeholder Engagement Plana at this stage, conducted a series of in-person and on-line meetings and consultations with the relevant state stakeholders from the initial stages of the Feasibility studies. The primary purpose of the meetings, as further described in the following section, was the provision of information about the project (content, route, risks, etc.), identification of constraints and involvement of the experts in selection and decision-making process.

Involvement and active participation of the state organizations during the desktop studies and in the joint field visit before completion of the Environmental and Social Screening Report and the Project routing studies resulted in avoidance and proper assessment of the real and potential risks related to the various environmental and social subjects – overlying with the Kolkheti National Park with other protected areas and planned large-scale infrastructure project, disturbing the local population and having a negative impact on them, interrupt operating of existing on-shore facilities and off-shore objects, etc.

<u>Several state and non-governmental organizations have been involved in the meetings (online and in-person) and site visit, namely:</u>

1) The Ministry of Environmental Protection and Agriculture; Representatives participated in both - in-person and on-line meetings but the awareness in-person meetings with the Ministry's respective personnel started in January 2023. Consultations still are ongoing;
2) LEPL National Environmental Agency; Representatives participated in both - in-person and on-line meetings but the awareness in-person meetings with the Agency's respective personnel started in January 2023. Consultations still are ongoing;
3) LEPL National Agency of Protected Areas; Representatives participated in both - in-person and on-line meetings but the awareness in-person meetings with the Agency 's respective personnel started in January 2023. Consultations still are ongoing;
4) LEPL Anaklia Deep Water Port Development Agency; Representatives participated only in on-line meeting but the awareness in-person meetings with the Ministry's respective personnel started in 2022. Close collaboration and consultations still are ongoing;
5) LEPL Maritime Transport Agency; Representatives participated in both - in-person and on-line meetings but the awareness in-person meetings with the Agency's respective personnel started in January 2023. Close collaboration and consultations still are ongoing;
6) LEPL State Hydrographic Service of Georgia; Representatives participated in both - in-person and on-line meetings but the awareness in-person meetings with the Agency 's respective personnel started in January 2023;
7) Government of Samegrelo and Zemo Svaneti (Zugdidi and Tsalenjikha Municipalities); Representatives participated in both - in-person and on-line meetings;

8) Border Police of Georgia of the Ministry of Internal Affairs; Representatives participated only in on-line meeting but the awareness in-person meetings with the Ministry's respective personnel started in January 2023;

9) Operational-Technical Agency of Georgia. Representatives participated in both - in-person and on-line meetings but the awareness in-person meetings with the Agency 's respective personnel started in January 2023;

10) Commission of Communications of Georgia – as the project considers construction of digital cable, in-person meetings began in 2022 and the representative participated in the on-line meeting;

11) Protected Areas Policy Division; representatives participated in in on-line meeting;

12) Chief Executive Officer at Telecom 1 LLC; representatives participated in in on-line meeting;

13) Representative of the Coast Guard. Representatives participated in on-line meeting.

Finally, the Ministry of Economy and Sustainable Development did not participate in the mentioned meetings, however, communication with the Ministry goes through the Government of Georgia.

Following the in-person and online meetings with state stakeholders, the public and non-governmental ones were identified.

When planning engagement activities, it can be helpful to group stakeholders based on common interests and characteristics. As such, the Project uses a number of "stakeholder categories" to help structure engagement activities.

Georgian stakeholder categories include:

- Civil society (e.g., Non-governmental organisations (NGOs), academic and scientific organisations, etc.);
- Media (e.g, social and traditional media);
- Workers & trade unions;
- Contractors, suppliers and business partners;
- Businesses (e.g., businesses and business associations);
- Local community (e.g., potentially affected groups such as fisherman, coastal population etc).

An initial identification of stakeholders and their organization in categories are provided in Table 8-1; stakeholders are categorized in three tiers with more specific levels of detail. However, further ESIA activities will allow having a deeper understanding of the specific stakeholders in each category. As previously described, stakeholder identification and mapping is a continuous process that will go ahead during the entire Project lifecycle, in order to have a full stakeholder mapping, which will be kept updated during the Project lifecycle.

*Table 8-1 – Preliminary stakeholder identification – Georgia.*

| Stakeholder categories | | |
|---|---|---|
| ***I Level*** | ***II Level*** | ***III Level*** |
| Institutions | Government | Tsalenjikha municipality |
| | | Zugdidi Municipality |
| | | Samegrelo-Zemo Svaneti region |
| | | Georgian National Government |
| | | Ministry of Environmental Protection and Agriculture |
| | | Ministry of Economy and Sustainable Development |
| | | Türkiye and Romania National Governments |
| | Security forces | Local Police |
| | | National Police |
| | | Border Police of Georgia of the Ministry of Internal Affairs |
| | | Transnational Security Forces |
| | Authorities and Control Bodies | Local and Regional Authorities and Control Bodies |
| | | LEPL National Environmental Agency |
| | | LEPL National Agency of Protected Areas |
| | | LEPL Maritime Transport Agency |
| | | LEPL Anaklia Deep Water Port Development Agency |
| | | LEPL State Hydrographic Service of Georgia |
| | | Operational-Technical Agency of Georgia |
| | | Transnational Authorities and Control Bodies |
| Civil society | Political Groups | Local Political Groups |
| | | National Political Groups |

| Stakeholder categories | | |
|---|---|---|
| *I Level* | *II Level* | *III Level* |
| | Organizations/NGO/Associations for Social and Local Development | Local Organizations/NGO/Associations for Social and Local Development |
| | | National Organizations/NGO/Associations for Social and Local Development |
| | | International Organizations/NGO/Associations for Social and Local Development |
| | Organizations/NGO/Associations for Environment Protection | Local Organizations/NGO/Associations for Environment Protection |
| | | National Organizations/NGO/Associations for Environment Protection |
| | | International Organizations/NGO/Associations for Environment Protection |
| | University and Research Centres | University |
| | | National Research Centres |
| | | International Research Centres |
| | Professional associations | Local professional association |
| | | National professional association |
| | Religious Authorities | Local Religious Authorities |
| | | International / National Religious Autorities |
| Media | Social Media | Social Media that reach the local public in the area of influence |
| | | Social Media that reach a national public |
| | | Social Media that reach an international public |
| | Traditional Media | Traditional Media that reach the local public in the area of influence |
| | | Traditional Media that reach a national public |
| | | Traditional Media that reach an international public |
| Workers & trade unions | Company Workers | Company Workers |
| | Trade Unions | Local Trade Unions |
| | | National Trade Unions |
| | | International Trade Unions |

| Stakeholder categories | | |
|---|---|---|
| ***I Level*** | ***II Level*** | ***III Level*** |
| Contractors, suppliers and business partners | Contractors and Suppliers | Local Contractors and Suppliers |
| | | National Contractors and Suppliers |
| | | International Contractors and Suppliers |
| Businesses | Chamber of commerce | Chamber of commerce |
| | Business Associations | Local Business Associations |
| | | National Business Associations |
| | | International Business Associations |
| | Companies | Company located in the Area of Influence |
| | | Company located outside the Area of Influence |
| | | Tourism and accommodation businessed in Anaklia |
| Local community | Potentially affected groups | Internally Displaced Persons |
| | | Project Affected Persons |
| | | Fishermen |
| | | Vulnerable groups |
| | | Local communities in the AoI |

### *8.2.2 Romania*

Similar to Georgia, also for the Romania there has been a site visit involving the state organization responsible for electricity in Romania which is Transelectrica, the Romanian Transmission and System Operator (TSO).

The site visit is further described in the following section. As for Georgia, an initial identification of stakeholders and their organization in categories are provided in Table 8-2 where different groups for each category are reported.

Romania stakeholder categories include:

- Civil society (e.g., Non-governmental organisations (NGOs), academic and scientific organisations, etc.);
- Media (e.g, social and traditional media);
- Workers & trade unions;
- Contractors, suppliers and business partners;

- Businesses (e.g., businesses and business associations);
- Local community (e.g., potentially affected groups such as fisherman, Vulnerable groups etc).

*Table 8-2 – Preliminary stakeho–der identification - Romania.*

| Stakeholder categories | | |
|---|---|---|
| ***I Level*** | ***II Level*** | ***III Level*** |
| Institutions | Government | Constata, Medgidia and Oras Murfatlar Municipalities |
| | | Constata County |
| | | Romania National Government |
| | | Türkiye and Georgia National Governments |
| | Security forces | Local Police |
| | | National Police |
| | | Transnational Security Forces |
| | Authorities and Control Bodies | Local and Regional Authorities and Control Bodies |
| | | National Authorities and Control Bodies |
| | | Transnational Authorities and Control Bodies |
| Civil society | Political Groups | Local Political Groups |
| | | National Political Groups |
| | Organizations/NGO/Associations for Social and Local Development | Local Organizations/NGO/Associations for Social and Local Development |
| | | National Organizations/NGO/Associations for Social and Local Development |
| | | International Organizations/NGO/Associations for Social and Local Development |
| | Organizations/NGO/Associations for Environment Protection | Local Organizations/NGO/Associations for Environment Protection |
| | | National Organizations/NGO/Associations for Environment Protection |
| | | International Organizations/NGO/Associations for Environment Protection |
| | University and Research Centres | University |
| | | National Research Centres |
| | | International Research Centres |
| | Professional associations | Local professional association |

| Stakeholder categories | | |
|---|---|---|
| ***I Level*** | ***II Level*** | ***III Level*** |
| | | National professional association |
| | Religious Authorities | Local Religious Authorities |
| | | International / National Religious Autorities |
| Media | Social Media | Social Media that reach the local public in the area of influence |
| | | Social Media that reach a national public |
| | | Social Media that reach an international public |
| | Traditional Media | Traditional Media that reach the local public in the area of influence |
| | | Traditional Media that reach a national public |
| | | Traditional Media that reach an international public |
| Workers & trade unions | Company Workers | Company Workers |
| | Trade Unions | Local Trade Unions |
| | | National Trade Unions |
| | | International Trade Unions |
| Contractors, suppliers and business partners | Contractors and Suppliers | Local Contractors and Suppliers |
| | | National Contractors and Suppliers |
| | | International Contractors and Suppliers |
| Businesses | Chamber of commerce | Chamber of commerce |
| | Business Associations | Local Business Associations |
| | | National Business Associations |
| | | International Business Associations |
| | Companies | Company located in the Area of Influence |
| | | Company located outside the Area of Influence |
| | | Tourism and accommodation businesses in Constata |
| Local community | Potentially affected groups | Project Affected Persons |
| | | Fishermen |
| | | Vulnerable groups |
| | | Local communities in the AoI |

## 8.3 Preliminary Stakeholder Engagement Activities and Results

### *8.3.1 Georgia*

#### *8.3.1.1 Engagement activities with local authorities and with the general public*

During the Scoping process, GSE provided the State Stakeholders engagement with clear information about the Project and its potential impacts to allow them to provide feedbacks and potential issues to be addressed.

The on-line meetings with State and non-governmental stakeholders occurred on the 1st of March 2023. In-person meetings with State stakeholders occurred during the site visit at Anaklia on the 3rd of April 2023, during which Georgian State and GSE representatives met with representatives of the Italian consulting company CESI.


*Figure 8-1- in-person meeting held by the Georgian State Electrosystem (GSE) and Italian consulting company CESI with Georgian State Agencies.*


*Figure 8-2 Official site visit at Anaklia by representatives of the Italian consulting company CESI together with GSE and Georgian Government representatives.*

The Project was welcomed by all State Institutions and no particular concerns were expressed during the meetings.

Nevertheless, some of the Project-related aspects should still be taken into consideration; these aspects are:

- The protection of cultural heritage objects (if present in proximity of the potential Project component corridors);
- Ensuring that the Project does not affect commercial fishing activity;
- Ensuring that appropriate measures are taken to guarantee navigational health and safety, and to respond to emergency or unplanned events;
- Appropriate measures to manage waste generated by the Project;
- The local population in Zugdidi and Tsalenjikha Municipalities may express some concerns related to the construction of an overhead transmission line between Anaklia and Jvari;
- The presence of a Protected Area – the Kolkheti National Park – whose boundaries are located close to the Project footprint and in some cases may be included in the Project Area of Influence (Project footprint buffer);
- The close proximity to Anaklia Port, whose deep-sea construction is starting soon.

Considering the above-mentioned Project's related concerns, particular focus was given to the local community that could have been mostly affected by the Project, such as fisherman and fishing associations.

#### 8.3.1.2 *Interviews to public, non-governmental organizations and local authorities*

Targeted engagement activities were performed during the preparation of the present report; the activities involved representative stakeholders at the local level and had the overall aim of informing them about the Project, collecting their feedback in terms of concerns and expectations and retrieving primary baseline information.

The activities in this phase were aimed at the following categories of stakeholders:

- Local authorities and agencies;
- Local NGO;
- Representatives of fishermen communities.

The stakeholders to be involved were identified based on the previous mapping performed. A questionnaire was prepared with an outline of aspects to be covered during the meetings and questions to be asked; different questionnaires were prepared for each category. In addition, a Project presentation was used during the meetings, to provide participants with basic Project information.

Stakeholders were met in-person during a field visit in Anaklia performed by local consultants in the period between the 23rd and 26th of September 2023.

The following stakeholders were involved during these activities:

- One NGO: Nefa Community Foundation;
- One representative of a local Political Party;
- One representative of a State Agency: The Environmental Protection Division (EPD);
- Three representatives of fishermen communities,

The key comments obtained by stakeholders during the Scoping are reported in Table **8-3** below.

Among the positive aspects of the Project implementation, stakeholders report the increase of employment opportunities, enhanced recognition of the region and improved internet quality. Among the negative aspects of the Project implementations, the stakeholder’s main concerns are related to potential environmental impacts.

Complete interviews are reported in Annex 3 of the present report.

*Table 8-3 – Preliminary stakeholder engagement-Georgia*

| Stakeholder Categories and Preliminary Engagement | | | |
|---|---|---|---|
| ***Categories*** | ***Description*** | ***General overview of the Project by Respondents*** | |
| | | Positive aspects | Negative aspects |
| Civil society: NGO | **Nefa Community Foundation**. Operating in the Samgrelo-Zemo Svaneti region, the NCF (Nefa Community Foundation) focuses on women's empowerment and gender equality in rural areas. Since 2013, they've partnered with UN Women and the Taso Foundation, working on initiatives like Community Philanthropy, Economic Strengthening, and raising awareness about domestic violence. Through close ties with local governance, they advocate for the inclusion of community needs in local planning and budgeting | Employment Opportunities. | Possible environmental impact |
| | | Improved internet quality. | Safety Hazards |
| | | Enhanced recognition of the region. | Potential social repercussions. (further details on possible social impacts would be beneficial.) |
| | | Strengthening of economic growth | Possible environmental impact, particularly on local fish populations |
| | | Optimal utilization of the strategic ’ocation | The project's long-term sustainability and potential influence from the country's political situation on its execution. |
| Civil society: Political Groups | The responded is a Local Leader of a Political Party / Lawer | Improved internet quality | Potential impact on the environment, including water bodies and biodiversity |
| | | Strengthening ties with Europe. | |
| | | Generating transit revenues to boost the country's economy | |
| State Agency: The Environmental Protection Division (EPD) | **EPD**. The Agency patrols the Black Sea coast (Including Area near Anaklia), combating unauthorized fishing, addressing pollution, and related activities | Improved internet quality. | No concerns |
| | | Employment Opportunities | |
| | | Generating transit revenues | |
| | The responded is a local fisherman, local fishing activity (between 1 and 5 km>) from the | No specific expectations, generally positive expectation | No Concerns |

| Stakeholder Categories and Preliminary Engagement | | | |
|---|---|---|---|
| ***Categories*** | ***Description*** | ***General overview of the Project by Respondents*** | |
| | | Positive aspects | Negative aspects |
| Local community: Fisherman | shoreline. Main catch is mullet anchovies and barabulya | | |
| | The responded is a local fisherman, local fishing activity (between 1 and 5 km>) from the shoreline. Main catch is mullet, anchovies, herring and barabulya | New Jobs / Employment Opportunities | |
| | | Development of the Village (Anaklia) | |
| | The responded is a local fisherman, local fishing activity (between 1 and 5 km>) from the shoreline. Main catch is mullet, anchovies and barabulya | No Expectations at this stage of the project | No Concerns |

### 8.3.2 Romania

#### 8.3.2.1 In-person meetings with State Stakeholders

In Romania the meeting with local State stakeholders was carried out by GSE and CESI representatives during the site visit on the Romanian side. The stakeholders were representatives of the Transelectrica, the Romanian Transmission and System Operator (TSO, a state-owned company), which plays a key role in the Romanian electricity market.

Figure 8-3- in-person meeting held by the Romanian TSO (Transelectrica) and Italian consulting company CESI

#### 8.3.2.2 Interviews to public, non-governmental organizations and local authorities

Targeted engagement activities were performed during the preparation of the present report; the activities involved representative stakeholders at the local level and had the overall aim of informing them about the Project, collecting their feedback in terms of concerns and expectations and retrieving primary baseline information.

The activities in this phase were aimed at the following categories of stakeholders:

- Local authorities and agencies;
- Local NGO;
- Representatives of fishermen communities.

The stakeholders to be involved were identified based on the previous mapping performed. A questionnaire was prepared with an outline of aspects to be covered during the meetings and questions to be asked; different questionnaires were prepared for each category. In addition, a Project presentation was used during the meetings, to provide participants with basic Project information.

Stakeholders were contacted on-line by local consultants and the interviews were performed in the period between the 10th and 16th of October 2023.

The following stakeholders were involved during these activities:

- Three NGO/Fisherman Associations: Associatia Pescados, Associatia Olimpus, Associatia Grindul Lupilor, Federatia Romfish;
- The Mayor of Techirghiol and Tuzla;
- Three representatives of local fishermen communities.

