



Project “Blue 1”

Environmental and Social Impact Assessment (ESIA)

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TABLE OF CONTENTS

1. INTRODUCTION	17
2. LEGAL AND REGULATORY FRAMEWORK.....	18
2.1. Albanian National Legislation for Environmental Impact Assessment	18
2.1.1. Environmental Approval Procedure	19
2.1.2. Biodiversity and Protected Areas Protection Framework	20
2.1.3. Protection of the Physical Structure of the Environment	22
2.1.4. Health and safety	28
2.1.5. Other National Legislation relevant to this Project	29
2.1.6. International Conventions and Agreements	30
2.2. International Best Practice Standards and Guidelines	34
2.2.1. The World Bank Environmental and Social Framework.....	34
2.2.2. IFC Performance Standards.....	35
2.2.3. IFC Stakeholder Engagement Guidelines for Social and Environmental Issues	36
2.2.4. WHO Guidelines	36
2.2.5. International Union for Conservation of Nature	36
3. PROJECT DESCRIPTION	37
3.1. Location	37
3.2. General Project Description.....	37
3.3. Description of Proposed Works.....	38
3.4. Technical Overview	39
3.5. Technology Description	39
3.5.1. Photovoltaic Panels	40
3.5.2. Inverter Units	40
3.5.3. Tracking Unit.....	41
3.5.4. Overhead Transmission Line (OHL).....	41
3.5.5. Access Roads.....	41
3.5.6. Road layers evaluation method	43
3.5.7. Culverts.....	43
3.6. Development Activities and Project Implementation Period.....	44
3.6.1. Mobilization/Pre-construction phase.....	44
3.6.2. Construction Activities	45
3.6.3. Operations and Maintenance	48
3.7. Decommissioning and Completion	49
4. ESIA METHODOLOGY	51
5. BIODIVERSITY BASELINE.....	53
5.1. Habitats and Flora	53
5.1.1. Habitats.....	53
5.1.2. Vegetation and Flora	62
5.1.3. Threatened plant species	63

5.1.4.	Invasive Alien Species of Flora (IAS)	67
5.2.	Fauna	68
5.3.	Aquatic Ecology	77
5.3.1.	Habitat's characterization	78
5.3.2.	The aquatic plants	79
5.3.3.	The macroinvertebrate species	80
5.3.4.	Coastal and lagoon and communication channels fishes	82
5.3.5.	The disturbance and impacts caused by the spread of alien species	84
5.3.6.	Continental water fish species	84
5.4.	Avifauna	87
5.4.1.	Relative importance of the PDA for breeding birds	88
5.4.2.	Relative importance of the PDA for migratory birds	88
5.4.2.1.	Buffer zone of Blue 1	88
5.4.3.	Relative importance of the buffer zone of Blue 1 for breeding birds	89
5.4.4.	Relative importance of the area of project influence for migratory and wintering birds	89
5.4.5.	Transmission Line Routes	89
5.4.5.1.	Relative importance of the transmission line routes for breeding birds	89
5.4.5.2.	Relative importance of the transmission line route for migratory birds	90
5.4.6.	Bird species of conservation concern	90
5.4.7.	Key / Focus Species relevant to Project	102
5.5.	Protected Areas	103
5.5.1.	The landscape and natural heritage in Divjaka-Karavasta National Park	104
5.5.2.	Pishë-Poros Protected Area	106
5.5.3.	Divjaka Oasis Dunes (Natural Monument)	107
5.5.4.	Landscape Protected Area of Vjose-Narta	107
5.6.	Summary of the Critical Habitat Assessment	108
5.6.1.	Implications and next steps	108
6.	BASELINE INFORMATION ON PHYSICAL ENVIRONMENT	110
6.1.	Climate and Meteorology	110
6.2.	Air Quality	113
6.3.	Noise in the Project area	113
6.4.	Surface Waters	113
6.5.	Groundwaters	116
6.6.	Topography	116
6.7.	Geology	119
6.8.	Hydrographic network	120
6.8.1.	River Seman	120
6.8.2.	Drainage network in project areas	122
6.8.3.	Flood Risk	123
6.8.3.1.	Flood Risk from events related to Possible Sea Level Rise	126
6.8.4.	Floods	126

6.8.4.1.	Flooding from hydropower nonfunction	130
6.9.	Soil	130
6.9.1.	General Characterization.....	131
7.	SOCIO-ECONOMIC BASELINE	133
7.1.	The Project Development Area	133
7.2.	Methodology of socio-economic baseline	133
7.3.	National, Regional and Local Development Plans	135
7.4.	Local Administration and Population	136
7.5.	Livelihood and Local Economy.....	137
7.6.	Health Profile	139
7.7.	Infrastructure and Public Services.....	139
7.7.1.	Water Supply	141
7.7.2.	Sewage System in Topojë AU.....	142
7.7.3.	Roads and transport	143
7.7.4.	Energy supply	144
7.7.5.	Irrigation System.....	145
7.7.6.	The drainage.....	146
7.7.7.	Education.....	146
7.8.	Vulnerable groups and social care support	148
7.8.1.	Social Care Support	149
7.8.2.	Gender Analysis and Security & Crime	150
7.9.	Land Use, land tenure and Ecosystem Services.....	151
7.9.1.	Land use and landscape	151
7.9.2.	Land Tenure	151
7.9.3.	Ecosystem Services	153
7.9.4.	Projects being developed in the area	157
7.10.	Cultural Heritage.....	159
8.	IDENTIFICATION AND ASSESSMENT OF NEGATIVE ENVIRONMENTAL IMPACTS OF THE PROJECT	162
8.1.	Impact Assessment Methodology	163
8.1.1.	Introduction (Area of Influence)	163
8.1.2.	Impact Assessment Methodology.....	164
8.1.3.	Identification and Characterization of Impacts	164
8.1.4.	Evaluation of impacts	165
8.1.5.	Mitigation Potential and Residual Impacts	167
8.1.6.	Assessing the significance of impacts	168
8.1.7.	Cumulative Impacts	169
8.2.	Impact on physical environmental components	169
8.2.1.	Impacts on Air Quality	169
8.2.1.1.	Potential impacts during construction phase.....	170
8.2.1.2.	Potential impacts during operation phase	173

8.2.1.3.	Potential impacts during decommissioning phase	173
8.2.1.4.	Cumulative impact	173
8.2.2.	Climate Change Resilience and Adaption	173
8.2.2.1.	Potential impacts during construction phase	174
8.2.2.2.	Potential impact during Operation phase	176
8.2.2.3.	Potential impacts during decommissioning phase	178
8.2.3.	Potential impacts from Climate Change Adoption during Operation phase	178
8.2.3.1.	Cumulative impact	180
8.2.4.	Noise Impacts	180
8.2.4.1.	Potential impacts during construction phase	182
8.2.4.2.	Potential impacts during operation phase	184
8.2.4.3.	Potential impacts during decommissioning phase	185
8.2.4.4.	Cumulative impact	185
8.2.5.	Landscape Impact	185
8.2.5.1.	Potential impacts during construction phase	185
8.2.5.2.	Potential impacts during operation phase	187
8.2.5.3.	Potential impacts during decommissioning phase	189
8.2.5.4.	Cumulative Impacts	189
8.2.6.	Impacts on Geology and Soil.....	190
8.2.6.1.	Potential impacts during construction phase	190
8.2.6.2.	Potential impacts during operation phase	192
8.2.6.3.	Potential impacts during decommissioning phase	192
8.2.6.4.	Cumulative impacts	193
8.2.7.	Impacts on Water Resources	193
8.2.7.1.	Potential impacts during construction phase	193
8.2.7.2.	Potential impacts during operation phase	198
8.2.7.3.	Potential impacts during decommissioning phase	201
8.2.7.4.	Cumulative Impact	201
8.2.8.	Impacts from Wastes	201
8.2.8.1.	Potential impacts during operation phase	211
8.2.8.2.	Potential impacts during decommissioning phase	212
8.2.8.3.	Cumulative Impact	213
8.3.	Impacts on Local Ecology/ Biological components	213
8.3.1.	Impact Assessment Methodology.....	213
8.3.2.	Impact assessment on Terrestrial Habitats	216
8.3.2.1.	Potential impacts during construction phase	217
8.3.2.2.	Potential impacts during operation phase	221
8.3.2.3.	Potential impacts during decommissioning phase	221
8.3.2.4.	Cumulative impacts	221
8.3.3.	Impacts on Flora	221

8.3.3.1.	Important is to be analysed are the impacts of the main invasive species, which were observed during the field surveys. Potential impacts during construction phase.....	222
8.3.3.2.	Potential impacts during operation phase	223
8.3.3.3.	Potential impacts during decommissioning phase	224
8.3.3.4.	Cumulative impacts	224
8.3.4.	Impacts on Fauna and Terrestrial Ecology.....	224
8.3.4.1.	Pre-construction and Construction Phase.....	224
8.3.4.2.	Potential impacts during operation phase	227
8.3.4.3.	Potential impacts during decommissioning phase	228
8.3.4.4.	Cumulative impacts	228
8.3.5.	Impact Assessment on Aquatic Habitats and Species	228
8.3.5.1.	Potential impacts during construction phase.....	229
8.3.5.2.	Potential impacts during operation phase	231
8.3.5.3.	Potential impacts during decommissioning phase	232
8.3.5.4.	Cumulative impacts	232
8.3.6.	Impacts on Avifauna	233
8.3.6.1.	Potential impacts during construction phase.....	233
8.3.6.2.	Potential impacts during operation phase	235
8.3.6.3.	Potential impacts during decommissioning phase	238
8.3.6.4.	Cumulative impacts	238
8.3.7.	Impacts on Economy and Employment.....	239
8.3.7.1.	Potential impacts during pre-construction and construction phase.....	239
8.3.7.2.	Potential impacts during operation phase	241
8.3.7.3.	Potential impacts during decommissioning phase	243
8.3.7.4.	Cumulative Impacts	244
8.3.8.	Impacts on Land Use and Livelihood	244
8.3.8.1.	Potential impacts during preconstruction and construction phase	244
8.3.8.2.	Potential impacts during operation phase	247
8.3.8.3.	Potential Impacts during Decommissioning	249
8.3.8.4.	Cumulative impacts	249
8.3.9.	Impacts on Transport and Traffic.....	249
8.3.9.1.	Potential Impacts during Construction Phase	249
8.3.9.2.	Potential Impacts during Operation Phase.....	253
8.3.9.3.	Potential Impacts during Decommissioning Phase	253
8.3.9.4.	Cumulative Impacts	254
8.3.10.	Impacts on Health and Safety	254
8.3.10.1.	Potential impacts during construction phase.....	254
8.3.10.2.	Potential impacts during operation phase	257
8.3.10.3.	Potential impacts during decommissioning phase	260
8.3.10.4.	Cumulative impacts	260
8.3.11.	Impacts on Infrastructure and Community Services.....	260

8.3.11.1.	Potential impacts during construction phase	260
8.3.11.2.	Potential impacts during operation phase	262
8.3.11.3.	Potential impacts during decommissioning phase	263
8.3.11.4.	Cumulative Impacts	264
8.3.12.	Impacts on Landscape and Visual Amenities	264
8.3.12.1.	Potential impacts during construction phase	264
8.3.12.2.	Potential impacts during operation phase	266
8.3.12.3.	Potential impacts during decommissioning phase	267
8.3.12.4.	Cumulative Impacts	268
8.4.	Impacts on Cultural Heritage	268
8.4.1.	Potential impacts during construction phase	268
8.4.1.1.	Potential impacts during operation phase	269
8.4.1.2.	Potential impacts during decommissioning phase	270
8.4.1.3.	Cumulative Impacts	270
9.	THE POSSIBILITY OF REHABILITATION OF THE IMPACTED ENVIRONMENT	271
9.1.	Engineering works	271
9.2.	Biological restoration works	271
10.	MEASURES TO MITIGATE ENVIRONMENTAL AND SOCIAL IMPACTS	272
10.1.	Mitigation Measures During the Construction Phase	272
10.1.1.	Waste Management	272
10.1.1.1.	Usage and removal of hazardous materials	273
10.1.2.	Air Emissions Management	273
10.1.3.	Water Emissions Management	274
10.1.4.	Mitigation measures for land impacts	275
10.1.5.	Noise Management	275
10.1.6.	Protection of Flora and Fauna	275
10.1.7.	Possible Incidents and Emergency Procedures	279
10.1.8.	Employment and Economy	281
10.2.	Mitigation Measures During the Operation Phase	281
10.2.1.	Waste Management	282
10.2.1.1.	Solid Waste Management	282
10.2.1.2.	Electric Waste Management, Damaged Photovoltaic Panels and Underground Connecting Infrastructure	282
10.2.2.	Water Emissions Management	283
10.2.3.	Mitigation measures for impacts on geology and soil	283
10.2.4.	Noise management	284
10.2.5.	Mitigation Measures for Flora and Fauna	284
10.2.6.	Socio-Economic Impact	284
11.	POSSIBLE IMPACTS ON THE CROSS-BORDER ENVIRONMENT	285
12.	ENVIRONMENTAL AND SOCIAL MONITORING PLAN	286
12.1.	Environmental Monitoring parameters and monitoring methodology	286

12.2.	Social economic monitoring parameters and monitoring methodology.....	290
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List of Figures

