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*** This designation is without prejudice to positions on status and is in line with UNSCR 1244/199 and the ICJ opinion on the Kosovo declaration of independence.**

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WB21-MKD-ENE-03

North Macedonia, Strengthening the Transmission Network in the Southeast Region of North Macedonia - Component 1

Sub-project 2 - Reconstruction of the existing 110 kV Transmission Line from Valandovo to Strumica

Environmental and Social Assessment

Non-Technical Summary

September 2022

HILL INTERNATIONAL
IPF 7 CONSORTIUM

The Western Balkans Investment Framework (WBIF) is a financing facility launched in December 2009 by the European Commission, together with the Council of Europe Development Bank (CEB), the European Bank for Reconstruction and Development (EBRD), the European Investment Bank (EIB), Bilateral Donors, and Western Balkans countries with the purpose to deliver funding for strategic investment projects in beneficiary countries. Eligible sectors include infrastructure development in the environment, energy, transport, social and digital sectors as well as private sector development. KfW and the World Bank subsequently joined the Framework. In July 2017, the KfW became a partner organisation.

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Abbreviations

Abbreviation	Meaning
CESMP	Construction Environmental and Social Management Plan
E&S	Environmental and Social
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
EIA	Environmental Impact Assessment
ESP	Environmental and Social Policy (of the European Bank for Reconstruction and Development)
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
EU	European Union
EVP	Electric Traction Plant (in Macedonian '*Електровлечно построение*')
FS	Feasibility Study
GIP	Good International Practice
IFI	International Financing Institution
IMS	Integrated Management System
IPA	Important Plant Area
IPF7	Infrastructure Project Facility, Technical Assistance 7
MEPSO	Transmission System Operator of North Macedonia
OG	Official Gazette
OHL	Overhead Line
OHS	Occupational Health and Safety
RES	Renewable Energy Sources
RoW	Right of Way
SEP	Stakeholder Engagement Plan
SS	Substation
TSO	Transmission System Operator
WB	Western Balkans
WBIF	Western Balkans Investment framework

1. Introduction

The main objective of this project is to reconstruct the existing 110 kV transmission line from Valandovo to Strumica ('Project'), in south-eastern part of Macedonia, by upgrading its transmission capacity and partial underground cabling in the urban zones of Strumica.

The Project is a component of a wider development scheme for strengthening the transmission network in the Southeast Region of North Macedonia, which also includes a project for construction of a new 400/110 kV substation (SS) Miletkovo in the area of the village Miletkovo, in Gevgelija municipality, and connection of this new substation with the existing 110 kV transmission network in the region and with the existing 400 kV transmission line Dubrovo – Thessalonica (GR).

The project developer is the Macedonian Transmission System Operator (MEPSO). MEPSO is a Joint Stock company fully state-owned, established in 2005 after the transformation of the Electric Power Company of Macedonia ('Elektro-stopanstvo na Makedonija'). The core activity of MEPSO is a reliable electricity transmission via the national high voltage network, electric power system control and regular and duly electricity flow to its clients such as the large industrial consumers, and to the low voltage grid of the Macedonian electricity distribution system operator (EVN Macedonia).

MEPSO is seeking financing from the European Bank for Reconstruction and Development (EBRD). Therefore, an Environmental and Social Assessment has been undertaken to meet the EBRD's requirements.

2. Need for the Proposed Project

In order to meet the goals of the European Union for the integration of energy from Renewable Energy Sources (RES), North Macedonia makes efforts to maximize the integration of these energy sources into the national power system. Due to the favourable climate conditions, the investments in the RES (wind power, solar power and hydropower) are most cost-effective in the south-eastern region of North Macedonia. Therefore, it is expected that the most significant investments in utilization of RES are/will be located mostly in this region (Figure below). Transmission grid in this region of Macedonia is approaching the end of the lifecycle and lacks capacity for connection of new renewable electricity sources to the network. As such, it needs reconstruction due to ageing process. In addition, the Project will provide higher security of supply

In this stage, the Project is developed to a feasibility level - to a detail considered sufficient to establish that the proposed developments are technically feasible and to allow initial assessment of their environmental and social integrity and effects, i.e. to a level of Technical Assessment[1] (Conceptual Solution) that corresponds to a Feasibility Study. Therefore, the level of detail of the present E&S assessment is compliant with that of the Project's Conceptual Solution whose content and scope are not specifically regulated by the relevant Macedonian legislation[2]. As such, the Conceptual Solution is not considered as formalised design document and no administrative consenting process for its adoption by the competent authorities is required.

Further design, including precise new location of towers (if deemed required) and new access roads (where necessary) will be undertaken once the more detailed technical design (Preliminary Design and Detailed Design) as required by the Macedonian relevant legislation are developed and prior to construction commencing.

[1] WB21-MKD-ENE-03 North Macedonia, Strengthening the Transmission Network in the Southeast Region of North Macedonia - Component 1; Detailed Technical Assessment of Preferred Option, January 2022

[2] Law on Construction (Official Gazette of RM no. 130/09 and its amendments) and associated by-laws

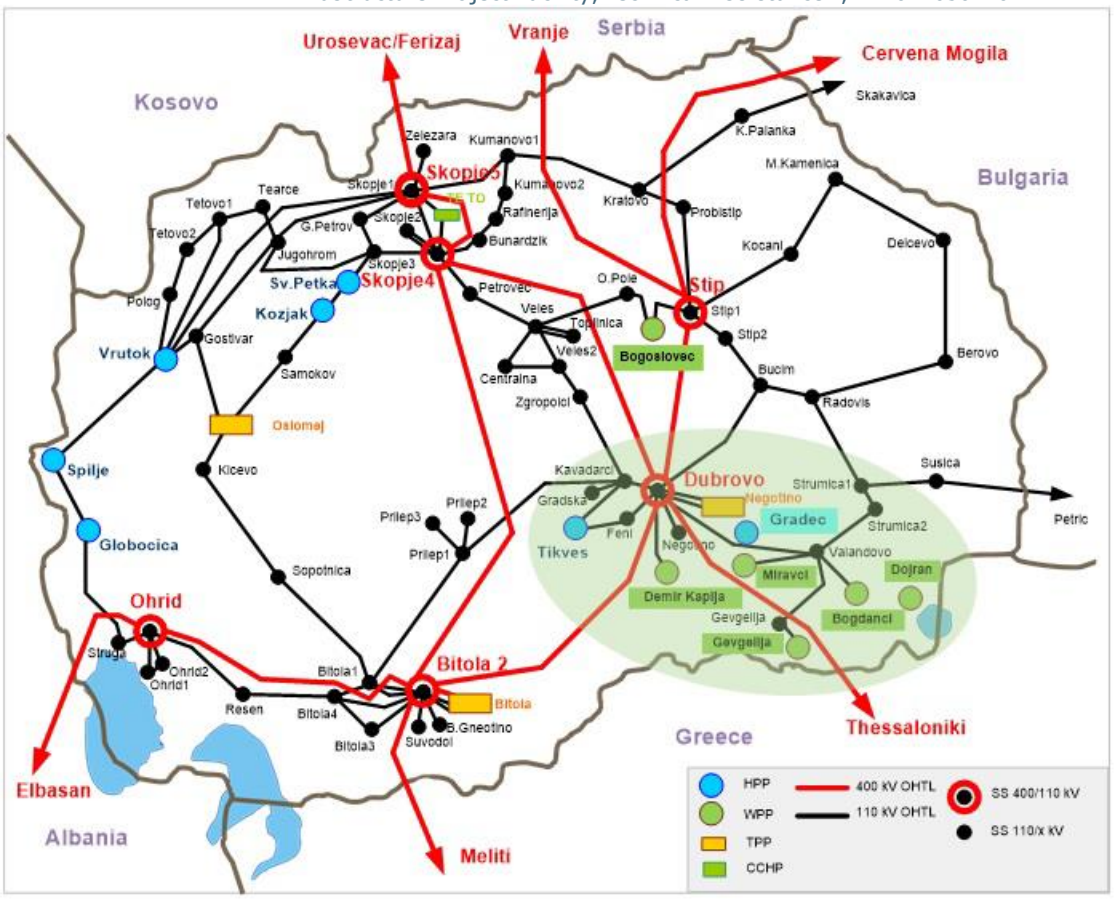


Figure 2.1: Macedonian grid and project area mid-term topology

Source: MEPSO

3. The Proposed Project

3.1 Project Location

The wider Project region - area between Gevgelija, Valandovo, Demir Kapija and Strumica is the warmest area in Macedonia. Gevgelija-Valandovo valley is well defined geographical unit that is encircled by mountains from west and east, opened to the south by the river Vardar valley at altitudes. This valley is about 60 km away from the Thessalonica gulf. Thus, the Mediterranean influence is evident being one of the warmest regions in Macedonia characterised with warm summers and mild winters. Similar is the Strumica valley surrounded by mountains of Belasica and Ograzhden and opened to the Mediterranean influence by rivers Strumeshnica and Struma.