The key comments obtained by stakeholders during the Scoping are reported in Table 8-4, below.

The main expectation of the interviewed stakeholders about the Project implementation is to be beneficial for Romania in terms of lowering the price of energy down, while the main concerns are related to the disturbances of the wildlife and possible temporary disruption of fishing activities/ causalities in wildlife.

The majority of the stakeholders are positive about the Project, however, but also a significant share of them is neutral, with Romfish Federation not expressing an opinion as they would like to have more information on the Project.

Complete interviews are reported in Annex 4 of the present report.

*Table 8-4: Preliminary stakeholder engagement-Romania*

| Stakeholder Categories and Preliminary Engagement | | | |
|---|---|---|---|
| ***Categories*** | ***Description*** | ***General overview of the Project by Respondents*** | |
| | | Positive aspects | Negative aspects |
| Civil society: NGO/fisherman associations | **Associatia Pescados** | Employment Opportunities | Interruption of fishing activity during the Project implementation period |
| | **Associatia Olimpus.** | Enhanced recognition of the region | No concerns |
| | **Associatia Grindul Lupilor** | To be beneficial for Romania in terms of cheap energy | Restriction/interruption of fishing activities |
| | **Federatia Romfish** | A part of the profit to be distributed to fishing activities | Potential impacts on biodiversity |
| | | | Restriction of fishing activities |
| Civil society: Mayor | The responded is the Mayor of Techirghiol | To create profitability through energy independence | Potential impact on the biodiversity |
| | | | Potential impact on marine protected areas |
| | The responded is the Mayor of Tuzla | To be beneficial for Romania in terms of cheap energy | No concerns |
| Local community: Fishermen | The responded is a local fisherman, site fishing activity (<1 km) from the shoreline. Main catch is gobies, baboon fish, anchovies | To be beneficial for Romania in terms of cheap energy | Potential impacts on sea organisms |
| | The responded is a local fisherman, regional fishing activity (> 5 km) from the shoreline. Main catch is mullet, anchovies, herring and horse mackerel | To be beneficial for Romania in terms of cheap energy | Potential impacts on sea organisms |
| | | | |
| | | To be beneficial for Romania in terms of cheap energy | Potential impacts on sea organisms |

| Stakeholder Categories and Preliminary Engagement | | | |
|---|---|---|---|
| ***Categories*** | ***Description*** | ***General overview of the Project by Respondents*** | |
| | | Positive aspects | Negative aspects |
| | The responded is a local fisherman, regional fishing activity (> 5 km) from the shoreline. Main catch is horse mackerel, gray mullet, bluefish, turbot, shark, anchovies | General positive view of the Project | Potential impacts on biodiversity |

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## 10 LIST OF ANNEXES

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# Georgia - Romania Electric and Digital Interconnection Feasibility Study
# SubTask 2.6 – ESIA Scoping Report

## Annex 1
## Georgia & Romania National Legislation

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# 1 GEORGIAN RELEVANT ENVIRONMENTAL AND SOCIAL LEGISLATION

There also are other key laws and requirements that will apply to the onshore segment of the Black Sea Submarine Power and Digital Interconnection project. These laws and requirements are:

- **Law of Georgia on Environment Protection** (adopted on 10.12.1996, last amended on 05.07.2018, 360.000.000.05.001.000.184). The law establishes the main principles of environmental protection. Provisions of the law that are relevant to the project include environmental management, licensing, standards, environmental impact assessment, ecosystem protection, protected areas, and biodiversity. The ESIA includes mitigation measures that are designed, in part, to ensure the project meets the requirements of this Law.
- **Law of Georgia on Environmental Assessment Code** (adopted on 01.06.2017). This Code aims to promote the protection of the environment, human life and/or health, cultural heritage and material assets, in the implementation of strategic documents or activities which may have significant effects on the environment, human life and/or health. The objectives of this code includes: (1) determining the rights and obligations of persons carrying out activities and ensure public access to information on all likely effects of the implementation of strategic activities, and (2) applying standards of best international practice in the implementation of environmental assessment procedures to prevent, reduce or mitigate adverse effects on the environment, human health and safety, cultural heritage and material assets. Finally, the code determines the procedures which shall be carried out in the case of transboundary impacts.
- **Law of Georgia on Licenses and Permits** (adopted on 24.06.2005, last amended on 31.10.2018). This Law regulates activities which may result an increased hazard to human life or health, involve interests of importance to the State or public, or are connected to consumption of State resources. The Law defines the full list of activities which require licenses and permits, and sets out the rules for granting, amending and abolishing licenses and permits.
- **Law of Georgia on Water** (adopted on 26.10.1997, last amended on 20.07.2018). The purpose of this law is to create legal foundations for water resources management in the country, which ensure the protection of water resources for implementation of a unified state policy in the field of citizens' access to clean water The Law includes the use and protection of both surface and underground water. Project developer is obliged to prepare technical project for extraction of water from any surface water body, which shall be agreed with and approved by the Ministry of Environment and Agriculture of Georgia.
- **Law of Georgia on Air Quality** (adopted on 27.07.2018, Appendix II of Resolution №383 and Resolution N17 - about approval of the environmental technical regulations 2014). The Law encompasses both the WHO and EU's Directives (2008/50/EC, 2004/107/EC) in a series of amendments which set out a regulatory framework and ambient air quality standards.
- **Law of Georgia on Soil Protection** (adopted on 12.05.1994, last amended on 07.12.2017). This law is intended to ensure preservation of soil integrity and improve soil fertility.
- **Law of Georgia on Protection of Atmospheric Air** (adopted on 22.06.1999, last amended on 05.07.2018). This law prohibits human activities that affect air quality from causing a negative impact on human health or the environment.

- **Forest Code of Georgia** (adopted on 22/05/2020). This Code regulates legal relations related to forest management. The purpose of this Code is:

a) To conserve the biodiversity of the forest of Georgia, and, in order for the environmental, social and economic functions of forest to be performed, to preserve and improve its qualitative properties, and the quantitative and qualitative characteristics of forest resources;

b) To preserve the original natural and cultural environment of forest, including the vegetation cover and animal world, and natural and cultural property located in forest, and rare and endangered plant species and other assets for future generations and to ensure the harmonised regulation of their interrelation;

c) To ensure targeted and rational use of forest resources and other natural potential of forest;

d) To determine the main principles of forest management which shall become the basis for sustainable forest management.

- **Law of Georgia on the System of Protected Areas** (adopted on 07.03.1996, last amended on 20.07.2018). The law establishes categories of protected areas and defines activities that are permissible within the boundaries of such areas.

- **Law of Georgia on “Red List” and “Red Book” of Georgia** (adopted on 06.06.2003, last amended on 20.07.2018). This law establishes the rules for compiling and maintaining the Red List and Red Book of Georgia, which identify endangered species of wild animals and plants that are found in Georgia. This law prohibits taking or causing significant effects on listed species and their habitats.

- **Law of Georgia on Wildlife** (adopted on 25.12.1996, last amended on 20.07.2018). The main goal of this law is to protect and restore wildlife as well as their habitats, including ensuring maintenance of species diversity and genetic resources, and general protection of wildlife, including in situ and ex situ conservation, translocation, and reproduction of wildlife, and the production of wildlife products.

- **Waste Management Code** (adopted on 26.12.2014, last amended on 05.07.2018). This Code establishes the legal framework for the management of hazardous and non-hazardous wastes, including minimizing waste generation and maximizing reuse and recycling.

- Although the **Georgian environmental legislation** covers all main components that shall be considered during the project different phases (pre-construction, during-construction, operation and decommissioning), it **does not specify marine and submarine studies and construction projects.** Therefore, **all involved processes – study, construction, operation, maintenance and decommissioning processes shall comply with the good internationally applicable standards/practices and monitoring of the processes shall be implemented accordingly.**

- **Fishing in Georgia is regulated by the Governmental Resolution of Georgia No. 423** (December 31, 2013) which determines the next: in the territorial waters of the Black Sea and the continental shelf, fishing is prohibited from May 1 to July 1. During this period, it is only possible to collect mollusks with diving equipment or other devices and catch mullet-pilengas with a fishing net. Fishing of the marine mammals and the fishes (sturgeon, salmon and others), also Crustaceans included in the "Red List" of Georgia are prohibited during the entire year.

- **Law of Georgia on Cultural Heritage** (adopted on 08.05.2007, last amended on 20.07.2020). This law sets “compulsory conditions for the implementation of large-scale earth works”, which would include all type of earth moving works.

- **Law of Georgia on Public Health** (adopted on 27.06.2007, last amended on 14.11.2018). The law establishes rights and obligations related to public health, including the prevention of contagious diseases. To ensure a healthy environment, the Ministry of Labor, Health and Social Affairs of Georgia establishes environmental quality standards with which the project must comply, including maximum permissible concentrations and exposure limits for contaminants in air, water, soil, noise, and electromagnetic radiation. The Ministry also is responsible for monitoring compliance with the standards.

- **Labor Code of Georgia** (adopted on 17.12.2010, last amended on 30.11.2018). Administered primarily by the Ministry of Health, Labour and Social Affairs, this law regulates labor relations between workers and employers. It requires fair reimbursement and the creation of safe and healthy working conditions. The law includes a number of provisions relevant to the project, including employment guarantees, working time, government social insurance, benefits and pensions, age, internal labor regulations (i.e., human resources manual), and occupational health and safety. If the contractor employs expatriate workers, those persons have the same rights and obligations as citizens of Georgia. The law prohibits discrimination based on color, race, sex, sexual orientation, handicap, religion, political and social status, and other personal characteristics. In addition to the Labor Code, other laws concern risks to workers from specific hazards, such as the Act on HIV Infection / AIDS and the Act on Tobacco Control.

  The Labor Code of Georgia defines the minimum age of the employees as 14 years. Employees under 18 years of age are not allowed to undertake certain jobs, as defined in the Code, and there are limits on working hours for workers between 14 and 18. For this project, GSE will prohibit the contractor from employing anyone under 18 years old.

- **Law of Georgia on the Procedure for Expropriation of Property for Necessary Public Needs (adopted 23.07. 1999, last amended 29.06.2018).** Georgia has the constitutional power to seize any property from registered owners by means of expropriation for projects of imminent public necessity. The decision is made only through a Regional Court that must be preceded by the Decree of Minister of Economy and Sustainable Development of Georgia, justifying the imminent nature of the public necessity. The court decision must include a description of the property to be expropriated and an instruction on the necessity to pay due compensation. The expropriator (in this case, GSE) has to make every reasonable effort to acquire property by negotiation and is required to value the property at fair market value (at its own expense) before negotiations. GSE does not intend to expropriate any land unless all other attempts to reach agreement fail and the line cannot be routed to avoid disputed land. The Resettlement Policy Framework will guide development of a more detailed Resettlement Action Plan, which will provide procedures for negotiations to reach agreement, losses for which compensation will be paid, and the means by which compensation will be paid.

- **Law of Georgia on Payment of Substitute Land Reclamation Cost and Damages in Allocating Farmland for Non-Farming Purposes (adopted 02.10.1997, last amended 20.07.2018).** This law establishes requirements for compensating the country and affected private landowners and users for property loss, plus lost profits by the beneficiary, of an allocation of agricultural land for non-agricultural purposes. In the event that agricultural land is taken out of agricultural use, the law requires that a land replacement fee be paid to cover costs of agricultural land of equivalent size and quality, and that the owner/user of such land be fully compensated for damages. This law will apply when GSE acquires agricultural land for towers, tower foundations, and the substation, and also will apply if agricultural land or crops are damaged during construction or maintenance activities. The Resettlement Policy Framework will guide compensation for impacts on agricultural land.

- **Law of Georgia on Occupational Safety (adopted 07.03.2018, last amended 22.12.2018,).** This new law defines basic requirements and general principles of occupational safety for jobs that are dangerous, hard, harmful, and/or hazardous. The above-mentioned activities are listed in the ordinance of government of Georgia #381. The activities related to civil construction, such as construction of electrical distribution facilities and works related to provision of electricity and telecommunications are considered as dangerous, hard, harmful, and/or hazardous activities. This law would apply to contractors and supervising engineers, and to GSE employees who visit project locations during construction and/or operation.

  The law imposes a general obligation on employers to provide employees with a safe and healthy working environment and to inform workers of the potential risks their jobs may present to their health and safety. Measures that must be taken include, but are not limited to, training and information campaigns as well as adoption of relevant preventive measures. The law includes requirements for organizing and managing health and safety programs, providing emergency care and services, and responding to accidents. Other requirements include controlling access to hazardous workplaces, providing personal protective equipment at no charge to workers, and medical examinations.

- **Land Ownership.** The project implementation will require resettlement and restriction of land use under the easement; therefore, the legislation bases for the resettlement and land ownership registration is important. Main governmental institutions involved in the land registration processes are presented below.

- **Public registry.** The governmental office in charge of official registration of land ownership is the National Agency of Public Registry (NAPR). NAPR is also in charge of property transfer through purchase agreement from landowners to the GSE. Previously operating Municipality (Rayon) Archives are now transferred into the possession of Municipal Registration Offices of the NAPR and information is registered and stored in a centralized database. Municipality Archives are used for cross-verification of ownership documentation and validity of physical possession of land by persons seeking registration as legalizable owners. If valid registration in the NAPR database does not exist, the Archives can be used to prove the rights of for a particular land parcel and historical documentation can be used for legal registration.

- **Property Rights Recognition Commission.**_Under the Law of Georgia on Recognition of the Property Ownership Rights Regarding the Land Plots Owned/Used by Physical Persons or Legal Entities (2007), the Government of Georgia has established the Property Rights Recognition Commission (PRRC) at the municipal level for recognition of ownership rights of owners/users for registration. PRRC verifies and authorizes application of ownership for registration with the NAPR. PRRC authorizes application of only those interested persons, who are not registered but have non-agricultural or agricultural plots adjacent to the parcel where the applicant lives.

In cases when the project is important for public and state, and the landowner refuses to accept resettlement or compensation, the law of Georgia on “Procedure for the Expropriation of Property for Necessary Public Social Needs” can be used as last resort, as described above.

- Also, there is a series of other **ordinances, including specific to on-shore high-voltage transmission lines,** that shall be taken into consideration as a guideline during development of the project.

- Several key elements of the Ordinance of Government of Georgia №366, on “**Establishment of protection rules and protection zones for linear constructions of power grid”** will have far-reaching effects on the final design and construction of the project. The purpose is to facilitate the uninterrupted functioning of the power grid, ensure safe operations, meet sanitary and safety norms, and prevent accidents. Key standards include parameters for protective zones (distances, width, clearances), access roads, rights-of-way (ROWs) in forests and other treed/vegetated areas, conditions for locating/constructing buildings (other facilities) and conducting works in these buffer areas.
  A key requirement of this ordinance is to require a safety zone for the 500kV OHL ROW that extends at least 30 meters beyond the conductor (wire) on each side of a tower. This safety zone will therefore be 74.5 meters wide: 30 meters on each side plus the 14.5 meters between the outermost conductors.

*Table 1 Table summarizing Project related Georgian National Laws and/or regulations*

| Year of enforcement of law | Name of law | Registration code | Latest version |
|---|---|---|---|
| 1994 | Law of Georgia on Soil Protection | 370.010.000.05.001.000.080 | 05/11/2021 |
| 1994 | Law of Georgia On Roads | 310.090.000.05.001.000.089 | 28/07/2020 |
| 1995 | Constitution of Georgia | 010.010.000.01.001.000.116 | 29/06/2020 |
| 1996 | Law of Georgia on Environmental Protection | 360.000.000.05.001.000.184 | 28/06/2023 |
| 1997 | Law of Georgia on Wildlife | 410.000.000.05.001.000.186 | 30/06/2023 |
| 1997 | Law of Georgia on Water | 400.000.000.05.001.000.253 | 20/07/2023 |
| 1997 | Maritime Code of Georgia | 400.010.020.05.001.000.212 | 13/06/2023 |
| 1999 | Law of Georgia on Ambient Air Protection | 420.000.000.05.001.000.595 | 06/07/2023 |
| 2000 | The Forest Code of Georgia | 390.000.000.05.001.000.599 | 28/07/2020 |
| 1999 | Law of Georgia on Compensation for Damage Caused by Hazardous Substances | 040.160.050.05.001.000.671 | 12/03/2021 |
| 2003 | Law of Georgia on the Red List and the Red Data Book | 360.060.000.05.001.001.297 | 30/06/2023 |
| 2003 | Law of Georgia on About soil conservation and fertility restoration-improvement | 370.010.000.05.001.001.274 | 20/07/2023 |
| 2005 | Law of Georgia on Licenses and Permits | 300.310.000.05.001.001.914 | 27/12/2022 |

| | | | |
|---|---|---|---|
| 2006 | Amendments to the Law of Georgia "On Regulation and Engineering Protection of the Sea, Water Bodies and River Banks of Georgia" | 400010010.05.001.016296 | 28/07/2020 |
| 2007 | Law of Georgia on Public Health | 470.000.000.05.001.002.920 | 20/07/2023 |
| 2007 | Law of Georgia on Cultural Heritage | 450.030.000.05.001.002.815 | 30/06/2023 |
| 2014 | Law of Georgia on Public Safety | 140070000.05.001.017468 | 11/07/2018 |
| 2014 | Waste Management Code | 360160000.05.001.017608 | 30/06/2023 |
| 2017 | Environmental Assessment Code | 360160000.05.001.018492 | 30/06.023 |

