1 Non-Technical Summary

Summary description of the proposed project:

AD ESM – Skopje holds a 35-year generation license granted by the ERC in November 2005. AD ESM – Skopje main business line encompasses power generation and lignite extraction. The company owns and operates eight hydropower plants (554 MW), two thermal power plants (842 MW) and three coal mines. AD ESM – Skopje plans to establish two Photovoltaic Power Plants in the region of Bitola, with an installed capacity of 60 MW and 100 MW.

Also, the Project is within the scope of the Government of North Macedonia's energy decarbonization engagement to contributing an estimated carbon reduction of 27,600 tons of Carbon Dioxide Equivalent per year.

KfW submitted a Letter of interest for a new Program "Energy Transition – Renewable Energy Programme North Macedonia", for the relevant Project. The program was approved by the German Government. AD ESM – Skopje submitted Information to the Government of the Republic of North Macedonia, upon which Conclusion No. 44-3583/1 dated 12.05.2020 was based. Pursuant to the Conclusion, on June 12, 2020, the Ministry of Finance and AD ESM – Skopje approached KfW for awarding grant funds for this Project, specifically for the elaboration of Feasibility Studies for two Photovoltaic Power Plants incl. Solar Measuring Campaign and Environmental and Social Impact Assessment (ESIA).

Fichtner GmbH & Co. KG was hired by KfW as consultant for feasibility, baseline studies, design, as well as ESIA development according to the RNM national, KfW Development Bank Sustainability Guideline and other international requirements and Good Practice adopted by RNM and KfW.

The Employer and the Project Executing Agency (PEA) is The AD Elektrani of North Macedonia (Sate owned Company), Skopje (AD ESM – Skopje).

Rational for the proposed project:

The proposed Project will produce clean energy from renewable sources which will reduce North Macedonia's contribution to climate change, through a reduction in the use of fossil fuels required to drive thermal power plants. Thermal power plants are costly and increase the carbon load. The Project areas where the PVPPs are planned to be installed are devastated areas, used in the past to dispose the waste rock material coming from the upper layer of the coal mine. These are unused areas and with The Project the existing land condition will be improved.

Project and ESIA Objectives:

The main Project objectives are following:

- reduction of dependency on electricity imports,
- increase the utilization of renewable energy sources,
- replacement of electricity produced by fossil fuels and enabling a reduction of greenhouse gas emissions,
- developing opportunities for local short- and long-term employment, and
- significant incentives for the local economy.

The main objective of this Environmental and Social Impact Assessment (ESIA) Study is to assess the potential positive and adverse impacts that may arise from the implementation of the Project on the physical and natural environment, on the socio-economic wellbeing and conditions of the local population (community and workforce) at the local, regional and national level.

Project ESHS Requirements and Permitting:

Current status of received permits/approvals are following presented:

1. The EIA Report (Elaborate) for Bitola 2 PV 60 MW project (covers PV plant and substations) has been prepared and approved by MoEPP.
2. The EIA Report (Elaborate) for Bitola 3 PV 100 MW project (covers PV plant and substations) has been prepared and approved by MoEPP.
3. As the transmission line is approx. 9 km long, the EIA Report (Elaborate) should be developed and approved by the MoEPP (not prepared yet because the layout of the transmission line has been adopted recently).
4. The SEA procedure for Urban Project for Bitola 2 and Urban Project for Bitola 3 has not been started yet.

To allow KfW to take a final decision on the financial support of the Project, the following documents, in compliance with the KfW Development Bank Sustainability Guideline and Environmental and Social Standards of the World Bank Group (ESSs), and other international standards have been developed and approved by KfW and ESM:

- Environmental and Social Scoping report (ESS);
- Biodiversity Survey Report (BSR);
- Stakeholder Engagement Plan (SEP);
- Socio – economic survey;
- Climate Risk Analysis (CRA).
- Livelihood Restoration Plan (LRP) for the project:
- Environmental and Social Impact Assessment (ESIA);
- Environmental and Social Management and Monitoring Plan (ESMP; and
- Environmental and Social Action Plan (ESAP).

Project Alternatives:

The locations were initially selected by the ESM and based on the selection alternative locations were not taken into consideration. Environmental and Social criteria were taken into account for location selection. Both locations (Bitola 2 and Bitola 3) are devastated and abandoned sites that will be reused as locations for energy production from renewable sources without occupation of additional land.

As Alternatives "do nothing" and different design, technical, construction and equipment solutions were analyzed.

In the "do nothing" alternative, the project will not be realized. This option would lead to no change in the current environmental or social impacts, and no increase in the utilization of renewable energy sources and no reduction of greenhouse gas emissions.

With "do nothing" alternative the land will be rehabilitated according to the Recultivation Plan in the period of closure of the mine, that will lead to negative long-term impact on environment in the meantime until closure. According to the Recultivation Plan, for both project locations, planting of trees (highly protective greenery) is planned.

Not implementing the project or "do nothing" alternative would mean termination of operation of the REK Bitola (when all the reserves of coal will be exploited) as there will be no coal for electricity production after this period.

Because of this PVPP Bitola 2 and Bitola 3 have to be built that will result with replacement of electricity produced by fossil fuels with energy from renewable resources and reduction of the dependency of the Republic of North Macedonia upon electricity imports.

Numerous scenarios of Project, design, plant optimization technical, construction and equipment have been considered and final scenarios for both plants and transmission line rooting have been selected based on the Cost-Benefit and Environmental and Social impacts and risks avoidance and/or all-out mitigations are expected. Scenario with International Good practices application, like using the PVPP plans areas for pasturing have been considered and selected.

Description of the baseline conditions within the project sites (including the AoI):

AD ESM – Skopje plans to establish two Photovoltaic Power Plants in the region of Bitola, with an installed capacity of 60 MW and 100 MW. The Project is within the scope of the Government of North Macedonia's energy decarbonization engagement to contributing an estimated carbon reduction of 27,600 tons of Carbon Dioxide Equivalent per year. The Employer and the Project Executing Agency (PEA) is The AD Elektrani of North Macedonia (Sate owned Company). Fichtner GmbH & Co. KG was hired by KfW as consultant for feasibility, baseline studies, design, as well as ESIA development according to the RNM national, KfW Development Bank Sustainability Guideline and other international requirements and Good Practice adopted by RNM and KfW.