Figure 1 EIA procedure and timelines pursuant to Albanian legislation.....	20
Figure 2 Project region – as a higher radiation area in Albania	37
Figure 3 Project location.....	38
Figure 4 Basic Module Details.....	40
Figure 5 Access roads.....	42
Figure 6 Habitats' Map	55
Figure 7 Salt meadows and marsh of <i>Juncetalia maritime</i>	56
Figure 8. 1310 Mostly salt marshes with <i>Salicornia</i>	56
Figure 9. Reedbeds vegetation / Drainage channels vegetation	57
Figure 10 Coastal Coniferous Forest of Aleppo and stone pines.....	58
Figure 11 Wind break belt of <i>Eucaliptus globules</i>	59
Figure 12 Mixed mosaic agricultural land.....	61
Figure 13 Ruderal vegetation	62
Figure 14 Biological spectrum	63
Figure 15 Forest Fund Map.....	63
Figure 16 Plant Cover Picture	68
Figure 17 Aquatic ecology survey points (B1-Blue 1; and TL-Transmitting line)	78
Figure 18 The most dominant Gastropoda species	81
Figure 19 The sea hare (<i>Alpysiadepilans</i> Gmelin, 1791).	82
Figure 20 The most dominant Bivalvia species.....	82
Figure 21 Commercially important species caught in Blue lagoon area/Darezeza and coastal water (a) Eel (<i>Anguilla anguilla</i>); (b) Gilthead seabream (<i>Sparus aurata</i>); (c) Sand smelt (<i>Atherinaboyer</i>); (d) Mediterranean killifish (<i>Aphanius fasciatus</i>); (e) Gudgen (<i>Gobiussp.</i>); (f) Common sole (<i>Solea vulgaris</i>); (g) Flathead grey mullet (<i>Mugil cephalus</i>); (h) European sea bass (<i>Dicentrarchuslabrax</i>); (i) Karamote prawn (<i>Melicerthuskerathurus</i>);	83
Figure 22 Map of Protected Areas	104
Figure 23 Map of zoning of Divjaka-Karavasta National Park.....	106
Figure 24 Natural Monuments Map.....	107
Figure 25 Average monthly temperature in the project area.....	111
Figure 26 Average monthly precipitation in the project area.....	112
Figure 27 Predominant wind direction in the project area.....	112
Figure 28 Hydrographic Map.....	114
Figure 29 View of Hoxhara Pumping Station in the west of the project	115
Figure 30 The drainage canal on the western boundary of the property	115
Figure 31 Topographic map	117
Figure 32 The highest Dunes segment (over 4 m) along the Municipality of Fier coastline (Co-PLAN, 2016).....	118

Figure 33 Geological Map of the Area.....	120
Figure 34 Hydrographic map of the Seman River catchment area	121
Figure 35 View of the main drainage channels and embankments	122
Figure 36 Existing Blue 1 drainage channel network	123
Figure 37 Flood plan in the rivers: Shkumbin and Seman	124
Figure 38 Embankments erected on the Seman River	125
Figure 39 Digital Terrain Model (DTM)	126
Figure 40 Modelling results Water Depth with return period 50 years (flood plan)	127
Figure 41 Modelling Water Depth with return period 50 years Blue 1	128
Figure 42 Modelling results Water Velocity with a return period of 50 years Blue 1	128
Figure 43 Modelling results Water Depth with return period of 100 years (flood plan)	129
Figure 44 Modelling results Water Depth with return period 100 years Blue 1	129
Figure 45 Modelling results Water velocity with return period 100 years Blue 1	130
Figure 46 The saline soil on the Project area.....	131
Figure 47 The Fluvisol planted with alfalfa (left) and mixed soil lightly salted (right)	131
Figure 48 Project Location with Buffer Area.....	133
Figure 49 Administrative Map of Project Area.....	135
Figure 50 Religion composition of Topojë AU	137
Figure 51 The presence of a trash container and sheep in the main road	140
Figure 52 Persons with disabilities in Topojë AU	148
Figure 53 Topojë AU Female, Male Population	150
Figure 54 Female and male populations by age category in Topojë AU	150
Figure 55 View from Seman Beach.....	155
Figure 56 Land use map.....	157
Figure 57 Other projects being developed near the Project area	159
Figure 58 The Area Cultural and Historical Map	160
Figure 59 Production (in the life cycle) of an equivalent amount of CO2 per KWh generated for different energy production methods.	176
Figure 60 Access Roads	183
Figure 61 Manual dry cleaning of solar panels.....	199
Figure 62 Robotic cleaning.....	200
Figure 63 Mechanical cleaning.....	200
Figure 64 Typical sketch of a septic tank	209
Figure 65 Examples of bird markers	237
Figure 66 Transport route and distance from the Port of Durrës to the site.....	250
Figure 67 Transport route to the construction site	251

List of Tables

Table 1 Albanian legislation for an EIA	18
Table 3 Legislation on the protection of cultural heritage.....	22

Table 4 Legislation regarding the protection of the physical environment	23
Table 5 Legislation for health and safety.....	29
Table 6 Other National Legislation relevant to this Project	29
Table 7 International Conventions and agreements signed/ratified Albania	30
Table 9. Estimated equipment and durations below, Construction Equipment.....	46
Table 10. Delivery Vehicles Duration	46
Table 11. List of Habitat classified per EUNIS and Annex I of Habitat Directive	54
Table 12. List and status of the threatened species.....	64
Table 13. Mammal species occurring in the wider Blue 1 PV study area	68
Table 14. Amphibian and reptile species occurring in the wider study area of Blue 1 PV area and OHL ..	72
Table 15. List Terrestrial fauna identified as Priority Biodiversity Features inside the study area.....	75
Table 16: Dominant aquatic species and their conservation status of identified species following National Conservation Status (Albanian Red List of 2013) and International Conservation Status (IUCN)	79
Table 17 The list of identified mollusk species in the project area of influence	80
Table 18: Coastal and Lagoon fish species and their conservation status	85
Table 19. Species of Conservation Concern and their ecological characteristics (BirdLife International 2021).....	90
Table 20: Bird species of Conservation Concern	102
Table 21. Average monthly temperature	110
Table 22. Average monthly precipitation	111
Table 23. Maximum design inflows plumber	127
Table 24. The projections of populations in Topojë AU	136
Table 25. Demographic profile of villages in project area in Topojë AU	137
Table 26. Land surface benefited person in villages of project area - Topojë AU	138
Table 27 Land infrastructure and use in the villages in project area - Topojë AU	138
Table 28 The figures of mortality rate attributed to chronic diseases for Fier County in 2019.....	139
Table 29 Infrastructure utilities in Topojë AU	140
Table 30 Water supply system Topojë AU	141
Table 31 Water Production Topojë AU.....	141
Table 32 Sewage system Topojë AU	142
Table 33 Road network Topojë AU	143
Table 34 Energy supply Topojë AU.....	144
Table 35 Irrigation system data Topojë AU	145
Table 36 School facilities.....	147
Table 37 The number of students in the primary school Lili Stavre, Topojë village.....	147
Table 38 Social infrastructure Topojë AU.....	148
Table 39 The number of households with social support in villages of project area, Topojë AU	149
Table 40 Land structure Topojë AU	152
Table 41 Land cultivation Topojë AU	152
Table 42 Land quantity Topojë AU	153
Table 43 Natural Resources of Topojë AU.....	154

Table 44. Ecosystem Services	155
Table 45 Projects present or being developed in the area and interaction with Blue 1	157
Table 46 The identified environmental interactions that are likely to bring about significant impacts.....	162
Table 47 Mitigation hierarchy	168
Table 48 Impact significance matrix	168
Table 49. Dust Nuisance Assessment Matrix.....	170
Table 50 Purchased Electricity: Country Grid Emissions Factors (IEA CO ₂ Statistics 2009).	177
Table 51 Avoided g CO ₂ /year for the operation of the project	177
Table 52. Estimation of project magnitude of impacts on climate change during the operation phase	178
Table 53. IFC Noise Level Guidelines.....	181
Table 54. Impact Assessment Methodology for Residential Receptors.....	181
Table 55. Potential Waste Streams and Classification Codes for the proposed project.....	202
Table 56. Assessment Criteria and impact Assessment Methodology for Habitats.....	213
Table 57 Assessment Criteria and impact Assessment Methodology for Biological Species	214
Table 58 Ecosystem services impact assessment.....	245
Table 59 Environmental and Social Monitoring Programme during construction phase	286
Table 60. Environmental and Social Monitoring Programme during operational phase	289
Table 61. Social Monitoring Programme during construction	290
Table 62 Social Monitoring Programme during operation.....	294

Abbreviations

ADB/ BAZH	Asian Development Bank
NEA	National Environmental Agency
ASIG	State Authority for Geospatial Information
EU	European Union
BNRN / IUCN	International Union for Conservation of Nature
CBD/ KDB	Convention on Biological Diversity
CR	Critically Endangered
RDCH	Regional Directory of Cultural Heritage
EC/ KE	European Commission
EEC	European Economic Community
EN	Endangered species
EMF	Electromagnetic Field
PV	Photovoltaic
GHG	Greenhouse gases
GIS/ SGJI	Geographic Information System
HDAII	Habitats Directive Annex II
HDAIV	Habitats Directive Annex 4
HDAV	Habitats Directive Annex 5
IFC-KNF	International Finance Corporation
IGEWE	Institute of Geosciences, Energy, Water and Environment
ILO/ ONP	International Labor Organization
ICM	Institute of Cultural Monuments
IPED/CSP	Concentrated Solar Power Plant
ISO/ ONS	International Organization for Standardization
SE	South-east
SW	South-west
KLMS/ EFS	Environmental and Social Framework

CH	Chapter
KTNSRR / CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
LC	Lower concern
MIE	Ministry of Infrastructure and Energy
MRSHAEU / AEW	Agreement on the Conservation of African-Eurasian Migratory Waterbirds
MTE	Ministry of Tourism and Environment
MW	Mega Vat
NT	Near-threatened
OBSh/ WHO	World Health Organisation
NGO	Non-Governmental Organizations
UN	United Nations
SEP	Stakeholders Engagement Plan
SEP	Main Actors Engagement Plan
PIP/ I&AP	Affected Persons
EMMP	Environmental Management & Monitoring Plan
ESMP	Environmental and Social Management Plan
GIIP	Good International Industry Practice
IAP	Interested and Affected People
UNDP	United Nations Development Programme
SAR	Sodium Absorption Ratio
SBNK/ ICCP	International Climate Change Summit
TAP	Trans Adriatic Pipeline - TAP
UNFCCC/ KKKBNK	UN Framework Convention on Climate Change
UNMN/ IUCN	International Union for Conservation of Nature
DCM	Decision of the Council of Ministers
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment

NW	North-west
VU	Vulnerable
WF	Sediment Quantity in the Air
WT	Sediment Quantity
PA	Protected Areas
PIA	Project Impact Area

1. INTRODUCTION

According to the Albanian National Energy Strategy¹, Albania aims to "Increase the security of energy supply and minimize environmental impacts at an affordable cost for Albanian citizens." In certain areas, Albania has an average of 360 days of solar radiation and therefore the production of energy from solar Power Plants is an important potential electricity source that will help diversify energy resources by reducing the dependency on water resources and imported electricity.

Blue 1 Solar Power Plant project (the Project) is one of the most important investments in renewable energy in Albania and will be implemented by the temporary joint venture of companies Blessed Investment sh.p.k. and Matrix Konstruksion sh.p.k. This Project is in line with the overall objectives of Albania's national energy strategy and meanwhile, it supports the Albanian Strategy to meet its growing energy needs and reduce reliance on energy imports by taking advantage of the optimal features of Albania for the production of energy from Solar Plants.

Blessed Investment sh.p.k registered in NBC with NUIS L71423028S is an investment company with a portfolio that includes companies operating in various fields and sectors such as Economic, Engineering and Legal Consulting, Recruitment and Contracting Services in IT, Tourism, Marine, Logistics, Real Estate etc.

Matrix Konstruksion sh.p.k is one of the largest construction and development companies in Albania. The company was established in October 1995 in Tirana with NUIS J91306009Q. The mission of Matrix Construction is to design and develop high-quality residential, socio-cultural, and commercial buildings, and civil infrastructure projects, as well as to develop and manage tourist villages, etc. Matrix Construction, based on its experience in the field of development and construction, where it is undoubtedly one of the most reliable and respected companies in Albania, constitutes a huge guarantee for this investment.

The project is planned to be built in the southwestern part of Albania, in one of the areas with the highest level of solar radiation in the country. The Solar Power Plant will be constructed in Topojë Administrative Unit (AU), Fier Municipality. The project is named "SPV Blue 1" and covers an area of 87.05 hectares with an expected capacity of 50 MW (AC). "Blue 1" is considered one of the most important projects for the future of renewable energy in Albania.

The "Blue 1" project is located in the southwestern lowland, in a territory where almost no agricultural activity takes place due to very low fertility and very high salt concentration.

According to Annex 2 of Law No. 10440/2011, "On Environmental Impact Assessment" as amended, the Blue 1 Project falls under preliminary EIA. This was also confirmed by the letter of the Ministry of Tourism and Environment (MoTE) ref. AN211120200004 and the approval of the EIA report by MoTE and the National Environmental Agency (NEA).