The Project is located on dominantly hilly terrain. From a geological point of view, the southern part of the wider Project area is built by stable metamorphic rocks, while the northern part is characterised with sedimentary rocks (clay, with interlayers of gravel and sand) and volcanic rocks and proluvial sediments (in the region of Strumica). No occurrence of slips and landslides has been registered in the Project area.

The land cover within the Project area is dominated by agricultural land cover types as well as some hilly forest and shrubland. Significant percentage of the land cover belongs to urban and industrial areas (Strumica sub-urban and urban zones). The line alignment crosses one prominent watercourse – river Trkanja. It crosses one internationally recognised area – Important Plant Area (IPA) Belasica approx. in 1.9 km long section. The existing line passes through one legally protected area - Monument of Nature 'Cham Chiflik'. The proposed Project design encircles this protected area by an underground cable and no interaction between the Project and the protected area will occur.

The overhead line section passes through the outskirts of Valandovo, and is distant from the closest residential or other properties. Furthermore, it passes nearby villages Zleshevo (abandoned) and Kosturino, as well as settlement Tri Vodi, all in the municipality of Strumica, all located at a relative distance of more than 500 metres from the Project. The underground cable section passes through the sub-urban and urban zones of Strumica, along the city's street network. This solution has achieved to eliminate the operational risks (electro-magnetic radiation, operational noise and community risks) to currently affected properties, from the existing line which passes in immediate vicinity or over residential and other properties in Strumica. The existing line in this section will be dismantled and removed.

The line crosses the regional road Valandovo – Strumica.

There are no cultural heritage sites or otrher cultural resources which will be affected by the implementation of the Project.

3.2 Project Elements

3.2.1 Transmission Line Route

The main elements of the Project and their inclusion in the environmental and social appraisal comprise the following (Annex 1):

I. To construct a new overhead line from SS Valandovo towards SS Strumica 2 (to its crossing point with the regional road Valandovo – Strumica), with an approximate length of 14.2 km, by utilising the route of the existing one

The starting point of the existing line is the substation in Valandovo. In total, the line is 15.8 km long and in its ending part in approx. 2.5 km long section, towards the entry in SS Strumica 2 and further to SS Strumica 1, passes through the inhabited and urbanized part of Strumica (Figure below).

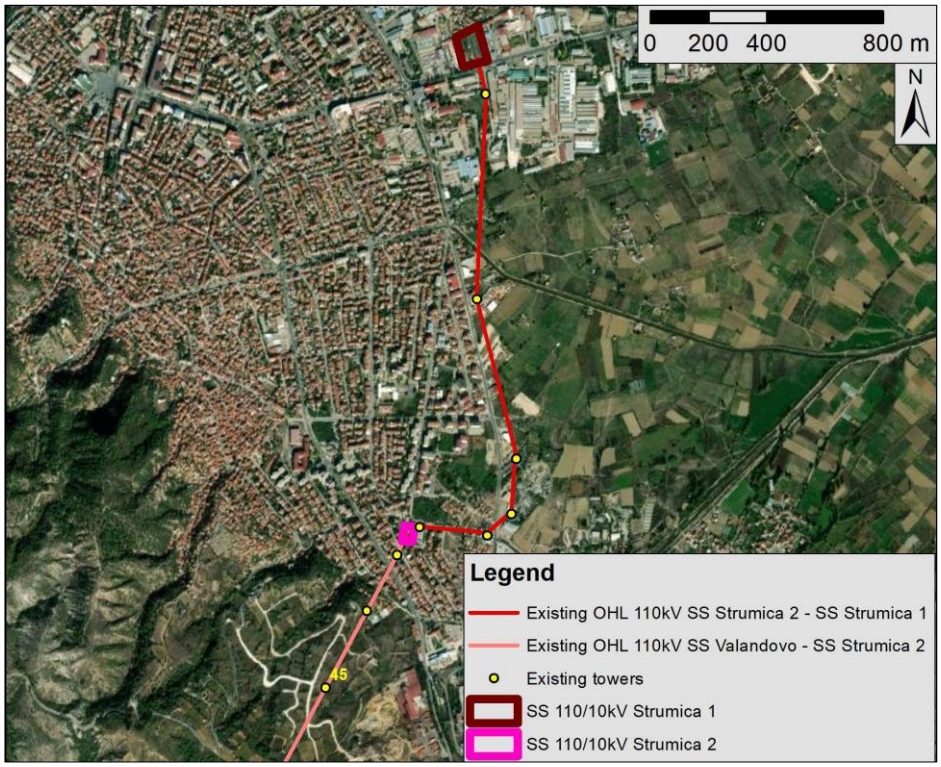


Figure 3.1: Existing 110 kV overhead line in urban zone of Strumica

In addition, the existing line passes through one legally protected area – Park of Nature Cham Chiflik in 0.5 km long section and one internationally recognised area – Important Plant Area Belasica in 2.8 km long section

(Figure below). Due to the geographical spread of IPA Belasica, it is not possible to avoid this designated area. The use of a power underground cable managed to reduce the length of the crossing from 2.8 km to 1.6 km. Most of the identified values of IPA Belasica are characteristic for the higher parts of Belasica Mountain and, therefore, it would not be significantly affected by the implementation of the Project.

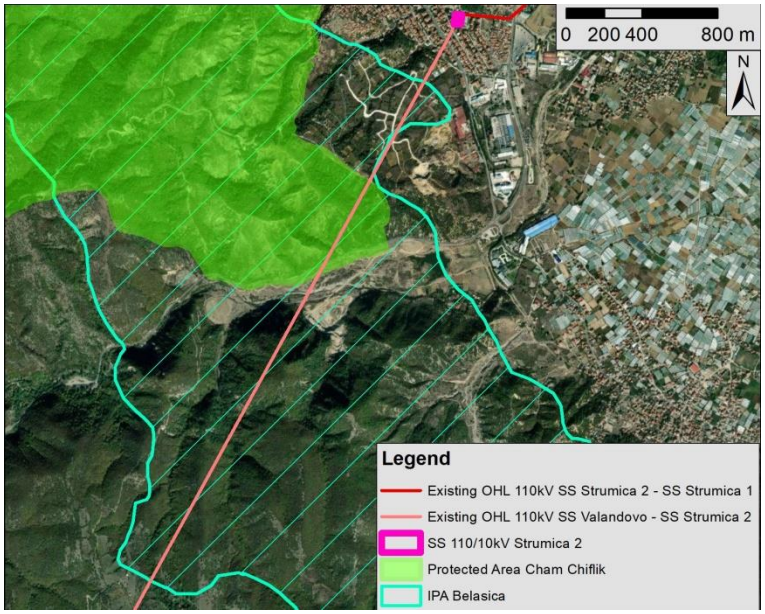


Figure 3.2: Existing 110 kV overhead line relative to designated areas of natural heritage

Considering the year of the construction of the line and the fact that it has been in operation for around 50 years now, the reconstruction works will consist of construction of a completely new 110 kV OHL along the same corridor, by utilising the same existing route. Based on the outcomes from the stakeholders consultation process, one particular deviation of the route has been introduced in order to avoid one sensitive location – public space with a park and playground – located in Valandovo municipality, currently located within the footprint of the existing line and its immediate vicinity (Figure below).

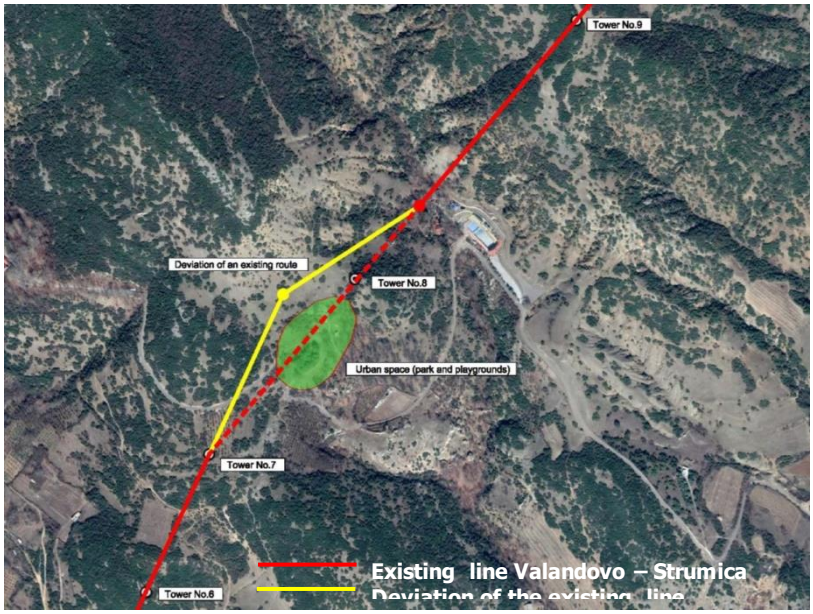


Figure 3.3: Deviation of the transmission line to avoid sensitive location – public space in Valandovo municipality

Wherever possible, the preferred design principle to use locations of the existing towers for the new towers will be applied through the upcoming Project reference development stages (Preliminary Design and Detailed Design).