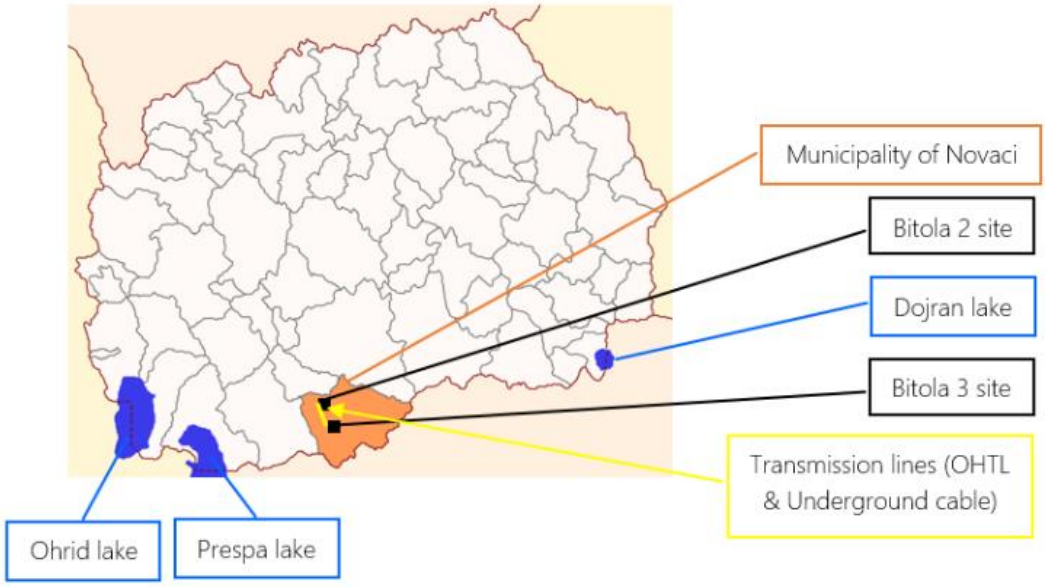
The Project includes the construction of two PVPPs (Bitola 2 and Bitola 3). Total installed peak power for PVPP Bitola 2 will be 73,5 MWp. PV panels will be connected to 15 invertors with an output power of 4 MW each. The total output power calculated for PVPP Bitola 2 is 60 MW. The PVPP will have about 183.750 PV panels with 400 Wp power each. The expected yearly electricity production is 112 GWh. It will be connected to a new two-system 110 kV transmission line with a transformer station consisting of two 110/35 kV transformers with installed power of 31.5 MVA each.

The PVPP Bitola 3 will have 273.000 PV panels with 425 Wp power each. The total calculated peak power is 116 MWp. PV panels will be connected to 25 inverters with output power of 4 MW each. The total output power is calculated at 100 MW. The expected yearly electricity production is 181 GWh. The PVPP Bitola 3 will be connected to a new two-system 110 kV transmission line (the same for PVPP Bitola 2) with transformer station consisting of three 110/35 kV transformers with installed power of 50 MVA each.

The project sites Bitola 2 and Bitola 3 and planned 110 kV Overhead transmission (OHTL) and underground cable lines are located in the southern part of the Republic of North Macedonia, about 12 km northeast and 13.5 km east from City of Bitola (Municipality of Bitola) and approx. 3 km away from settlement Novaci (Municipality of Novaci). The length between the new PV substations Bitola 3 and Bitola 2 is about 5 km.

The length between the new PV SS Bitola 2 and the existing HV SS 400/110 kV Bitola 2 is about 4 km, of which 3 km is OHTL and close to 1 km is 110 kV power cable.

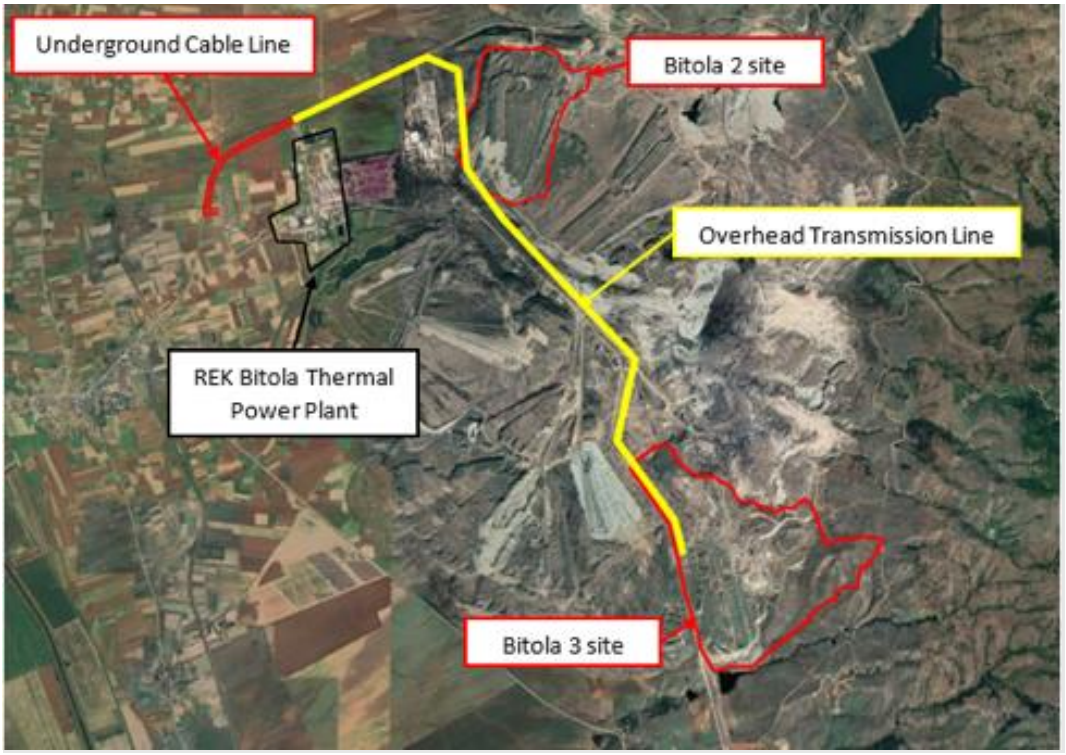
The location of the project sites and Transmission lines in relation to the Republic of North Macedonia and the Municipality of Novaci is shown in Figure 5.



Source: https://en.wikipedia.org/wiki/Novaci_Municipality#/media/File:Map_of_Novaci_Municipality.svg

Figure 1: Location of the project sites Bitola 2 and Bitola 3 and the Transmission lines

The project sites are within the location of REK Bitola (Thermal Power Plant and coal mine) and cover an area of 110 ha and 201 ha (with a perimeter of about 4,53 km and 7,1 km) respectively. Both sites are located in devastated areas operated by AD ESM – Skopje/REK Bitola, where the waste rocks material (trepel) from coal mining process was disposed through years. The micro location of the project sites Bitola 2 and Bitola 3 and the Transmission lines within REK Bitola is shown in Figure 6.