The following document presents an Addendum Environmental and Social Impact Assessment study, which is prepared as a complementary ESIA report based on a preliminary EIA study report prepared earlier for the project "Blue 1" Photovoltaic Park to obtain an EIA approval in 2021 from the Albanian authorities.

This ESIA report has considered the additional baseline studies, impact assessment on biodiversity and socio-economic aspects, traffic and road assessment, etc., and a Critical Habitat Assessment Study conducted for this project.

¹ <https://qbz.gov.al/> Albanian National Energy Strategy 2018 -2030

2. LEGAL AND REGULATORY FRAMEWORK

2.1. Albanian National Legislation for Environmental Impact Assessment

Albania has specific legislation that addresses the need for Environmental Impact Assessment. The 2002 Law on Environmental Protection sets out several requirements, including the requirement to conduct an EIA and obtain an environmental permit prior to the commencement of the project. This law provides for the monitoring requirement to assist in identifying project impacts during construction, operation and rehabilitation, as well as requirements during the project closure phase. The 2002 Law was replaced by law no. 10431, dated 09.06.2011 "On environmental protection" as amended, which aims to reflect the directives of the European Union and best practices related to environmental management. The 2011 Law on Environmental Protection (as amended) sets out the environmental protection framework, institutional framework and competencies, the principles of environmental impact assessment and environmental permits. The law defines them as activities that affect the environment "any economic and social activity that uses the environment or a part of it, or that discharges materials and energy by changing its characteristics."

This EIA is based on the legal requirements of Law no. 10440/2011, "On Environmental Impact Assessment" as amended, the project "Blue 1" is classified for preliminary EIA as follows:

Project Components	Legal Reference	EIA Study Classification
Photovoltaic Park "Blue 1"	Annex II/ 3. Power Industry. a) Industrial Installation for generating power, steam or hot water (projects not included in Annex I)	It is subject to the preliminary environmental impact assessment procedure.

The legal and procedural framework for conducting an EIA is provided in Table 1.

Table 1 Albanian legislation for an EIA

Legislation	Overview	Connection to the project
Law No. 10431 (09.06.2011) as amended	"On Environmental Protection" (as amended) - This law sets out the legal framework for environmental protection, the institutional framework and competencies, the principles of environmental impact assessment and environmental permits. The law is based on European Union principles and best environmental management practices.	The EIA must be performed, and the environmental permit obtained prior to the commencement of a Project. The law sets out monitoring requirements to identify project impacts during construction and operation phase.
Law No. 10440 (07.07.2011) as amended	"On Environmental Impact Assessment" (as amended) sets out the principles of an EIA, defines the categories of projects with an environmental impact and sets out the responsibilities and rights of institutions and the public in the EIA procedure. The law defines the competencies of the National Environment Agency (NEA) and the Ministry of Tourism and Environment (MTE) regarding the procedure, review of the EIA report and its final approval.	The EIA for the Project shall be submitted to MTE and NEA to be examined, reviewed and approved.
Law No. 10448 (14.07.2011)	"On environmental permits" (as amended) - sets out the terms and conditions for the issuance of environmental permits to industrial operators and sets	The environmental declaration applies to the construction of the

Legislation	Overview	Connection to the project
as amended	out measures to prevent and control the pollutants discharge and to safely manage chemicals. In general, the subject of the regulatory framework is: to prevent damage to the environment; to ensure compliance with health standards; and to offer protection from any remaining liability.	photovoltaic park (regulated by law 10440/2011)
DCM 686 (29.07.2015) as amended	"On the rules, responsibilities, timelines for the EIA procedure and the transfer procedure of the decision for the environmental declaration", as amended - The Act sets out specific and detailed rules for the procedure, framework and the structure of the EIA report and appendices, the timeline of the procedure, the request for approval, the final decision and impact monitoring and reporting during project execution.	The EIA report has been prepared in compliance with this DCM.
DCM No. 247 (30.04.2014)	"On the determination of the rules and requirements of the procedures for information and involvement of the public in environmental decision making" - The Act sets out specific requirements for stakeholder consultation, focusing on consultation with local communities. It also provides details on the procedure to be followed, the timeline and the media coverage.	Stakeholders shall be engaged/consulted during the EIA process; a Stakeholder Engagement Plan (SEP) has been developed and implemented by the developer and consultant.

2.1.1. Environmental Approval Procedure

All projects related to potential environmental impacts shall carry out an EIA prior to the commencement of the implementation. The EIA report and other necessary documents shall be submitted to MTE which shall transfer the project files to the NEA in order to be reviewed. The project shall be approved by the Decision/Environmental Declaration of NEA and MTE. The EIA procedure has the timelines for carrying out the environmental impact assessment (EIA) procedure and the transfer procedure of the amended decision and environmental declaration.

The EIA procedure graph is illustrated in the figure below and is based on the legal requirements of law no. 10440/2011, "On environmental impact assessment" as amended, Annex II Paragraph 3. Power industry in relation to "Industrial installations for generating power, steam or hot water (projects not included in Annex I)."

Pursuant to Law No. 10440/2011 (Article 11), at the end of the EIA process, the NEA shall decide whether to issue an Environmental Declaration or whether further studies are required (i.e. Advanced EIA). MTE is set out to issue an Environmental Declaration at the end of the EIA process. Therefore, an application for an Environmental Declaration shall be submitted to MTE. The documents that are required to be submitted to MTE together with the application for the Environmental Declaration consist of:

- The environmental interaction report;
- Full EIA report;
- Non-technical overview;
- Technical report summarizing the project;
- A summary of the consultation process with the public and other stakeholders that was conducted during the EIA process;
- A copy of the service fee payment, as set out in the relevant legislation.

National, regional and municipal institutions that play a role during the EIA process are:

- The Ministry of Tourism and Environment;
- The National Environment Agency;

- The Regional Environmental Directorate;
- The National Agency of Protected Areas;
- The Regional Administration of Protected Areas;
- The Municipality of Fier.

In addition to legislation specifically related to the need for an EIA, there are national policies, laws and regulations applicable to the proposed Project and its environmental and social aspects. Furthermore, Albania has developed environmental standards mainly based on European Commission directives. Existing standards include: biodiversity protection; cultural heritage, air emissions; noise levels, water quality and discharge and waste management.

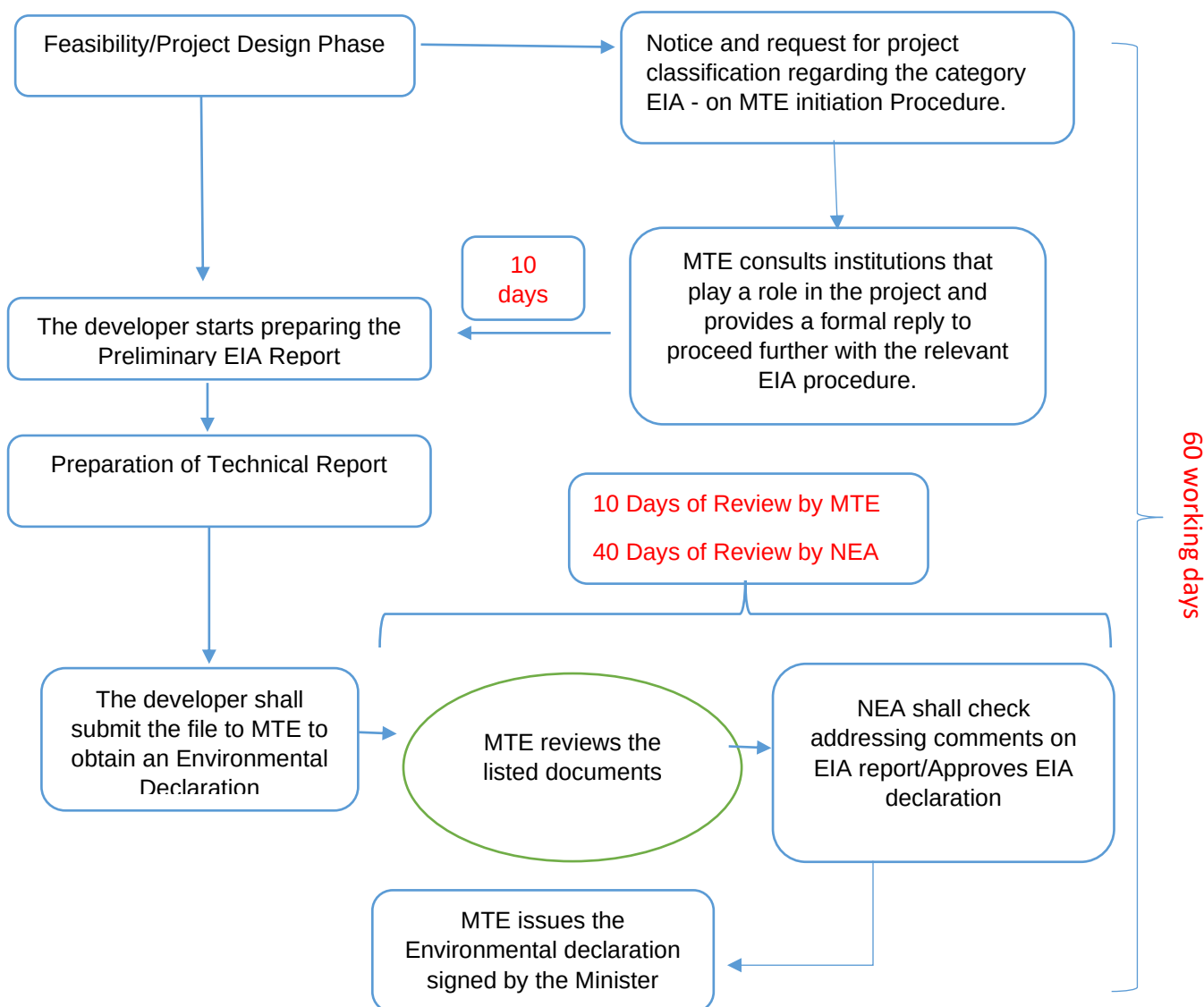


Figure 1 EIA procedure and timelines pursuant to Albanian legislation

2.1.2. Biodiversity and Protected Areas Protection Framework

MTE is responsible for the conservation and management of natural resources in Albania, including the protection of the environment, forest resources, biodiversity, pastures and watercourses. Biodiversity in Albania is protected by special legislation and practical measures, as set out in the system of Protected Areas (PA). The Albanian legislation on biodiversity protection and the importance of the project are highlighted in the table below.

Table 2 Albanian Legislation on Biodiversity Related to the Project

Legislation	Overview	Relevance to the Project
Biodiversity		
Law no. 9587 (20.07.2006)	"Law on Biodiversity Protection" (as amended) - This law sets out requirements for the conservation and protection of biological diversity, including protected areas, habitats and sensitive species. The law requires a biological assessment as part of the environmental assessment and the collection of all relevant data for the decision-making process.	The basic biodiversity characterization of the Project Area in EIA includes the description of protected areas, habitats and sensitive species based on the desk study of the available literature, supplemented by data collected as part of the basic on-site studies. Impact assessment takes into account potential impacts on biodiversity and proposes mitigation measures for biodiversity protection.
Protected Areas		
Law no. 81/2017, dated 04.07.2017	"On Protected Areas" - This law regulates all issues related to Protected Areas in Albania. It defines the categories of protected areas in Albania, management rules and roles in the decision-making process. It requires compliance with specific rules when entering, working and performing any other activity near and/or within protected areas.	<p>The area where the photovoltaic park will be built is not included in the list of Protected Areas or Areas with Special Status.</p> <p>It is not part of the Natural or Cultural Monuments protected by law.</p> <p>Divjaka-Karavasta National Park is located in the north of the project area, at a distance of 7.8 km. The protected area Pisha Poro is located at a distance of 5.5 km from the Natural Monument Dunat Ranore, in the south at a distance of 5.13 km, the Natural Monument Kurrora is located in the north-east at a distance of 11.4 km.</p>
Order No. 1280, dated 20.11.2013	"On the approval of the red list of wild flora and fauna" (as amended) - This order determines the conservation status of flora and fauna species in Albania.	The study of species of conservation interest has been carried out based on the literature and recent conducted studies. Further studies will be conducted within the scope of the EIA process.

Law no. 81/2017 "On Protected Areas" defines the various categories of Protected Areas in Albania and the management method. Albanian Law no. 81/2017 on protected areas (PA) defines 7 categories of protected areas, each with different degrees of protection, which were found to be present in the field of study:

- Strict nature reserve/scientific reserve (Category I);
- National park (Category II);
- Natural monument (Category III);
- Municipal Natural Park (Category IV);
- Protected landscape (Category V);
- Managed Nature Reserve/natural park (Category VI);
- Protected areas of international interest (no specific categories of protection).

The category definition does not necessarily define the protection given to a protected area. Additional information on protected areas in the Study Area is provided in Chapter 6 Description of the Current State of the Environment.

The Albanian legislation on the protection of cultural heritage and the importance of the project are highlighted in the table below.