| Law | Date |
|---|---|
| Law on protection of plants from harmful organisms | 12. 10. 1994 |
| Law On the System of Protected Areas | 07. 01. 1996 |
| Law on Normative acts | 29. 10. 1996 |
| Law on Wildlife | 26. 12. 1996 |
| Law of Georgia on Ecological Examination | 01. 01. 1997 |
| Law on Environmental Permits | 01. 01. 1997 |
| Law on Creation and Management of Protected Areas of Kolkheti | 09. 12. 1998 |
| Law on About the Protection of Plants from Harmful Organisms Ammendments | 16. 04. 1999 |
| Forest Code | 22. 06. 1999 |
| National Environmental Action Plan of Georgia | 19. 06. 2000 |
| Law on Land Melioration | 16. 10. 2000 |
| Law on the special protection of the green plants and the state forest on the borders of the city of Tbilisi and in the surrounding area | 10. 11. 2000 |
| Law on Borjom-Kharagauli National Park | 28. 03. 2001 |
| Law on The State Control of Environmental Protection | 23. 06. 2005 |

| Date of enforcement | Name of normative document | Registration code |
|---|---|---|
| 31/12/2013 | Technical regulations - „On Approval of Technical Regulations for Calculating Threshold Limit Values of Emission of Harmful Substances into the Ambient Air“ Government of Georgia, Ordinance No. 408 | 300160070.10.003.017622 |
| 31/12/2013 | Technical regulations - "About the water protection zone", Government of Georgia, Ordinance No. 440. | 300160070.10.003.017640 |
| 31/12/2013 | Technical regulation- "The instrumental method of determining the actual amount of emission from stationary sources of pollution into the ambient air, the standard list of special measuring and control equipment for determining the actual amount of emission | 300160070.10.003.017660 |

| | | |
|---|---|---|
| | from stationary sources of pollution into the ambient air, and the reporting methodology of the actual amount of emission into the ambient air from the stationary sources of pollution according to the technological processes" Government of Georgia , Ordinance No. 435 | |
| 03/01/2014 | Technical regulation- "On the protection of atmospheric air in adverse meteorological conditions “Government of Georgia, Ordinance No. 8 | 300160070.10.003.017603 |
| 06/01/2014 | Technical regulation - "Methodology of inventory of stationary sources of atmospheric air pollution" Government of Georgia, Ordinance No. 42 | 300160070.10.003.017588 |
| 14/01/2014 | The technical regulation - "Methodology for determining (calculating) the damage caused to the environment" Government of Georgia, Ordinance No. 54 | 300160070.10.003.017673 |
| 15/01/2014 | Technical regulation - "On the maximum permissible concentrations of harmful substances in the air of the working zone" Government of Georgia, Ordinance No. 70 | 300160070.10.003.017688 |
| 17/02/2015 | "Rule of implementation of state control by the environmental supervision department of the state sub-agency institution of the Ministry of Environment and Natural Resources Protection of Georgia". Government of Georgia, Ordinance No. 61 | 040030000.10.003.018446 |
| 04/08/2015 | Technical regulation - "Rules for reviewing and agreeing on the company's waste management plan“. The Ministry of Environment and Natural Resources Protection of Georgia, Order of the Minister No. 211 | 360160000.22.023.016334 |
| 17/08/2015 | Technical regulation - "On determining and classifying the list of waste according to types and characteristics". Government of Georgia, Ordinance No. 426 | 300230000.10.003.018812 |
| 11/08/2015 | "On the form and content of waste accounting production, implementation of reporting Government of Georgia, Ordinance No. 422 (August 11, 2015, Tbilisi) | 360100000.10.003.018808 |
| 29/03/2016 | Technical Regulation of the "Waste Transportation Rules" Government of Georgia, Ordinance No. 143 (March 29, 2016, Tbilisi) | 300160070.10.003.019208 |
| 29/03/2016 | Government of Georgia, Ordinance No. 144 (March 29, 2016, Tbilisi) "On the rules and conditions for registration of waste collection, transportation, pretreatment and temporary storage“ | 360160000.10.003.019209 |
| 29/03/2016 | Government of Georgia, Ordinance No. 145 (March 29, 2016, Tbilisi) "On Approval of Technical Regulations on Special Requirements for Hazardous Waste Collection and Processing" | 360160000.10.003.019210 |
| 1/04/2016 | Government of Georgia, Ordinance No. 159 (April 1, 2016, Tbilisi) "On the procedure for collecting and processing municipal waste" | 300160070.10.003.019224 |
| 15/08/2017 | Technical regulation- "On acoustic noise norms in the premises and territories of residential houses and public/public institutions" Government of Georgia, Ordinance No. 398. | 300160070.10.003.020107 |

## 2 ROMANIAN RELEVANT ENVIRONMENTAL AND SOCIAL LEGISLATION

Law no. 255/2010 regarding the expropriation for public utility required for developments of national, county and local interest (the "Law") was published in the Official Gazette no. 813 of November 17th 011 – Part I.

It provides for the type of works/investments considered as being of public utility and it includes elements related to the electricity networks and transformation stations.

The Law has suffered several modifications and one of them, in 2011, established that within 20 (twenty) calendar days as of the date of the notification issued by the expropriator, the owners of the expropriated properties must be present at the expropriator's headquarters in order to decide the level of the compensation.

The expropriation decision is issued and is effective even if the owners of the expropriated properties do not comply with the abovementioned term, don't have a valid title or are unknown. The same will apply for unopened succession/unknown successors or in case there is no agreement regarding the level of compensation.

Regarding the compensation, it must be "prior and fair", as mentioned in the law and the Expropriator is proposing an amount as compensation. This principle requires the expropriator the obligation to fully cover the damages suffered by the landlord and the other holders of the real rights over property subject to expropriation. If the expropriated person is not content with the proposed compensation, he may address to the Court. When calculating the amount of compensations, the experts and the court will take into account the price used for selling buildings of the same kind in the administrative-territorial unit, at the date of the report, and also the damage brought to the owner, depending on the case, to the other entitled persons, taking into account the presented evidence. However, the compensation established by the Court may not be less than the one offered by the Expropriator or higher than the amount requested by the expropriated person.

The specialized literature shows that in practice the expropriation is rarely disputed. In the absence of an agreement between the parties, the court determines the method for the payment of compensation, a term which cannot exceed 30 days from the date of the final judgment.

The expropriation cannot be suspended by invoking the existence of disputes.

With respect to Health and safety, the provisions in force related to health protection are set by *Order no. 119/2014 for the approval of the Norms of hygiene and public health regarding the living environment of the population*.

The Order defines as "protected territory" a territory in which it is not allowed to exceed the maximum allowable concentrations for physical, chemical, and biological pollutants from environmental factors; it includes residential areas, parks, nature reserves, areas of balneo-climatic interest, rest and recreation, social-cultural, educational, and medical institutions. The "sanitary protection zone" is represented by the land around the objective where any use or activity that could lead to pollution/contamination of environmental factors with repercussions on the health of the resident population in the immediate vicinity of the objective is prohibited.

The minimum sanitary protection distances between the protected territories and the perimeter of the units that cause discomfort and risks to the human health include predefined distances; however substations and power lines are not explicitly mentioned in this Order, but they will need to respect the safety distances established through the secondary legislation issued by ANRE. (Technical Norm regarding the delimitation of protection and safety zones related to energy capacities, approved by ANRE Order no. 239/2019) (i.e., for a 220 kV or higher, the safety zone is 35 m from the station fences)

Law No. 319/2006 on occupational health and safety (and its subsequent changes and updates from 2012, 2018, 2021) regulates the H&S principles and rules and needs to be considered during the project planning and implementation.

Another piece of regulation worth to be considered is the Emergency Ordinance no. 57 of 20 June 2007 on the regime of protected natural areas, conservation of natural habitats, wild flora and fauna (and its subsequent changes and modifications) has the role of reconciling the national legislation with the terms of European Union in the field of nature protection and taking into account the provisions of Directive 79/409/EEC on the conservation of wild birds and Directive 92/43/EEC on the conservation of natural habitats and of species of wild flora and fauna, is to guarantee the conservation and sustainable use of the natural heritage, an objective of major public interest and a fundamental component of the national strategy for sustainable development.

This Ordinance regulates several topics among which: a) ensuring the biological diversity, by conserving the natural habitats, of the wild flora and fauna present on the Romanian territory; b) maintaining or restoring of a favorable state of conservation of natural habitats and their varieties and species of wild flora and fauna; c) identification of natural heritage assets that require a special protection regime, for their conservation and sustainable use; d) categories of protected natural areas, types of natural habitats, species of flora and fauna and other goods of natural patrimony that are subject to the special regime of protection, conservation and sustainable use regimes; e) the establishment, organization and development of the national network of protected natural areas, as well as of its regime; f) regime of administration of protected natural areas and the procedures for establishing the protection regime for other natural areas and natural heritage assets; g) measures for the protection and conservation of endangered, vulnerable, endemic and/or rare species of wild animals and plants, as well as those for the protection of geomorphological and landscape formations of ecological, scientific, aesthetic, cultural-historical and other interest, of goods natural resources of speleological, paleontological, geological, anthropological interest and other natural assets with natural heritage value, existing within the perimeters of protected natural areas and/or outside them; h) responsibilities and attributions for the implementation of these provisions.

# Georgia - Romania Electric and Digital Interconnection Feasibility Study
# SubTask 2.6 – ESIA Scoping Report

## Annex 2
## Turkey & Bulgaria Legislation & EIA Framework

*Table of Contents*

# 1 TURKEY

## 1.1 Current National Environmental Legislation

The Turkish legal framework for environmental protection was developed in line with national and international initiatives and standards, and some of them have been revised recently to be harmonized with the EU Directives in the scope of pre-accession efforts of Turkey to the EU. In the following sections, related institutions, legislation, processes, and procedures that are related to the environmental and social aspects of the proposed project are described.

The Ministry of Environment, Urbanizationand Climate Change ("MoEUCC") is the responsible organization for the issuing and implementation of policies and legislation adopted for protection and conservation of the environment and for sustainable development and management of natural resources.

The Ministry of Agriculture and Forestry ("MoAF") is the responsible organization for the issuing and implementation of policies and legislation adopted for the protected areas.

The Turkish Environment Law No. 2872, which came into force in 1983, deals with environmental issues on a very broad scope. According to the basic principles that govern the application of the Environment Law, and as stated in the Constitution, citizens as well as the state bear responsibility for the protection of environment. Complementary to the Environment Law and its regulations, other laws also govern the protection and conservation of the environment, the prevention and control of pollution, and the implementation of measures for the prevention of pollution.

The Environment Law of 1983 has a comprehensive structure that has a holistic and integrated vision for the environment." Polluter pays" and "user pays" principles and carrying capacity concepts form the basis of regulatory tools in the Environmental Law. The Law is supported by numerous Regulations and decrees prepared or updated in the process of alignment with EU legislation, thus contributing significantly to compensating the gaps within the former legislative system of Turkey.

## 1.2 Turkey Relevant National Legislation

- Exhaust gas emission control regulation. 2017-03-11
- Communique No. 2023/2 concerning the administrative fines as per the Environment Law No. 2872. 2023-01-14 (and annual updates of the Communique)
- Communique on road transport of wastes. 2015-03-20
- Regulation on Air Quality Assessment and Management. 2008-06-06
- Regulation on Control of Industrial Air Pollution. 2008-07-03
- Regulation on Ozone Layer Depleting Materials. 2017-04-07
- Regulation on the Reduction in the Sulphur Content of Some Fuel Types. 2019-10-6
- Regulation on environmental audit. 2021-06-12
- Regulation on Environmental Impact Assessment. 2022-07-29
- Regulation on environmental management of dredging material. 2020-01-14
- Regulation on Environmental Permit and License. 2014-09-10

- Regulation on reception of waste from ships and waste control. 2004-12-26
- Regulation on strategic environmental assessment. 2017-04-08
- Regulation on tracking of greenhouse gas emissions. 2014-05-17
- Communique on Monitoring and Reporting of Greenhouse Gases. 2014-07-22
- Regulation on Water Pollution Control. 2004-12-31
- Regulation on Control of Pollution Caused by Hazardous Substances in Water and its Environment. 2005-11-26
- Wastewater Treatment/Deep Sea Discharge Facility Project Approval Circular" numbered 2018/4 and dated 20.11.2018
- Regulation on Water Intended for Human Consumption. 2005-02-17
- Regulation on Control of Waste Batteries and Accumulators. 2004-08-31
- Regulation on Control of Polychlorinated biphenyls (PCBs) and Polychlorinated terphenyls (PCT)s. 2007-12-27
- Regulation on Waste Management. 2015-04-02
- Regulation on Control of End-of-Life Tires. 2006-11-25
- Regulation on Management of Waste Oils. 2019-12-21
- Regulation on Management of Vegetable Waste Oils. 2015-06-06
- Regulation on Control of Medical Wastes. 2017-01-25
- Regulation on the Control of Packaging Wastes. 2021-06-26
- Regulation on the Control of Waste Electrical and Electronic Equipment. 2022-12-26
- Regulation on Zero Waste. 2019-07-12
- Law on Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Hazardous Materials. 2005-03-11
- Implementation Regulation of The Law on Law on Principles of Emergency Response and Compensation for Damages in Pollution of Marine Environment by Oil and Other Hazardous Materials. 2006-10-21
- Regulation on Radiation Safety. 2000-03-24
- Regulation on the Safe Transportation of Radioactive Materials. 2005-07-08
- Regulation on the Transportation of Hazardous Goods by Road. 2022-06-18
- Regulation on the Classification, Labelling and Packaging of Materials and Mixtures. 2013-12-11
- Regulation on Environmental Noise Control. 2022-11-30
- Regulation on Noise Emission in the Environment Generated by the Equipment Used in the Open Space. 2006-12-30
- Regulation on Fishing Harbors. 1996-12-13

- Environmental Law (No: 2872). 1983-08-11
- Fisheries Law (No 1380). 1971-04-04
- Coastal Law (No 3621). 1990-04-17
- Law on Protection of Cultural and Natural Heritage (No: 2863). 1983-07-23
- Regulation on the Collection and Control of Movable Cultural and Natural Property to be Protected. 2019-04-20
- Regulation on the Identification and Registration of Immovable Cultural and Natural Property to be Protected. 1987-12-10
- Regulation on Survey, Sounding and Excavation to be Performed in Relation to Cultural and Natural Property. 1984-08-10
- Decision of Council Ministers on The Cultural and Natural Assets Under Water that need to be Protected. 2001-08-06
- Law on Military Restricted Zones and Security Zones (No:2565). 1981-12-22
- Regulation on Opening a Business and Working Licenses. 2005-08-10
- Decision on the Turkish Exclusive Economic Zone. 1986-12-17
- Law on Services for Navigation and Hydrography (No 1738). 1973-06-07
- Labour Law, No: 4857

**International Conventions and Agreements**

**Accession:**

- Convention on the Conservation of European Wildlife and Natural Habitats (Berne, 1979) (Official Gazette Date: 12 Jul 1995)
- United Nations Framework Convention on Climate Change (1997) (Official Gazette Date: 24 May 2004)
- Convention for the Protection of the Ozone Layer (Vienna, 1985) (Official Gazette Date: 08 Sep1990)
- Protocol to the United Nations Framework on Climate Change (Kyoto Protocol), 1997
- International Convention on Civil Liability for Bunker Oil Pollution Damage (BUNKER), 1978
- International Convention on Maritime Search and Rescue (SAR 1979) (Official Gazette Date: 24 Mar 1986)
- International Convention on Standards of Training, Certification and Watch keeping for Seafarers (STCW 1978) (Official Gazette Date: 29 Sep 2003)
- UN Convention on the Elimination of All Forms of Discrimination against Women, 1979 (20 Dec 1985)

- United Nations Educational, Scientific and Cultural Organization (UNESCO) Convention for the Protection of Cultural Property in the Event of Armed Conflict with Regulations for the Execution of the Convention (The Hague Convention, 1954) (15 Dec 1965)
- ICOMOS 1996 Charter for the Protection and Management of the Underwater Archaeological Heritage (Sofia Charter) (9 Oct 1996)
- Unplanned Events International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC 1990) (Official Gazette Date: 18 Sep 2003)
- International Convention for the Safety of Life at Sea (SOLAS 1974) (Official Gazette Date: 31 Jan 2013)

**Ratified:**

- Biodiversity Convention on Biological Diversity (Rio, 1992) (Official Gazette Date: 27 Dec 1996)
- Air Quality Convention on Long-Range Transboundary Air Pollution (Geneva, 1979) (Official Gazette Date: 23 Mar 1983)
- UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention, 1972)
- UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003 (27 Mar 2006)
- International Convention for the Protection of Birds (Paris, 1950) (Official Gazette Date: 17 Dec 1966)
- UN Convention on the Rights of Persons with Disabilities, 2006 (28 Sep 2009)
- International Convention on the Elimination of All Forms of Racial Discrimination, 1966 (16 Sep 2002)
- European Convention for the Protection of Human Rights and Fundamental Freedoms, 1950 (18 May 1954)
- UN Covenant on Civil and Political Rights (23 Sep 2003)
- European Convention for Protection of Archaeological Heritage (Valletta Treaty, 1992) (Official Gazette Date: 8 Aug 1999)
- Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972) (Official Gazette Date: 14 Feb 1983)
- European Convention on Offences relating to Cultural Property (1985) (26 Sep 1985)
- Waste Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel, 1989) (Official Gazette Date: 22 Jun 1994)
- Marine Protection Convention on the Protection of the Black Sea Against Pollution (Bucharest, 1992) (Official Gazette Date: 15 Jan 1994)
- International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978,Regulations for the Prevention of Pollution by Oil (as amended 1991) Annex I to VI (MARPOL 1973) (Official Gazette Date: 24 Jun 1990 for Annex I, II and V, updated on 16 March 2013

and 14 May 2013 to include Annex III, IV and VI) [Annex I includes regulations for the Prevention of Pollution by Oil and is mandatory. Annex II includes regulations for the Control of Pollution by Noxious Liquid Substances in Bulk. Annex III covers Harmful Substances Carried by Sea in Packaged Form. Annex IV covers the Prevention of Pollution by Sewage from Ships. Annex V includes regulations for the Prevention of Pollution by Garbage from Ships. Annex VI covers the Prevention of Air Pollution from Ships]