Since the existing OHL route in the last, approx. 1.6 km long, section before its connection to the SS Strumica 2 crosses the protected area – Park of Nature Cham Chiflik and urban area of Strumica (passing in vicinity and over various residential and other properties), underground cabling of the line in approx. 2.2 km long section is foreseen, until the SS Strumica 2 (Figure below).

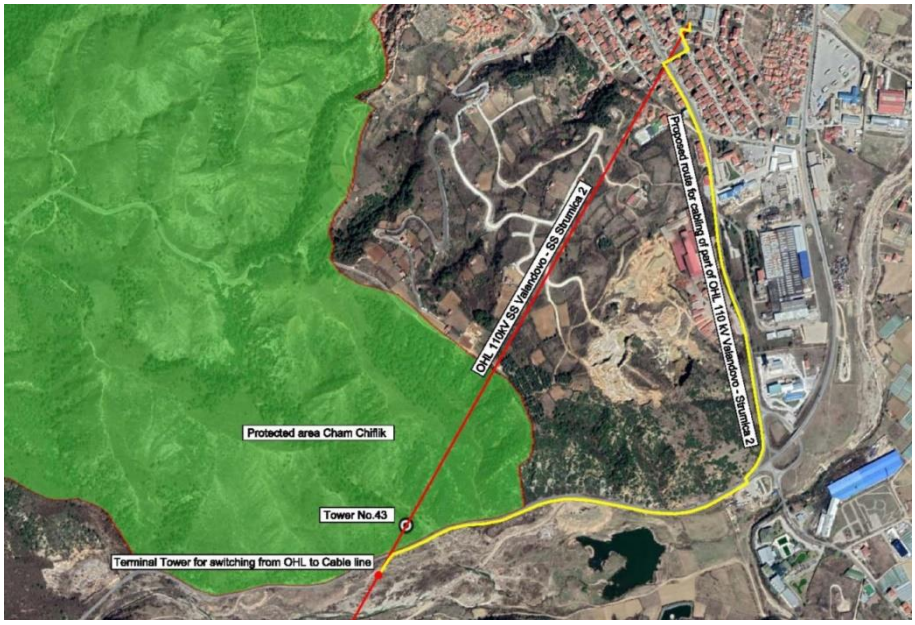


Figure 3.4: 110 kV transmission cable to substation Strumica 2

The cable route to SS Strumica 2 through urban zone of the city is presented in Figure below.

Figure 3.5: 110 kV transmission cable to substation Strumica 2, urban zone of Strumica

This route will be further evaluated during more advanced Project design stages (Preliminary Design and Detailed Design), from technical and financial aspect and taking into the consideration the social implications and urban constraints in the affected area. Adoption of the final route for the proposed transmission cable would need to be based on consultation with stakeholders and be formalised by the local authorities (Strumica municipality), including its inclusion in respective urban planning documentation.

The Project completely avoids the legally protected area Cham Chiflik (Figure below).

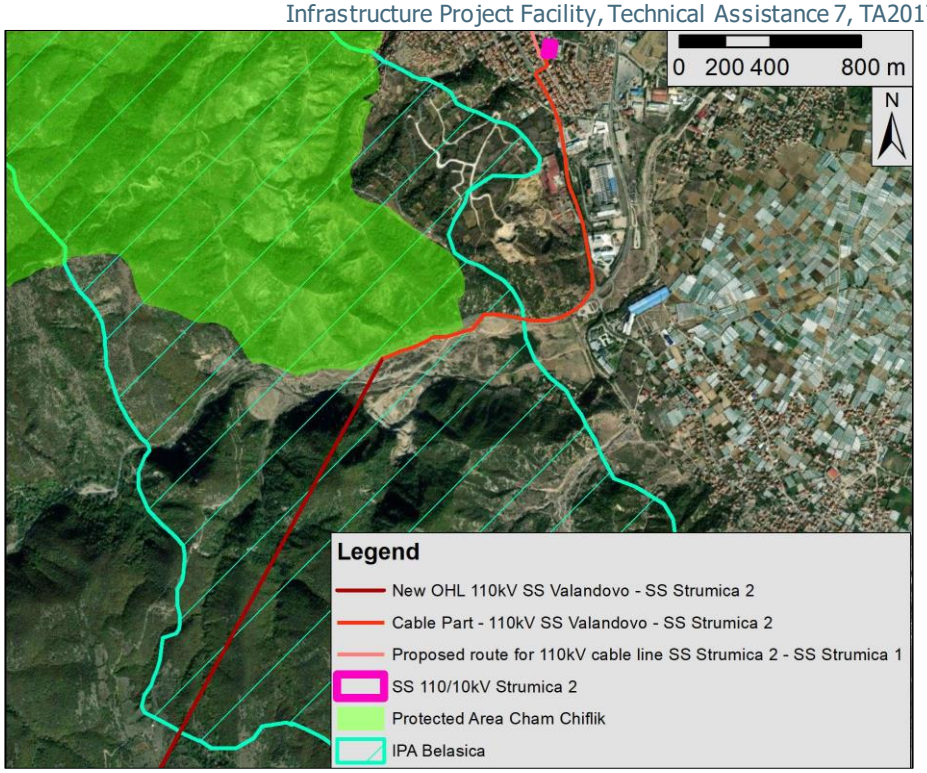


Figure 3.6: The Project relative to designated areas of natural heritage

II. To construct an underground transmission cable with an approximate total length of 4.45 km from the ending point of the new overhead line to SS Strumica 2 and further to SS Strumica 1

The OHL is 1.9 km long, passing through urban area of Strumica (Figure below).

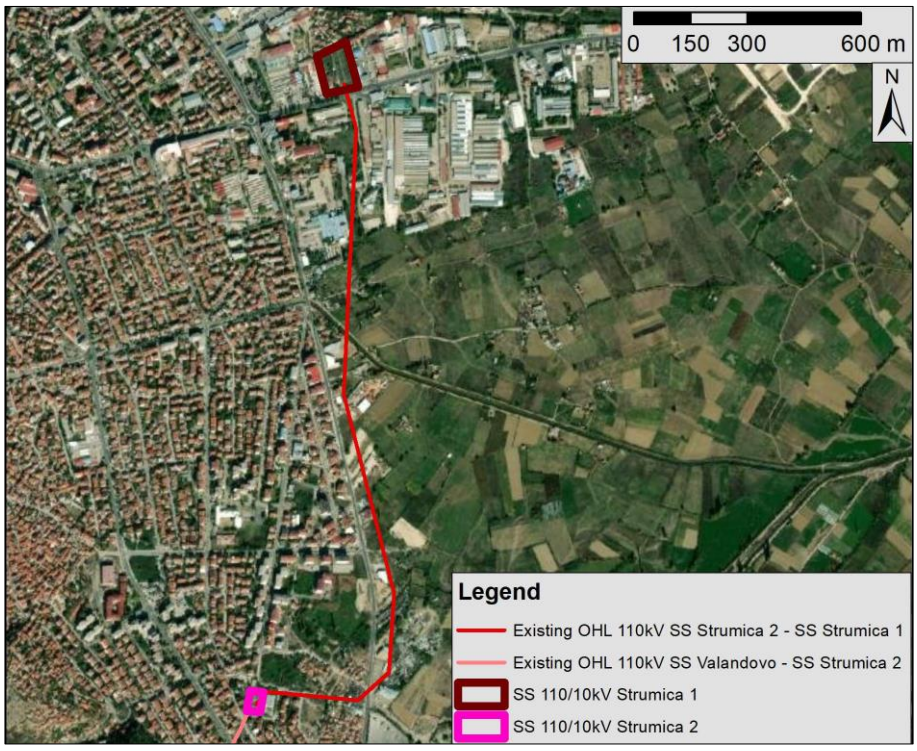


Figure 3.7: Existing transmission line between subtations Strumica 2 and Strumica 1

Considering the fact that this line has been in operation for around 50 years now, and taking into the consideration that it passes through urban zones of Strumica, the reconstruction works will consist of its replacement

with a 110 kV power underground cable along a new approx. 2.1 km long alignment along the existing street network in Strumica, in the section between the two terminate substations (Figure below).