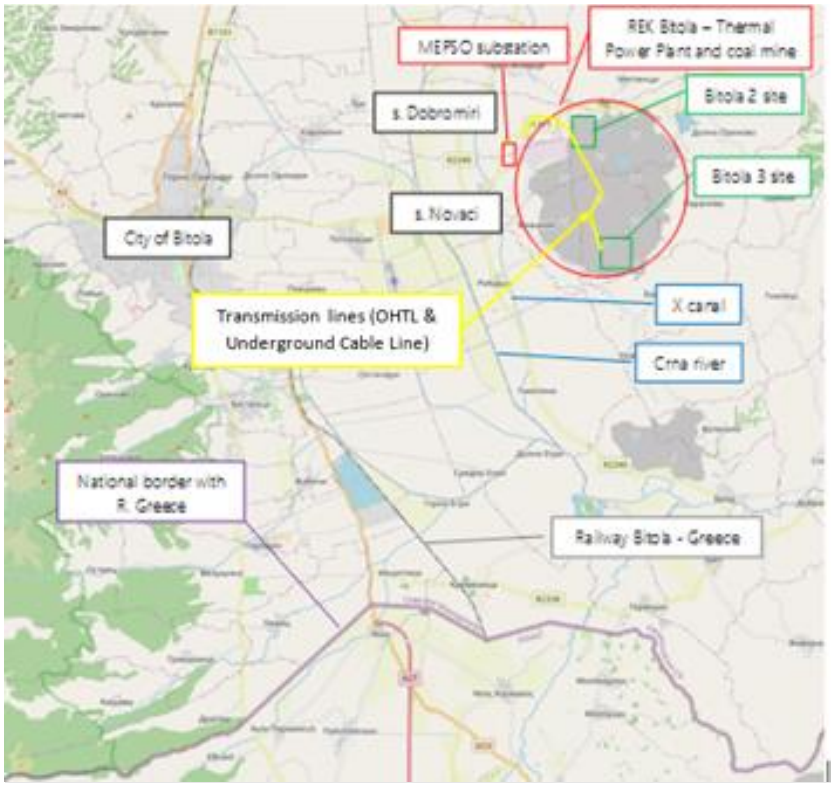
Source: Google Earth

Figure 2: Micro location of the project sites Bitola 2 and Bitola 3 and the Transmission lines within REK Bitola

The nearest populated areas, relevant for Bitola 2 and 3 sites and the Transmission lines are settlement Novaci (about 2,8 km southwest from Bitola 2 and about 4,8 km northwest from Bitola 3) and settlement Dobromiri (about 3,6 km west from Bitola 2 and about 6,8 km northwest from Bitola 3). The nearest access road to the project site Bitola 2 and 3 and Transmission lines is regional road R1311, located on the north border of the project site. The other site access is a dirt road (accessible with trucks), located near the north and west side of the project site. Railway Bitola-Greece is located about 13 km and 14,5 km west from Bitola 2 and 3 sites respectively.

The closest river is the Crna River, located about 4 km southwest from Bitola 2 and about 5,5 km west from Bitola 3 site and discharge canal (about 3 km southwest from Bitola 2 site and about 4 km west from Bitola 3 site).

The location of Bitola 2 and Bitola 3 sites and Transmission lines referred to the wider surroundings is presented in Figure 7.



Source: https://www.openstreetmap.org/search?query=bitola#map=12/40.9877/21.4511L

Figure 3: Location of Bitola 2 and Bitola 3 sites and Transmission lines in relation to the surrounding receptors

Area of influence was analyzed for environmental, biodiversity and social aspects, using the following limitations for each aspect shown in following table.

No.	Environmental and Social aspects	Area of Influence (AoI)	Justification
1	Air Quality	500 m	Dust emissions, fugitive dust, etc. are typically observed within 100-200 m from the construction/operation area. A minimum of 500 m AoI has been taken to capture all sources of these emissions including vehicular movement across access roads.
2	Noise and vibrations	500 m	Noise can often be detected up to 400-500 m from any operation.
3	Water quality	/	Identified main receptors related to surface waters for both project sites (including the transmission line) are Suvodolska river, discharge channel and Crna river. Area of influence includes the riverbed of Crna river, after entering of the discharge channel downstream into Crna river for both project sites. Also, for Bitola 3 site, two ponds belong into the area of influence. Two ponds (small water bodies naturally formed) from the left side (Pond 1) and right side (Pond 2) of conveyor belt are located. Pond 1 is located south, near the borders of Bitola 3 site (about 50 m south from the Bitola 3 site). Pond 2 is located about 300 m southwest from Bitola 3 site.
4	Soil	500 m	Impacts on soil are often restricted to the Project area. An AoI of 500 m taken into account. Indirect effects usually occur due to vehicular/ heavy machinery movements and activities at the sites.
5	Socio-economic Conditions	5 km	An AoI of 5 km radius is considered for socio economic consultations to determine perceived impacts due to the Project including employment opportunities, increased anthropogenic/ vehicular activity in and around the project sites, etc.

No.	Environmental and Social aspects	Area of Influence (AoI)	Justification
6	Area influence with regard to transportation activities during construction	/	The Project area of influence regard to transportation activities during construction, will include the existing transportation areas/routes (toward the mine and within the mine) which will be used for transportation of construction materials (e.g., PV modules) or workers within the project sites.
7	Area of influence of borrow pits	/	The Project area of influence of borrow pits will include all temporary storge locations for procured construction materials from the suppliers.
8	Area of influence concerning source of water for cleaning the panels (water supply)	/	Area of influence concerning source of water for cleaning the panels of both PVPPs in operational phase, will include following: ▪ annual water consumption from Strezevo Lake (pipeline - water comes from around 30-40 km away from REK Bitola used for cooling of tower(s) within the thermal power plant); ▪ water consumption as secondary emergency water supply from Suvodol reservoir; and ▪ water consumption as secondary emergency water supply from Crna River.

The landowners of the project sites are AD ESM – Skopje, Republic of North Macedonia (Bitola 2 and Bitola 3 PVPPs) and Private Owners (8 parcels under underground TL). The nearest national protected area, relevant for Bitola 2 and Bitola 3 sites and Transmission lines is the National Park (NP) Pelister which is located about 20 km southwest from Bitola 2 and about 22 km west from PV plant Bitola 3 site. The nearest internaional protected area is IBA Pelagonija, located about 408 m north from PVPP Bitola 2 site; and about 1,3 km southeast from PVPP Bitola 3 site. The vegetation cover within the project sites is classified as ruderal vegetation with low level and value of biodiversity. In the wider surroundings of the Bitola 2 site, the following habitat types were identified: agricultural land; urban and industrial area; and forests habitats (at Baba Mountain, near City of Bitola).

The Bitola 2 and Bitola 3 sites are mainly characterized by disturbed areas where the upper layer of the coal mine (waste rocks material – trepel) was disposed after its excavation from the mine site. The aerial pictures below show the sites in Figure 8 below.

Source : https://en.wikipedia.org/wiki/Novaci_Municipality#/media/File:Map_of_Novaci_Municipality.svg

Figure 4: Proposed Bitola 2 site (left map) and Proposed Bitola 3 site (right map)

Stakeholder Engagement Plan (SEP):

Stakeholder engagement is a process conducted throughout the project lifecycle. Its aim is to support the development of strong, constructive and responsible relationships important for the successful management of a project's environmental and social risks. The early, regular, respectful and clear communication with stakeholders helps to manage stakeholders' expectations and avoid risks, potential conflict, and project delays. In addition, the Stakeholder Engagement Plan assists in managing stakeholder expectations which will have a bearing throughout the lifespan of the project. Hence, this SEP provides a plan to interact effectively to support project interests.