- Convention on Persistent Organic Pollutants (Stockholm, 2004)
- United Nations Framework Convention on Climate Change., Paris Climate Agreement. Paris, 4 November 2016 (Official Gazette dated 7 October 2021)

**In force:**

- Labour International Labour Standards (ILO) Convention (No.29) on Forced Labour (30 Oct 1998)
- ILO Convention (No. 87) on Freedom of Association and Protection of the Right to Organize (12 Jul 1993)
- ILO Convention (No.98) on the Right to Organize and Collective Bargaining (23 Jan 1952)
- ILO Convention (No.100) on Equal Remuneration (19 Jul 1967)
- ILO Convention (No.105) on the Abolition of Forced Labour (29 Mar 1961)
- ILO Convention (No.111) on Discrimination (Employment and Occupation) (19 Jul 1967)
- ILO Convention (No.138) on Minimum Age (of Employment) (30 Oct 1998)
- ILO Convention (No. 182) on the Worst Forms of Child Labour (02 Aug 2001)

The list of all relevant International Labour Organization (“ILO”) conventions ratified by Türkiye are listed as follows:

- Unemployment Convention, 1919
- Right of Association (Agriculture) Convention, 1921
- Weekly Rest (Industry) Convention, 1921
- Minimum Wage-Fixing Machinery Convention, 1928
- Forced Labour Convention, 1930
- Workmen's Compensation (Occupational Diseases) Convention (Revised), 1934
- Underground Work (Women) Convention, 1935
- Officers' Competency Certificates Convention, 1936
- Shipowners' Liability (Sick and Injured Seamen) Convention, 1936
- Food and Catering (Ships' Crews) Convention, 1946
- Certification of Ships' Cooks Convention, 1946

- Medical Examination (Seafarers) Convention, 1946
- Medical Examination of Young Persons (Industry) Convention, 1946
- Final Articles Revision Convention, 1946
- Labour Inspection Convention, 1947
- Freedom of Association and Protection of the Right to Organise Convention, 1948
- Employment Service Convention, 1948
- Accommodation of Crews Convention (Revised), 1949
- Labour Clauses (Public Contracts) Convention, 1949
- Protection of Wages Convention, 1949
- Fee-Charging Employment Agencies Convention (Revised), 1949
- Right to Organise and Collective Bargaining Convention, 1949
- Minimum Wage Fixing Machinery (Agriculture) Convention, 1951
- Equal Remuneration Convention, 1951
- Social Security (Minimum Standards) Convention, 1952
- Abolition of Forced Labour Convention, 1957
- Seafarers' Identity Documents Convention, 1958
- Discrimination (Employment and Occupation) Convention, 1958
- Radiation Protection Convention, 1960
- Final Articles Revision Convention, 1961
- Equality of Treatment (Social Security) Convention, 1962
- Guarding of Machinery Convention, 1963
- Employment Policy Convention, 1964
- Minimum Age (Underground Work) Convention, 1965
- Maximum Weight Convention, 1967
- Accommodation of Crews (Supplementary Provisions) Convention, 1970
- Prevention of Accidents (Seafarers) Convention, 1970
- Workers' Representatives Convention, 1971
- Minimum Age Convention, 1973
- Human Resources Development Convention, 1975
- Tripartite Consultation (International Labour Standards) Convention, 1976
- Seafarers' Annual Leave with Pay Convention, 1976

- Labour Relations (Public Service) Convention, 1978
- Occupational Safety and Health (Dock Work) Convention, 1979
- Hours of Work and Rest Periods (Road Transport) Convention, 1979
- Occupational Safety and Health Convention, 1981
- Termination of Employment Convention, 1982
- Vocational Rehabilitation and Employment (Disabled Persons) Convention, 1983
- Occupational Health Services Convention, 1985
- Health Protection and Medical Care (Seafarers) Convention, 1987
- Repatriation of Seafarers Convention (Revised), 1987
- Safety and Health in Construction Convention, 1988
- Safety and Health in Mines Convention, 1995
- Worst Forms of Child Labour Convention, 1999
- Promotional Framework for Occupational Safety and Health Convention, 2006

## 1.3 EIA Detailed Legal Framework

The Environmental Impact Assessment ("EIA") Regulation, which dates originally from 1998, has had several revisions and was most recently amended on July 29th, 2022. According to the regulation, the industries or facilities listed in Annex 1 and Annex 2 of the regulation must obtain an EIA permit. The EIA process is carried out by companies licensed by the MoEUCC. The report submission and official correspondence process is carried out online.

The projects with high production capacity are listed in Annex 1 and the EIA submission and approval process is more detailed and longer. It includes scoping and public participation steps, and is directed by the MoEUCC, the central authority. During the process, an application report and an EIA Report are prepared by a licensed company. The "EIA Positive" or "EIA Negative" decision is obtained at the end of the process.

The projects listed in Annex 2 have shorter EIA processes and comprise of smaller industries. The EIA submission and approval process does not include the scoping and public participation steps and is directed by the Provincial Directorate of Environment, Urbanization and Climate Change ("PDoEUCC"). During the process, a PDF (Pre-EIA Report) is prepared by authorized licensed company. If the "EIA is not required" decision is obtained, the Project can be implemented. However, if "EIA is required" decision is obtained, the same process for the Annex I projects, needs to be initiated.

The Turkish EIA procedure follows a process of selection and elimination criteria, with the final decision of the MoEUCC. The MoEUCC, establishes a "EIA Commission", which has considerable influence on the review and supervision of the EIA report. The EIA commission comprises representatives from relevant institutions and establishments, Ministry authorities and Project representatives. This commission is responsible for defining all required studies for the EIA report.

The MoEUCC, when deciding regarding the EIA Report, takes into consideration the studies and decisions made by the EIA Commission.

As so required, the MoEUCC may invite research and specialist organizations, professional associations/chambers, trade unions, associations and Non-Governmental Organizations ("NGO"s) representatives to the commission meetings. Main steps in the Turkish EIA Process to be followed are as follows:

- Firstly, site visit by informing the PDoEUCC before the EIA Application File ("EIA-AF") studies,
- Submission of the EIA-AF to the MoEUCC,
- Public Participation Meeting (announcements in one national and one local newspaper need to be given and other notifications need to be made before the meeting),
- Issuing of the special EIA format by the MoEUCC for the Project (the special EIA format defines baseline and impact assessment studies required specifically for the Project) based on the comments of the EIA commission and outcomes from the Public Participation meeting,
- Submission of the EIA Report to the MoEUCC,
- Commission meetings during the EIA process,
- Revision and finalization of the EIA Report,
- Public disclosure of the Final EIA Report by PDoEUCC,
- Obtaining final decision from the MoEUCC (EIA Positive or EIA Negative).

# 2 BULGARIA

## 2.1 Bulgaria Relevant National Legislation

- Environmental Protection Act. (Promulgated SG. 91/25.9.2002) regarding environmental information
- Convention for environmental impact assessment in transboundary context /Espoo 1991, signed by 25.02.1991 and ratified by Decree 87/23.03.95.
- Regulation for conditions and order for implementation of Environmental Impact Assessment (approved by Decree of the Ministers № 59 on 7.03.2003, promulgated no. 25 dated on 18.03.2003, amended and supplemented no. 3 on 11.01.2011).
- Access to public information act (SG No.55 on 7.07l.2000, amended, SG. No.77 on 01.10.2010).
- Black Sea Coast Act (SG. No. 48/15.06.2007 amended SG. No. 92/20.11.2009)
- Law on the maritime spaces, inland waterways and ports of the Republic of Bulgaria (SG. No. 12 from 11.02.2000, amended SG.No.23/22.03.2011)
- Waste Management Act (Promulgated, SG, No.86 of 30.09.2003, amended SG, No. 87of 25.01.2011).
- Clean air act Enforced on 29.06.1996, Prom. SG. 45/28 May 1996, amend. SG. 88/9 November 2010.
- Subsurface resources act (Promulgated SG. No. 23 of 12.03 1999, amend. SG. No. 19 of 08.04.2011).
- Biological Diversity Act (Promulgated, SG No. 77/9.08.2002, amended SG No 19 of 08.03.2011).
- Protected Areas Act (Promulgated SG. No.133 of 11.11.1998, amended SG. No. 19/8.03.2011).
- Law on fishing and aquacultures (Promulgated SG.No.41 of 24.04.2001, amended SG.No.8 of 25.01.2011.).
- Cultural Heritage Act (Promulgated SG. 19/13.03.2009, amended SG. No.80/09.10.2009, amended SG. No.92/20.11.2009, amended SG. No.93/24.11.2009, amended SG. No.101/28.12.2010).
- Protection from Environmental Noise Act (Promulgated SG No. 74/13.09.2005 in force of 1.01.2006, amended No. 98/14.12.2010, in force of 1.01.2011).
- Health Act (Promulgated SG. No.70/10.08.2004, amended SG. No.9/28.01.2011).
- Law on Health and Safety at Work Act (Promulgated SG. No.124/23.12.1997, amended and supplemented No. 108/19.12.2008).
- Energy Efficiency Act (Promulgated SG. No.98 of 14.11.2008, amended SG. No.97 since 10.12.2010).

## 2.2 International Conventions and Agreements

**Ratified:**

- Aarhus Convention on Access to Information, to Public Participation in the Decision Making Process and the Administration of Justice concerning Environmental Matters

- Convention Concerning the Protection of the World Cultural and Natural Heritage
- Convention on Protection of Underwater Cultural Heritage Objects
- Convention on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)
- Convention on the Protection and Use of Transboundary Watercourses and International Lakes
- Convention on the Transboundary Effects of Industrial Accidents (Helsinki Convention)
- Espoo Convention on Environmental Impact Assessment in Transboundary Context
- Geneva Convention on Long-Range Transboundary Air Pollution
- Kyiv Protocol on Strategic Environmental Assessment to the Convention on Environmental Impact Assessment in a Transboundary Context
- Stockholm Convention on Persistent Organic Pollutants
- United Nations Convention on the Law of the Sea (UNCLOS)
- United Nations Framework Convention on Climate Change (UNFCC)

**Accession:**

- Wastes and Their Disposal to regulate the transboundary movements of hazardous wastes and provides obligations to its Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.
- Berne Convention on the Conservation of European Wildlife and Natural Habitats
- Bonn Convention on the Conservation of Migratory Species of Wild Animals
- International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL) Annex I – V
- International Convention on Civil Liability for Bunker Oil Pollution Damage (BUNKER)
- International Convention on Maritime Search and Rescue (SAR)
- International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC)
- International Convention on Standards of Training, Certification and Watch keeping for Seafarers (STCW)
- The Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar)
- Vienna Convention for the Protection of the Ozone Layer

**Signed:**

- Bucharest Convention on the Protection of the Black Sea Against Pollution
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention)
- European Convention for Protection of Archaeological Heritage (Valletta Treaty)
- International Convention for the Protection of Birds

**Acceptance:**

- Convention on Biological Diversity International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 (MARPOL) Annex VI

**Approval:**

- International Convention for the Safety of Life at Sea (SOLAS)

### 2.3 EIA Detailed Legal Framework

Following the MoEW decision for the development of a National Bulgarian EIA 3 stages must be considered:

1. **EIA Terms of Reference (ToR).** This stage includes the preparation of the Terms of Reference for the Project and coordination with the MoEW. Additionally, the competent authority will provide instructions and recommendations for the EIA consultations and specify the mandatory stakeholders to be consulted for the Project as part of the EIA process.

2. **EIA development.** The EIA will comply with the requirements of Article 96 of the Environmental Protect Act, the ToR and the MoEW's comments and recommendations to the ToR.

3. **Reporting and Disclosure.** Public Hearings will be undertaken as determined by the MoEW in accordance with the requirements of the EIA Ordinance. The results of the Public Hearings will be submitted to the competent authority within 10 days from the date of the last Public Hearing.

In line with Bulgarian national requirements, an EIA will be prepared for the Project and submitted to the Ministry of Environment and Water for review. Once a positive evaluation is received, the EIA report will be disclosed to the public via public hearings.

Stakeholder engagement meetings will be held with representatives of: Municipal and local authorities; Marine Authorities; Potentially project-affected communities (PACs); Marine Users and Business Associations; and Local and national non-government organisations (NGOs). Public consultation processes will be coordinated in accordance with the Bulgarian EIA process, and meetings will be held with organisations specified by the Ministry of Environment and Water in their response to the Project Notification.

The results of the public hearings will be submitted to the competent authority within 10 days following the last public hearing. In accordance with Bulgarian legislation (Environmental Protection Act and Regulation on the conditions and order for implementing environmental impact assessment), the competent authority is expected to decide on the EIA Report within 45 days after conducting the last public hearing.

## SOCIAL SURVEY FOR CESI - GEORGIA

***QUESTIONNAIRE FOR THE AUTHORITIES/CIVIL SOCIETY***

### INSTRUCTIONS FOR THE PERSON CONDUCTING THE INTERVIEW

This form is to be used with persons living in the study area.

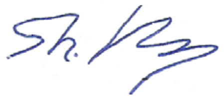
Before the start of the interview the respondents must be informed that they are free not to respond to certain questions if they are considered sensitive.

The respondents must be informed that all the information will be stored and used in a confidential matter by ESG and by WSP and will not be shared with third parties. The information collected will be included in the ESIA report in an aggregated form and no sensitive data will be made publicly available.

Please take the geographical coordinates (GPS position) and photos of the location where this interview is taking place and/or of the respondents, after having received authorization from the person to take pictures.

Interviews should only be conducted with informed consent – permission should be sought in a transparent way from interviewees, and granted, prior to the interview.

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number: | A_001 | |
| 1.2Address and GPS coordinates of the location where this interview takes place | Anaklia, Rustaveli street N173 | X =<br>Y =<br>42.397228, 41.577557 |
| 1.3 Date and time | 23.09.2023<br>16:00 | |
| 1.4 Does the respondent authorize the publication of pictures? | ☒ 1.4.1 Yes<br>☐ 1.4.2 No | |

| **2. INTERVIEWERS INFORMATION** | | |
|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 Gvantsa Lukava | Signature  |
| | 2.1.2 Shalva Bosikashvili | Signature  |
| 2.2 Name of supervisor: | | Signature |

| **3. RESPONDENT INFORMATION** | |
|---|---|
| 3.1 Name of respondent | Nino Korshia |
| 3.2 Respondent phone number | +995 574 17 24 34 |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.4 Respondent location | Anaklia |
| Respondent field of activity/field of expertise | Founder and Head of the Board for a Local NGO. |
| Brief description of the activities of the organization/institution/association that the respondent represents | Operating in the Samgrelo-Zemo Svaneti region, the NCF (Nefa Community Foundation) focuses on women's empowerment and gender equality in rural areas. Since 2013, they've partnered with UN Women and the Taso Foundation, working on initiatives like Community Philanthropy, Economic Strengthening, and raising awareness about domestic violence. Through close ties with local governance, they advocate for the inclusion of community needs in local planning and budgeting. |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.1 Are you familiar with the project? | ☒ 4.1.1 Yes<br>☐ 4.1.2 No |
| 4.2 What is your general attitude towards the project? | ☐ 4.2.1 Good<br>☐ 4.2.2 Bad<br>☐ 4.2.3 Neutral<br>☒ 4.2.4 Don't know/don't have enough information |
| 4.3In your opinion what are the three main problems in the local area | Persistent electricity outages. |
| | High unemployment and limited opportunities for youth, leading to outmigration. |
| | Lack of professional education resources. |
| 4.4 In your opinion what are the three main positive aspects in the local area | Touristic Potential of the Area, beaches and favorable climate, presence of Kolkheti National Park |

| **4. PROJECT KNOWLEDGE AND FEEDBACK** | |
|---|---|
| | Economic potential, highlighted by the Anaklia Sea Port Project. |
| | Efficient communal systems including water, sewage, and natural gas infrastructure. |
| 4.5What are the three most important economic sectors in the area? | Please fill<br>☐4.5.1__Tourism<br>☐4.5.2__ Small business<br>☐4.5.3__Agriculture |
| 4.6 What are your expectations for the project? Maximum 3 answers | 4.6.1 Employment Opportunities. |
| | 4.6.2 Improved internet quality. |
| | 4.6..3 Enhanced recognition of the region.. |
| | 4.7.1 Possible environmental impact. |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.7What are your concerns about the project? Maximum 3 answers | 4.7.2 Safety Hazards |
| | 4.7.3 Potential social repercussions. (Further details on possible social impacts would be beneficial.) |

# 1. SOCIAL SURVEY FOR CESI - GEORGIA

| |
|---|
| ***QUESTIONNAIRE FOR THE AUTHORITIES/CIVIL SOCIETY*** |

## INSTRUCTIONS FOR THE PERSON CONDUCTING THE INTERVIEW

This form is to be used with persons living in the study area.

Before the start of the interview the respondents must be informed that they are free not to respond to certain questions if they are considered sensitive.

The respondents must be informed that all the information will be stored and used in a confidential matter by ESG and by WSP and will not be shared with third parties. The information collected will be included in the ESIA report in an aggregated form and no sensitive data will be made publicly available.

Please take the geographical coordinates (GPS position) and photos of the location where this interview is taking place and/or of the respondents, after having received authorization from the person to take pictures.

Interviews should only be conducted with informed consent – permission should be sought in a transparent way from interviewees, and granted, prior to the interview.