Figure 3.8: 110 kV transmission cable between substations Strumica 2 and Strumica 1

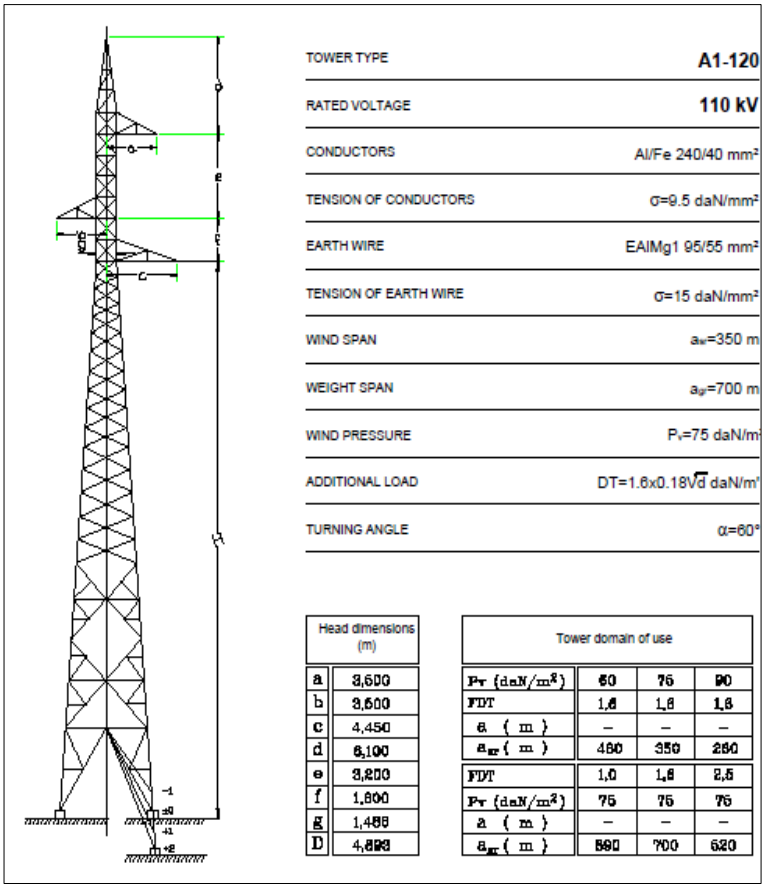
It would be further evaluated during more advanced Project design stages (Preliminary Design and Detailed Design), from technical and financial aspect and taking into the consideration the social implications and urban constraints in the affected area. Adoption of the final route for the proposed transmission cable would need to be based on consultation with stakeholders and be formalised by the local authorities (Strumica municipality), including its inclusion in respective urban planning documentation.

3.2.2 Technical Elements of Reconstruction

3.2.2.1 Overhead Line

The proposed reconstruction of the 110 kV OHL SS Valandovo – SS Strumica 2 – overhead line section - includes the following technical elements:

- Towers, (Figure right), with a height range between 9 and 30 metres. The maximal footprint area for a tower is approximately up to 100 m^2.
- Phase conductors and insulator strings. One conductor per phase is foreseen. Characteristics of the conductors will be in compliance with national standards and European standards. The designed distance between the closest conductors (set in triagle formation) is between 4.0 meters and 4.6 metres).
- A ground wire strung above the towers arms at the tower peak for protection against lightning strikes.



TOWER TYPE	A1-120
RATED VOLTAGE	110 kV
CONDUCTORS	Al/Fe 240/40 mm²
TENSION OF CONDUCTORS	σ=9.5 daN/mm²
EARTH WIRE	EAlMg1 95/55 mm²
TENSION OF EARTH WIRE	σ=15 daN/mm²
WIND SPAN	a_w=350 m
WEIGHT SPAN	a_g=700 m
WIND PRESSURE	P_v=75 daN/m²
ADDITIONAL LOAD	DT=1.6x0.18√d daN/m
TURNING ANGLE	α=60°

Head dimensions (m)	
a	3,600
b	3,600
c	4,450
d	6,100
e	3,200
f	1,800
g	1,488
D	4,892

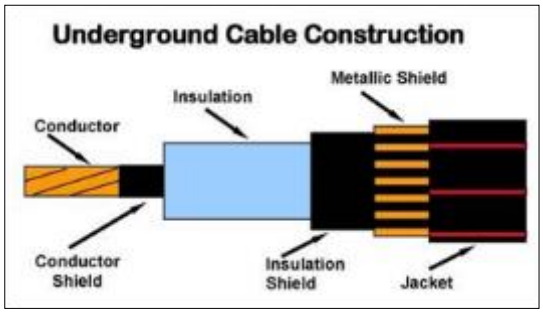
Tower domain of use			
Pv (daN/m²)	60	75	90
FDT	1,8	1,8	1,8
δ (m)	–	–	–
a_w (m)	480	350	280
FDT	1,0	1,8	2,5
Pv (daN/m²)	75	75	75
a (m)	–	–	–
a_g (m)	590	700	620

Figure 3.9: Typical tower for reconstruction of the existing transmission line from SS Valandovo to SS Strumica 2

3.2.2.2 Underground Line

The proposed reconstruction of the 110 kV OHL SS Valandovo – SS Strumica 2 – SS Strumica 1 - underground cable line section - includes the following technical elements:

- Transmission cable (Figure below), made of aliminium with characteristics of the conductor in compliance with national standards and European standards.



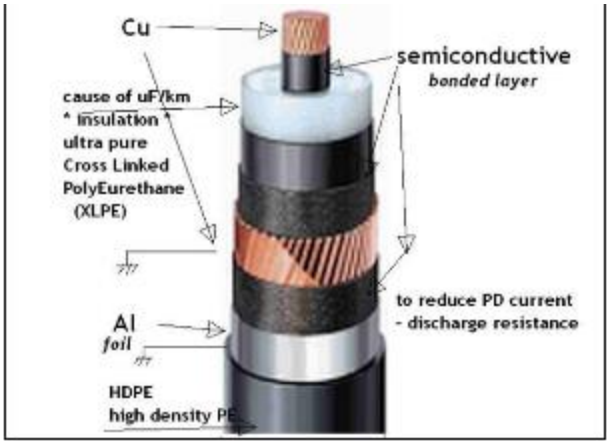


Figure 3.10: Typical underground transmission cable

- Cable trench to accommodate the transmission cable system (Figure below). The cable system will be laid in a trench at a depth of 1.60 m. The cable will be laid in a cable bed made of a special material and covered with concrete slabs for mechanical protection.