The SEP not only considers the primary stakeholders who may be affected by the project, but it also aims at including all those stakeholders, such as national government Institutions, NGOs and the concerned municipalities, who may provide support and/or advice wherever needed during the project preparation and the implementation work.

Stakeholder mapping to identify the stakeholder groups who may be affected by and/or may have an interest in/influence on the Project, including initial consultation of relevant stakeholders was done. Based on this the SEP (separate document) was prepared to guide stakeholder engagement activities to be undertaken during the Project implementation. The SEP is aligned with the World Bank ESS 10. Grievance mechanism proportionate to the potential risks and impacts of the project was established in the frame of the SEP. This SEP will be updated as necessary.

ESIA Methodology and Approach: Methodology for development of ESIA includes different types of activities: (i) desktop-based review/research of available data related to the project, (ii) review of associated Environmental, Social and H&S policies and standards of ESM, (iii) review of applicable international E&S and H&S legal framework (iv) collection of social baseline data from secondary and primary sources, including site visits and meetings with ESM representatives, (v) preparation of the Stakeholder Engagement Plan (vi) identification of the area of direct influence for each project location; (vii) identification of potential E&S and H&S risks and impacts and their prioritization/assessment (vii) public disclosure of the document.

The consultant has performed review of the overall available documentation relevant to the Project, including all documents received from ESM/Branch offices and KfW, as well as other documentation available on the websites of ESM and collected from relevant municipalities, NP Managements and other institutions. National and international regulatory, policy, and institutional framework for the proposed Project's planned rehabilitation measures were analysed and their relevance to the project was assessed. Environmental and social baseline conditions were analysed based on the available documentation and conducted site visits on Biola 2 and Bitola 3 PVPPs and Transmission line construction sites.

Environmental and Social Baseline Surveys:

The project area scoping, data analysis has provided further clarification as to the number, nature and scale of baseline studies that required for this ESIA to accurately document the baseline conditions in those areas identified as containing potential sensitive receptors or selected representative environments.

The summary of identified information gaps and necessary studies is presented below. Recommendations are applicable to all proposed project sites.

For adequate estimation of the environmental conditions and impacts (including cumulative) for both Bitola 2 and Bitola 3 project sites, it is required and have been undertake the following surveys and assessments of the project areas likely to be affected:

- Biodiversity Survey - Biodiversity team engaged by Consortium Fichtner & GEING has performed biodiversity survey of the project area – Bitola 2 and Bitola 3 sites within the scope of the Project. The purpose of the baseline survey is to identify the presence of any critical habitats, priority biodiversity features, significant or endangered flora and fauna species within and within the PVPP Bitola 2 and PVPP Bitola 3 construction sites and AoI.

The biodiversity survey was performed through two site visits: winter period (13.12.2022) and spring period (31.5.2023). Due to winter season and adverse weather conditions (short day duration, insufficient development of the vegetation cover, slow motion or absence of fauna movement (e.g. hibernation, etc.), the project team carried out a spring survey in order to provide proper identification of habitats, determination of surrounding flora and present fauna (herpetofauna, ornithofauna) species within the two project locations - including the route of the planned overhead transmission line which will connect the two project locations to the main MEPSO HV substation.

According to the WE ESS6 requirements, no critical habitats or natural habitats with significant biodiversity value were identified within the PVPP Bitola 2 site. Three types of habitats (92A0 Salix alba and Populus alba galleries; 6220 Pseudo-steppes with grasses and annuals of the Thero-Brachypodietea; and Inland surface waters: 3100 Standing water) has been identified as natural habitats with significant biodiversity value. These types of habitats are marked with medium receptor sensitivity.

According to the WE ESS6 requirements and from the literature, three species (B.variegata, T.hermanni and E.orbicularis) are considered as fauna species with significant biodiversity value for the project area of PVPP Bitola 2 and PVPP 3 sites. The two ponds (1 and 2) near PVPP Bitola 3 site are playing a vital role as a reproductive center for the amphibian's class and are source of water that determines the amphibians' migratory routes in the reproductive period from April till June. These water courses should be taken into account when installing the photovoltaic structures. Although, the water level in this water bodies can vary throughout the year they are playing a vital role to the amphibian class dispersal in this micro region.

For the PVPP Bitola 2 site is not the same situation due to the fact that only two species of amphibians were noted in that area B.bufo and B.viridis. Both species require more moisture therefore they are dependent on aquatic habitats. However, like all amphibians they are requiring water bodies for reproduction which are located in nearby vicinity of the site. Therefore, unlike the PVPP Bitola 3 site, PVPP Bitola 2 has no reproductive center on the site, so there is no threat from the future installation of the photovoltaic power plant.

In regard to the reproductive center and migratory routes, same conclusion as habitat destruction, inversion and fragmentation can be made from the aspect of establishing a buffer zone in the PVPP Bitola 3 - between the site and the pond 2. Buffer zones should be established (should be obligatory in the site of PVPP Bitola 3) in order to minimize the effect of construction of PVPP (e.g., to prevent water and soil pollution from construction machinery, etc.). The buffer zone for breeding centers should be at least 30 meters around the water center (pond) and at least 10 meters on each side of the identified migration route (Semlitsch & Bodie 2003).

During the survey, a total of six bird species in the project area were recognized as species of global and national conservation interest species due to their presence in Annex 1 of the EU Birds Directive. In accordance with the IUCN European Red List of Threatened Species one species of interest were recognized as vulnerable (Streptopelia turtur). Three of the determined bird species recognized like species of global and national conservation interest are birds of prey (Circaetus gallicus - short-toed snake eagle; Circus cyaneus - hen harrier; and Buteo rufinus - long-legged buzzard) that are mostly in flight over or hunting rodents in or around the project area and the remaining three species are sparrow-like birds that are widely distributed all around the territory of the project area. (Unpublished data of the author of the report), it is known that often the territory of Pelagonija is used by the eagles to cross south to Greece. In any case, the field chosen for the construction of a photovoltaic power plant is very small, compared to the territory of Pelagonija, and is hidden by the complex of thermal power plants and the flights of these birds over the PV plant will be at a great height. Because of that, the impact of the PV plant on the trigger species will be negligible.

For all identified habitats, flora and fauna species relevant for the Project, the biodiversity team proposed appropriate mitigation measures for all project phases, presented in the chapters 11.2.8; 11.3.2 and 11.5 within this ESIA Study.

Socio-economic conditions and impacts of all project sites:

Project affected region is Pelagonija region and project affected is the municipality of Novaci. Project affected settlements are: Novaci, Dobromiri, Suvodol (depopulated), Meglenci, Dolno Orehovo, Paralovo, Vranjevci (depopulated), Baldovenci (depopulated) and Biljanik (depopulated). At the last conducted census (2021), the municipality of Novaci had a total of 2,648 inhabitants, with men representing 52% of the total enumerated population.