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number: | A_002 | |
| 1.2Address and GPS coordinates of the location where this interview takes place | Anaklia, Rustaveli street N223 | X =<br>Y =<br>42.396075, 41.566590 |
| 1.3 Date and time | 24.09.2023<br>19:00 | |
| 1.4 Does the respondent authorize the publication of pictures? | ☐ 1.4.1 Yes<br>■ 1.4.2 No | |

| 2. INTERVIEWERS INFORMATION | | |
|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 Gvantsa Lukava | Signature |
| | 2.1.2 Shalva Bosikashvili | Signature |
| 2.2 Name of supervisor: | | Signature |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.1 Name of respondent | Maia Pipia |
| 3.2 Respondent phone number | +995 593 13 27 20 |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.4 Respondent location | Anaklia, |
| Respondent field of activity/field of expertise | Local NGO Representative |
| Brief description of the activities of the organization/institution/association that the respondent represents | Operating in the Samgrelo-Zemo Svaneti region, the NCF (Nefa Community Foundation) focuses on women's empowerment and gender equality in rural areas. Since 2013, they've partnered with UN Women and the Taso Foundation, working on initiatives like Community Philanthropy, Economic Strengthening, and raising awareness about domestic violence. Through close ties with local governance, they advocate for the inclusion of community needs in local planning and budgeting. |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.1 Are you familiar with the project? | ☒ 4.1.1 Yes<br>☐ 4.1.2 No |
| 4.2 What is your general attitude towards the project? | ☒ 4.2.1 Good<br>☐ 4.2.2 Bad<br>☐ 4.2.3 Neutral<br>☐ 4.2.4 Don't know/don't have enough information |
| 4.3In your opinion what are the three main problems in the local area | Lack of supermarkets. |
| | Inadequate internet connectivity. |
| | Absence of a community center for gatherings and meetings. |
| 4.4 In your opinion what are the three main positive aspects in the local area | Well-organized/equipped public transport. |
| | Strategic location favorable for development. |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| | Efficient communal systems including water, sewage, and natural gas infrastructure. |
| 4.5What are the three most important economic sectors in the area? | Please fill<br>☐4.5.1__Tourism<br>☐4.5.2__Fishing<br>☐4.5.3__Agriculture |
| 4.6 What are your expectations for the project? Maximum 3 answers | 4.6.1 Strengthening of economic growth. |
| | 4.6.2 Enhanced recognition of the region. |
| | 4.6..3 Optimal utilization of the strategic location. |
| | 4.7.1 Possible environmental impact, particularly on local fish populations. |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.7What are your concerns about the project? Maximum 3 answers | 4.7.2 The project's long-term sustainability and potential influence from the country's political situation on its execution. |
| | 4.7.3 |

# 1. SOCIAL SURVEY FOR CESI - GEORGIA

***QUESTIONNAIRE FOR THE AUTHORITIES/CIVIL SOCIETY***

## INSTRUCTIONS FOR THE PERSON CONDUCTING THE INTERVIEW

This form is to be used with persons living in the study area.

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Please take the geographical coordinates (GPS position) and photos of the location where this interview is taking place and/or of the respondents, after having received authorization from the person to take pictures.

Interviews should only be conducted with informed consent – permission should be sought in a transparent way from interviewees, and granted, prior to the interview.

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number: | A_003 | |
| 1.2Address and GPS coordinates of the location where this interview takes place | Anaklia, | X =<br>Y =<br>42.396134, 41.575610 |
| 1.3 Date and time | 25.09.2023<br>17:00 | |
| 1.4 Does the respondent authorize the publication of pictures? | ☐ 1.4.1 Yes<br>☒ 1.4.2 No | |

| **2. INTERVIEWERS INFORMATION** | | |
|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 Gvantsa Lukava | Signature |
| | 2.1.2Shalva Bosikashvili | Signature |
| 2.2 Name of supervisor: | | Signature |

| **3. RESPONDENT INFORMATION** | |
|---|---|
| 3.1 Name of respondent | respondent wishes to remain anonymous |
| 3.2 Respondent phone number | respondent wishes to remain anonymous |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.4 Respondent location | Poti |
| Respondent field of activity/field of expertise | Environmental Protection Supervision Department, Black Sea Convention Division Representative / respondent wishes to remain anonymous |
| Brief description of the activities of the organization/institution/association that the respondent represents | Oversight of the Black Sea coast (Including Area near Anaklia), combating unauthorized fishing, addressing pollution, and related activities |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.1 Are you familiar with the project? | ☐4.1.1 Yes<br>☒4.1.2 No |
| 4.2 What is your general attitude towards the project? | ☐4.2.1 Good<br>☐4.2.2 Bad<br>☐4.2.3 Neutral<br>☒4.2.4 Don't know/don't have enough information |
| 4.3In your opinion what are the three main problems in the local area | Pollution |
| | unauthorized fishing |
| | |
| 4.4 In your opinion what are the three main positive aspects in the local area | Economical Potential |
| | Touristic Potential of the Area |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| | |
| 4.5What are the three most important economic sectors in the area? | Please fill<br>☐4.5.1__Tourism<br>☐4.5.2__Fishing<br>☐4.5.3__Agriculture |
| 4.6 What are your expectations for the project? Maximum 3 answers | 4.6.1 Improved internet quality. |
| | 4.6.2 Employment Opportunities |
| | 4.6..3 Generating transit revenues |
| | 4.7.1 No Concerns |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.7What are your concerns about the project? Maximum 3 answers | 4.7.2 |
| | 4.7.3 |

# 1. SOCIAL SURVEY FOR CESI - GEORGIA

***QUESTIONNAIRE FOR THE AUTHORITIES/CIVIL SOCIETY***

**INSTRUCTIONS FOR THE PERSON CONDUCTING THE INTERVIEW**

This form is to be used with persons living in the study area.

Before the start of the interview the respondents must be informed that they are free not to respond to certain questions if they are considered sensitive.

The respondents must be informed that all the information will be stored and used in a confidential matter by ESG and by WSP and will not be shared with third parties. The information collected will be included in the ESIA report in an aggregated form and no sensitive data will be made publicly available.

Please take the geographical coordinates (GPS position) and photos of the location where this interview is taking place and/or of the respondents, after having received authorization from the person to take pictures.

Interviews should only be conducted with informed consent – permission should be sought in a transparent way from interviewees, and granted, prior to the interview.

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number: | A_004 | |
| 1.2Address and GPS coordinates of the location where this interview takes place | Anaklia, Rustaveli street N267 | X =<br>Y =<br>42.393190, 41.562645 |
| 1.3 Date and time | 26.09.2023<br>12:00 | |
| 1.4 Does the respondent authorize the publication of pictures? | ☐ 1.4.1 Yes<br>☒ 1.4.2 No | |

| 2. INTERVIEWERS INFORMATION | | | |
|---|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 Gvantsa Lukava | Signature | |
| | 2.1.2 Shalva Bosikashvili | Signature | |
| 2.2 Name of supervisor: | | Signature | |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.1 Name of respondent | Salome Khubua |
| 3.2 Respondent phone number | +995 592 13 89 89 |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.4 Respondent location | Anaklia, |
| Respondent field of activity/field of expertise | Local Leader of a Political Party / Lawer |
| Brief description of the activities of the organization/institution/association that the respondent represents | Political Party |

| **4. PROJECT KNOWLEDGE AND FEEDBACK** | |
|---|---|
| 4.1 Are you familiar with the project? | ☒4.1.1 Yes<br>☐4.1.2 No |
| 4.2 What is your general attitude towards the project? | ☒4.2.1 Good<br>☐4.2.2 Bad<br>☐4.2.3 Neutral<br>☐4.2.4 Don't know/don't have enough information |
| 4.3In your opinion what are the three main problems in the local area | Frequent electricity outages due to aging transmission lines, especially during the tourist season. |
| | High unemployment rates. |
| | Significant population outflow due to mass migration. |
| 4.4 In your opinion what are the three main positive aspects in the local area | The region's potential, such as the Anaklia Sea Port. |
| | Favorable location, local climate and natural beauty. |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| | The warmth and hospitality of the local population. |
| 4.5What are the three most important economic sectors in the area? | Please fill<br>☐4.5.1__Tourism<br>☐4.5.2__Trading<br>☐4.5.3__Agriculture |
| 4.6 What are your expectations for the project? Maximum 3 answers | 4.6.1 Improved internet quality. |
| | 4.6.2 Strengthening ties with Europe. |
| | 4.6..3 Generating transit revenues to boost the country's economy. |
| | 4.7.1 Potential impact on the environment, including water bodies and biodiversity. |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.7What are your concerns about the project? Maximum 3 answers | 4.7.2 |
| | 4.7.3 |

# 1. SOCIAL SURVEY FOR CESI - GEORGIA

***QUESTIONNAIRE ON ECOSYSTEM SERVICES FOR FISHERMEN (ANAKLIA PORT)***

## INSTRUCTIONS FOR THE PERSON CONDUCTING THE INTERVIEW

This form is to be used with persons living in the study area.

Before the start of the interview the respondents must be informed that they are free not to respond to certain questions if they are considered sensitive.

The respondents must be informed that all the information will be stored and used in a confidential matter by ESL and by WSP and will not be shared with third parties. The information collected will be included in the ESIA report in an aggregated form and no sensitive data will be made publicly available.

Please take the geographical coordinates (GPS position) and photos of the location where this interview is taking place and/or of the respondents, after having received authorization from the person to take pictures.

Interviews should only be conducted with informed consent – permission should be sought in a transparent way from interviewees, and granted, prior to the interview.

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number: | F-001 | |
| 1.2Address and GPS coordinates of the location where this interview takes place | Anaklia, Dgebuadze street | X =<br>Y =<br>42.396668572936, 41.564743285964234 |
| 1.3 Date and time | 24.09.2023<br>17:00 | |
| 1.4 Does the respondent authorize the publication of pictures? | ☐ 1.4.1 Yes<br>☒ 1.4.2 No | |

| 2. INTERVIEWERS INFORMATION | | |
|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 Gvantsa Lukava | Signature |
| | 2.1.2 Shalva Bosikashvili | Signature |
| 2.2 Name of supervisor: | | Signature |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.1 Name of respondent | Merabi Patlandze |
| 3.2 Respondent phone number | +995 577 07 75 12 |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.4 Respondent location | Anaklia |

| 4. ECOSYSTEM SERVICES | |
|---|---|
| 4.1 Where do you fish? | ■4.1.1 Site <1km<br>■4.1.2 Local 1km-5km<br>☐4.1.3 Regional >5km |
| 4.2How often do you fish? | ☐ 4.2.1 Once a day<br>■4.2.2 More than once a week<br>☐4.2.3 More than once a month |
| 4.3How much time do you spend fishing? | ☐4.3.1 Morning<br>■4.3.2 Afternoon and evening<br>☐ 4.3.3 All day |
| Do you fish all year round or is it a seasonal activity? If so which are the months when you go fishing? | Seasonal (Not Fishing during May-July) |
| 4.4 What animals do you fish? | Barabulya,<br>European anchovy,<br>Mullet |

| | |
|---|---|
| 4.4 What is the average amount of fish caught on a monthly basis? | 400 kg |
| 4.5What is the use of the catch? | ☐4.5.1 The catch is consumed<br>■4.5.2 The catch is sold. Specify where it is sold and to whom (if local/ national/international companies/private): Local Market In Zugdidi |
| 4.6 What type of boat is used for fishing? | Motorboat „Progress“ |
| 4.7 What type of fishing technique is used? | gill netting/gillnet |

| | |
|---|---|
| 4.8 Are fishing activities carry out individually or with the support of others? | With support of fishing partner |
| 4.9 Is fishing your only occupation? | ■ 4.9.1 Yes<br>☐ 4.9.2No. Please specify your other occupations: |
| 4.10 How much do fishing activities cover the household economic budget? | ☐ 4.10.1 It covers the house budget<br>■ 4.10.2 It covers partially the house budget<br>☐ 4.10.3It covers little of the house budget |

| 5. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 5.1 Are you familiar with the project? | ☒5.1.1 Yes<br>☐5.1.2 No |
| 5.2 What is your general attitude towards the project? | ☐5.2.1 Good<br>☐5.2.2 Bad<br>☒5.2.3 Neutral<br>☐5.2.4 Don't know/don't have enough information |
| 5.3 What are your expectations for the project? Maximum 3 answers | 5.3.1 No specific expectations, generally positive expectation |
| | 5.3.2 |

| 5. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| | 5.3.3 |
| 5.4 What are your concerns about the project? Maximum 3 answers | 5.4.1 No Concerns |
| | 5.4.2 |
| | 5.4.3 |

Interviewer's Note: During the interview process, the fishermen initially hesitated to acknowledge their current fishing activities and mentioned they "used to fish". Before the interview, they were informed of the purpose and confidentiality of the interview, as per the guidelines provided. **Error! Unknown document property name.**

# 1. SOCIAL SURVEY FOR CESI - GEORGIA

***QUESTIONNAIRE ON ECOSYSTEM SERVICES FOR FISHERMEN (ANAKLIA PORT)***

## INSTRUCTIONS FOR THE PERSON CONDUCTING THE INTERVIEW

This form is to be used with persons living in the study area.

Before the start of the interview the respondents must be informed that they are free not to respond to certain questions if they are considered sensitive.

The respondents must be informed that all the information will be stored and used in a confidential matter by ESL and by WSP and will not be shared with third parties. The information collected will be included in the ESIA report in an aggregated form and no sensitive data will be made publicly available.

Please take the geographical coordinates (GPS position) and photos of the location where this interview is taking place and/or of the respondents, after having received authorization from the person to take pictures.

Interviews should only be conducted with informed consent – permission should be sought in a transparent way from interviewees, and granted, prior to the interview.

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number: | F-002 | |
| 1.2Address and GPS coordinates of the location where this interview takes place | Anaklia, Apkhazeti street N27 | X =<br>Y =<br>42.388268, 41.567217 |
| 1.3 Date and time | 24.09.2023<br>17:49 | |
| 1.4 Does the respondent authorize the publication of pictures? | ☐ 1.4.1 Yes<br>☒ 1.4.2 No | |

| 2. INTERVIEWERS INFORMATION | | |
|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 Gvantsa Lukava | Signature |
| | 2.1.2 Shalva Bosikashvili | Signature |
| 2.2 Name of supervisor: | | Signature |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.1 Name of respondent | Mamuka Kvakulidze |
| 3.2 Respondent phone number | +995 568 45 79 27 |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.4 Respondent location | Anaklia |

| **4. ECOSYSTEM SERVICES** | |
|---|---|
| 4.1 Where do you fish? | ☒ 4.1.1 Site <1km<br>☒ 4.1.2 Local 1km-5km<br>☐ 4.1.3 Regional >5km |
| 4.2How often do you fish? | ☒ 4.2.1 Once a day<br>☐ 4.2.2 More than once a week<br>☐ 4.2.3 More than once a month |
| 4.3How much time do you spend fishing? | ☒ 4.3.1 Morning<br>☐ 4.3.2 Afternoon and evening<br>☐ 4.3.3 All day |
| Do you fish all year round or is it a seasonal activity? If so which are the months when you go fishing? | Seasonal (Not Fishing during May-July) |
| 4.4 What animals do you fish? | Herring,<br>Barabulya,<br>European anchovy,<br>Mullet |

| | |
|---|---|
| 4.4 What is the average amount of fish caught on a monthly basis? | 200 kg |
| 4.5What is the use of the catch? | ■4.5.1 The catch is consumed<br>■4.5.2 The catch is sold. Specify where it is sold and to whom (if local/ national/international companies/private): Local Market In Zugdidi |
| 4.6 What type of boat is used for fishing? | Motorboat „Progress 2“ |
| 4.7 What type of fishing technique is used? | gill netting/gillnet |

| | |
|---|---|
| 4.8 Are fishing activities carry out individually or with the support of others? | With support of fishing partner |
| 4.9 Is fishing your only occupation? | ☒ 4.9.1 Yes<br>☐ 4.9.2No. Please specify your other occupations: |
| 4.10 How much do fishing activities cover the household economic budget? | ☐ 4.10.1 It covers the house budget<br>☒ 4.10.2 It covers partially the house budget<br>☐ 4.10.3It covers little of the house budget |

| 5. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 5.1 Are you familiar with the project? | ☒ 5.1.1 Yes<br>☐ 5.1.2 No |
| 5.2 What is your general attitude towards the project? | ☐ 5.2.1 Good<br>☐ 5.2.2 Bad<br>☒ 5.2.3 Neutral<br>☐ 5.2.4 Don't know/don't have enough information |
| 5.3 What are your expectations for the project? Maximum 3 answers | 5.3.1 New Jobs / Employment Opportunities |
| | 5.3.2 Development of the Village (Anaklia) |

| 5. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| | 5.3.3 |
| 5.4 What are your concerns about the project? Maximum 3 answers | 5.4.1 No Concerns |
| | 5.4.2 |
| | 5.4.3 |

**Error! Unknown document property name.** Interviewer's Note: The fishermen mentioned that they had received information about the project from television broadcasts.

# 1. SOCIAL SURVEY FOR CESI - GEORGIA

***QUESTIONNAIRE ON ECOSYSTEM SERVICES FOR FISHERMEN (ANAKLIA PORT)***

## INSTRUCTIONS FOR THE PERSON CONDUCTING THE INTERVIEW

This form is to be used with persons living in the study area.

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Interviews should only be conducted with informed consent – permission should be sought in a transparent way from interviewees, and granted, prior to the interview.


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Capitale sociale Euro 105.200,00 i.v.