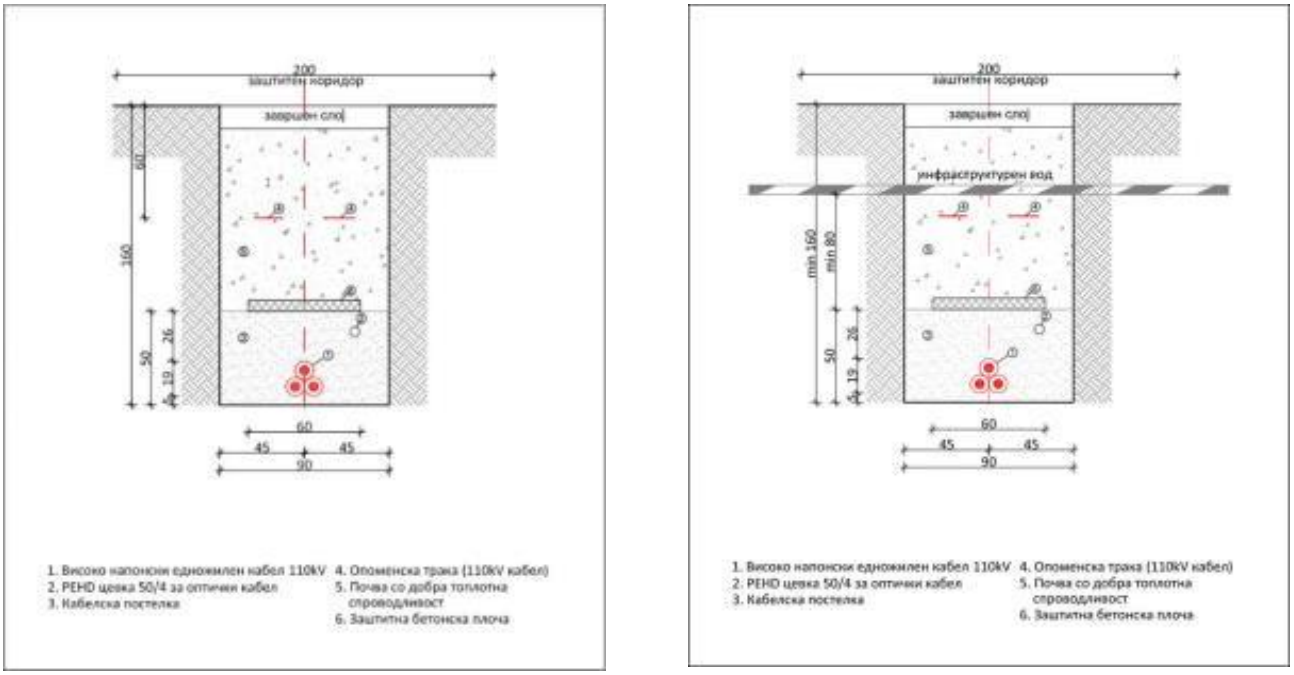


Figure 3.11: Typical trench for an underground transmission cable

3.3 Right of Way

The relevant Macedonian legislation[3] requires establishment of a protection zone (safety zone) or Right of Way (RoW) along the path of a transmission line and in proximity to a substation. This zone is prescribed by MEPSO's Grid Code[4], according to which – 'the safety zone is the area and the space, below, above and along the existing electric power transmission facilities, necessary for their spatial planning, protection and maintenance, in which the right of ownership is restricted or the possibility for performing construction actions and other activities without consent granted by MEPSO is limited'. For an operational transmission line, the protection zone is determined by the voltage of the line: 30 m and 20 m wide corridor along the path of the line, for 400 kV and 110 kV, respectively. For an operational substation with a nominal voltage of 400 kV and 110 kV, the required safety distance is 5 metres from the outer edge of the substation's fence or wall.

The regulation's objective is to facilitate the uninterrupted functioning of the power grid, to ensure safe operations, to meet the requirements of the sanitary and safety norms, and to prevent accidents. Within this protection zone buildings and facilities must not be constructed and certain activities are restricted to ensure the safe operation of the lines and for the safety of people. These mainly include agriculture activities within the RoW which include cultivated plants or trees which reach height that may pose safety operational risk for the line[5], or agricultural practices that use spraying equipment as well as fixed or mobile irrigation equipment. It is also necessary to remove trees and vegetation from within the RoW for the safe operation of the

[3] Rulebook for Construction of Overhead Lines with rated Voltage from 1 kV to 400 kV (Official Gazette of RM no.25, from 1.2.2019)

[4] MEPSO Grid Code (2021)

[5] According to the applicable regulation, the minimum vertical clearance for an operational transmission line in regard vegetation, trees, etc. is set to 3.0 metres.

transmission line. Therefore, in areas of forestry and woodland, clearance on either side of the transmission line within the safety zone is required according to the rules defined by the relevant Macedonian legislation[6].

3.4 Project Timeline

According to the present Project's implementation indicative schedule, the following further development stages are foreseen (for the Project as a whole):

III. Year 2022 - 2024 - completion of the next Project's technical design (Preliminary Design) as well as accompanied technical documents and land acquisition documentation, including preparation of tender dossier / procurement documents for selection of Contractor(s) and selection of Contractor(s)

Year 2025 – 2027 – completion of the final Project's technical design (Detailed Design) by the Contractor(s), obtaining of construction permit and construction of the Project, including testing and commissioning, as follows: (1) supply of equipment (Q4/2024 – Q4/2025, in total 15 months); (2) civil works, installation works, etc. (Q/2024 – Q3/2027, in total 36 months), and (3) tests and commissioning (Q1/2027 – Q4/2027, in total 12 months).

Hence, the actual construction period for the Project is anticipated to be up to two years from the start of the works, including the necessary dismantling works at the existing overhead line. The construction period in any particular location along the transmission lines would be in the order of several days to weeks, while the construction of the new substation will be continuous process at the substation's construction site.

3.5 Alternatives Considered and Selection of Preferred Option

3.5.1 No Project Option

The Macedonian Strategy for Energy Development until 2040 (the Strategy) foresees high level of integration of the national system with the international energy markets and reduction of the greenhouse gas emissions associated with the energy production, by increasing the renewable energy sources in the overall energy consumption. In this context, the Project is seen as an important step towards fulfilment of the goals for integration of energy from renewable sources into the national system, since the most significant investments in this regard are (will be) located mostly in southeast region of the country.

The 'No Project' option would mean status quo situation. It does not involve capital investment costs. However, maintenance costs are higher than for lines within the expected life span because the equipment would become obsolete with an expired useful life. Consequently, this option will directly contribute to higher operational costs of the existing out-of-date transmission infrastructure in the Project region, as well as to higher technical losses. It will also decrease security and reliability of the power supply in the Project region.

Therefore, the 'No Project' option is least favourable option since it has no positive argument in its favour. If the proposed Project is not build, then it would cause a serious problem in the energy sector development and the regional integration of the Macedonian electricity system.

3.5.2 Project Options

Three options have been identified (including alternative corridors for each option) (Figure below), in order to make a clearer distinction between different network configurations.

The key technical elements of the identified options are as follows:

[6] Rulebook for Construction of Overhead Lines with rated Voltage from 1 kV to 400 kV (Official Gazette of RM no.25, from 1.2.2019)

1. Project Option 1 - Double Circuit 110 kV OHL Dubrovo – Valandovo, which includes the following main components:
    a. Construction of a new double circuit 110 kV OHL between Valandovo and Dubrovo
    b. New 400/110 kV power transformer in the 400/110 kV SS Dubrovo, with respective 110 kV and 400 kV bays
    c. Reconstruction of the existing 110 kV OHL Valandovo – Strumica 2 – Strumica 1
2. Project Option 2 - New 400/110 kV substation and lead in-out of existing 400 kV OHL Dubrovo – Thessalonica (GR), which includes the following main components:
    a. Construction of a new 400/110 kV substation
    b. Connection of the existing 400 kV OHL Dubrovo – Thessalonica (GR) into the new substation
    c. Rec*onstruction of the existing 110 kV OHL Valandovo – Strumica 2 – Strumica 1
3. Project Option 3 – New 400/110 kV substation with interconnection (new 400 kV OHL Dubrovo – Valandovo – Thessalonica (GR)), which includes the following main components:
    a. Construction of a new 400/110 kV substation
    b. Construction of a new 400 kV OHL Dubrovo – Valandovo – Thessalonica (GR)
    c. Reconstruction of existing 110 kV OHLs Valandovo – Strumica 2 – Strumica 1

As an element of the wider development scheme for strengthening the transmission network in the Southeast Region of Macedonia, the Sub-project 2 - Reconstruction of the existing 110 kV OHL Valandovo – Strumica (Component 2) was included in each of the identified options. As such, this element was not a comparative factor for the decision-making process for selection of the preferred option and was not taken into the comparative analysis of the identified options[7].