Table 3 Legislation on the protection of cultural heritage

Legislation	Overview	Connection to the Project
Cultural heritage		
Law no. 27/2018, dated 17.05.2018	"On cultural heritage and museums" - All issues related to cultural heritage in Albania are governed by this law." The law defines the procedures of preservation and random finds (archaeological objects or valuable objects for the cultural heritage which were discovered by chance) that will be used during the implementation of the Project.	Cultural heritage monuments near the project area have been identified in advance, based on data obtained from the literature and the portal of the State Authority for Geospatial Information (ASIG). Further studies will be conducted during the basic EIA.
Article 146 of the Law	It requests and obliges anyone who accidentally discovers or excavates objects of cultural heritage value during construction works, to immediately suspend work and inform the relevant local authorities within three days. Relevant local authorities consist of the local government office (Municipality), the Police Station and the Regional Directorate of Cultural Heritage (RDCH - DRTK). RDCH verifies the situation/findings and reports to the Institute of Cultural Monuments (IMC - IMK). These institutions are responsible for assessing the archaeological value of the objects that were found and determining whether work can continue or should be suspended until the performance of further studies.	The random finding procedure shall be developed and implemented in the project construction area and in case of a random find, the authorities shall be notified pursuant to the law. The local authority responsible for the preservation, restoration and management of cultural monuments is the RDCH, the subordinate institution of the Ministry of Culture. The regional directorate that applies for this project is the RDCH of Fier Region.
Article 5/64 and Article 31	It defines the preservation of intangible cultural heritage through measures that aim at the long-term preservation of such cultural assets.	To date the project has not identified intangible cultural assets.

2.1.3. Protection of the Physical Structure of the Environment

Albania has developed legislation for the protection of the physical environment, including guidelines, emission thresholds and limits. Legislation regarding water discharge, air and noise emissions, vehicles and equipment emissions, fuel quality, waste and waste water is summarized in the Table below.

Table 4 Legislation regarding the protection of the physical environment

Legislation	Overview	Relevance to the Project
Water		
Law no. 111/2012 as amended by Law No. 6/2018	<p>"On integrated management of water resources" as amended by Law no. 6/2018 "On some amendments and addenda to the law "On Integrated Management of Water Resources" based on the directive 2000/60/EC on the water framework. The scope of the law consists in: (i) the protection and improvement of the aquatic environment, of surface waters, be them temporary or permanent, of inland marine waters, of territorial waters, of exclusive economic zones, of continental shelf, of transboundary waters, of groundwater, as well as of their status; (ii) the protection of water resources from pollution, misuse and overconsumption beyond actual needs; This law provides for the definition of water bodies and imposes some protective measures and restrictions on use and requires the adoption of other by-laws. The law defines the shores of water resources, the restriction of certain harmful construction activities on the shores² and the protected water areas.</p>	<p>In order to protect water and aquatic ecosystems, it is necessary to take special protective measures, the protected areas are defined based on this law and other relevant laws. Protected Areas may include the following:</p> <ul style="list-style-type: none"> A) hygienic and sanitary areas for the protection of water resources, designated for the production of potable water; b) areas for fishing and shellfish aquaculture, pursuant to the fishing legislation; c) areas for thermal baths, for curative care and recreation; d) areas prone to eutrophication and areas at risk from nitrates and nitrites; e) areas targeted for the protection of plants or animals, as well as habitats, where the preservation or improvement of water status is an important element of their protection. The Minister responsible for the environment defines the Protected Areas upon the proposal of the Water Basin Council. <p>Mitigation measures for groundwater protection and surface water quality have been proposed.</p>
DCM No. 177 (31.03.2005)	<p>"On the permitted norms of liquid discharge and zoning criteria for receiving water environments" provides the permitted norms for river discharge into the environment, for the protected water resources.</p>	<p>All liquid discharges must comply with Albanian standards and regulations for quality, temperature and odour prior to being discharged into the environment. Project-related water discharge norms are regulated only according to discharge norms related to the construction of temporary camps. Some alternatives for the waste water will be considered within the scope of the EIA process. It should be noted that there are no set norms for small waste water discharge equipment and current norms consider only community discharge norms upon treatment in a separate plant. Currently,</p>

² "Coasts" are the lateral strips of land along seas, lakes, reservoirs, lagoons and ponds, as well as along the course of riverbeds and stream beds which, in terms of use, include at least two areas: i with a width of 5 m in the normal direction with the ground from the upper side of the natural bed on the steep shores and 20 m away from the line of the maximum level of the plots with probability of recurrence, once in 25 years, of water on the flat shores, used for public purposes with special provisions, ii. with a width of 100 m in the normal direction with the ground from the upper side of the natural bed on the steep shores and 200 m away from the line of the maximum level of the plots with a probability of recurrence once in 25 years of water on the flat shores, in which any developed activity is determined by the bodies of water resources administration or management.

Legislation	Overview	Relevance to the Project
		there are no specific norms for small agglomeration discharges (such as from camps with less than 200 workers). In the absence of such emission norms for the project, an international norm or regulation may apply, but this must be done by agreeing with the authorities through a clarification procedure for the installation and management of (potential) camps in the field.
DCM No. 379 (25.05.2016)	"On the adoption of the regulation ³ on the Quality of Potable Water" - The purpose of this regulation is to protect human health from the harmful effects of any pollution of water intended for human consumption by ensuring that it is healthy and clean. It regulates a series of issues related to potable water testing and protection areas around water wells or community groundwater deposition. The regulation defines three protected areas (buffer zones) from groundwater wells or places of water deposition in the ground. The immediate protection area varies from 15 to 100 m from the well shaft or tank. The exact distance is determined based on the assessment of geological formations by the hydro-geological expert. The second and third buffer areas are situated around the first, but for those areas the regulation does not define the criteria of distance, but limits activities that may affect water quality, such as, disposal or landfilling of waste, digging holes, etc.	The standard set by this regulation (the immediate protection area) is taken into consideration in the EIA and appropriate mitigation measures are proposed.
Air		
Law no. 162 (04.12.2014) that became effective on January 1st, 2018)	"On the protection of ambient air quality" fully transposes Directive 2008/50/EC on ambient air quality and cleaner air for Europe, as well as Directive 2004/107/EC concerning arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air. This law entered into force on January 1st, 2018, and provides the institutional framework, regulations, roles, fines to ensure compliance. The law stipulates that natural and legal persons, public or private, local or foreign persons, have the duty to keep the air clean and to protect it from pollution caused by the activities that	Mitigation measures were proposed in the EIA to limit the impact of project activities.

³ Based on Council Directive 98/83/EC dated November 3rd, 1998 on the quality of the water intended for human consumption) it is related to the quality of water intended for human consumption.

Legislation	Overview	Relevance to the Project
	they carry out in the territory of the Republic of Albania.	
Vehicle emissions		
Instruction No. 6527 (24.12.2004)	Ministry of Environment and Ministry of Transport "On the permissible values of the elements of air pollutants from the environment and noise emissions caused through road vehicles and methods to control them", as amended by Instruction No. 12, dated 15.06.2010 "On some amendments and additions to Instruction no. 6527, dated 24.12.2004 accompanied by the Manual of Vehicles Control.	The Certificate of technical compliance shall be issued by SGS Albania ⁴ and is mandatory for all vehicles registered in Albania (with Albanian license plates). The compliance with this instruction has been considered upon the development of EIA mitigation measures.
Transport, vehicle and equipment emissions		
Order of Minister of Transport and Infrastructure No. 149 (07.04.2014)	"On the approval of the rules on implementing the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations", fully aligned with the EU Regulation No. 748/2012 of 03.08.2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations;	Compliance with this order has been considered in the development of EIA mitigation measures.
Instruction No.6527 (24.12.2004)	"On allowed vehicle air emission, noise generation levels, and control methods "amended - This instruction includes requirements for annual vehicle inspections and allowed air emissions. All vehicles shall comply with these norms.	Heavy machinery, four-wheeled drive vehicles and pick-up trucks will be used for the construction of the Photovoltaic Park project of Sheq Marinas, Topojë, Fier. The Certificate of technical compliance is issued by SGS Albania, and it is mandatory for all vehicles registered in Albania (with Albanian licence plate). Compliance with this order is considered in the development of EIA mitigation measures.
DCM No.613 (07.09.2011)	"Approval of the technical rules for the assessment of the noise conformity for the equipment installed in open spaces or environment." It sets noise emission rates for certain equipment generating noise, such as; electricity generators, tractors, compressors, etc. The regulation lists the set thresholds.	Heavy machinery will be used for the construction of the Photovoltaic Park project of Sheq Marinas, Topojë, Fier. Compliance with this order has been considered in the development of EIA mitigation measures.

⁴ <https://www.automotivealbania.sgs.com/>

Legislation	Overview	Relevance to the Project
DCM No.10 (30.05.2015)	"On the type-approval of agricultural or forestry tractors, their trailers and interchangeable trailers, together with their systems, components and separate technical units" based on EU Directive 2003/37/EC dated 26.05.2003	Compliance with this instruction has been considered as mitigation and recommendation measures in the EIA report.
Noise		
Law no. 9774, dated 12.07.2007, amended by Law No. 39/2013	"On the assessment and administration of the environmental noise" – defines the requirements for environmental protection from noise, how to avoid and prevent, reduce and eliminate the harmful effects of exposure to them, including inconvenience from noise. This Law aims to protect human health and the environment from adverse effects caused by noise emissions and sets general rules, authorities, inspection etc.	Heavy machinery and trucks will be used during the construction of the Photovoltaic Park project of Sheq Marinas, Topojë, Fier. It is important for the EIA process, to operate with noise generating machinery during daytime hours ⁵ . Compliance with this law will be considered as a relevant document for suggesting mitigation and management measures within the scope of the EIA process.
DCM No. 587, dated 07.07.2010	"On monitoring and control of noise levels in urban and tourist areas" – sets the rules and regulations on the protection from noise generation and noise level administration in urban and tourist areas.	Compliance with this law will be considered as a relevant document for suggesting mitigation and management measures within the scope of the EIA process.
DCM No. 1063 (23.12.2015)	"On the Approval of the technical rules for the assessment of the noise conformity for the equipment installed in open spaces or environment" sets the noise release norms for certain equipment's generation noise such as electricity generators, tractors, compressors etc. The regulation lists set thresholds (mainly power capacity - kW)	Compliance with this order has been considered in the development of EIA mitigation measures. Application of these rules needs to be ensured from sub-contractor based on list of equipment and vehicles that will be employed for operations.
Instruction No. 6527/2004	The instruction regulates vehicle noise generation levels and control methods. This includes requirements for the annual vehicle inspections and to comply with predetermined norms. The compliance of these norms shall be verified with certification of control issued from SGS Albania ⁶ .	The compliance with this instruction has been considered upon the development of EIA mitigation measures. Application of these rules needs to be ensured from sub-contractors, based on the list of equipment and vehicles that will be employed for operations
Instruction No.8 (27.11.2007)	Ministry of Environment and Ministry of Health "On noise levels in different media", sets the numerical values of noise in specific zones and aims to ensure adequate noise exposure protection for human health.	Compliance with this order has been considered in the development of EIA mitigation measures.

⁵ IFC Environment, Health and Safety Instructions: Environmental Noise Management <https://www.ifc.org/wps/wcm/connect/4a4db1c5-ee97-43ba-99dd-8b120b22ea32/1-7%2BNoise.pdf?MOD=AJPERES&CVID=Is4XYBw>

⁶ <https://www.automotivealbania.sgs.com/index.php>

Legislation	Overview	Relevance to the Project
Instruction No.6527 (24.12.2004)	"On allowed vehicle air emission, noise generation levels, and control methods "amended - This instruction includes requirements for annual vehicle inspections and allowed air emissions. All vehicles shall comply with these norms.	Compliance with this order has been considered in the development of EIA mitigation measures.
Fuel Quality		
DCM No. 147 (21.03.2007)	"On the quality of petrol and diesel fuels."	Only fuel available in Albania that is in compliance with this decision will be used.
DCM No.781 (14.11.2012)	"On the quality of certain liquid fuels for thermal, civil, industrial and water transport use (sea, river and lake)."	Only fuel available in Albania that is in compliance with this decision will be used.
Waste		
Law No.10463 (22.09.2011) amended	"On the integrated waste management" (as amended) - aims to protect human health and the environment, and to ensure environmental sound management of waste through integrated management.	Both hazardous and non-hazardous wastes will be generated principally only during the construction of the Photovoltaic Park project of Sheq Marinas, Topojë, Fier. Waste management has been considered in the development of mitigation measures and will be addressed in the Environmental Management and Monitoring Plan (EMMP).
Law No.99 (18.02.2005) amended	"Albanian waste catalogue" (as amended) - which makes the classification of the waste, based on industry types, and the criteria to assess the hazardousness of the waste. The regulation codifies the waste types based on the European Waste Catalogue.	This Law has been considered in the classification of the wastes to be generated during the construction and operation of the Photovoltaic Park project.
DCM No. 229 (23.04.2014)	"On the approval of the rules for transferring the non-hazardous waste and the data to register in the transferring document" – The newly enforced regulation requires transferring the waste at licensed companies and ensuring final disposal in approved facilities. This act requires documenting the waste transfers and providing the final disposal certificate to the NEA. The regulation requires for all waste generating companies to be registered at NEA and obtain a personal waste generation number.	Non-hazardous wastes generated during the construction of the Project will be transferred and disposed of in accordance with this directive.
DCM No. 371 (11.06.2014)	"On the approval of the rules for transferring the hazardous waste and the data to register in the transferring document" – The newly enforced	Hazardous wastes will be considered within the scope of the EIA process. A personal waste generation number with

Legislation	Overview	Relevance to the Project
	regulation requires transferring the waste at the licensed company and ensuring final disposal in approved facilities. This act requires documenting the waste transfers and providing the final disposal certificate to the NEA. The regulation requires for all waste generating companies to be registered at NEA and obtain a personal waste generation number.	be registered to the NEA in compliance with Albanian legal requirements.
Waste water		
Law no. 9115/2003 (24.07.2003)	<p>"On the Treatment of polluted water" provides regulations that state the need for treatment of polluted water before it is discharged. Article 6 sets the obligations of physical and legal entities that discharge polluted waters. Physical and legal entities, the activity of which discharges polluted waters, are obligated to take measures to:</p> <p>a) continuously reduce the amount of used waters they discharge in the receiving environment; b) reduce the degree of pollution in discharged waters, especially the pollution caused by hazardous substances and waste; c) manage and treat polluted waters. To comply with these obligations, the physical and legal entities whose activities discharge polluted waters must design a program of technical, technological and organizational measures. This program is subject to control by the Environmental Inspectorate, the licensing authority and the local government structures.</p>	Compliance with this law has been considered in the development of mitigation measures of the EIA.