Novaci is the seat of the municipality of Novaci, and it had 1283 residents in the 2002 Census and that number decreased to 1107 in 2021. In Suvodol only two residents were enumerated in the 2002 Census, however in 2021 Census, the village was completely displaced. The settlement Dobromiri in 2002 had 345 residents, but in 2021 that number decreased to 296 inhabitants. In the settlement Paralovo, in 2021 were enumerated only three (3) residents. Other settlements in the project area have been displaced. The largest share of the population in the municipality of Novaci has completed secondary and primary education. The net migration balance in the Pelagonija Region and in the municipality of Novaci in 2021 was negative.

Through the territory of the municipality of Novaci there are regional roads of first (R1311) and second category (R2340 and R2238). The municipality of Novaci, in 2021 had in total 80 active enterprises. REK Bitola is a large-sized enterprise located in the project area. More than 2 400 workers work in the REK Bitola. Near this combinate is located the sub-station of MEPSO.

The total agricultural area of the municipality of Novaci in 2022 was 12,484 ha. The cultivated area was in total 8,630 ha. The biggest part of the agricultural area was sown with wheat and barley. 30.8% of the total agricultural area in the municipality of Novaci were pastures.

In 2022, the Pelagonija region had the largest number of cattle and sheep in Macedonia. 23% of the total number of cattle in Macedonia, that is, 37, 873 heads of cattle, are bred in the Pelagonija region. 20,3% of the country's total sheep number, namely, 131, 417 sheep, were registered in that same region. In the

municipality of Novaci, in Census 2007, the total number of cattle was 4,707, and the total number of sheep was 20,819.

The land allocated for the construction of the PvPPs is company and state-owned land. The required land for the construction of Bitola 2 with the installed capacity of 60 MW is around 110 ha company owned land. For Bitola 3 PVPP with an installed capacity of 100 MW is around 200 ha company and state-owned land. Both PvPPs will be built on land of about 310 hectares. Based on the information obtained by the representatives of the municipality of Novaci, the lands within the borders of proposed PvPPs Bitola 2 and Bitola 3 are used for domestic animals pasturing. After analysis of the conducted interviews, it can be concluded that the total number of herders potentially using the proposed project area for construction of Bitola 2 and Bitola 3 is limited to eight farmers and one company.

The average household size or the mean number of persons per household in the municipality of Novaci is 3.3 persons. The elementary school in Novaci is one of the oldest schools in the Pelagonija valley. This school operates as a central school in Novaci, and it has seven four-year regional schools in seven villages. According to the insights into official statistics, it is noticeable that in the last years the number of students has decreased.

In Novaci is located the private ambulance d-r DASKAL. There is a pharmacy in Novaci as well. Regular veterinary services also operate in the municipality.

The Inter-municipal center for social work in Bitola is responsible for provision of social work services and delivery of financial support to address the various social issues including childcare allowances, parental allowances, special allowances, guaranteed minimum assistance payments, etc.

Based on the available data, the locations of the registered immovable monuments of culture are outside of the proposed boundaries of the project footprint area (or Project Direct Area of Influence) for construction of both PvPPs and 110 kV transmission line but are within wide AoI. Findings and conclusions of these two surveys have been incorporated in the ESIA report and used for the E&S impacts and risks evaluation and mitigation measures and actions. Among other mitigation measures and action plans the Livelihood restoration plan (LRP) have been elaborated and submitted as a separate document.

Project Environmental, Social, Health and Safety (ESHS) Impacts & Risks Assessment:

The purpose of impact assessment and mitigation is to identify and evaluate the significance of potential impacts (positive or negative) on identified receptors and resources according to defined assessment criteria; to develop and describe the measures that will be taken to avoid or minimize any potential adverse effects and enhance potential benefits.

Fichtner's methodology for classifying the impacts of a project on the environment is based primarily on the ARVI approach (IMPERIA, 2015). ARVI is an approach for assessing the significance of the expected impacts of a proposed development project and was the key deliverable of the EU sponsored IMPERIA Project[1]. This resulted in a transparent, reliable, and objective methodology that is depicted into the following 3 steps:

- Step 1: Distinguish positive and negative impacts.

[1]More on this project here: https://www.jyu.fi/science/en/bioenv/research/natural-resources-and-environment/imperia-project

- Step 2: Dismiss non-significant impacts.
- Step 3: Multi-criteria analysis for significant impacts pre- and post-mitigation.

Based on the abovementioned methodology positive and negative impact magnitude, significance have been assessed for pre- and post-mitigation measures. Overall findings of this passement are as follows:

- The proposed Project will produce clean energy from renewable sources which will reduce North Macedonia's contribution to climate change, through a reduction in the use of fossil fuels required to drive thermal power plants. Thermal power plants are costly and increase the carbon load.
- The Project areas where the PVPPs are planned to be installed are devastated areas, used in the past to dispose the waste rock material coming from the upper layer of the coal mine. These are unused areas and with The Project the existing land condition will be improved.
- With the implementation of this renewable energy Project (Bitola 2 and Bitola 3 PVPPs) the reducing of the 200.970 t CO_2/y is expected. This project will contribute to the reduction goals on national level for GHG emissions in energy sector in line with Strategy on Energy and Long-term Strategy on Climate Action.
- The nearest relevant protected area for both sites is IBA Pelagonija: located about 408 m north from PVPP Bitola 2 site; and about 1.3 km southeast from PVPP Bitola 3 site. Small part of the planned route of TL (length of 1.3 km overhead and length of 1.2 km underground cable) will pass near the borders of IBA Pelagonija. The planned route of the TL does not overlap with any Protected and Conservation Areas.
- As water supply sources, for all project activities in the construction phase of both PVPPs, REK Bitola will be using the existing water sources that are used for the technological process for electricity production: Strezevo Lake (pipeline - water comes from around 30-40 km away from REK Bitola used for cooling of tower(s) within the thermal power plant); Suvodol reservoir (as secondary emergency water supply for TPP Bitola); and Crna Reka (also as secondary emergency water supply for TPP Bitola).
- AD ESM has defined criteria that are relevant for all three aspects: general management (quality of products, equipment, devices), environmental management (if the supplier has introduced or works towards ISO 14001, how the supplier uses the resources – energy, water, any grievances etc.) and OHS management (labor).
- Project stakeholders include international organizations and funding institutions who will provide investment and sustainable financing, meeting the Government of North Macedonia's energy decarbonization targets.
- Positive impacts of the proposed Project are expected through the impacts on the regional and national economy during the construction and operation phases and impacts from local employment and training during construction and operation.
- The proposed Project has potential to cause some environmental and social effects mainly in air (during construction and decommissioning phase), noise disturbance caused by machinery and equipment work, generation of different types of waste (damaged PV modules, WEEE, transformer oils, etc.), possible habitats fragmentation, temporal loss of land for grazing sheep and permanent restricting for cow grazing , impacts on livelihoods of identified PAPs, need for temporarily land take for construction of the underground cable transmission line under few private parcels, possible OH&S risks (including supply chain risks), community health risks as a result of workers overcrowding at the same time on local surrounding settlements and workers and community health and safety.

The Project is in line with national policy for green transition through replacement of the fossil fuels with renewable energy resources.