[7] For more details see:

- WB21-MKD-ENE-03 North Macedonia, Strengthening the Transmission Network in the Southeast Region of North Macedonia - Component 1; Selection of the preferred Option, October 2021
- WB21-MKD-ENE-03 North Macedonia, Strengthening the Transmission Network in the Southeast Region of North Macedonia - Component 1; ESIA Scoping Report, January 2022

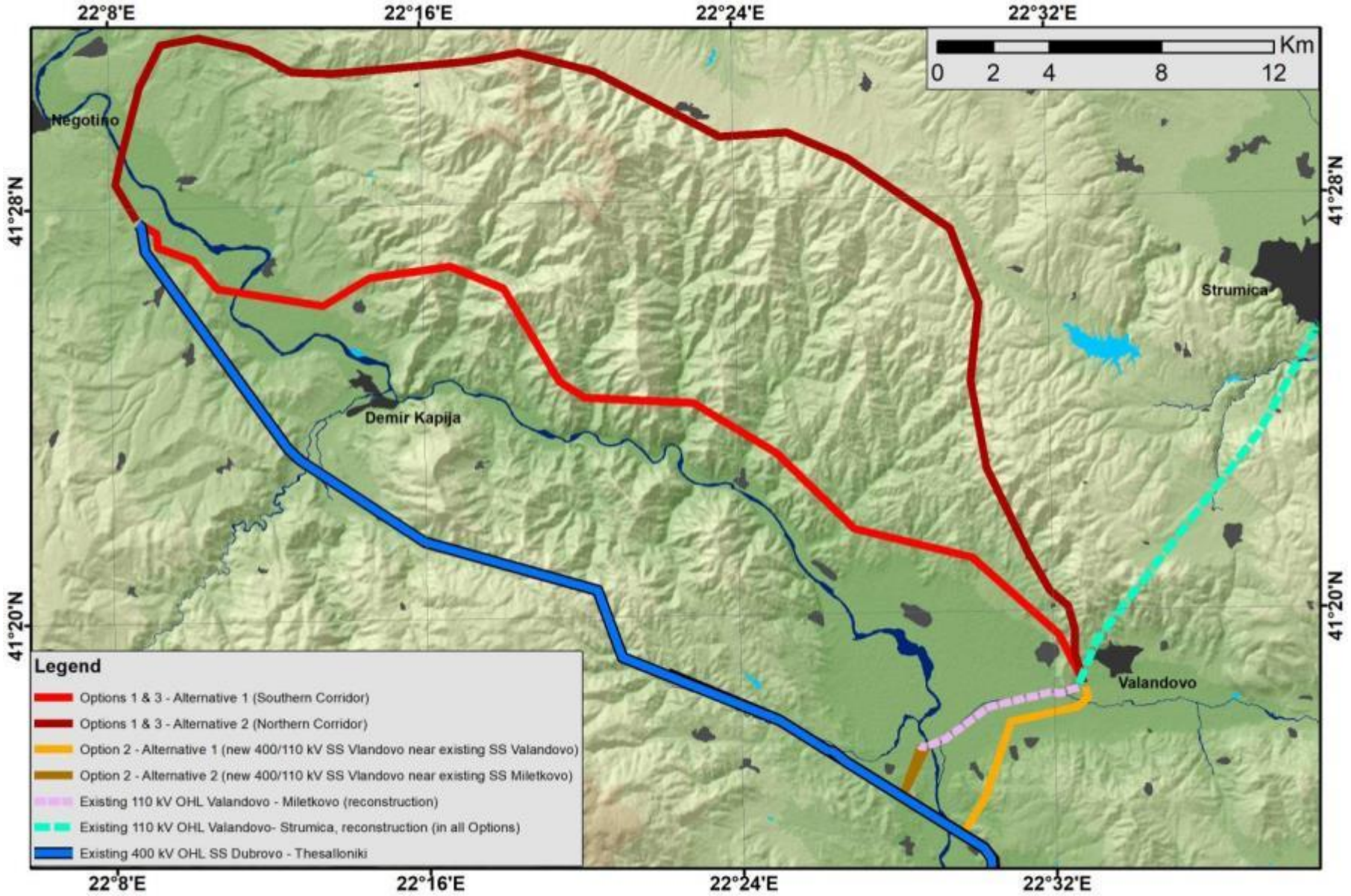


Figure 3.12: Project options and alternatives within Project options

3.5.3 Evaluation of Options - Multi-Criteria Analysis

The identified options have been evaluated via a Multi-Criteria Analysis against the following main criteria categories:

(i) network and market based criteria, with two sub-categories – non monetised benefits and monetised benefits and costs (e.g. variation of CO_2 emission, integration of the renewable energy sources, benefit / cost ratio, socio-economic welfare, etc.)
(ii) engineering or technical criteria (e.g. terrain conditions and topography, climate parameters, landa-vailability, etc.)
(iii) environmental and social criteria, with two sub-categories - environmental elements (e.g. biodiversity and sensitive zones such as forests, protected areas, etc.) and social elements (e.g. proximity to people and settlements, health and safety such as exposute to electric and magnetic fields, cultural and archaeological heritage, etc.).

3.5.4 Selection of Preferred Option

The selection process of the preferred Project option based on the evaluation of each identified option and alternatives within the options against the selected criteria has indicated that preferred option would be the Option 2, Alternative 2 - New 400/110 kV SS Miletkovo and lead in-out of existing 400 kV OHL Dubrovo – Thessalonica (GR).

The rationale behind this recommendation is as follows:

IV. System studies and economic assessment

According to the results of system studies, Option 2 is indicated as the best one from the reduction of energy curtailed from RES in the Project region, from the biggest losses reduction, and increase of additional capacity reserve.

From economic assessment point of view, the Project brings sufficient benefits to Macedonia and it is mpost economically viable option for the society and the national economy as a whole.

V. Technical assessment and E&S aspects

From the technical as well as from the environmental and social perspective, the Option 2, Alternative 2 is superior in comparison to other identified Project options and respective alternatives, since:

- It does not require construction of new long 110 kV or 400 kV overhead line and, therefore, it implies the least land-take needs and land cover / land use changes;
- It implies the least interventions (reconfiguration and extensions) in the existing transmission assets in the Project region and, therefore, the least impact on the existing operation of the power system;
- There are no settlements in proximity to the Project locations and no operational community safety risks (e.g. public exposure to electro-magnetic radiation or nuisance due to corona noise) are likely to occur;
- It implies the least potential impact magnitude to sensitive habitats in the Project region;
- It does not interact with any legally protected area or internationally recognised area in the Project region;
- It implies the least potential impact magnitude on agricultural land and, therefore, will likely result in the least compensation arrangements;
- There are no cultural heritages sites and resources in proximity to the Project locations.

The preferred Project option consists of the following components:

VI. Construction of a new SS Miletkovo, located in Miletkovo area (Gevgelija municipality), with its connection to the existing 400 kV and 110 kV transmission network via the following interventions:

- Approx. 0.5 km long line for connection with the existing 400 kV line from SS Dubrovo to Thessalonica (GR)
- Reconstruction of the existing approx. 6.4 km long transmission line from SS Valandovo to SS 'EVP' Miletkovo and its extension to the new SS Miletkovo.
- Construction of a new approx. 1.8 km long 110 kV OHL connector with the existing SS 'EVP' Miletkovo

Based on the subsequent review and consultative process with key relevant stakeholders[8], this proposal was accepted by MEPSO and EBRD in October 2021 and it was selected as preferred Project option for further development and E&S assessment.

As noted, the Sub-project 2 - Reconstruction of the existing 110 kV OHL Valandovo – Strumica (this Project) is a constituent element of the wider development as a whole and as such it is further developed through respective technical design and associated E&S assessment.

The preferred Project option is shown in Annex.

4. Environmental and Social Assessment Summary

Different project aspects have been considered throughout the process of assessing the impact of the Project on the biophysical and societal environment.

The high level summary of the assessment and the effects for individual relevant E&S topics is provided in Table below, and more detailed assessment is done as part of the respective Environemntal and Social Assessment Report..

[8] For more details see: WB21-MKD-ENE-03 North Macedonia, Strengthening the Transmission Network in the Southeast Region of North Macedonia - Component 1; Stakeholder Engagement Plan, March 2022

Table 4.1: Summary of assessment of likely significant environmental and social impacts and key mitigation

Topic	Phase	Key Potential Impacts	Significance (without mitigation)	Key Mitigation	Residual Impact
Climate – Greenhouse Gases	Construction	Construction GHG emissions Note: Since the Project is in its initial development stage and the relevant information for GHG calculation during construction stage of the Project is currently not available (e.g. number of OHL towers, construction transport and methods, etc.), the calculation of GHG emissions associated with the construction of the Project has been scoped out from the present assessment[9] and, if required, it is to be considered as part of next development stages of the Project (e.g. Preliminary Design or Detailed Design).	NA	- Calculation of GHG emissions associated with the construction of the Project, based on proven methodology - Construction Environmental and Social Management Plan (CESMP) - Traffic Management Plan - Waste Management Plan Other principle mitigation: - Optimisation of the construction methods to reflect the carbon reduction hierarchy - Select and engage with material suppliers and Contractor(s) taking into account their policies and commitments to reduction of GHG emissions, including embodied emission in materials. - Request from Contractor(s) to: minimise energy consumption, including fuel usage; maximise the local sourcing of materials and the use of local waste management facilities.	NA
	Operation	Operational GHG emissions Note: GHG emissions are expected to be very small over time during operational life of the Project. Therefore, calculation of GHG emissions during operation and maintenance of the Project have been scoped out from the assessment[10].	None to minor adverse	- Low carbon design specifications such as durable construction materials to reduce maintenance and decrease replacement cycles.	Minor adverse