2.1.4. Health and safety

Law no. 10 237, dated 18.2.2010, "On occupational safety and health" guarantees safety and health protection through the prevention of occupational hazards, elimination of risk factors and accidents, information, counselling, balanced participation in accordance with the law. This law is under implementation of the following legal framework:

- Council Directive 89/391/EEC of 12 June 1989, "On the introduction of measures to encourage improvements in the safety and health of workers at work."
- European Council Directive 94/33/EC of 22 June 1994 "On the protection of young people at work", Article 6;
- European Council Directive 92/85/EEC "On the introduction of measures to encourage improvements in the safety and health at work of pregnant workers and workers who have recently given birth or are breastfeeding."

Albanian health and safety legislation and their importance for the project are highlighted in the table below.

Table 5 Legislation for health and safety

Legislation	Overview	Relevance to the Project
Health and safety		
Law no. 10237/2010 (18.02.2010)	“On Safety and Health at Work” – This law regulates the framework of health and safety in the workplace and determines the roles of each party subject to the law.	The project will comply with this law to ensure the health and safety of its workers. Specific measures will be included in the mitigation plan.
Law no. 9863/2008	The State Sanitary Inspectorate aims to protect workers from the impacts of adverse working conditions, such as exposure to toxic substances, radiation, unworkable noise, vibrations, unfavourable microclimate, and controls the level of occupational diseases and accidents as a result of adverse conditions.	The project will comply with this law to protect the health safety of its workers. Specific measures will be included in the mitigation plan.
Law no. 9863/2008 (28.01.2008)	“On food” specifies the rules of food safety in Albania.	The project needs to ensure the safety of food consumed by its workers. Specific measures will be included in the mitigation plan.
Law no. 10433/2011 (16.06.2011)	“On Inspection in the Republic of Albania.”	The project is subject to inspections for adherence to health and safety regulations.
DCM No. 562/2013 (03.07.2013)	Decision of the Council of Ministers concerning the approval of the regulation on minimum safety and health requirements for the workplace.	The project/ employer needs to ensure the safety of its workers in the work place. A specific set of rules are to be drafted in the Safety Regulation of the Employer. Specific measures will be included in the mitigation plan.
DCM No. 312/2010 (05.05.2010)	“On safety in site construction” sets the rules of safety for construction activities.	The installation of worker facilities needs to comply with the rules of this decision. Specific measures will be included in the mitigation plan.
Decision No. 692/2001 (13.12.2001)	“On special measures on safety and health protection at work.”	The project will comply with this law to protect the health safety of its workers. Specific measures will be included in the mitigation plan.
DCM No. 842/2014 (03.12.2014)	“For the health safety and protection of the employee from noise risks in the working places” requires the employer to assess the noise levels at the working place and ensure the protection of its workers.	Specific measures will be included in the mitigation plan.

2.1.5. Other National Legislation relevant to this Project

Other Albanian legislation of relevance to the project is highlighted in the below Table.

Table 6 Other National Legislation relevant to this Project

Legislation	Overview	Relevance to the Project
Land use and territory planning		
Law no. 107/2014	"On Territory Planning and Development" - The law aims to integrate the urban planning legislative framework into a single law, and includes the concept of the protection of natural and cultural heritage, and community's health and safety for territory planning.	The law and its by-laws require declaration for any construction. The project is temporary. The protection of natural and cultural heritage, and community's health and safety will be included in the EIA mitigation measures.
DCM No. 408 (13.5.2015 amended by DCM 231/2017)	The regulation for territorial development.	This regulation specifies the type of installations that require a construction permit. A preliminary clearance should be sought for the construction of the facilities. The installations of mobile structures require a preliminary clearance (or declaration of works) issued by the municipality.
Law no. 9244/2004	"On Agricultural Land Protection" determines the protection status of given agricultural fields.	The project is obliged to inform the local authority of any damage to agricultural land from the operations. The authority assesses the damage and requires that the land user restore any damage in agricultural land. Mitigation measures will be proposed.
Law no. 8752/2001 (26.03.2001) amended several times.	"On the establishment and functioning of the structures for land administration and protection", amended by Law No. 10257/2010 regulates land uses issues, and their compatibility with Regional Planning.	The land administration department of each municipality is responsible for land management and leasing of state - owned land. This authority will be responsible for the coordination of the implementation procedures and execution of the compensation during the project implementation.

2.1.6. International Conventions and Agreements

Albania is signatory to a number of international agreements relevant to the Project.

Table 7 International Conventions and agreements signed/ratified Albania

Convention/Agreement	Overview	Ratified	Relevance to the Project
General			
Aarhus Convention on Access to Information, Public Participation in Decision-making and	The Convention establishes a number of rights to the public, with regard to the	26.10.2000	Arrangements are to be made by public authorities to enable the public potentially affected by the project and environmental NGOs,

Convention/Agreement	Overview	Ratified	Relevance to the Project
Access to Justice in Environmental Matters (1998)	environment; including access to environmental information; public participation in environmental decision-making and access to justice ⁷ .		to comment on proposals for projects affecting the environment, or plans and programmes relating to the environment. The comments received are to be taken into consideration in decision-making, and information to be provided on the final decisions and the reasons for it.
Climate change			
UN Framework Convention on Climate Change (UNFCCC) (1992) entered into force in 1994	United Nations The UN Framework Convention on Climate Change (UNFCCC) has been crucial in addressing climate change and the need for a reduction of emissions of greenhouse gases. The ultimate objective of the Convention is to stabilize greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous human interference with the climate system.	01.12.1994	As Albania is signatory to the convention, every effort should be made to limit the greenhouse gases (GHGs).
<u>Paris Agreement at COP21 in Paris on 12 December 2015, entered into force on 4 November 2016</u>	The Paris Agreement builds on the Climate Change Convention to combat climate change ⁸ .	21.09.2016	The project shall adopt mitigation measures to reduce greenhouse gas emissions.
Kyoto Protocol	The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change; signatories commit to setting internationally binding emission reduction targets ⁹ .	01.04.2005	The project shall adopt mitigation measures to reduce greenhouse gas emissions.
Water			

⁷ <http://ec.europa.eu/environment/aarhus/index.htm>

http://unfccc.int/files/paris_agreement/application/pdf/qa_paris_agreement_entry_into_force.pdf

⁹ <https://unfccc.int/process-and-meetings/the-kyoto-protocol/what-is-the-kyoto-protocol>

Convention/Agreement	Overview	Ratified	Relevance to the Project
Convention on the Protection and Use of Transboundary Watercourses and International Lakes (1992)	Avoid or minimize adverse effects on water resources and water quality	05.01.1994	The study area is situated near the Seman River but does not affect Transboundary Waters.
Biodiversity			
Convention on Biological Diversity (CBD (1992)	Avoid or minimize adverse effects on important habitats and species, internationally and naturally designated nature conservation sites; conservation, sustainable and equitable use of biodiversity.	05.04.1994	The Convention requires, under Principle 17, that EIA shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.
Convention on the Protection of Wild Flora and Fauna and Natural Habitats in Europe (Bern Convention) (1976)	The Convention aims to ensure conservation of wild flora and fauna species and their habitats. Special attention is given to endangered and vulnerable species, including endangered and vulnerable migratory species ¹⁰ ; to avoid or minimize adverse effects upon important habitats and species, internationally and naturally designated nature conservation sites.	02.03.1998	There are International Union for Conservation of Nature (UNMN / IUCN) protected areas within the Study area.
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) (1979)	Avoid or minimize adverse effects upon migratory species.	01.09.2001	The Project Area includes protected sites that may contain globally vulnerable species of birds as well as migratory birds. There are specific resolutions and instruments such as species action plans under this convention that apply to Albania.
Agreement on the Conservation of African-Eurasian Migratory Water birds (1995)	African-Eurasian Migratory Water birds Agreement (AEWA) covers 254 species of birds ecologically dependent on wetlands	01.07.2001	Species and habitats protected by this agreement may be present in the study area. Mitigation measures for the protection of flora

¹⁰ <https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/104>

Convention/Agreement	Overview	Ratified	Relevance to the Project
	for at least part of their annual cycle. All AEWA species cross international boundaries during their migrations and require good quality habitat for breeding as well as a network of suitable sites to support their annual journeys ¹¹ . Avoid or reduce adverse effects upon migratory water bird species.		and fauna will be identified in the EIA.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) (1975)	CITES is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. ¹²	27.09.2003	Endangered and threatened species and their habitats have been identified in the study area. Mitigation measures for the protection of flora and fauna have been identified in EIA.
Cultural heritage			
Convention on the Protection of the World Cultural and Natural Heritage (1989)	Avoid adverse effects upon Albanian and World Cultural Heritage sites; minimize adverse effects on unknown and intangible cultural heritage sites, material assets and another infrastructure.	10.07.1989	Cultural and natural heritage sites have been identified near of the study area. Mitigation measures were proposed for the protection of cultural heritage.
Work			
ILO Convention 29, Forced Labour Convention (1930) and ILO 105 Abolition of Forced Labour Convention (1957))	Its object and purpose are to suppress the use of forced labour in all its forms, irrespective of the nature of the work or the sector of activity in which it may be performed.	25.06.1957 27.02.1997	Local workers will be employed on the project. The project will adopt monitoring measures to ensure compliance with the convention.
ILO Convention 87 "Freedom of Association and Protection of the Right to Organise" (1948)	Protects the rights of workers and employers to "join organizations of their own choosing without previous authorization."	03.06.1957	Local workers will be employed on the project. The project will adopt monitoring measures to ensure compliance with the convention.

¹¹ <https://www.cms.int/en/legalinstrument/aewa>

¹² <https://www.cites.org/eng/disc/what.php>

Convention/Agreement	Overview	Ratified	Relevance to the Project
ILO Convention 98 “The Right to Organize and Collective Bargaining”	The convention provides for workers to be able to join unions and engage in collective bargaining.	03.06.1957	Local workers will be employed on the project. The project will adopt monitoring measures to ensure compliance with the convention.
ILO Convention 100 “Equal Remuneration Convention” (1951)	Each Member shall, by means appropriate to the methods in operation for determining rates of remuneration, promote and, in so far as it is consistent with such methods, ensure the application to all workers of the principle of equal remuneration for men and women workers for work of equal value.	03.06.1957	Local workers will be employed on the project. The project will adopt monitoring measures to ensure compliance with the convention.

2.2. International Best Practice Standards and Guidelines

International credit institutions have guidelines for their environmental and social impact assessment (E&S - M & S) requirements and emphasize the achievement of sustainable environmental and social outcomes. They also have environmental standards and restrictions on emissions and discharges. A number of important measures have also been specified to mitigate the impact of such projects, such as returning to the previous condition (if necessary).

The overall design of the project and this EIA process are based on relevant guidelines published by the World Bank and IFC. Therefore, guidelines are expected to be in compliance with the environmental and social requirements of potential lending institutions. EIA is based on environmental, social and other baseline data, site-specific characteristics and project technical specifications and mitigation measures applicable to hydropower plants in compliance with EU Directives, World Bank Policies and Environmental, Health and Safety Guidelines; IFC Performance Standards and will comply with the official Albanian legislation and procedures. As a result, in principle, it is accepted that projects developed under this program should refer to IFC Performance Standards.

EIA has been drafted in accordance with the following international guidelines:

- The International best practice standards and guidelines include the IFC performance standards for environmental and social sustainability. This includes guidelines published by the World Bank, the World Health Organization (WHO) and the International Union for Conservation of Nature (IUCN);
- Good International Industry Practices (PMNI);
- Relevant international agreements and conventions which Albania has signed, published by the United Nations (UN), the International Labour Organization (ILO) and other parties; and
- International Organization for Standardization (ISO/ONS) (including ISO 9001: 2015 (Quality Management Systems), ISO 14001: 2015 (Environmental Management Systems), and ISO 18001: 2004 (Information Technology - Identify radio frequency for item management).

2.2.1. The World Bank Environmental and Social Framework

Since October 1, 2018, the World Bank has implemented the Environmental and Social Legal Framework (ESF) for all new project financing investments. The Environmental and Social Legal Framework (ESF) sets out the World Bank's commitment to sustainable development, through a banking policy and a set of Environmental and Social Standards designed to support the borrower's projects to end extreme poverty and promote shared prosperity.