Livelihood Restoration Plan:

The Livelihood Restoration Plan (LRP) is prepared to guide land acquisition process and livelihood restoration. The LRP prepared in accordance with the requirements and standards of North Macedonian National legislation and WB Environmental and Social Standard ESS 5. on Land Acquisition, Restrictions on Land Use, and Involuntary Resettlement. It should be implemented by ESM (PIU) under the monitoring of Local Authorities and prior to the start of construction phase of PVPPs Bitola 2 and Bitola 3, including 110 kV TL.

This LRP has been developed to respond to the following objectives.

- To mitigate unavoidable adverse social and economic impacts from temporary restrictions of land use.
- To quantify impacts on those displaced/affected and establish appropriate mitigation in alignment with international standards (WB) and best practice.
- To compensate economically (if required) displaced persons and companies equitably and transparently.
- To identify and provide special assistance for the vulnerable PAPs who are affected by the Project.
- To ensure that LRP activities are planned and implemented with appropriate disclosure of information, meaningful consultation, and the informed participation of those affected (PAPs).

Key principles which are applied to this LRP are as follows:

- This LRP is prepared in accordance with applicable national legislation and the applicable requirements from Lender (KfW Sustainability guideline, WB ESS5 and ESS10).
- Livelihood restoration activities developed within this LRP will ensure that impacted land users shall have an opportunity to maintain, or improve their economic earning capacity, livestock activities and agricultural production levels, and standards of living in the shortest time possible.
- The feedback from stakeholder engagement activities will be used to refine and improve the future implementation of the LRP, using a participatory and inclusive approach.
- Livelihood restoration assistance shall be provided to Project Affected Persons (PAPs) with a range of measures, with also specifically targeting the restoration of women headed households and vulnerable PAP's livelihood.
- An effective grievance mechanism is developed and will be accessible during the project all phases. This mechanism will continue to be used during preparation and implementation of the LRP and remain during construction and operation phases of the Project.
- The implementation of the LRP will be monitored and monitoring reports will be developed and submitted to the relevant Authorities, Interested Parties and Lenders.

Impacted land users (farmers and herders) will be preferentially targeted for proposed mitigation measures during the Project all phases.

As an assumption of the conducted Socioeconomic survey, the project sites intended for the construction of PVPPs Bitola 2 and Bitola 3 are intensively used by the local farmers for cattle and sheep grazing. Animal husbandry is an important branch of agriculture in the project affected settlements. The total number of identified projects affected households with livestock is eight (8) and one company which have 23

employees. Eight households and one agricultural company are included in the socio-economic survey. The total number of animals breed in the project areas is 3.630 head of sheep, and 465 head of cattle. Sheep and cows are the main animals raised in this area. Seven households have in total 460 cows. The agricultural company has a total of 3.500 sheep (and five cows), while an individual farmer/household has a flock of 130 sheep. Two households keep the largest number of cows, or each one has 100, Two households have 60 cows each, while another one has a total of 55 cows. The remaining two households keep a total of 85 cows (the first household has 45, and the other one 40 cows).

The project areas (Bitola 2, Bitola 3 and 110 kV TL) are located away from individual houses and local settlements and therefore there will be no requirements for physical resettlement and a Resettlement Action Plan for the project. However, it is identified that the project locations of Bitola 2 and Bitola 3 are currently used by a number of farmers (8) and by one livestock farm/company for grazing of cattle and sheep. There will be temporary (during the Construction phase only) restrictions of land use as pasturing area and respectively negative impact on the livelihood income of above-mentioned PAPs within the project implementation. As a conclusion of conducted socio-economic survey, 17 PAPs are identified as follows:

1. PVPP Bitola 2 - six (6) farmers using Bitola 2 project area as pasture for their cattle,
2. PVPP Bitola 3 - two (2) farmers and one Company (livestock Farm or Agricultural Company has 23 employees), using Bitola 3 project area as pasture for their cattle (Cows and sheep),
3. 110 kV Transmission Line – the land parcels of eight (8) private landowners will be impacted partially and temporarily, due to temporary land taken for earthworks, and trenching works for installation of underground wire (with 1km length and 3.2m width) during the construction of the Transmission Line (TL).

The proposed livelihood restoration measures are divided in two categories:

1. Livelihood Assistance Measures (in Agricultural / Livestock rearing) and
2. Additional assistance for Vulnerable PAPs.

All identified land users will be proposed livelihood assistance measures. It is important to note that the affected land users will be impacted only during the construction phase of these two projects if case/option of co-use of the PVPPs areas are used also for posturing during the operation phase.

During the operational phase, international best practices could be applied, the affected land users could have opportunities to continue with the grazing livestock within the project areas of Bitola 2 and Bitola 3, due to the technical design of the PV panels metal construction. The fixed mounting structure will be mounted higher (the lowest height is 0,8 m and the highest point is almost 3 m) and the grass land under the mounted panels within the project areas of Bitola 2 and Bitola 3 can be used for grazing the sheep and collecting grass for livestock feeding. In fact, the generation of photovoltaic electricity will be combined with agricultural land use. It is expected that prior request for fenced areas will be submitted to ESM/REK Bitola and the permit will be issued by the company for authorization of grazing or and collecting grass for livestock feeding.

It is important to emphasize that during the development of key aspects of the project, particular care was taken to avoid or to minimize the negative impact related to the land acquisition as much as possible. In this context, the use of land owned by ESM and the state-owned land was proposed for construction of PVPV Bitola 2 and PVPV Bitola 3 and TL. The use of privately owned land was avoided.

The construction of TL requires only temporary and partially land taken of privately owned land. For construction of TL the avoidance of privately owned land was not possible. Only the land parcels of eight (8) private landowners will be impacted partially and temporarily, due to temporary land taken for earthworks, and trenching works for installation of underground wire (with 1km length and 3.2m width) during the construction of the TL. The proposed mitigation measures will minimize or reduce the risks and impacts to acceptable levels.

Agricultural / Livestock rearing

Support for agricultural equipment and livestock production improvements providing and assistance including:

- Consultation with ESM, to use, or to gain access to other grasslands during the construction phase, which can be used for grazing cattle and sheep, or mowing grass for livestock feeding.
- AD ESM will provide the transitional support for those who are significantly affected by project implementation[27].
- Construction of water troughs for the livestock, in the project affected settlements.
- Agreements with ESM, to use, or to gain access to grasslands of the Bitola 2 and Bitola 3 during the operational phase of the constructed PVPs Bitola 2 and Bitola 3, which can be used for grazing small animals - sheep, or collection of trimmed grass for livestock feeding.
- Temporary grazing fee payment exemption, for livestock grazing in the surrounding areas during the construction phase.
- Making it easier for the land users to receive subsidies for purchasing of agricultural machinery.
- Education for land users to transition from keeping mountain cattle to keeping stable cattle, trainings on Intelligent farming, composted animal food production other relevant trainings shall be suggested and conducted.
- Assistance related to access training, skill development, agricultural development support, such as advice on crop production, advice on drying, storage, and transportation, of agricultural products and similar, based on consultations with the local population.
- Additional promotion of the traditional livestock products from the project affected area.
- Promotion and support for branding the local livestock and agricultural products, etc.