[9] For more details see: WB21-MKD-ENE-03 North Macedonia, Strengthening the Transmission Network in the Southeast Region of North Macedonia - Component 1; ESIA Scoping Report, January 2022

[10] For more details see: WB21-MKD-ENE-03 North Macedonia, Strengthening the Transmission Network in the Southeast Region of North Macedonia - Component 1; ESIA Scoping Report, January 2022 [Ref.6]

Topic	Phase	Key Potential Impacts	Significance (without mitigation)	Key Mitigation	Residual Impact
Climate - Resilience	Operation	Vulnerability to a range of climate change risks, including an increased frequency and severity of prolonged and/or heavy precipitation events and lightning, cold and heat waves, and an increased risk of storms with high wind speed. These extreme weather events associated with the expected climate changes may result in the following principle impacts: - Material deterioration due to high or low temperatures and also from periods of heavy rainfall. - Damage to towers through erosion or landslide due to change in extreme rainfall - Flood risk - inundation of towers. - Storm damage to OHL tower structures. - Asset deterioration from exposure to heat, freezing, snow and ice.	Significant	Design-based measures would need to be identified and incorporated into the further project design stages (e.g. Preliminary Design and Detailed Design, based on the climate design parameters applicable for the Project region), so to achieve that the Project is designed to be resilient to impacts arising from current and future weather events and climatic conditions, and designed in accordance with current planning, design and engineering practice and codes.	Not significant
Air Quality	Construction	Construction emissions (dust and particulate matter, construction traffic)	Minor to moderate adverse	- CESMP with associated management procedure and plans - Traffic Management Plan	Neutral
	Operation	During the operation phase of the Project it is not anticipated that there would be any significant emissions to air and no significant air quality impacts would occur. The assessment of air quality impacts during the operational phase is, therefore, scoped out of the assessment[11].	Minor adverse	Good operational practice	None
Geology and Soils	Construction	Disturbance effects to geological deposits and soils due to construction works and transport activities. The project area is characterised with low to medium potential erosion risk and landslide hazard.	Minor adverse (for the Project as a whole)	CESMP with associated management procedure and plans	Neutral
		Key risks to soils: - Degradation of shallow geology and topsoil due to contamination - Loss of fertile soil through excavation and removal	Minor to moderate adverse		Neutral to minor
	Operation	Degradation of topsoil due to contamination during maintenance works	Minor adverse	Prevent and control pollution	Neutral to minor

[11] For more details see: WB21-MKD-ENE-03 North Macedonia, Strengthening the Transmission Network in the Southeast Region of North Macedonia - Component 1; ESIA Scoping Report, January 2022 [Ref.6]

Topic	Phase	Key Potential Impacts	Significance (without mitigation)	Key Mitigation	Residual Impact
Water Environment	Construction	Risks to the water environment due to: - excavation, and the subsequent deposition of soils, sediment, or other construction materials causing pollution; - spillage of fuels or other contaminating liquids causing pollution; - temporary physical modifications interrupting the natural passage of surface and sub-surface flow; - mobilisation of contaminants following disturbance of ground or through uncontrolled site run-off. Potential increase in flood risk, mainly due to undertaking construction works within floodplains.	Minor to moderate adverse	- Good design practice based on avoidance strategy (e.g. setting Project locations away from watercourses and wetlands) - CESMP with associated management procedure and plans	Neutral
	Operation	- Accidental spillage of oils and fuels from vehicles; - Compaction of land around OHL towers foundations, leading to local effects on hydrology from compaction	Minor adverse	Good operational and maintenance practice	Neutral to minor
Noise and Vibration	Construction	Noise emissions from construction vehicles and machinery	Moderate adverse	- CESMP - Traffic Management Plan	Neutral
	Operation	Noise due to the phenomenon known as "corona discharge"	Negligible to minor adverse	Design-based measures: - Avoidance of potential effects due to operational noise from the Project have been achieved by: o avoiding the populated areas in the Project region as well as residential zones and other properties o replacement of the existing overhead line in urban zones of Strumica with underground cable line - Incorporation of respective design parameters into the Project design (e.g. set out minimum required conductor vertical clearance (6 metres) and application of noise reducing coatings for conductors, if deemed necessary). Pre-construction and construction: - Ensure that correct manufacturing and installation methods and procedures are provided as an essential prerequisite measure that would allow reduction of eventual audible nuisance due to operations of the transmission line.	Neutral
Biodiversity	Construction	Loss and disturbance of terrestrial habitats (destruction and alteration of habitats as a result of land	Negligible to minor	CESMP with associated management procedure and plans	Minor

Topic	Phase	Key Potential Impacts	Significance (without mitigation)	Key Mitigation	Residual Impact
		take requirements and habitat conversion beneath OHL conductors (creation of a clearance corridor) Note: Clearance corridor along the existing line is already created and subject to maintenance works.			
		Loss of terrestrial flora	Negligible		Neutral
		Disturbance of species due to construction (breeding, foraging, roosting)	Minor adverse		Neutral
		Introduction of alien species	Negligible		Neutral
		Key Biodiversity Features (Critical Habitat and Priority Biodiversity Features)	Negligible		Neutral
		Designated Areas (internationally recognised area – IPA Belasica)	Negligible	CESMP with associated management procedure and plans	Neutral
	Operation	Conversion of habitats (maintenance of the clearance corridor)	Negligible	Good operational and maintenance practice	Neutral
		Fauna: potential impact to avian fauna (collision risk and electrocution of birds)	- Collision risk: Minor - Electrocution: Negligible	- Design-based measures would need to be incorporated into the further project design stages (e.g. installation of bird (flight) diverters to the earth wire of the transmission line between village Tri Vodi and river Trkanja). - A post construction monitoring programme to assess eventual bird mortality due to collision is to be designed and implemented along the section between village Tri Vodi and river Trkanja during first three years of the Project implementation. - Offset measure to ensure net gain for critical habitats is proposed: MEPSO's support of revalorization study for the protected area Cham Chiflik.	Neutral to minor
Landscape and Visual	Construction	Visual impacts - direct temporary physical and visual change to the landscape of negligible significance and, therefore, scoped out from the assessment[12].	None to minor adverse	CESMP with associated management procedure and plans	Neutral
	Operation	Visual impacts – no new structures will be introduced to the landscape and no change to existing basline will occur, therefore, scoped out from the assessment[13].	None to minor adverse	Good operational and maintenance practice (e.g. allow the maximum vegetation height within the Right of Way corridor while still maintaining the required clearance; width of all access roads and tracks to be kept to the minimum necessary for their use).	Neutral

[12] For more details see: WB21-MKD-ENE-03 North Macedonia, Strengthening the Transmission Network in the Southeast Region of North Macedonia - Component 1; ESIA Scoping Report, January 2022 [Ref.6]

[13] For more details see: WB21-MKD-ENE-03 North Macedonia, Strengthening the Transmission Network in the Southeast Region of North Macedonia - Component 1; ESIA Scoping Report, January 2022 [Ref.6]

Topic	Phase	Key Potential Impacts	Significance (without mitigation)	Key Mitigation	Residual Impact
Waste Generation	Construction	Waste generation and disposal, including waste from dismantling of the existing line	- Dismantling: Major adverse - Construction: Minor adverse	Waste Management Plan, based on the following key principles: - Waste would be minimized wherever practicable by reusing and recycling any materials, including the spoil and surplus excavated material. - All wastes would be identified, classified, quantified and, where practicable, appropriately segregated. - All waste materials, including demolition waste from dismantling works removed from construction sites would be in accordance with relevant national waste and environmental regulations.	Minor
	Operation	Waste generation and disposal Note: Waste generation is expected to be very small during operation of the Project.	Minor adverse	These wastes to be managed by MEPSO using the procedures established in their Integrated Management System[14] which, inter alia, includes a certified environmental management system.	Neutral
Beneficial social aspects	Construction	Opportunities: - Employment opportunities - Local economy and supply chain opportunities	Moderate beneficial	Various instruments (e.g. Supply Chain Management based on preferable supply from local suppliers)	NA
	Operation	Improvement of the national power system	Major beneficial	/	NA
Labour and Working Conditions	Construction	Workers employment, rights and working conditions	Minor to Moderate adverse	Package of management procedures and plans, e.g.: - Code of Conduct for Workers - Occupational Health and Safety Plan - Grievance Mechanism for Workers - Emergency Preparedness and Response Plan	Neutral to minor
		Occupational health and safety (e.g. working on height, electrocution, woring in confined space, etc.)	Moderate adverse		Neutral to minor
		Workers' accommodation	Minor adverse		Neutral
	Operation	- Labour and Working Conditions - Occupational Health and Safety (e.g. electrocution from the energised overhead conductors)	Moderate adverse	Environmental and Social Management System	Neutral to minor
Community	Construction	Community health and safety - Construction traffic risks - Safety risks - Workers influx	Minor to moderate adverse	Package of management procedures and plans, e.g.: - Code of Conduct for Workers - Community Health, Safety and Security Plan - Traffic Management Plan - Emergency Preparedness and Response Plan - Stakeholder Engagement Plan (prepared in the scope of this assessment)	Minor

[14] MEPSO has an IMS, incorporating quality, environment and health & safety, certified under respective international standards - ISO 9001 (Quality Management System), ISO 14001 (Environmental Management System) and OHSAS 18001 (Occupational Health and Safety Management System), as well as ISO 50001 (Energy Management System). Note: some of these certificates require renewal.