The Ten Environmental and Social Standards set out the standards that the borrower and the project shall meet throughout the project life cycle, as follows:

- Environmental and Social Standard 1: Environmental and Social Impact Assessment and Management;
- Environmental and Social Standard 2: Labour and Working Conditions;
- Environmental and Social Standard 3: Resource Efficiency and Pollution Prevention and Management;
- Environmental and Social Standard 4: Community Health and Safety;
- Environmental and Social Standard 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement;
- Environmental and Social Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- Environmental and Social Standard 7: Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities
- Environmental and Social Standard 8: Cultural heritage;
- Environmental and Social Standard 9: Financial Intermediaries; and
- Environmental and Social Standard 10: Stakeholder Engagement and Information Disclosure.

2.2.2. IFC Performance Standards

The International Finance Corporation (IFC) implements Performance Standards to manage social and environmental risks and impacts and to increase the opportunity for private sector development. Performance standards can be applied by other financial institutions that choose to apply them to projects in emerging markets. The eight Performance Standards presented below together set out the standards that a project must meet throughout the investment duration made by IFC or other relevant financial institutions. Based on the IFC Performance Standards on Environmental and Social Sustainability, approved on January 1, 2012, the performance standards are as follows;

- Performance Standard 1: Environmental and Social Impact Assessment and Management;
- Performance Standard 2: Labour and Working Conditions;
- Performance Standard 3: Resource Efficiency and Pollution Prevention;
- Performance Standard 4: Community Health and Safety;
- Performance Standard 5: Land Acquisition and Involuntary Resettlement;
- Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources
- Performance Standard 7: Indigenous Peoples;
- Performance Standard 8: Cultural heritage;

Regarding to Albanian EIA requirements, the application of IFC Standards requires additional processes, as follows:

- Focus on the study phase: a process through which stakeholders are consulted to contribute to the identification of key issues to be studied as part of the EIA. This EIA Report has been prepared in compliance with this requirement.
- Stakeholder Engagement Plan: a comprehensive approach to communicating and consulting with identified stakeholders throughout the project life cycle.
- Focus on Social Issues: While Albanian legislation refers mainly to environmental impacts, IFC's approach also focuses on identifying impacts in affected communities and identifying mitigation measures needed to be followed.

2.2.3. IFC Stakeholder Engagement Guidelines for Social and Environmental Issues

This EIA Report has been prepared in accordance with the best practices set out in the IFC guidelines, and in particular:

- 2007 Environmental, Health and Safety (EHS) Guidelines for Electrical Power Transmission and Distribution;
- 2007 Environmental, Health and Safety Guidelines;
- 2007 Stakeholder Engagement Handbook;
- 2009 The Good Practice Note for addressing grievances from Project-Affected Communities;
- 2009 Problem Solving Handbook as a result of the Internal Migration due to the Project;
- 2009 Introduction to Health Impact Assessment;
- 2018 Attitude to environmental, health and safety issues for Hydropower Projects.

2.2.4. WHO Guidelines

Relevant WHO Guidelines used in this EIA Report include:

- WHO Guidelines for Community Noise (1999);
- WHO Air Quality Guidelines (2005);
- WHO Guidelines for Drinking Water Quality (2011).

2.2.5. International Union for Conservation of Nature

The IUCN Red List of Threatened Species is one of the most recognized objective assessment systems for classifying the status of threatened plants, animals and organisms. It includes clear criteria and categories for classifying the conservation status of certain species based on their probability to get extinct. The IUCN Red List (2017) for Albania has been used to describe the flora and fauna within the Study Area.

3. PROJECT DESCRIPTION

3.1. Location

Located on the central western coastal area of Albania, approximately 120 km from the capital Tirana, Fier municipality has a micro climate that captures the most solar radiation in the whole country. The area is mainly reclaimed marshland and has a sandy soil structure and drainage channels exist within and bounding the project site. A similar solar energy plant has already been constructed in the nearby area.

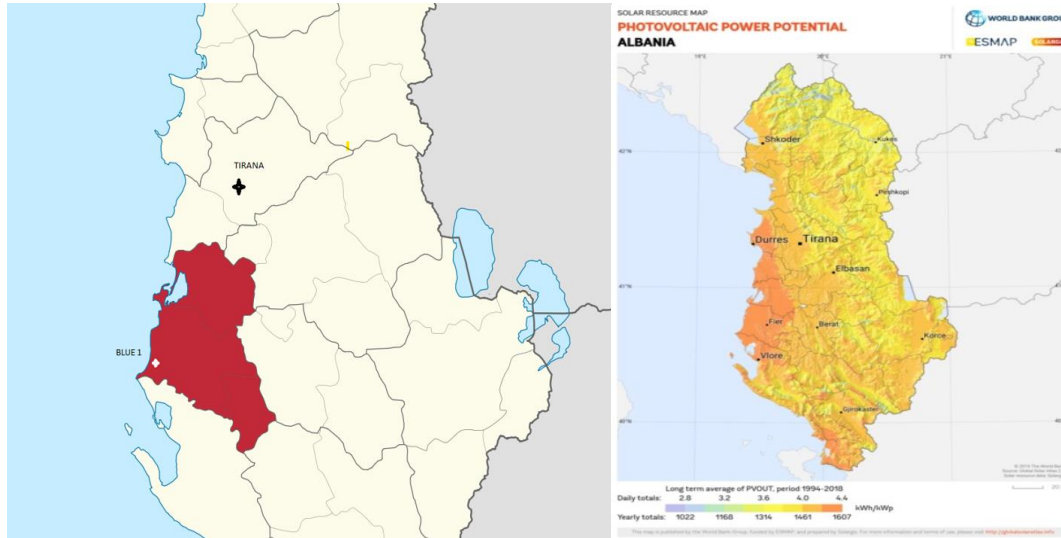


Figure 2 Project region – as a higher radiation area in Albania

3.2. General Project Description

In Fier Municipality in the local area of Seman, Blessed investment and Matrix Construction plan to construct a PV Solar Power Plant with a capacity of 50 MW on a plot of land with the area of 87 ha.

Figure 3 describes the general location of the Power Plant, including the local landscape, the access roads and the project location.

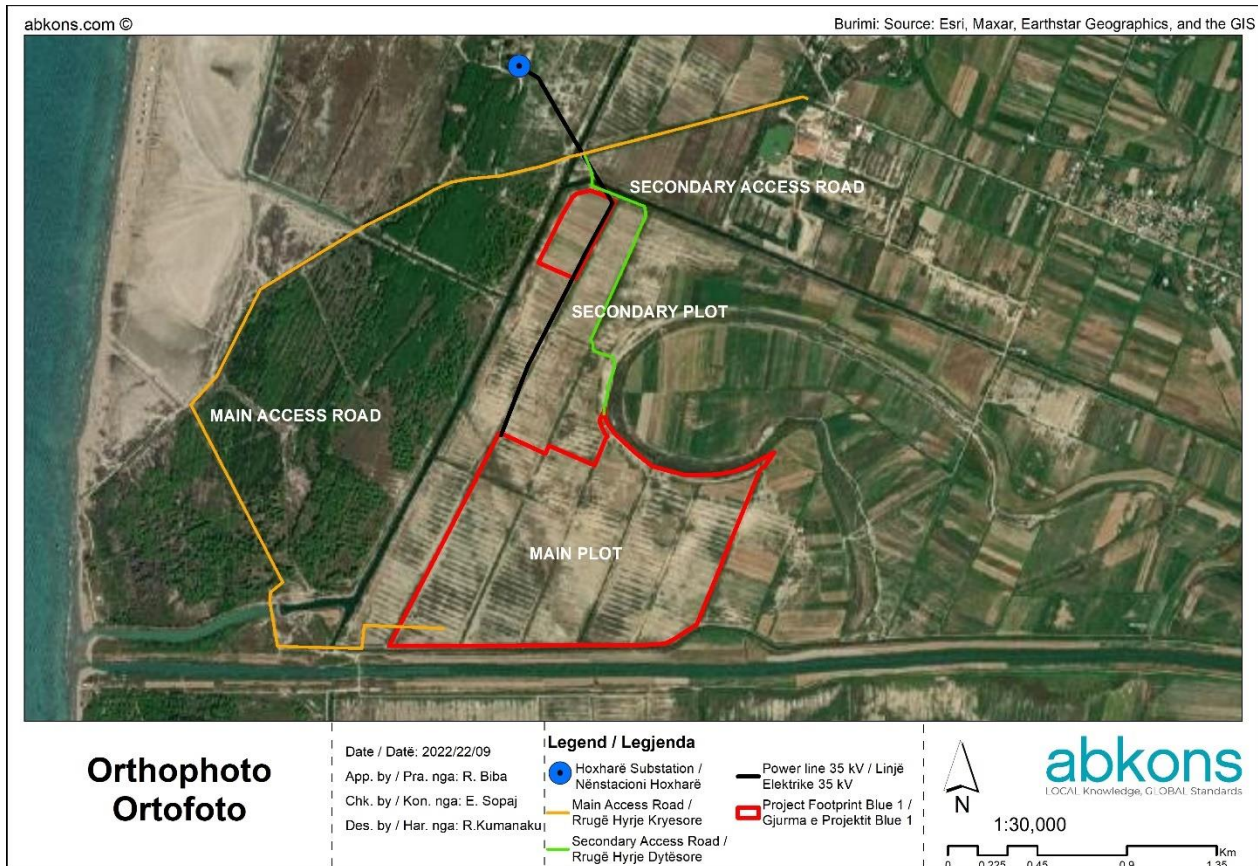


Figure 3 Project location

As can be seen above the plant is in 2 locations both with their own access roads from the main road that leads to Fier having the main entrance in the south west area and the secondary entrance in the North East for the secondary plot. From the central area the blue line indicates the high-voltage gridline from Blue 1 substation, connecting to the Hoxhare substation and then to the national grid.

The overall system of the power plant consists of over 103,020 solar panels that transmit DC electricity to combiner boxes, which gather the power and transmit it on to the inverters. Then, the inverters shift it to AC form, increase the voltage and transmit the electricity to the main control house, which has a main inverter and a main transformer. Finally, from the main control house, the electrical flow is sent to the Hoxhare substation by OHL approximately 1 km away to join the main national grid line.

3.3. Description of Proposed Works

The proposed works on site comprise of following elements,

- Access road improvements
- Act of staking out with legal construction supervisor
- Site Setup including site offices and utilities
- Site clearing and grading
- Security fencing and gates and security cabin
- Receipt and laydown of materials
- Piling for panel installation
- Photovoltaic panels and framework installation
- Excavations and earthworks for conduit and cabling connections
- Installation of inverters
- Construction of control building and transformer substation.
- Completion of internal access roads
- OHL installation
- CCTV and communications installation
- Commissioning Works.

3.4. Technical Overview

Solar PV technology involves the direct conversion of photons (i.e., sunlight) into electricity. PV modules (also called solar panels) absorb solar radiation and convert it into direct current electricity. This direct current power is then converted into alternating current electricity for delivery to the electrical grid system. This conversion occurs when direct current (DC) flows through an inverter, which converts the electrical characteristics to alternating current (AC) that can be tied to the power distribution system for power delivery.

The electrical current produced is directly dependent on how much light strikes the module SO will be variable seasonally.

Multiple PV panels are wired together to form an array, an arrangement that increases the total system output. PV systems are relatively simple to operate and maintain and require little water for project operations compared to solar thermal energy systems.

A solar PV project involves constructing and operating a utility-scale, single-axis tracking PV project at the proposed project site. PV trackers using single-axis (east-west) tracking maximize the panels' absorption of sunlight during the day and throughout the year. Tracking PV modules produce more electricity annually compared to fixed-tilt modules.

There is a minimized number of moving parts, complicated machinery, liquids, or significant water requirements to employ photovoltaic technology, making it a preferred technology choice. Once constructed, there is little maintenance required at Blue 1 due to the high reliability of all the systems employed. Thus, Blue 1 will deliver zero emission solar generation to the Albanian power grid.

3.5. Technology Description

Blessed investment and Matrix Constructions EPCM contractor have extensive experience developing, constructing and operating large scale solar power plants and currently has over 1,9 GW constructed or under construction.

Blessed Investment and Matrix Constructions engineers in conjunction with the EPCM have looked at a number of solutions tailored to the specific site and after consideration and modelling have decided to use the following core components for the construction of Blue 1.

Table 8 Technical standards of power source equipment¹³

Panel	Panel Power	Wp	650
	Panel Technology		BIFACIAL DUAL GLASS MONOCRYSTALLINE MODULE PERC TSM-DEG21C.20
	Panel Efficiency	%	20.9%
	Panel Model		FS-6450A
	Panel Manufacturer		Trina
	Panel life span	Years	30
Inverter	Inverter Power	kW (AC)	350
	Inverter Technology		String
	Inverter Model		Sungrow SG350HX
	Inverter Manufacturer		Sungrow

	Output voltage	KW	350
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3.5.1. Photovoltaic Panels

High performance Bifacial Perc Monocrystalline modules have been chosen manufactured by Trina. Bifacial solar modules offer many advantages over traditional solar panels. Power can be produced from both sides of a bifacial module, increasing total energy generation. They're often more durable because both sides are UV resistant, and potential-induced degradation (PID) concerns are reduced when the bifacial module is frameless. Balance of system (BOS) costs are also reduced when more power can be generated from bifacial modules in a smaller array footprint.