Vulnerable persons or persons at risk

This assistance to this group can be presented in the following forms:

- Provision of tangible support and/or allowance for the persons at social risk / vulnerable persons, PAPs with disabilities who are not actively engaged with land activities.
- Provision of transitional allowance for those who are significantly affected by project implementation.
- Provision of legal aid.
- Provision of assistance in obtaining personal documents, with access services available under national legislation.

- Provision of general information related to accessing social welfare.
- Provision of general information related to access to free care and assistance at home by certified caregivers.
- Provision of information and assistance / support related to the activities of the Red Cross Branch in Bitola.

Environmental and Social Management and Monitoring Plan (ESMMP):

This ESMMP is a "living document" which will be updated by the Project owner, based on the then available detailed engineering, at the beginning of the Construction, Operation & Maintenance and Decommissioning phases. In addition, the ESMMP shall be updated at least once per year or on as per needed bases (major changes in design, rehabilitation, location, extension etc.), to include new issues, which were not or not sufficiently considered in the already prepared ESMMP.

ESMMP can be used as a stand-alone document during the different phases of the Project by the Contractors (construction, decommissioning), the Project Operator, the governmental authorities, and other responsible parties. Responsible parties during construction and operation periods and description of the responsibilities of each of them are provided below.

The Contractor will have responsibilities for implementation of this ESMMP prescribed for the construction activities. Contractors' obligation includes but not limited to:

- Preparation and implementation of Construction Site Specific Management Plan, including Waste management Plan, Biodiversity Management Plan, Occupational Health and Safety Plan for workers, Community Health and Safety Plan, Traffic Management Plan, Monitoring Plans (air, noise etc.), based on this ESMMP and ESIA findings and are responsible for submission to the Project Owner/PIU for their approval.
- Engagement of qualified workers for executing the specific construction works.
- Ensuring proper H&S personal protective equipment and means for the workers.
- Providing all necessary Environmental, Social, Health and Safety (ESHS) training for workers.
- Ensuring the usage of the appropriate machinery and equipment that is in compliance with EU requirements.
- Signing Contracts with authorized companies for management with different types of waste.
- Implementing good construction practice, introducing grievance mechanisms for workers and local citizens.

Project Owner/AD ESM – Skopje (through the PIU) has the overall responsibility for monitoring the implementation of the ESMMP. This includes:

- Review of Contractors' Environmental, Social, Health and Safety (ESHS) deliverables;
- Monitoring the Contractors' performance;
- Appointing a qualified HSE professional with relevant HSE expertise to monitor the implementation of the ESMMP during the construction phase of the project;
- Acting as a point of Contact for engagement with the public and interested parties, i.e., stakeholders; and
- Monitoring of the implementation of the activities within the Livelihood Restoration Plan (LRP)

Project Owner/AD ESM – Skopje has to ensure that all project-related activities of the Contractors are implemented and executed in accordance with the stipulations included in the present ESMMP and permits granted for the project. AD ESM – Skopje, in close coordination with the Contractors, will execute regular site inspections.

AD ESM – Skopje has the right to inspect how the work is being implemented even with respect to the overall HSE performance at site. This includes the right to check the potential risk affecting the workers and the public, their probability of occurrence and preventive actions taken to fulfil the HSE goals.

Consultant shall be nominated which will support AD ESM – Skopje in implementation of the health, safety, environmental and social aspects of the project, including the implementation of the ESMMP.

Project Owner/AD ESM – Skopje as the Operator of the asset shall prepare and implement HSE Management System including at least HSE Policies, Procedures and Management Plans as listed below:

- Environmental, Social, Health and Safety (ESHS) Plan for operations & maintenance,
- Plan on Biodiversity Protection,
- Waste Management Plan (WMP),
- Emergency Response Plan (ERP),
- Traffic Management Plan
- Hazardous Materials Management Plan,
- Incident/accident (Environmental and OHS) Management Plan Community Health and Safety Plan,
- and in addition
- Adapt and implement noise, vibration, air quality, biodiversity monitoring plans (if applicable),
- Implement regular maintenance of the PV panels and supporting infrastructure (replacement of damaged PV panels, regular checks and replacement of defective parts, control the condition of the route of OHTL and underground cable line) to eliminate HSE incidents/accidents.

AD ESM – Skopje shall deploy an HSE team with the following suggested composition:

- Operator's ESHS Manager: responsible for coordinating and managing all the environmental, social, health and safety (ESHS) activities during the operation phase; prepares the Operators' ESHS Plan for operation and maintenance; acts as main point of contact between the regulatory authorities and the project on ESHS issues.
- Operator's Biologist - Operator AD ESM – Skopje shall appoint a biologist to develop a Plan on Biodiversity Protection based on this ESMMP and the ESIA and monitor implementation of the mitigation and monitoring measures stipulated in such Plan.

A Consultant shall be nominated who will support AD ESM – Skopje in implementation of the health, safety, environmental and social aspects of the project, including the implementation of this ESMMP as described below. The Consultant will appoint a qualified Environmental and Social Expert

In summary, Consultant 's Environmental and Social Expert will:

- perform review of the Contractors' ESMMPs prior to commencement of any works on site,
- conduct regular environmental and social site inspection visits during the construction phase of the project (frequency as per the Contract with AD ESM),

- in case deviations from the ESMMP are identified, develop timely measures to rectify the deviation and related consequences, as applicable, and
- review and approval of monthly reports concerning environmental issues.

The Consultant's Environmental and Social Expert will analyze the reports produced by the Contractors. Based on these reports and site visits, the Consultant will report regularly to the AD ESM (PIU) on the progress of implementation of the ESMMP.

The **Contractors (CC)** responsibilities are to:

- Prepare and implement Construction site specific ESMP (SS ESMP) based on this ESMMP and ESIA findings;
- ensure that all provisions of the permits issued for the project which are applicable for his scope of work are included in the SS ESMPs;
- prepare an HSE Plan and procedures (including Traffic Management Plan, Plan on Biodiversity Protection, Waste Management Plan (WMP), Construction/Site management Plan, Emergency Response Plan (ERP), Community Health and Safety Plan, Hazardous Materials Management Plan etc.) for construction which will include relevant provision of this and/or updated ESMMP;
- assume full responsibility for the HSE for construction under the contract;
- submit the SS ESMP and HSE Plans and procedures for construction for the ESM's and Consultant's review and approval;
- update the SS ESMP for construction as necessary (and as required) as a result of:
  - any changes to this ESMMP;
  - any identified corrective actions arising from non-conformances;
  - identified improvement areas.
- ensure that the HSE Plans and procedures for construction are fully implemented and maintained.

Some governmental authorities have responsibilities in the ESMMP related issues of the PVPPs Bitola 2 and Bitola 3 project. These have been identified as being the main stakeholders: Ministry of Environmental and Physical Planning responsible for EIA/SEA permitting process, Ministry of Agriculture, Forestry and Water Economy for registration, management, promotion, and sale of state-owned agricultural land, Ministry for Economy of the Republic of North Macedonia, Ministry of Transport and Communication, Public Enterprise for Management of State-owned Pastures Regional office in Bitola, Agency for Real Estate Cadaster, Energy Agency and Energy Regulatory Commission of the Republic of North Macedonia).