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number: | F-003 | |
| 1.2Address and GPS coordinates of the location where this interview takes place | Anaklia, Apkhazeti street N33 | X =<br>Y =<br>42.387830, 41.568008 |
| 1.3 Date and time | 24.09.2023<br>18:15 | |
| 1.4 Does the respondent authorize the publication of pictures? | ☒ 1.4.1 Yes<br>☐ 1.4.2 No | |

| 2. INTERVIEWERS INFORMATION | | |
|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 Gvantsa Lukava | Signature |
| | 2.1.2 Shalva Bosikashvili | Signature |
| 2.2 Name of supervisor: | | Signature |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.1 Name of respondent | Givi Kvashilava |
| 3.2 Respondent phone number | +995 558 99 56 12 |

| **3. RESPONDENT INFORMATION** | |
|---|---|
| 3.4 Respondent location | Anaklia |

| 4. ECOSYSTEM SERVICES | |
|---|---|
| 4.1 Where do you fish? | ☒ 4.1.1 Site <1km<br>☒ 4.1.2 Local 1km-5km<br>☐ 4.1.3 Regional >5km |
| 4.2How often do you fish? | ☒ 4.2.1 Once a day<br>☐ 4.2.2 More than once a week<br>☐ 4.2.3 More than once a month |
| 4.3How much time do you spend fishing? | ☒ 4.3.1 Morning<br>☐ 4.3.2 Afternoon and evening<br>☐ 4.3.3 All day |
| Do you fish all year round or is it a seasonal activity? If so which are the months when you go fishing? | Seasonal (Not Fishing during May-July) |
| 4.4 What animals do you fish? | Barabulya,<br>European anchovy,<br>Mullet |

| | |
|---|---|
| 4.4 What is the average amount of fish caught on a monthly basis? | 300 kg |
| 4.5What is the use of the catch? | ☐4.5.1 The catch is consumed<br>☒4.5.2 The catch is sold. Specify where it is sold and to whom (if local/ national/international companies/private): Local Market In Zugdidi |
| 4.6 What type of boat is used for fishing? | Motorboat „Progress 4“ |
| 4.7 What type of fishing technique is used? | gill netting/gillnet |

| | |
|---|---|
| 4.8 Are fishing activities carry out individually or with the support of others? | With support of fishing partner |
| 4.9 Is fishing your only occupation? | ☒4.9.1 Yes<br>☐4.9.2No. Please specify your other occupations: |
| 4.10 How much do fishing activities cover the household economic budget? | ☐4.10.1 It covers the house budget<br>☒4.10.2 It covers partially the house budget<br>☐4.10.3It covers little of the house budget |

| 5. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 5.1 Are you familiar with the project? | ☒5.1.1 Yes<br>☐5.1.2 No |
| 5.2 What is your general attitude towards the project? | ☒5.2.1 Good<br>☐5.2.2 Bad<br>☐5.2.3 Neutral<br>☐5.2.4 Don't know/don't have enough information |
| 5.3 What are your expectations for the project? Maximum 3 answers | 5.3.1 No Expectations at this stage of the project |
| | 5.3.2 |

| 5. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| | 5.3.3 |
| 5.4 What are your concerns about the project? Maximum 3 answers | 5.4.1 No Concerns |
| | 5.4.2 |
| | 5.4.3 |

**Error! Unknown document property name.**

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number: | 1 | |
| 1.3 Date and time | 10.10. 2023 | |

| 2. INTERVIEWERS INFORMATION | | | |
|---|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 ROMI CREȚU | Signature | |
| | 2.1.2 | Signature | |
| 2.2 Name of supervisor: | | Signature | |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.1 Name of respondent | VISILIU LENUȚA |
| 3.2 Respondent phone number | 0764 595 577 |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.4 Respondent location | Haltă Pescăruș / Plaja 23 August. |

| 4. ECOSYSTEM SERVICES | |
|---|---|
| 4.1 Where do you fish? | ☒ 4.1.1 Site <1km<br>☐ 4.1.2 Local 1km-5km<br>☐ 4.1.3 Regional >5km |
| 4.2How often do you fish? | ☒ 4.2.1 Once a day<br>☐ 4.2.2 More than once a week<br>☐ 4.2.3 More than once a month |
| 4.3How much time do you spend fishing? | ☒ 4.3.1 Morning<br>☐ 4.3.2 Afternoon and evening<br>☐ 4.3.3 All day |
| Do you fish all year round or is it a seasonal activity? If so which are the months when you go fishing? | All year (not when prohibition) |
| 4.4 What animals do you fish? | [illegible] Guvide, Stavride, Chefal |

Golder Associates S.r.l.
Via Antonio Banfo 43, 10155 Torino, Italia

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R.E.A. Torino n. TO-938498
Capitale sociale Euro 105.200,00 i.v.

| | |
|---|---|
| 4.4 What is the average amount of fish caught on a monthly basis? | 3-4 kg. |
| 4.5What is the use of the catch? | ☒4.5.1 The catch is consumed<br>☐4.5.2 The catch is sold. Specify where it is sold and to whom (if local/ national/international companies/private): |
| 4.6 What type of boat is used for fishing? | Lotcă |
| 4.7 What type of fishing technique is used? | undiță |

| | |
|---|---|
| 4.8 Are fishing activities carry out individually or with the support of others? | Individually. or 2 pers. in boat. |
| 4.9 Is fishing your only occupation? | [x] 4.9.1 Yes<br>[ ] 4.9.2No. Please specify your other occupations: |
| 4.10 How much do fishing activities cover the household economic budget? | [ ] 4.10.1 It covers the house budget<br>[ ] 4.10.2 It covers partially the house budget<br>[x] 4.10.3It covers little of the house budget |

| 5. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 5.1 Are you familiar with the project? | ☐ 5.1.1 Yes<br>☒ 5.1.2 No |
| 5.2 What is your general attitude towards the project? | ☐ 5.2.1 Good<br>☐ 5.2.2 Bad<br>☒ 5.2.3 Neutral<br>☐ 5.2.4 Don't know/don't have enough information |
| 5.3 What are your expectations for the project? Maximum 3 answers | 5.3.1 - cheap energy bill. |

| 5. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| | 5.3.2 |
| | 5.3.3 |
| 5.4 What are your concerns about the project? Maximum 3 answers | 5.4.1 not to destroy the sea creatures |
| | 5.4.2 |
| | 5.4.3 |

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number: | 2. | |
| 1.3 Date and time | 11.10.2023 ; 11:30. | |

| 2. INTERVIEWERS INFORMATION | | | |
|---|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 CRETU ROMI | Signature | |
| | 2.1.2 | Signature | |
| 2.2 Name of supervisor: | | Signature | |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.1 Name of respondent | STEFANESCU CONSTANTIN |
| 3.2 Respondent phone number | +40 766 935 888 |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.4 Respondent location | Portul Tomis - Constanța |

| 4. ECOSYSTEM SERVICES | |
|---|---|
| 4.1 Where do you fish? | ☐ 4.1.1 Site <1km<br>☐ 4.1.2 Local 1km-5km<br>☒ 4.1.3 Regional >5km |
| 4.2 How often do you fish? | ☐ 4.2.1 Once a day<br>☐ 4.2.2 More than once a week<br>☐ 4.2.3 More than once a month |
| 4.3 How much time do you spend fishing? | ☒ 4.3.1 Morning<br>☒ 4.3.2 Afternoon and evening<br>☐ 4.3.3 All day |
| Do you fish all year round or is it a seasonal activity? If so which are the months when you go fishing? | All year except winter. |
| 4.4 What animals do you fish? | guvid, barbun, chefal |

| | |
|---|---|
| 4.4 What is the average amount of fish caught on a monthly basis? | 8-12 Kg. |
| 4.5What is the use of the catch? | ☒4.5.1 The catch is consumed<br>☒4.5.2 The catch is sold. Specify where it is sold and to whom (if local/ national/international companies/private): |
| 4.6 What type of boat is used for fishing? | Typycally fisherman boat. |
| 4.7 What type of fishing technique is used? | Rod. |

| | |
|---|---|
| 4.8 Are fishing activities carry out individually or with the support of others? | 2-3 persons on a boat. |
| 4.9 Is fishing your only occupation? | ☒4.9.1 Yes<br>☐4.9.2No. Please specify your other occupations: |
| 4.10 How much do fishing activities cover the household economic budget? | ☐4.10.1 It covers the house budget<br>☒4.10.2 It covers partially the house budget<br>☐4.10.3It covers little of the house budget |

[redacted]

| 5. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 5.1 Are you familiar with the project? | ☐5.1.1 Yes<br>☒5.1.2 No |
| 5.2 What is your general attitude towards the project? | ☒5.2.1 Good<br>☐5.2.2 Bad<br>☐5.2.3 Neutral<br>☐5.2.4 Don't know/don't have enough information |
| 5.3 What are your expectations for the project? Maximum 3 answers | 5.3.1 cheep energy cost - |

| 5. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| | 5.3.2 |
| | 5.3.3 |
| 5.4 What are your concerns about the project? Maximum 3 answers | 5.4.1 Not to harm the marine life. |
| | 5.4.2 |
| | 5.4.3 |

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number: | 4. | |
| 1.3 Date and time | 12.10.2023 ; 17:30. | |

| **2. INTERVIEWERS INFORMATION** | | | |
|---|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 CREȚU ROMI | Signature | |
| | 2.1.2 | Signature | |
| 2.2 Name of supervisor: | | Signature | |

| **3. RESPONDENT INFORMATION** | PESCĂRIE MAMAIA |
|---|---|
| 3.1 Name of respondent | SC PREZENT SRL - Aurel Anghel |
| 3.2 Respondent phone number | +40 744 580 396. |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.4 Respondent location | MAMAIA - CONSTANȚA . |

| 4. ECOSYSTEM SERVICES | |
|---|---|
| 4.1 Where do you fish? | ☐ 4.1.1 Site <1km<br>☐ 4.1.2 Local 1km-5km<br>☒ 4.1.3 Regional >5km |
| 4.2 How often do you fish? | ☐ 4.2.1 Once a day<br>☐ 4.2.2 More than once a week<br>☐ 4.2.3 More than once a month<br>3 times/Day. |
| 4.3 How much time do you spend fishing? | ☐ 4.3.1 Morning<br>☐ 4.3.2 Afternoon and evening<br>☒ 4.3.3 All day |
| Do you fish all year round or is it a seasonal activity? If so which are the months when you go fishing? | All year |
| 4.4 What animals do you fish? | Guvid, Hamsie, stavrid, Lufar, calcan, Rapana, Rechin. |

| | |
|---|---|
| 4.4 What is the average amount of fish caught on a monthly basis? | depends, it's not estabilished. |
| 4.5What is the use of the catch? | ☐ 4.5.1 The catch is consumed<br>☒ 4.5.2 The catch is sold. Specify where it is sold and to whom (if local/ national/international companies/private): |
| 4.6 What type of boat is used for fishing? | Lotcă, MAHUNĂ, Pescadoare. |
| 4.7 What type of fishing technique is used? | Traulere + staționar cu plase și taliene! |

| | |
|---|---|
| 4.8 Are fishing activities carry out individually or with the support of others? | traulere echipaje de 6-8 pers. |
| 4.9 Is fishing your only occupation? | ☒ 4.9.1 Yes<br>☐ 4.9.2No. Please specify your other occupations: |
| 4.10 How much do fishing activities cover the household economic budget? | ☒ 4.10.1 It covers the house budget<br>☐ 4.10.2 It covers partially the house budget<br>☐ 4.10.3It covers little of the house budget |

| 5. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 5.1 Are you familiar with the project? | ☒ 5.1.1 Yes<br>☐ 5.1.2 No |
| 5.2 What is your general attitude towards the project? | ☒ 5.2.1 Good<br>☐ 5.2.2 Bad<br>☐ 5.2.3 Neutral<br>☐ 5.2.4 Don't know/don't have enough information |
| 5.3 What are your expectations for the project? Maximum 3 answers | 5.3.1 To be beneficial for Romania |

| 5. PROJECT KNOWLEDGE AND FEEDBACK | | |
|---|---|---|
| | 5.3.2 | To have a small price for electricity. |
| | 5.3.3 | |
| 5.4 What are your concerns about the project? Maximum 3 answers | 5.4.1 | Not to impact the sea life. |
| | 5.4.2 | To respect biodiversity. |
| | 5.4.3 | |

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number: | 3 | |
| 1.2Address and GPS coordinates of the location where this interview takes place | Techirghiol City Hall | X =<br>Y = |
| 1.3 Date and time | 12.10.2023 ; 13:45 | |
| 1.4 Does the respondent authorize the publication of pictures? | ☐ 1.4.1 Yes<br>☒ 1.4.2 No | |

| 2. INTERVIEWERS INFORMATION | | |
|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 Cretu Romi | Signature |
| | 2.1.2 | Signature |
| 2.2 Name of supervisor: | | Signature |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.1 Name of respondent | IULIAN - CONSTANTIN SOCEANU |
| 3.2 Respondent phone number | +40.722.545 470. |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.4 Respondent location | Techirghiol - City HALL. |
| Respondent field of activity/field of expertise | MAYOR. |
| Brief description of the activities of the organization/institution/association that the respondent represents | activities that involve actions specific to a mayor. |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.1 Are you familiar with the project? | ☐ 4.1.1 Yes<br>☒ 4.1.2 No |
| 4.2 What is your general attitude towards the project? | ☒ 4.2.1 Good<br>☐ 4.2.2 Bad<br>☐ 4.2.3 Neutral<br>☐ 4.2.4 Don't know/don't have enough information |
| 4.3In your opinion what are the three main problems in the local area | Infrastructure, high costs of development.<br>implementation of European Founds.<br>protected areas. |
| | |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.4 In your opinion what are the three main positive aspects in the local area | highly developed balneo tourism |
| 4.5What are the three most important economic sectors in the area? | Please fill<br>☐4.5.1__ Balneo Tourism<br>☐4.5.2__ Real estate development -<br>☐4.5.3__ |
| 4.6 What are your expectations for the project? Maximum 3 answers | 4.6.1 to create profitability through energy independence. |
| | 4.6.2 |
| | 4.6..3 |
| | 4.7.1 |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | | |
|---|---|---|
| 4.7What are your concerns about the project? Maximum 3 answers | 4.7.2 | Not to influence biodiversity |
| | 4.7.3 | Respect of protected areas. |

| 1.QUESTIONNAIRE INFORMATION | | |
|---|---|---|
| 1.1 Survey Form Number. | 9 | |
| 1.2Address and GPS coordinates of the location where this interview takes place | Str. Constanței nr. 80 A, Tuzla 907295 | X =<br>Y = |
| 1.3 Date and time | 9.50 - 16.10.2023 | |
| 1.4 Does the respondent authorize the publication of pictures? | ☐ 1.4.1 Yes<br>☒ 1.4.2 No | |

| 2. INTERVIEWERS INFORMATION | | |
|---|---|---|
| 2.1 Names of interviewers: | 2.1.1 Rotti CRETU | Signature |
| | 2.1.2 | Signature |
| 2.2 Name of supervisor: | | Signature |

| 3. RESPONDENT INFORMATION | |
|---|---|
| 3.1 Name of respondent | Resit Javen. |
| 3.2 Respondent phone number | +40 723 331 125 – to be contacted only through official channels |

| 3. RESPONDENT INFORMATION | |
| --- | --- |
| 3.4 Respondent location | Constanța, Tuzla, str. Constanței nr 80 A |
| Respondent field of activity/field of expertise | Mayor. |
| Brief description of the activities of the organization/institution/association that the respondent represents | all activities involving the duties of a mayor. |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.1 Are you familiar with the project? | ☐ 4.1.1 Yes<br>☒ 4.1.2 No |
| 4.2 What is your general attitude towards the project? | ☒ 4.2.1 Good<br>☐ 4.2.2 Bad<br>☐ 4.2.3 Neutral<br>☐ 4.2.4 Don't know/don't have enough information |
| 4.3In your opinion what are the three main problems in the local area | this must be discussed in an official meeting. with the company executing the project supervised by 4 participants from the local council. |
| | |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.4 In your opinion what are the three main positive aspects in the local area | the Town very well positioned on the sea shore |
| 4.5What are the three most important economic sectors in the area? | Please fill<br>☐4.5.1_ Tourism 180 properties for accomodation in the<br>☐4.5.2_ Through the next PUG the sea-shore will area<br>☐4.5.3_<br>enter in the areas with built-up possibilities. so tourism will grow.<br>- Aeroport<br>- Agriculture |
| 4.6 What are your expectations for the project? Maximum 3 answers | 4.6.1 - To be dissculted in an official meeting. |
| | 4.6.2 - to bring. value to Romania and to decrease the costs. of. power. |
| | 4.6..3 - The mayory hall paigs 150.000 Ron/month so will be good to get help for this cost. |
| | 4.7.1 |

| 4. PROJECT KNOWLEDGE AND FEEDBACK | |
|---|---|
| 4.7What are your concerns about the project? Maximum 3 answers | 4.7.2 |
| | 4.7.3 |

**Georgia - Romania Electric and Digital Interconnection**

# Terms of Reference

# Environmental and Social Impact Assessment

## *Abbreviations*

- **BMP**: Biodiversity Management Plan
- **ESIA**: Environmental and Social Impact Assessment
- **ESMP**: Environmental and Social Management Plan
- **ESS**: Environmental and Social Standards
- **GSE**: Georgian State Electrosystem
- **m**: meters
- **OFC**: Optical Fiber Cable
- **PMG**: Project Management Group
- **PV**: Photovoltaic
- **RAP**: Resettlement Action Plan
- **RE**: Renewable Energy
- **SC**: Southern Caucasus
- **SEE**: South-Eastern Europe
- **SEP**: Stakeholder Engagement Plan
- **ToR**: Terms of Reference
- **$W_0$**: starting date
- **WB**: the World Bank

# *Table of Contents*

# 1 PREFACE

The Environmental and Social Impact Assessment (ESIA) for the Black Sea Submarine Cable (BSSC) Project will produce seven main deliverables. **Five** of these documents will be **ESIA reports,** and **two** documents will be **submissions for permitting** required for the cable laying within the Turkish and Bulgarian Exclusive Economic Zones (EEZ)s.