There will be approximately 103,020 panels in individual strings of of 33 panels and this will be reproduced 3434 times to reach the required 67MWp, 50 MW AC on grid connection.



Figure 4 Basic Module Details.

3.5.2. Inverter Units

The Sungrow SG 350 HX has been chosen as the inverter for the Blue 1 project as it is currently the most powerful inverter manufactured by SUNGROW. The inverter has compact dimensions of 1,136 x 870 x 361 mm and low total weight of only 110 kg. The inverter is connected via DC connectors and via an AC connection area. There is a total number of 177 inverters.

3.5.3. Tracking Unit

For flat-panel photovoltaic systems, trackers are used to minimize the angle of incidence between the incoming sunlight and a photovoltaic panel. Reducing this angle increases the amount of energy produced from a fixed amount of installed power generating capacity.

The Vanguard 1P tracker from Trina has been chosen for the Blue 1 Project.

3.5.4. Overhead Transmission Line (OHL)

Presently, Blue1 Power Plant through Blue1 SPV has signed the Connection Agreement with Transmission System Operator for connection in transmission grid to new Hoxhara Substation, which will be a 110/35/20 kV substation. This substation is located around 1.6 km from Blue 1 Power Plant. The PoC is define on the agreement as extension of 110 kV busbar in new Hoxhara S/S. On Hoxhara S/S switchyard will be installed the Blue1 Power Transformer (110/35 kV, 50/60 MVA) and connection with busbar will be through a 110-kV transformer bay (completed with all primary and secondary elements based on the technical framework). The evacuation line (the transmission line) that will connect Blue1 Power Plant with the new Hoxhara S/S is double circuits overhead line with 35 kV voltage level (poles/towers structure will be as for 110 kV configuration and the conductor section will be 240 mm²).

The scope will be the internal configuration electrical part of Blue1 SPP. The Blue1 SPP electrical configuration will be with two voltage levels as installed capacity and area of PV installation is very large. The high voltage level will be 35 kV as this level of voltage will be used for power flow evacuation to Hoxhara S/S. The electrical scheme for this configuration will start with Main Cabin where will be installed the 35 kV line feeders and LV feeders for each intermediate power transformers which will be located on the area, the control and monitoring system (the local SCADA system), the auxiliary systems, the power system for electrical supply purpose etc. The 35 kV feeders will be separated into two 35 kV busbar connection in order to be more efficient and guaranty the security if supply during the operation phase.

3.5.5. Access Roads

To reach the project area, there are 2 access roads. The existing road (1.2 km) from the main road Topoje – Darezeze to Hydrovor e directly to Blue 1 is the main new access road.

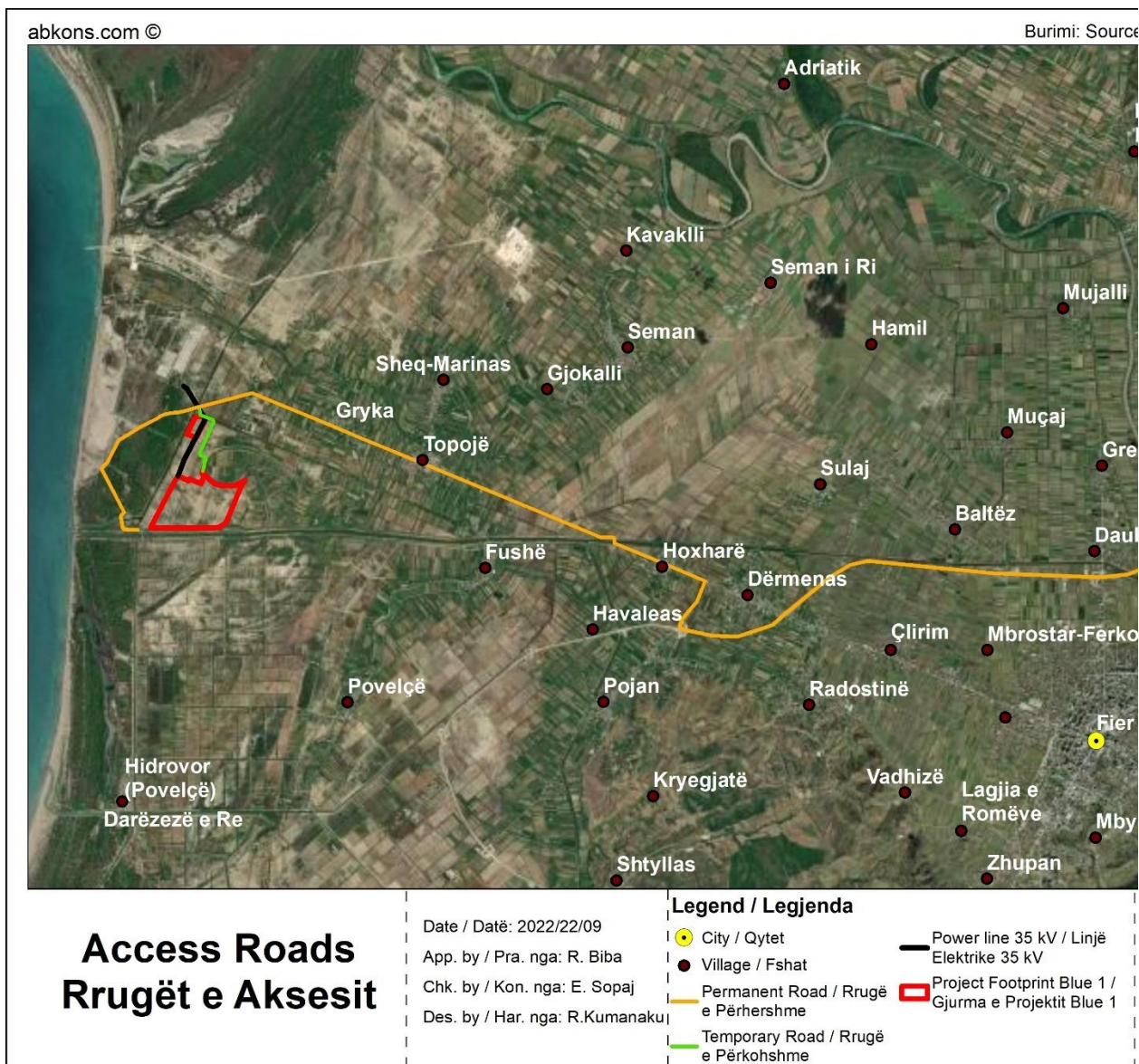


Figure 5 Access roads

Some technical specifications are as following:

- The width of the road is expected to be 2.5 m
- Docks, each with a width of 0.25 m
- General Road width 2.5 m
- Axis slope 2%

For this mean, the investor has planned to do the following interventions:

- Excavation and backfilling
- 15 cm gravel layer
- Stabilizer layer/bituminous sand 10 cm

A temporary access road is proposed to follow an existing field track that lies along the channals and being used for cleaning of the drainage channels, etc.

3.5.6. Road layers evaluation method

The layers of the road are calculated and treated in such a way as to provide a guarantee for the road, stability and to withstand the actual and prospective capacities for a period of 10 years. The calculation of the thickness of the layers was made taking into account the geology of the area where the road passes, accepting a deformation coefficient of 80 kg/cm².

The design of the road layers was carried out using the modern method (AASHTO). The calculation of the layers was made for a limited frequency of heavy vehicles, including trucks with a total weight of up to 60 tons, as well as for a traffic with an average daily intensity of 200 cars and vans in 24 hours. It is natural that, due to the calculation of layers, cars do not have any great effect.

The method considers the road layer as a flexible cover and the traffic evaluation is done according to the method by making field observations on the day and at different intervals during the 24 hours of traffic. Since no such survey has been made, since the time frame of the project design does not allow such a thing, approximate values have been obtained by accepting on the road an intensity of 50 heavy and medium vehicles per 24 hours and 200 vehicles in 24 hours.

The equivalence factor (ef) is calculated with the formula $N_{axiale}/8160$. Furthermore, the annual average daily traffic (AADT) is determined, which will be used to determine the value of the calculated traffic for the project for the 20-year service period in the form of the cumulative number in million equivalent standard axes (ESA-Equivalent Standard Axes) needed for design of road layers.

The service level index (PSI) is defined between values 0-5 (where 5 is for a very good road) as the ability to serve the type of traffic that will use the road.

Each layer is converted into a flexible layer structure through an AASHTO coefficient of the layer structure through the structure number (SN) and which expresses the measure of the relative ability of the layer material. Further, the calculation of the thickness of the layer is done through monograms using the number of vehicles that circulate in 24 hours, the California bearing ratio (CBR) and the road pressure coefficient M (in MPa), finding the coefficient I based on which, after we have determined the upper layers of bituminous sand 10 cm, or stabilizer 15 cm, we calculate the layer of cake for the docks 10 cm.

3.5.7. Culverts

For the channel that is at the entrance of Blu 1 site, the Company will clean the slopes and install white road stabilizers with a stone diameter of 5-8 cm. We will need 5-6 trucks, about 20 m³ of gravel like this. The gravel will be compacted by the passing machine until we have a hard surface. It is not advisable to change or level the existing channel, because it can be damaged and, in this case, we have to change the whole thing.

The slopes will be strengthened with reinforced concrete structures.

The project foresees that for the completion of works for the object: "Reconstruction of Hidrovor Hoxhara road - Photovoltaic project Blue 1, Sheq Marinas, Fier", a period of 3 months is needed.



3.6. Development Activities and Project Implementation Period

The general development stages for the large-scale solar PV project can be classified as follows:

- Mobilization/Pre-construction phase: such as site preparation, mobilization of equipment and materials in the Project area.
- Construction and Installation: including civil works, electrical works and equipment installation.
- Operation: plant operation and routine maintenance.
- Dismantling: dismantling of equipment and associated equipment and rehabilitation of the area.

The proposed total capacity of the PV plant of 50 MW (AC) is proposed to be built in a single phase. The electricity generated by the project will be exported through power lines to the nearby substation for transmission and distribution through the national grid, which construction is planned to take place at the same time with the PV element of the Project.

Possible environmental and social impacts are related to activities undertaken during the construction, operations and decommissioning phases, the main activities during these phases are summarized in the following sections.

3.6.1. Mobilization/Pre-construction phase

The mobilization phase should take place before the beginning of the construction and installation time at the project site. The pre-construction phase includes the development of the detailed design, mobilization and preparation phases of the Project area.

The mobilization phase includes ordering materials and equipment, signing contracts with subcontractors and human resources. This phase also includes workers' mobilization, logistics planning for the transportation of project components, equipment and materials to the project area (for example PV panels). This phase also includes terrain preparation, such as cleaning, surveying and levelling the site, creating spaces in the area for constructing the facilities. This project does not include the construction of buildings to house workers.

Heavy equipment and other equipment will be relocated to the project site at the beginning of construction activities for the civil works development and equipment installation. All PV panels, electrical and structural equipment are planned to be transported to the Project area via the existing road in "containers." In addition to equipment, the project should include vehicles and large construction equipment, such as bulldozers, excavators, cranes, etc.

During the Project area preparation period, the workforce required for security, manual work, civil works, freight, and other similar services will most likely be sourced from the local area.

3.6.2. Construction Activities

The Company has selected a qualified CM contractor for the construction of Blue 1 PV power plant. The construction and management team will mobilize as soon as possible once material delivery dates are confirmed. Early site clearance works and access road rehabilitation may commence earlier than full site construction works and will be subject to a separate WMS and safety procedures.

Site access shall be controlled for personnel and vehicles. A security fence will be installed around the plant site boundary, including the laydown area. Security will be maintained as required by the Company with a suitable qualified subcontractor to maintain public safety.

During construction, temporary utilities shall be provided for the construction offices, laydown area, and the project site using an on-site generator. Area lighting would be provided and strategically located for safety and security, and targeted to minimize light pollution for area neighbours.

Communications among personnel during construction, as well as operation, would consist primarily of mobile phones it is not envisaged to use handheld radios.

The following site services would be provided by the Project subcontractors or service providers:

- Environmental Health Safety Training
- Unexploded ordnance surveys
- Site Security
- Site First Aid
- Construction testing if required
- Site fire protection and extinguisher maintenance
- Furnishing and servicing of sanitary facilities
- Trash collection and disposal
- Disposal of hazardous materials and waste in accordance with local, state, and federal regulations.

Construction materials such as concrete, pipe, wire and cable, panels, steel, and small tools and consumables would be delivered to the site by truck. These as will the delivery of large, heavy or oversize materials shall be covered by the Project Transport Management plan.

Construction Access and Transportation

During Project construction, the construction workforce would largely be supplied from sub-contractors with some content from the local area. The Company management team and EPCM technicians and engineers will be housed in the local area in rented accommodation. The construction laydown and parking area would be located in the south-westerly corner of the Project Site. The project will have an access road of less than a 1.5 km to the main gates. The existing partially tarmacked and short unpaved access road will be improved and widened to accommodate construction traffic. Materials and equipment will be delivered by regular sized trucks.

Construction Workforce and Vehicles

The on-site workforce would consist of laborers, craftsmen, supervisory personnel, supply personnel, and construction management personnel. The on-site workforce is expected to reach its peak of approximately 100 individuals with an average construction-related on-site workforce of 40 individuals.