The monitoring of the works may reveal the necessity to adapt the measures of the ESMMP to specific site conditions not known at the time of preparation of this ESIA Study. Items which are not anticipated in the ESMMP may come up, as well as areas that need improvements. The Contractors shall be ready to handle both cases by adapting the dispositions of this ESMMP. Any changes to the commitments of this ESIA and the ESMMP shall not be undertaken without the previous approval of the Project Owner AD ESM - Skopje and the Lenders.

Overall findings, Recommendations and Conclusions:

The aim of ESIA study was to conduct an assessment of the proposed PV Project to determine whether or not the Project and the associated infrastructure would have any adverse environmental and social effects. The ESIA study involved an assessment of the baseline environment; review of the relevant national

legislation and requirements from international standards; stakeholder engagement, performed site visits on both location (PV PP Bitola 2 and Bitola 3) and OHTL and meetings with AD ESM representatives; biodiversity survey on project sites, identification of potential environment impacts during the pre-construction, construction, operation and decommissioning phases of the Project; and development of an appropriate measures for the mitigation of negative effects associated with the proposed Project activities.

Based on the study findings, the following conclusions have been reached.

- The proposed Project will produce clean energy from renewable sources which will reduce North Macedonia's contribution to climate change, through a reduction in the use of fossil fuels required to drive thermal power plants. Thermal power plants are costly and increase the carbon load.
- Positive impacts of the proposed Project are expected through the impacts on the regional and national economy during the construction and operation phases and impacts from local employment and training during construction and operation.
- AD ESM has defined criteria that are relevant for all three aspects: general management (quality of products, equipment, devices), environmental management (if the supplier has introduced or works towards ISO 14001, how the supplier uses the resources – energy, water, any grievances etc.), OHS management (labor);
- Project stakeholders include international organizations and funding institutions who will provide investment and sustainable financing, meeting the Government of North Macedonia's energy decarbonization targets.

Recommendations

The general recommendation from the ESIA study is that the proposed Bitola PV Plant Project should proceed but in order to ensure the environmental and social sustainability of the proposed Project, in addition, the following recommendations are proposed by the FICHTNER/GEING Project Team to be implemented by ESM:

- Preparation of a technical specification for the call for tenders for the engagement of Main Design Developers, Contractors for construction activities, equipment procurement and Consultants.
- AD ESM – Skopje/Consultant/Engineer shall implement supply chain management from the delivery of source materials from the supplier by following fundamental steps of a supply chain: sourcing raw materials, order products, product delivery, customer support and return services.
- AD ESM – Skopje/ Consultant/Engineer shall develop List of recommended companies for supplying PV equipment (PV panels, concrete, wires, cables, insulation materials), PV part production in order to choose most appropriate company that gives the best offer and have no precedents or potential of human rights violation (e.g., child labour, forced labour, modern slavery).
- Review and update of ISO standards (ISO 9001, ISO 14001, and ISO 45001) considering the Project activities to be implemented.
- Establishment of PIU and organizational structure responsible for implementation of all proposed actions and measures within the ESIA Study.
- Delivery of training to the AD ESM employees who will be involved in the implementation of the project as well as for Contractors and sub – contractors.
- Adaptation measures for PV panels, OHTL and cable line construction from the Climate risk vulnerability assessment to be take into consideration into the Main Design.

- Grievance Mechanism should be established before the work starts.
- Implementation of all activities and actions defined in the LRP.
- Development of all required Management Plans before starting with construction works.
- Conducting Monitoring for biodiversity species on Bitola 2 and Bitola 3 sites.
- Implementation of the developed Stakeholder Engagement Plan and commit to a pro-active and continuous stakeholder engagement process to address emerging project issues and to continue the enlightenment of the community on Project benefits. Community engagement should be undertaken in close collaboration with the local administration (local representatives and the NGOs);
- Defining and choosing a method of cleaning the PV panels and appropriate handling of the wastewater from the cleaning of the panels.
- Monitoring of implementation of measures prescribed within the ESIA Study.
- For construction of the underground segment of transmission line will be proposed temporarily and partly expropriation of 8 land parcels. But there is the need to prepare the Geodetic report for affected land in order to define the expropriation area, the owners of land plots, contact information, etc.
- During the decommissioning phase all used PV Panels to be dismantled and handed over to an authorized company for management with this type of waste (WEEE) and project sites to be returned into previous condition, in order to be used for other purposes.

Project Information Disclosure:

AD ESM-PIU will use appropriate methods to disclose information about the project, consult with stakeholders on potential benefits and risks of the planned activities and potential adverse impact mitigation measures. The project documentation will be prepared in English and Macedonian, and it will be available upon their official approval by EDM and the KfW. Project-related information for persons with disabilities (mainly blind) will also be made accessible (e.g., as an NTS lecture available on the website of AD ESM). The draft final version of the ESIA Study and other documents will be publicly disclosed on the website of AD ESM-PIU and on the websites of the project-affected municipalities and/or should be provided on as per request of stakeholders in the required format (e.g., hard copy). Documents will remain disclosed during a period of 30 days before the public consultation event. All affected and interested parties can submit a comment on the disclosed project documentation for the period of 30 days. During the public consultation event after the presentation of the main project activities and main findings from the ESIA, attending stakeholders can raise their comments, questions, suggestions and any concern about the project. After the public hearing and "no objection" by KfW Development Bank, a final version of ESIA and related documents (ESMP, ESAP, LRP) should be disclosed.

At least one public meeting with physical presence will be organized on this ESIA.

AD ESM / PIU in cooperation with the officials of the affected municipality will define the date for public consultation. All stakeholders will be informed via public announcement in media on the time of the public consultation, with the following set of information:

- purpose of the public consultation
- exact time and date for the event
- availability of the disclosed draft documents for comments and
- possibility for submitting comments on the prepared documents by filling in the form for submitting comments and suggestions on the ESIA to the person responsible from the PIU.

The public disclosure package for the construction project will contain the following parts:

- This non-technical summary (NTS) as a short account of the project providing a brief description of the project's main characteristics without technical data and information, expected risks and impacts identified, and proposed preventive and mitigation measures and monitoring activities.
- The results of the prepared Environmental and Social Impact Assessment (ESIA) Study with the SEP shall be presented within a concise study. ESIA is focused on the site-specific impacts and risk assessment and proposed respective mitigation measures.
- The project Grievance Redress Mechanism (GRM) to express concerns or comments they have about the project and find optimal ways to resolve disputes.
- The Livelihood Restoration Plan for project-affected people within the project sites. In fact, the land users or the herders who pasture their cattle within the borders of proposed project locations for PVPP Bitola 2 and PVPP Bitola 3 are identified in this plan. Livelihood Restoration Plan will provide an opportunity for them to prevent and mitigate potential adverse impacts.