Topic	Phase	Key Potential Impacts	Significance (without mitigation)	Key Mitigation	Residual Impact
	Operation	Community health and safety - Public Exposure to Electro-Magnetic Fields - Operational risks	- Minor to moderate adverse - Major positive (in urban zone of Strumica)	Design-based measures through the present design of the Project: - avoiding the populated areas in the Project region as well as residential zones and other properties - replacement of the existing overhead line in urban zones of Strumica with underground cable line Design-based measures through the further design of the Project: - Incorporation of respective design parameters for the minimum conductor vertical clearance into the Project design. - Establish safety / clearance corridor along the path of the transmission lines and safety distance from the substation according with the requirements of the relevant Macedonian legislation. - Appropriate selection of the towers micro locations within the selected corridor in relation to residential and other properties. Risks to communities during Project operation: - Provide hazard notices / signs / barriers to prevent access to energized components of the Project.	- Minor - Major positive (in urban zone of Strumica)
Property	Construction	Land acquisition and land use	Minor adverse	- Compliance with relevant Macedonian legislation and international requirements - Land Acquisition and Resettlement Framework (prepared in the scope of this assessment) - Land Acquisition and Resettlement Plan, if deemed necessary	Minor
Cultural Heritage	Construction	Potential loss or damage of unknown heritage assets (undiscovered archaeological sites)	Minor to moderate adverse	Chance-find procedure	Neutral
Cumulative effects	Construction	Interaction with other similar projects (air pollution, nuisance due to construction noise, traffic disturbance, waste generation, etc.) – low probability	Negligible	If necessary, coordinated E&S management and cooperation between contractors of the developments throughout the construction period will be needed in order to optimize the mitigation strategy (e.g. Waste Management Plan, Traffic Management Plan, etc.).	Neutral
	Operation	Interaction with other similar projects – other transmission project(s) or wind farm developments (visual impact) – not likely in the Project region	Minor	/	/

5. Environmental and Social Management

5.1 Introduction

A Project's Environmental and Social Management Plan (ESMP), as a standalone document, consisting of a set of mitigation and monitoring measures, criteria for their successful implementation and institutional measures to be taken during the Project implementation to eliminate adverse environmental and social impacts, offset them, or reduce them to acceptable levels, has been developed. It has been prepared based on the findings of this E&S appraisal to ensure that the Project is executed in compliance with applicable Macedonian laws and regulations and EBRD environmental and social requirements.

The ESMP is a key document that lists the environmental and social requirements, including health and safety risks, and details the operational procedures necessary for managing the significant issues connected to the Project activities.

The ESMP will be implemented during the pre-construction, construction and operation / maintenance of the Project. As such it can be used as a standalone document during the different phases of the Project by the key Project stakeholders: MEPSO in its capacity as Project Developer / Operator and by the Contractor(s), as well as by the governmental authorities and other competent / responsible parties.

The E&S Management of the Project comprises a set of measures or specifications that have been originated following the outcomes of the Project's E&S assessment but also measures that are considered to reflect GIP.

MEPSO takes overall responsibility for the implementation of environmental and social mitigation and compensation measures of the Project. Effective implementation of these specifications before and during the construction phase will be supervised by a Consultant who is to be appointed by MEPSO. MEPSO will be responsible and take ownership of the measures relevant to the operation and maintenance phase of the Project.

5.2 Organisation of Environmental and Social Management

The core (indicative) structure and organization of the Project's environmental and social management is presented in the Figure below.

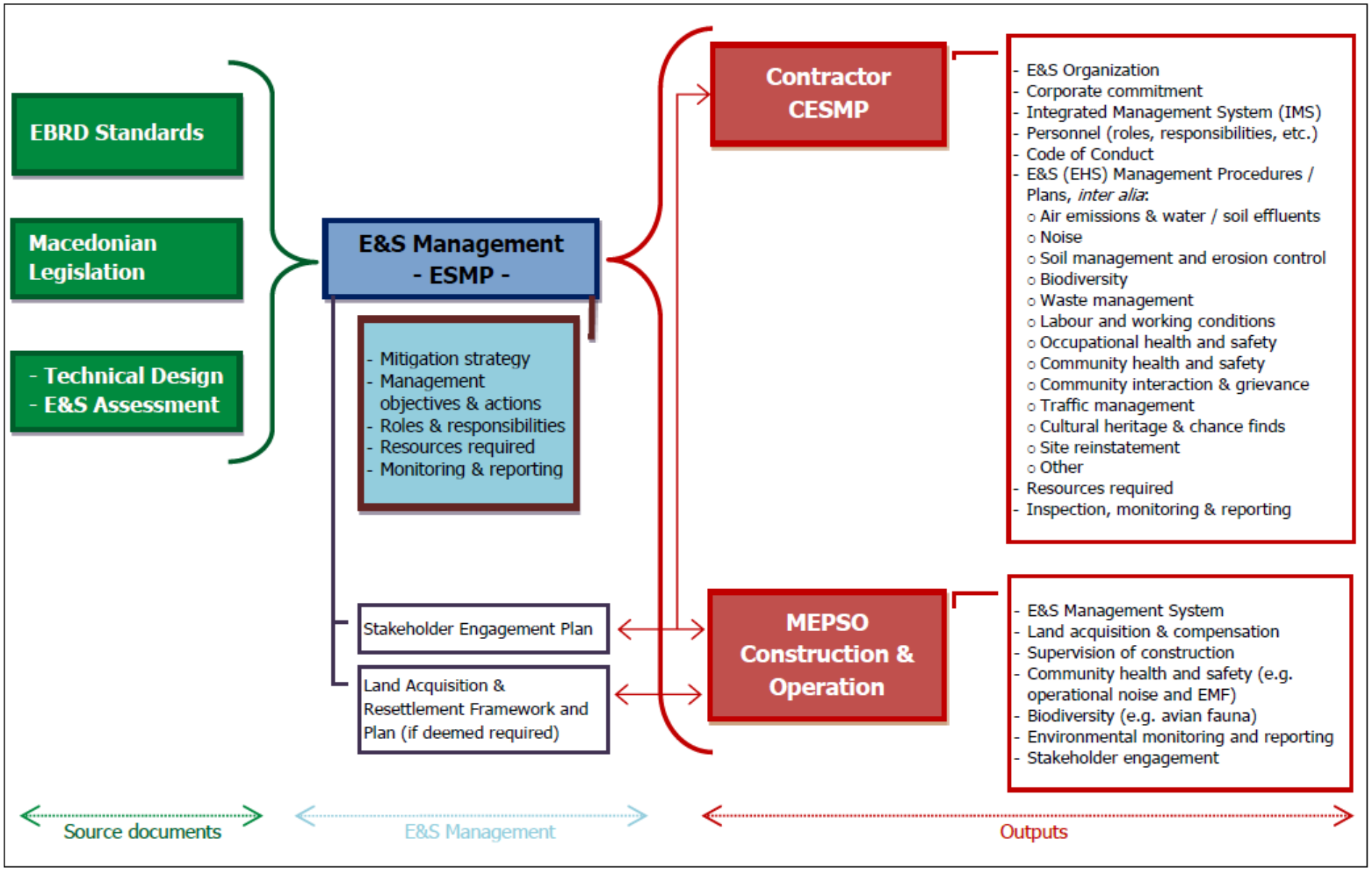


Figure 5.1: Core structure and organization of the Project's Environmental and Social Management

6. Annexes

Annex 1: Project Map – Existing 110 kV Transmission Line from Valandovo to Strumica

Annex 2: Project Map – Reconstruction of Existing 110 kV Transmission Line from Valandovo to Strumica

Annex 1: Project Map – Existing 110 kV Transmission Line from Valandovo to Strumica

Annex 2: Project Map – Reconstruction of Existing 110 kV Transmission Line from Valandovo to Strumica