The five ESIA reports will be as follows:

- **ESIA for submarine cable construction and operation in Georgia** which covers both the onshore and offshore parts of infrastructure all way to the Georgian EEZ.
- **ESIA for submarine cable construction and operation in Romania** which covers both the onshore and offshore parts of the infrastructure will way to the Romanian EEZ.
- **Overarching ESIA for submarine cable construction and operation** which includes:
  - the two above mentioned national ESIAs, and
  - the marine area linking Georgia and Romania (which includes the Turkish and Bulgarian EEZs)
- **ESIA for Overhead Transmission Lines (OHLs) in Georgia** connecting the submarine cable to the national grid of Georgia.
- **ESIA for OHL in Romania** connected the submarine cable to the national grid of Romania.

Further, for the two countries whose EEZ's will be crossed, the Consultant shall extract relevant information from the overarching ESIA for submarine cable construction and operation, using the respective format required by the two countries:

- A "**Notification document**" for Bulgaria
- A "**Pre-EIA Report** (or a "Project Presentation File") for Türkiye

# 2 INTRODUCTION

The Black Sea Submarine Cable (BSSC) Project represents one of the most strategic and ambitious energy and digital connectivity initiatives in the South Caucasus and Southeast Europe. It would include parallel electricity and fiber-optic submarine cable interconnections across the Black Sea, with landing points in Georgia and Romania. Increased electricity trade through the electricity interconnection is expected to enable renewable energy RE development in the South Caucasus and contribute to the decarbonization of energy supply, enhanced energy security, and electricity supply reliability on both sides of the interconnection. The digital interconnection would reduce internet connection costs, improve bandwidth, and build redundancy for international digital connectivity across the Black Sea. Besides Georgia and Romania, Hungary, Azerbaijan, and potentially other countries in the South Caucasus and Southeast Europe are expected to participate in the development and financing of the BSSC Project.

Government of Georgia requested the World Bank assistance with the preparation and implementation of BSSC Project, that will be undertaken in several phases. The first phase is confined to studies required for the detailed design and construction of infrastructure. It would include: (i) the geophysical and geotechnical investigations of the Black Sea seabed to identify a corridor for the power and fiber-optic cable system (the two key technical studies that still need to be carried out as part of the feasibility study process), and (ii) legal and financial advisory, technical assistance, capacity building, and knowledge transfer to support financial negotiations, institutional strengthening and stakeholder engagement at both the Georgian and intergovernmental levels, and preparatory technical studies, and Environmental and Social Impact assessment (ESIA) of the BSSC Project.

Georgia State Electosystem, a State-owned joint stock company operating the national transmission network of Georgia and the implementing agency for the first phase of BSSC Project, seeks consultant services of a legal body (a single entity or a consortium) to undertake ESIA of the BSSC Project.

## 3 OBJECTIVES OF THE ASSIGNMENT

The main objectives of the assignment are to:

- Identify sensitive environmental, social, and cultural heritage receptors within the corridor of the submarine cable and OHLs, point out risks to the natural and social environment and to the cultural assets associated with the anticipated construction works in this corridor, and describe their nature and scope.
- Cooperate with the team of designers hired by GSE in the process of conducting analysis of alternative alignments of the marine and terrestrial parts of BSSC Project infrastructure with the purpose of integrating environmental, social, and cultural heritage perspectives into the selection of the optimal route.
- Provide a set of detailed mitigation measures aimed at avoiding or decreasing expected negative impacts of construction on the natural, social, and cultural environment, and develop an environmental management matrix including mitigation and monitoring plans.
- Produce ESIA reports and submissions for permitting satisfactory to GSE and the World Bank.
- Assist GSE, as requested, during public consultations on the draft ESIA reports.

## 4 PURPOSE AND STRUCTURE OF ESIA

BSSC Project includes construction and operation of complex infrastructure comprising of various structural elements to be located in different biophysical environment and in territories of several countries. Also, ESIA information will be used for obtaining environmental and construction permits from relevant State authorities of the involved countries. Therefore, ESIA of the BSSC Project will produce several outputs to facilitate administrative procedures. All outputs will be aligned with the relevant Environmental and Social Standards (ESSs) of the World Bank, international marine regulations, Environmental, Health and Safety Guidelines of the World Bank, and good international industry practice. In addition, country-specific outputs must be compliant with the national legislation of involved countries and requirements of international treaties that these countries are parties to.

### Structure of ESIA reports

All ESIA reports to be produced in the scope of the present assignment will be organized as follows:

- Nontechnical summary
- Introduction (general description of the Project, purpose and objectives of the study, report structure)
- Project description
- Analysis of alternatives
- Overview of regulatory framework relevant for construction and operation of deep-sea section of submarine cable
- ESIA Methodology
- Description of environmental and social baseline of the area of influence

- Assessment of environmental, social, health and safety risks and potential Impacts of construction and operation of infrastructure
- Environmental, social, health and safety risk management and monitoring; Environmental and Social Management Plan
- Institutional arrangements for environmental and social management, costs, and administrative frames for ESMP implementation
- Stakeholder engagement in the ESIA process, ESIA report disclosure, and public consultation
- References and Annexes.

# 5 SCOPE OF CONSULTANT'S ASSIGNMENT

## 1) Overview of the Legal and Institutional Framework

The ESIAs shall contain an overview of environmental and social legislation and institutional set-up directly affecting project implementation during the construction, operation, and decommissioning phases.

For each law and regulation covered in the overview, their implications for the project must be clearly described. Comparative analysis of the national environmental and social management systems and the relevant ESSs of the World Bank should be provided, emphasizing differences and gaps. Analysis of the capacity of the national institutions to enforce national and international environmental and social legislation as well as capacity to apply the World Bank's ESSs should be included. Finally, recommendations should be given for closing existing gaps and addressing weaknesses for the purpose of the project implementation. It should be emphasized that in case of difference between the national regulations and the requirements of the World Bank ESSs, the more stringent rules apply.

Reference should be made to the applicable sections of the Environmental, Health, and Safety Guidelines of the World Bank and good international industry practice.

## 2) Environmental and Social Baseline

The environmental and social baseline shall be based on the field investigations and reconnaissance surveys in the Project's area of influences, collection and analysis of secondary data, and discussions with key stakeholders.

Collected data must be sufficiently robust, detailed, and recent, to enable sensitivity elements to be identified and mitigation to be planned appropriately. Therefore, if the available information is insufficient, outdated, or of uncertain reliability, then the consultant shall gather primary data. The Consultant should describe the proposed field work in detail in the inception report identifying exact purpose, timing, scope, and methodology including survey tools.

The Consultant will use information on the Project stakeholders provided in the Stakeholder Engagement Plan of BSSC Project and engage with relevant stakeholders during the ESIA. The received feedback will be analyzed to determine how they can be addressed in the ESIA and the Project designs. Focus should be put on the parties that, due to their circumstances may be at a disadvantaged or vulnerable.

Baseline data should include, but not necessarily be limited to, the physical, biological and social information described below.

**Physical environment** – terrestrial and marine: Landscape, topography; geology and geo hazards; soil types and existing pollution level; climate and expected impacts of change in the undersea and onshore areas interested by the project; air quality; hydrology: surface water bodies, groundwater levels, water pollution; noise:

- Meteorological conditions – secondary data.
- Geology (both terrestrial and marine), watershed, landslides, and erosion: Including topography/terrain, geology and geomorphology and slope stability & landslide/soil–erosion risk zones - secondary and primary data (site visit).
- Seismicity (including terrestrial and marine geohazards), terrestrial (including soil, groundwater, surface water and landscape) and fluvial geology and geomorphology, coastal morphology, marine Geomorphology (Continental shelf), marine sediments (sediment transport, sediment composition, sediment quality), and carbonate mounds with the associated bacteria communities - Secondary and primary data.
- Seawater and surface water chemical description. Hydrology: rivers, floods, seasonal water flows. Sea level variation, wave climate, storm surges, water temperature, water salinity, water density, distribution of Oxygen, Hydrogen sulfide, pH, alkalinity, Silica, Organic Matter, turbidity and suspended sediments, Phosphorus compounds, Nitrogen compounds, sea water contamination - secondary data (if available) and primary data especially in correspondence of the marine and coastal electrode footprints.
- Groundwater: groundwater wells, hydrogeochemical characteristics of the groundwater resources, field parameters of groundwater areas, groundwater quality (concentrations of heavy metals, electrical conductivity, and chemical parameters) – secondary data (if available).
- Noise: Equivalence continuous noise pressure level and noise levels during different periods of the day. Identify peculiar communities and assess the noise levels near their habitats – primary and secondary data.
- Underwater noise: characterization of the underwater noise based on the main potential noise sources present in the Project area of influence - secondary data.
- Air quality: sulfur dioxide, nitrogen oxides, nitrogen dioxide, hydrogen sulfide, ozone $PM_{10}$ and $PM_{2.5}$ parameters. Volatile organic compounds and settled dust concentrations - secondary data (if available).
- Climate change: According to ESS1 of the World Bank, an assessment on the projected climate change is necessary considering direct, indirect, and cumulative Project-related impacts. Climate change impacts should also be considered on selection, siting, planning, design and implementation of the Project – secondary data.
- Global and transboundary Project-related risks and impacts should be taken into account – secondary data.

**Biological environment** – terrestrial and marine: flora and fauna; rare and/or endangered species (Red List species); habitats classified into three categories - transformed, natural, and critical; marine and terrestrial habitats; protected areas, Emerald sites, important bird areas, routes of migratory bird species, and other sensitive receptors deemed relevant by the Consultant.

- Overview of life in the Black Sea – secondary data.
- Overview of Georgia's and Romania's coastal and other ecosystems under the Project's area of influence – secondary data.
- Plankton (phytoplankton and zooplankton) – secondary data.
- Benthic communities – secondary and primary data.
- Fish (migration, reproduction, spawning, the Black Sea Sturgeon protection and conservation) – Secondary data and interview with fishermen.

- Seabirds and marine mammals – secondary data and interview with fishermen.
- Terrestrial flora and fauna: International Union for Conservation of Nature status for the species present in the Area of Influence of the Project. Important aspects include migratory (migratory patterns) and endemic species, economically or culturally important species that play an important ecological function as food sources or sustainers of the key habitats - secondary and primary data.
- Marine habitats according to EUNIS classification – secondary and primary data.
- Terrestrial habitats according to EUNIS classification – secondary and primary data.
- Habitat categorization into transformed, natural, and critical – according to the World Bank's ESS 6.
- Protected areas and global, national, or regional importance within the Project's area of influence, including detailed information on the zoning, habitats, flora and fauna, populations and their viability, management plans, monitoring programs, administrations and their institutional capacity of Kolkheti protected areas (terrestrial and marine parts, sites protected under Ramsar Convention, sites included in the Emerald Network, UNESCO natural heritage sites, etc.) – secondary data and primary data.

**Physical environment:**

- Landscape/seascape: describe the main landscape/seascape features in the Project's area of influence, identifying elements of aesthetic value, especially elements important for local communities and those important due to their present or potential role for tourism or recreational purposes. The baseline should identify specific sensitive viewpoints – secondary data.
- Topography; geology and seabed structure; seismic and geo hazards; soil types and soil degradation; coastal erosion – secondary and primary data.
- Point and non-point sources of pollution; air, water, and soil pollution; pollution hotspots – secondary and primary data.
- Noise propagation, marine acoustics.
- Climatic zones in the Project's area of influence; available projections of climate change and its main impacts, including expected rise of sea level – secondary data.
- Hydrology: the Black Sea; watersheds, surface water bodies, groundwater levels.

**Socioeconomical environment**: social aspects including land tenure, land-use, and livelihoods and community health and safety.

- Population and demographics: The section will be focused on potentially impacted communities especially disproportionately impacted, vulnerable or at a disadvantage and will provide all relevant demographic statistics (e.g., population, age, gender, minority groups, literacy rate, socio-economic conditions, internal displacement status, labour force profile, and labour force participation including gender-disaggregated data, prevalent economic activities, presence of seasonal and migrant workers).
- Community Health and Safety: baseline health status of the host communities based on secondary literature and data collected in the field, including identifying those that are vulnerable or disadvantaged. The baseline should be sufficient to:
  - determine the range and quality of health services available for the local population.
  - potential for gender-based-violence (GBV)/Sexual Exploitation and Abuse/Sexual Harassment (SEA/SH), particularly in relation to any labour influx that may occur due to the Project.

- key health issues, focusing on the presence of any disease which may become more prevalent in the area due to the Project.

- Education: define the education profile of the communities in the AoI through statistics and qualitative data. Focus should be placed on minorities and vulnerable groups. Identify education facilities in the Project's area of influence, assess their level of maintenance and access for local communities.

- Economy and livelihoods: map out the socioeconomic development status of the Project's area of influence, including resource conditions, economic activities (agricultural productions, fishery, sea farming, hotels, resorts, sea and terrestrial touristic attractions, etc. etc.), employment sources and trends, as well as local development needs, priorities, challenges, and planned or ongoing development interventions. Livelihoods: main economic activities and the de'ree of local people's dependence on them for livelihoods and benefits to be derived to be derived from project. Access to natural resources and their significance to local communities and livelihoods. Discuss gender related workload sharing and family economy; dependency and use of local and external resources; and production and marketing systems and patterns.

- Infrastructure, transport and mobility: identify the presence of infrastructure and access for local communities to potable water, wastewater networks, power, natural gas, telecommunications, waste management and other relevant infrastructures. A special focus should be placed on mobility in the Project's area of influence, in terms of road network, rail network, presence of airports and harbors; indications should also be provided on the main transport means used in the area of influence. The baseline should provide a description on the maintenance levels of such infrastructures and the level of access for local communities.

- Social infrastructure: identify the social infrastructure present in the Project's area of influence in terms of community centers and other facilities used for social purposes. The description should indicate the level of maintenance of such facilities and the level of access for local communities. Attention should be given to both formal and informal social infrastructures, such as informal support networks and support systems used by specific groups or minorities.

- Tourism: describe the role of the tourism sector in the economy of the Project's area of influence, including both onshore tourism and coastal/marine tourism. The baseline should describe the importance of the sector and the presence of facilities that could be potentially impacted.

- Land use and land tenure: characterize current land uses and indicate major trends in land use change which are taking place irrespective of the proposed Project. Identify Rural and urban areas including identification of areas with urbanization potential. Land tenure: Characterize types of land tenure (e.g., titles, customary), formal and informal institutions related to land tenure, and modes of land transactions in the area of influence. Main types of land use: residential, agricultural, resort, industrial, protected, or production forests); main types of land property and management: state-owned, community managed (e.g., pastures), privately owned, allocated for special use (plots around important pieces of infrastructure), etc. etc.; estimated need for land take and physical relocation for the Project purposes.

**Cultural heritage**: tangible and intangible

- **I**dentify known historic and cultural monuments (local, national, international significance) and respective physical and visual protective zones. Information and mapping of cultural resources (both tangible and intangible) of importance to those in the project areas should also be identified. The latter recognizes that cultural heritage also takes many other forms and of it may be visible, and many others may not be identifiable without consultations. The mapping and identification shall be informed through engagement with communities, including women, to identify spaces of cultural value and significance to them. The baseline should also help determine if activities may impact access to these resources, even temporarily. Conduct marine archaeological survey to identify presence/location of submerged archaeological settlements, objects, artefacts concentration or ancient shipwrecks.

- Define areas with high probability of archaeological chance finds.

### 3) Assessment of Risks and Potential Impacts

The methodology for the impact and risk assessment shall be based on the identification, description and quantification of the following key elements:

- **Project actions**: activities directly or indirectly related to the Project which can interfere with the environment as primary generative elements of environmental or social pressure.
- **Impact factors**: direct or indirect interferences produced by the project actions on the environment, able to influence the state or quality of one or more environmental and social components.
- **Impacts**: changes undergone by the environmental state or quality because of the effects caused by the impact factors on the environmental or social components.
- **Risks**: it refers to the vulnerability of the Project to natural or anthropogenic hazards and the risks that specific Project actions may represent a treat for human health or the environment.

The first step of this process is the identification of the **Project Actions** which are activities directly related to the Project that can generate primary pressures (Impact Factors) and, consequently, affect the current state of one or more environmental and/or social components.

**Impact Factors.** The Impact Factors are determined by the Project actions and can be defined as potential interference sources which may positively or negatively and directly or indirectly affect the environmental quality status. The impact factors identified during the analysis of the project and through the definition of the project phases and project actions shall be assessed in their relevance, using a scoring system. A number of parameters can be considered to assess the impact factor score, such as **duration** (the duration of the impact factor), **frequency** (the frequency with which the impact factor manifests itself), **geographic extent** (the geographical area within which the impact factor can exert its effects), **intensity** (a measure of the physical, economic or social severity of the impact factor) and **reversibility** (the property of an impact to diminish its magnitude over time and to eventually recede entirely) of the impact. All the parameters above described will allow to assess a score to negative or positive impacts based on their significance.

As mentioned above, together with negative impacts, a project can provide also positive impacts. Positive impacts are typically associated to economic and social opportunities and sometimes to environmental aspects where the project can address existing environmental issues. The assessment of positive impacts is based on the same parameters used for the assessment of negative impacts, with the only difference that mitigation measures are replaced by enhancement measures, or measures to maximize the potential positive impacts. The effectiveness of the enhancement measures defined in the environmental and social management plan should be assessed using expert judgement and the findings from the previous application of the measures to similar projects.

**Risks**. Like the potential impacts, the assessment of the **Risks** associated with Project activities shall be evaluated using a quantitative approach. The first part of the risk **analysis is based** on the **identification** of the **hazards categories and** the **events related to each hazard**. A hazard is defined as the intrinsic property of a specific factor/action that has the potential to cause harm. As part of the new Project, a series of accidental events, which could negatively influence the construction and/or operation phases, can take place (e.g., anthropogenic hazards, such as damage to the cable by anchors or trawling, collisions between vessels, road accidents; natural hazards, such as earthquakes, floods, wildfires etc.).

Following the identification of the dangerous events, the **risk estimation** should be performed by evaluating each event in terms of probability of occurrence and its seriousness (severity level). Thus, a probability and impact matrix should be created in the form of a grid, where potential risks are weighted according to the effect they could have on the objectives of the Project (PMI, 2013). The combination of the severity of the effect and the probability that the event will occur gives an indication of the comparative importance of the risk scenario (risk ranking), assigning a numerical value to the risk of each dangerous event. Then, to reduce the incidence of risks, the residual risk is calculated in relation to plant/technological and/or organizational mitigating measures.

Particular attention should be given to **risks related to potential crossing of Kolkheti protected areas** by Project infrastructure. These risks should be described based on the most recent conceptual designs of the Project, protected area maps with delineated boundaries of various protection zones within protected areas and boundaries of internationally designated protected sites, scope and timing of legal and administrative procedures that may be triggered in case of crossing protected areas, political implications and risk of pushback from conservation activists, whistle blowers, other civil society organizations, and local communities.

**4) Impact Mitigation and Monitoring**

Following the identification of environmental and social risks and impacts, the development of their mitigation measures shall be undertaken using international best practice. For each identified risks and impacts, this priority strategy should be followed (ESS1): "avoid, minimize, reduce and mitigate risks and impacts and where significant residual impacts remain, to compensate for or offset such impacts." The impact management hierarchy should be followed whereby avoidance and minimization of impacts should be given priority over mitigation. The Consultant must liaise closely with the design team to identify possibilities for the impact avoidance or minimization through the location or technical solutions. Thus, an impact matrix is created, where potential impacts are weighted according to the effects they could have on the component analyzed and the effectiveness of the mitigation measures adopted.

For every proposed measure, a cost estimate should be provided, and feasibility of its application in the Project context should be proved. Institutional responsibilities for applying mitigation measures should also be explained. In case of legal/institutional weaknesses the Consultant/s should recommend a way to close the gaps. Particular importance should be given to describing feasibility, timing, and implementation arrangements for undertaking biodiversity offsets, should such be proposed by the Consultant.

Environmental monitoring during Project implementation provides information about key environmental aspects of the Project, particularly the environmental impacts of the Project and the effectiveness of mitigation measures. The monitoring chapter should comprise of the description and technical details, of monitoring measures, including the parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits (where appropriate), and definition of thresholds that will signal the need for corrective actions. Monitoring and reporting procedures to ensure early detection of conditions that necessitate mitigation measures and furnish information on the progress and results of mitigation.

The final step of the ESIA study consists in the assessment of cumulative and residual impacts of the Project. Cumulative impacts should be interpreted as those "resulting from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted" according to ESS1. Residual impacts are those that may not be avoided because this is physically impossible or not feasible. Residual impacts shape the Project's environmental footprint.

**5) Analysis of Alternatives**

The ESIA shall include a comparison of the feasible Project alternatives (in terms of location, technology, design, and operation), including the "no Project" scenario.

The ESIA shall evaluate into detail alternatives to the Project and justify why the Project is viable in the present environment or why the other options are not viable.

# 6 SOURCES OF INFORMATION AVAILABLE FROM THE EMPLOYER

GSE, the Consultant's employer, will make available the following sources of secondary data: Environmental and Social Screening Reports of BSSC Project undertaken for Georgia and for Romania, Environmental and Social Scoping Report of the BSSC Project, Black Seabed Study Report, and the Submarine Cable Routing Report.

# 7 GENERAL GUIDANCE FOR FIELD WORK

Marine primary data collection

Marine primary data collection should concern at least the following components: benthos and benthic habitats; chemical and physical water parameters in the water column (in the electrode areas). In addition, data about fish, marine birds and marine mammals should be collected by interviews with local fishermen.

Additional primary data focused on the marine study area will be provided by the "geophysical, sediment, benthic and chemical characterization and geotechnical marine surveys" carried out by a specialized company. The data provided will concern the marine corridor in the coastal zone till 100 m depth and will include essential primary data for the benthos characterization (sampling with grab and visual observation by ROV), benthic habitat distribution (bathymetric maps e.g., isobaths, shaded relief, morphological maps based on backscatter interpretation), and sediment characterization along the cable corridor (grain size and chemical analyses according to national regulation and international standards).

Based on the data provided by the specialized company and the available bibliographic data, further visual inspection or sediment/benthos sampling in key areas (if any) by ROV/grab or scuba divers may be necessary within the ESIA baseline data collection. In addition, primary data about chemical features of the marine water should be collected in correspondence of the coastal and marine areas where the electrode will be installed. Data collection in different seasons are necessary. Measures with multiparametric probe and water samples (2 or 3 bathymetric elevations in each station according to the bathymetry) and analyses in specialized laboratory are necessary.

In regard to marine archeology, a specific archaeological report, geophysical and visual data will be provided by the specialized company in charge of the "geophysical, sediment, benthic and chemical characterization and geotechnical marine surveys". In any case the presence of marine archaeologists within the ESIA team will ensure avoidance of unknown submerged archaeological settlements/monuments/objects.

Terrestrial Primary Data Collection

Terrestrial primary data collection should include at least the following components: flora, fauna, noise, cultural heritage, stability & landslide/soil, landscape. Field data collection should be carried out considering the seasonality, when necessary, and applying the best practices and in compliance with the relevant national requirements of each country investigated.

Site inspection by experts and camera traps should be installed to carry out a proper identification of the fauna present in the Project's area of influence. Alongside the camera traps an expert should also utilize bird vocalizations to better classify and identify the bird communities present in the areas. The presence of bats should also be investigated with the use of bat detectors. Transects should be utilized to sample the flora and build a map of the existing habitats; it is advisable to use the EUNIS habitat classification.

In regard to slope stability & landslide/soil, geology, a site visit of qualified experts in the Project area (cable corridor) should be carried out; soil samplings in key areas should be performed to assess the soil typology and the presence of pre-existing pollution (if any).

Cultural Heritage desktop studies and walkover surveys implemented by the experienced experts should be performed during the terrestrial data collection.

Noise measurements and electromagnetic field assessments at the receptors and soil characterization along the cable corridor should be conducted according to the national legislation of Georgia and Romania.

Photo-rendering for assessing the visual impact especially of the overhead transmission lines (OHL) and other relevant infrastructures (e.g., substations) should be included in the ESIA.

## 8 ADDITIONAL SPECIALIZSED STUDIES

The consultant shall develop several specialist studies, including but not limited to:

- Biodiversity Management Plan (BMP) and Waste Management Plan (WMP) will also be required to satisfy the national legislation and WB's ESSs (ESS6 and ESS3, respectively).
- Modeling for assessing the risk of coastal erosion in correspondence of the Georgian coastal electrode site including the possible and real risks and their mitigation.
- Waste Management Plan for managing waste properly and in safe manner and to avoid or minimize as much as possible any risks for human health and the environment for both – off-shore and on-shore segments.

These specialized studies are described below.

### 1) Biodiversity Management Plan (BMP)

Based on the environmental and social assessment and conducted biodiversity studies, the requirements of a BMP are applied to all projects that potentially affect biodiversity or habitats, either positively or negatively, directly or indirectly, or that depend upon biodiversity for their success (ESS6).

The objectives of the BMP are:

- To protect and conserve biodiversity and habitats.
- To apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity.
- To promote the sustainable management of living natural resources.
- To support livelihoods of local communities, including inclusive economic development, through the adoption of practices that integrate conservation needs and development priorities.

BAP should be developed according to the national law about biological diversity and conservation.

### 2) Modeling for assessing the risk of coastal erosion

The ongoing coastal erosion along the Georgian coast in the area where the coastal electrode is planned should be evaluated with the use of numerical modeling. In addition, the modeling should also be used for assessing the potential impact on the coastal erosion due to the building of the electrode. Design of the electrode should be then revised according to the results of the modeling to avoid/minimize the impact on the coastal erosion.

**3) Waste Management Plan (WMP)**

According to the WB's ESS3, the generation of hazardous and nonhazardous waste should be avoided or limited. When waste generation cannot be avoided, it should be minimized, and reuse, recycle and recover waste should be applied in a manner that is safe for human health and the environment. In the case waste cannot be reused, recycled or recovered, it will be treated and disposed, destroy, or dispose in an environmentally sound and safe manner that includes the appropriate control of emissions and residues resulting from the handling and processing of the waste material.

Therefore, a waste management plan should be developed to ensure that waste is managed in a safe manner and in accordance with applicable national and international regulations. In terms of international regulations, the most relevant ones are the Strategic Action Plan, the London Convention, the Basel Convention, and the MARPOL Convention.

The Strategic Action Plan (SAP) for the Environmental Protection and Rehabilitation of the Black Sea includes several provisions related to waste management, including the provision of adequate port reception facilities for ship-generated wastes and establish a harmonized cost recovery system on ship-generated waste.

The London Convention covers the deliberate disposal at sea of wastes or other matter from vessels, aircraft, and platforms. Under these requirements, Parties (i.e., Georgia) are to establish authorities responsible for issuing permits, keeping records, and monitoring the condition of the seas and promote measures which prevent pollution from hydrocarbons and matter originating from exploration of the seabed.

The Basel Convention regulates transboundary movements of hazardous wastes and provides obligations upon its Parties to ensure that such wastes are managed and disposed of in an environmentally sound manner.

The MARPOL Convention covers the prevention of pollution of the marine environment by ships from operational or accidental causes (e.g., oily wastes generated by vessels). The project vessels used for the Project will therefore be compliant with MARPOL requirements.

Bucharest Convention - EU policies to protect Europe's ocean, seas, and coasts.

National relevant laws should be also considered in the preparation of the waste management plan for each country.

## 9 DELIVERABLES FOR SUBMISSION IN BULGARA AND TÜRKIYE

For Bulgaria and Türkiye, the two countries whose EEZ's will be crossed, the Consultant shall extract relevant information from the overarching ESIA for submarine cable construction and operation. The extracted information should be presented in the following formats required by the two countries:

- A "**Notification document**" for Bulgaria
- A "**Pre-EIA Report** (or a "Project Presentation File") for Türkiye

The scope of the information extracted from the overarching ESIA shall be determined by the Consultant in line with applicable domestic legislation and international law. The Consultant should also be ready to respond to any additional request to extract information from the ESIA in different format, if this is requested by either of the two countries during implementation of the ESIA assignment.

## 10 STAFFING AND KEY PERSONNEL

The following skills and professional figures are expected:

- Project Manager: (Required years of professional experience: 15) Project Manager should oversight the production of the four documents required for the study. It must also have at least a master's degree in Environmental Science or equivalent. Specific experience in managing projects financed by International Institutions (e.g. WB, IFC, EBRD) and experience in energy sector projects will be required.
- Environmental Specialist: (Required years of professional experience: 10) Environmental Specialist will supervise the preparation of part of the documents of the study. It must also have at least a master's degree in Environmental Management or equivalent, he should be familiar with World Bank's environmental and social safeguards policies and other international standards. Lastly, he should have a good knowledge of the Georgian environmental laws and regulations. The role for this specialist will be to evaluate general environmental issues in the physical and biological environment including potential impacts.
- Terrestrial Zoologist wildlife expert (national): (Required years of professional experience: 5) They shall have a master's degree in Zoology or a related field. The expert shall have experience in works related to zoological studies of the onshore projects.
- Terrestrial Botanists (one international and one national): (Required years of professional experience: 5) They shall have a master's degree in Botany/Ecology/Forest Management or a related field. The experts shall have experience in works related to botanical and ecological studies, preferably related to linear projects. One expert should have proven international knowledge and experience and one should have proven local knowledge and experience in Georgia.
- Marine Biologist : (Required years of professional experience: 10) They shall have at least master's degree or preferable PhD in Marine Biology or a related field. The expert should have previous experience with Project concerning marine habitats and biodiversity. Lastly a deep knowledge of the Black Sea habitats and biocenosis is mandatory.
- Ornithologist (international): (Required years of professional experience: 10) They shall have at least master's degree or preferable PhD in Zoology or a related field. Should also have field work experience in developing mitigation programs related to transmission infrastructure birds.
- Environmental ESIA experts (one international and one national): (Required years of professional experience: 10) They shall have a master's degree in Environmental Science/Environment Management/Environmental Engineering or a closely related discipline. The experts shall have experience in conducting environmental impact analysis of transmission line projects as per national laws and international best practices.
- Socio-Economist Specialist : (Required years of professional experience: 5) Socio-Economist Specialist should fill in the ESMP, SEP and RAP documents. It must have a thorough knowledge of social and land management issues and should be familiar with World Bank's environmental and social safeguards policies (including land acquisition, land use restrictions and involuntary resettlement/removal) and have a good knowledge of the Georgian laws and regulations on land management and public utility expropriation.
- Sociologist/Anthropologist : (Required years of professional experience: 10) They shall have a master's degree in Sociology/Anthropology or a related discipline. The expert shall have proven working experience and knowledge and experience in conducting ESIA of linear projects as per national laws relating to ESIA and similar studies.

- Environmental Law Specialist: (Required years of professional experience: 5) Environmental Law Specialist should be involved in the compilation of all four documents needed for the study. It must also have at least a Master's degree in Environmental Law, Law or equivalent.
- Electrical Engineer: (Required years of professional experience: 10) The Electrical Engineer must be involved in the technical parts of the study including (but not only limited to) risk and hazard identification, preliminary technical studies. The Electrical Engineer must have at least a Master's degree in Electrical/Power Engineer or equivalent.

The Consultant will add, at his own expense, any other skills, and professional figures that it deems useful to the success of the study.

## 11 COORDINATION

**Oversight and Implementation Arrangements**

- **The Client:** The Consultant will report to the Project Management Group (PMG) designated by GSE. The PMG will be responsible for review and approval of the deliverables. All contractual matters shall be channeled through the PMG. The Consultant will need to coordinate with GSE, the Ministry of Economy and Sustainable Development, the authorities responsible for various aspects and other bodies indicated by the GSE. The Consultant is expected to participate in at least 10 Project-related discussions/events/conferences to be organized by GSE to discuss critical issues and present the findings. Therefore, the Consultant should plan accordingly for its staff time when preparing the financial proposal.
- **Coordination activities:** During implementation, the Consultant will need to closely engage with authorities and entities in Georgia. The Consultant would also be required to discuss certain aspects of the study with external stakeholders depending on the need and guidance from the Client. The evaluation and identification of potential impacts and mitigation will involve consultations with key stakeholders, including potentially affected people, nongovernmental organizations with interest or expertise, and other interested parties, as well as regulators.
- **Travel:** The Consultant is expected to undertake regular travel to all countries involved in this assignment during the implementation of the study.
- **Consultant's management:** The Consultant shall provide overall management on all aspects of the Consulting Services. The Consultant shall nominate a Project Manager and a Deputy Manager (to be available during all times of unavailability of the former) to liaise with the designated representatives of the PMG.
- **Quality Control:** The Consultant shall also provide the necessary level of quality assurance and control of the work. The Consultant shall implement its internal quality control and assurance procedures during the execution of the contract and shall demonstrate that they are being applied to the work.

**Progress Review Meetings**

- The Consultant shall hold periodic progress meetings with the Client at least once a month. Additional meetings shall be scheduled if necessary. The intent of these meetings will be for the Client to provide input and to discuss options for addressing the Client's comments. The Consultant shall fully cooperate with the Client in scheduling and attending such meetings as requested by the Client. These meetings shall be held at the Client office. The Client will be responsible to prepare meeting minutes during each of these meetings. Minutes will be distributed to participants for review and comment.

**Client's Review**

- The Client will review submittals for consistency with the methodology concept presented in the Consultant's proposal. The primary purpose of the Client's review is to satisfy itself that the submittals conform to the intent of the contract. The Client's review shall not relieve the Consultant of the sole risk and responsibility for all defects, errors or omissions, or of sole responsibility for meeting all requirements of the contract.

## 12 DELIVERABLES

All reports – drafts and final versions must be submitted in English and Georgian languages.

Each deliverable shall be transmitted electronically (both PDF as well as editable version) and in hard copy, unless otherwise required by other sections of the ToR, with a cover letter to the Client at the office of the Client. Unless otherwise specified in the contract, the Consultant shall prepare up to five hard copies of each deliverable for distribution. The Client is responsible for distribution of deliverables to reviewers. Electronic submittals shall be in the original file format. The Consultant is responsible for the accuracy and completeness of the information submitted.

The Consultant shall make deliverables far enough in advance of subsequent activities to allow time for reviews, consultations with other entities, for securing necessary acceptance, for possible revisions and resubmittals. The Client intends to process Consultant's deliverables as quickly as practical.

The following deliverables are expected from the selected firm:

| Deliverables | Tentative deadline |
|---|---|
| Inception Report | $W_0$ + 4 weeks |
| ESIA for submarine cable construction and operation in Georgia | $W_0$ + 24 weeks |
| ESIA for submarine cable construction and operation in Romania | $W_0$ + 24 weeks |
| Overarching ESIA for submarine cable construction and operation | $W_0$ + 32 weeks |
| Deliverables to satisfy EIA requirements for Bulgaria ("Notification document") and Türkiye ("Pre-EIA Report", or "Project Presentation File") | $W_0$ + 34 weeks |
| ESIA for OHLs in Georgia | $W_0$ + 36 weeks |
| ESIA for OHL in Romania | $W_0$ + 36 weeks |
| BMP, coastal erosion assessment, WMP and other specialized studies required to satisfy the national legislation and relevant EESs of the WB | $W_0$ + 40 weeks |