Truck and worker vehicle traffic would be managed according to a Traffic Management Plan (TMP) to be prepared by the Company in conjunction with the EPCM and in coordination with the local Municipality. Parking for private vehicles will be provided close to the site.

Generally, construction work schedules are expected to be 8 hours per day Monday through Friday. Typically, the work day would consist of one shift beginning as early as 8:00 a.m. and ending as late as 6:00 p.m. The work schedule may be modified throughout the year to account for the changing weather conditions. For instance, during hot weather, it may be necessary to start work earlier to avoid pouring concrete during high ambient temperatures or for the health safety of workers. Additional hours may be

necessary to make up schedule deficiencies, or to complete critical construction activities (e.g., PV block construction, foundation pouring, or working around time-critical shutdowns and constraints). During the startup phase of the project, some activities might be performed over the weekend.

It is estimated that trucking water to the Project Site from the Local municipality for construction works, compaction and dust suppression would require 2 (4000 Gallon) trucks per day, over a 5-day working week for the length of the construction schedule. It is estimated that 1 truck trip averages a 15 km roundtrip.

Table 9. Estimated equipment and durations below, Construction Equipment

ITEM	UNITS	DURATION hrs./day	Duration Months	Purpose
Water Truck	2	8	8	Dust Control/Construction General
Front End Loader	2	8	8	Material Movement
Graders	2	8	4	Clear and Grade
Bulldozers	2	8	3	Clearance
Backhoes	3	8	6	Excavation
Cranes	2	8	6	Unloading/Equipment Placement
Pick-up Trucks/Minibus	6	8	8	Transportation
Piling equipment	2	8	4	Post Installation
Compactor/Roller	2	8	6	Compaction

Table 10. Delivery Vehicles Duration

Item	No of Deliveries	Vehicle Type	Axles	Deliveries per Day	Duration Months
PV Panels	204	53 ft Flatbed	5	4	2.5
Piling Posts	70	40 ft Flatbed	5	2	2
Racking	80	40 ft Flatbed	5	2	2
Cable	20	53 ft Flatbed	5	2	1
Inverters	10	40 ft Flatbed	5	2	1
Transformer	3	53 ft Flatbed	5	1	1
Concrete	30	Mixer truck	5	3	3
Crushed Stone	80	Dump Truck	3	2	3
Trash Haul away	20	Dump Truck	3	1	9
Fencing	10	40 ft Flatbed	5	2	1
Electrical equipment	10	40 ft Flatbed	5	2	1
Equipment Delivery/Haul away	10	Low Boy	5	1	3

Surveying and Staking Out

Site preparation shall begin shortly after final approval has been given by The Company. The act of staking out by carrying out final boundary surveys, in the presence of the Licensed Construction Supervisor shall precede any site work. Surveying would be completed by a surveyor licensed to perform work in the Country of Albania and approved by the Company.

The surveyor would complete a boundary survey and a constraints map and obtain approval from the Licensed Construction Supervisor. The surveyor would then provide construction staking as required throughout the duration of the project to ensure that all works are properly located in relation to the project boundary and approved drawings as per the permit requirements.

Temporary Facilities

The Company shall install temporary services including utilities, construction and support facilities, security and protection. All temporary utilities, construction and support facilities required to perform the work shall be provided as on the approved drawings and the "Temporary Facility Plan".

Temporary construction and support facilities include, but are not limited to, the following: Water service, storage and distribution, Sanitary facilities, Drinking water, electrical power by generator, Temporary

heat/cooling, grey water disposal services, Waste disposal services, Construction offices and miscellaneous services and facilities.

Site Clearance, Grading and Excavation

It is The Company's objective to minimize both grading and vegetation removal for Blue 1. The majority of site grading within the project would be limited to the major access roads, the inverter pad locations, channel banks and streambeds (where necessary), transmission tower foundations and work areas. In addition, grading would be required for all of the ancillary temporary facilities in the Northeast corner, including the O&M building, parking areas, water storage areas, laydown area, and substation.

For the solar field, The Company proposes to use site preparation techniques that would minimize the required volume of earth movement, including a "grade and roll" technique that uses equipment to grade the soil over much of the solar facility site and then roll it level, as well as "micro grading" or "isolated cut and fill and roll" of other areas of the site to trim off high spots and use the material to fill in low spots.

If there is a slope greater than 1 percent at the set-back boundaries of defined intermittent drainage canals, then grading would be completed to reduce the slope and make continuous with the solar panel area. If shoulders are created at the stream set-back, then they may be protected by rip rap or other rock. Excavation would be limited to the trenches for the collection system as discussed in the previous section.

Internal access roads for maintenance and construction will be constructed as per the approved drawings. For external access roads please see separate drawings and WMS "Blue 1 Access Road Rehabilitation Plan".

Solar Array Assembly and Construction

The panel field would be constructed as follows. After the site is prepared and graded to the extent required, the panel field would be laid out by installing the vertical pile galvanized steel beams directly into the ground by means of a small piling unit. A preliminary walk-through by civil engineers suggests that this foundation would be sufficient to meet geotechnical requirements for wind stability. Soil tests/Pull out tests if required will be used to validate the preliminary engineering. If tests conclude that further foundations are required, then the vertical pile galvanized steel beams may be attached to reinforced concrete foundations or RC piles. Once the foundations are secure, trenching would be dug along the string perimeter of the 3 MW units, to tie the inverter blocks together, and the electrical conduit and wires would be laid down. Next, the framing would be bolted to the vertical support beams. Once framing is complete, panels would be delivered on-site and be installed on the frames. The precast concrete inverter pads would be delivered and laid down then the inverters are secured to the pads, and the electrical wiring is completed.

In general, material delivery for the solar field would maintain a constant flow, and panels and framing structures would be delivered throughout the solar field adjacent to the 2.50 MW sub unit locations. Construction would proceed in an assembly-line fashion as each task is completed throughout the solar field. The laydown area shall be of sufficient size to provide a constant flow of materials to enable consistent flow of materials to the working area.

Power Plant Construction

Electricity will be generated directly at the PV solar panels and transported to the high voltage transmission system via conductors. There is also the installation of the following additional elements to the power plant.

- Control room Construction approx. 200 sq meters
- Installation of Transformers
- Installation of junction/combiner boxes
- Cable laying DC and AC
- Installation of earthing/grounding system
- Lightning protection
- Installation of Fire Protection Equipment
- Communications equipment
- OHL from Control room to Hoxhare substation
- CCTV Installation.

Lighting during construction would be limited to the laydown area for the construction trailers, parking area, and site security facilities and would be limited to that needed to ensure safety. It would be focused downward, shielded, and directed toward the interior of the site to minimize light exposure to areas outside the construction area. During construction, electric power would be derived, if possible, from the existing distribution lines adjacent to the project site, or by portable temporary diesel generators. The only possible additional fuel would be for maintenance vehicles.

Gravel, Aggregate and Concrete

Adequate aggregate surfacing would be provided within the generation facility, common areas and parking lots as required for maintenance and access. Gravel would be required for the main northeast- southwest access roads (not for the less often used routes). Aggregate or other similar material would be procured from the closest sources. All other areas not utilized for access roads would be left with the natural soil as the final surface.

Concrete would be required for the inverter pads, transformers and the control building. Concrete for the inverter pads and vertical pile supports (if required) would be pre-cast units or poured at site by mixer truck. Concrete will be purchased from the closest available commercial batching plant.

3.6.3. Operations and Maintenance

Once the construction phase is complete and commissioned it will be handed over to The Company preferred O&M team (contractor), all O&M works on the power plant will be in accordance with the operations and maintenance procedure. This procedure covers areas of responsibility, contractor compliance to HSSE and competencies required to work. In addition, if any works fall into construction works category, then a separate construction phase health and safety plan will be produced to cover the works.

Plant personnel would begin being on board the project 6 months prior to the scheduled start of commercial operations. Management personnel would provide technical oversight/guidance and training in two critical areas:

- Overall plant management,
- Plant operations and maintenance

Human resources, accounting, and administration will be managed from the main Company office in Tirana. The project would employ up to 4 full-time staff during operations.

Operation and Facility Maintenance

The Operation and Maintenance Plan provides basic assumptions and discussion of operations and maintenance areas and gives a short overview of the other programs used to meet the Company objectives.

The Operating Budget provides, on a monthly basis, details for:

- Operations, repairs, and expected improvements.
- Routine maintenance.
- Expected purchases (including capital expenditures and equipment acquisitions).
- Personnel plan.
- Administrative and support activities taken in support of the plant.
- Additional related aspects.

The Company would contract specific maintenance tasks or would perform them by the plant staff as appropriate and most cost-effective manner. The Company would operate and maintain the plant in accordance with approved procedures to comply with the issued Environmental Permits and appropriate laws.

The Company would operate the plant and associated systems to ensure that the emission limitations for air and waste water discharge contained in the plant permits are met. In addition, the Company would ensure that all hazardous waste on the site would be stored and disposed of properly. All environmental issues and associated permits would be the subject of continuing training and management emphasis. At least annually, an internal audit of environmental protection compliance would be made.

Maintenance Program

The Maintenance Program is conducted in accordance with the maintenance manual, vendor technical manuals, and good engineering practices. Subject to scheduled overhauls, the nominal design life for the major components of the plant is 30 years. This program consists of:

- Routine Preventive Maintenance (including "Operator checks") – normally conducted by the plant O&M staff, supported by outside contractors as required for some aspects of the predictive maintenance program (e.g., oil analyses).
- Corrective Maintenance – normally conducted by the plant O&M staff, supported as necessary by outside contractors as required due to special equipment or expertise which is not cost-effective to maintain current on site (e.g., "coded" welding) or to augment efforts to return the plant to operation as soon as possible following a forced or unscheduled outage.

The PV panels and other equipment will be covered by a warranty from the respective suppliers. All warranties would be tracked and compiled with and warranty claims would be made as directed by the Company's Representative.

The Operator would utilize a Computerized Maintenance Management Software (CMMS) package, vendor and contractor recommendations, and good engineering practices to plan and implement the component preventive maintenance program.

Scheduled Maintenance periods would be planned and coordinated with the utility in accordance with the PPA. There are no planned major equipment outages. Unscheduled corrective maintenance would be decided on a case-by-case basis. A projected outage maintenance schedule would be submitted separately.

Maintenance Service agreements are anticipated on the following areas, as appropriate:

- Predictive maintenance testing and analysis
- Testing and certification of fire protection system(s)
- Calibration services (beyond the cost-effectiveness of the plant's capability), such as:
 - High voltage protective relay calibration
 - Safety relief valve calibration
 - Electricity flow metering calibration
- Environmental engineering services
- Consulting engineering services
- Plant security services
- Fire protection services
- Plant janitorial services
- Trash and waste material disposal (including potentially hazardous waste)
- Individual office equipment, such as fax, copies, computers, etc.
- Employee transportation (as required)

3.7. Decommissioning and Completion

The project is expected to have an expected lifespan of photovoltaic of approximately 30 years and the PV Plant infrastructure will either be deactivated, extended or updated (if a new license is granted) once it has reached the end of its economic life. The expected operation time is estimated around 50 months and power generating source efficiency of 20.9%.

The Project update would consist of replacing old PV modules with new ones, increasing the total peaking power of the plant (a process called "power recharging"), or increasing the plant power by adding new elements to the plant, such as trackers, PV modules, or transformers.

If the Project is deactivated, then the Project Area shall be restored to its original state. PV plant components can be reused or sent for recycling. These two processes would cover the plant decommissioning costs and site rehabilitation.

PV panels and ancillary structures are made from recyclable materials, including glass, semiconductor material, steel, concrete, wood, aluminium, copper and plastic. When the PV Project reaches the end of its operational life, the components shall be dismantled and recycled. The project shall be dismantled and deactivated using the conventional equipment with minimal impact on the environment. These materials shall be recycled or safely disposed in accordance with all applicable laws and regulations at the time of disassembly.

Deactivation is expected to last from 6 and 12 months. The decommissioning effects are often similar, or at a lesser extent than the construction effects and will be considered where possible in the relevant EIA sections. However, there may be a high degree of insecurity regarding decommissioning as engineering approaches and technologies evolve over the operational life of the Project. The Project Deactivation Plan, including timelines and transportation methods, shall be submitted in advance to the relevant authorities.

4. ESIA METHODOLOGY

The potential environmental and social effects of a solar energy project have been considered and its impact has been assessed. A part of this assessment has been conducted as a 'desktop' study, in order to assess the site current situation and the surrounding environment.

National legislation has been reviewed to determine all specific EIA criteria applicable to Albania.

The main environmental and social factors for solar PV plants are listed below. It should be noted that the list of factors is not exhaustive:

- Construction activities lead to temporary gas emissions (dust and vehicle emissions), noise related to excavation, construction and vehicles transportation, solid waste generation and waste water generation from temporary construction sites and worker accommodation areas.
- Although there are few waters use requirements in the case of solar PV plants, solar power plants (IPED/CSP) may require more water, while plant clusters may require even larger water reserves in dry areas where local communities rely on scarce groundwater resources.
- Solar panels visibility within a wider visual span and the impacts related with its projections, species and surrounding communities.
- Potential impacts on ecology, including habitat loss/fragmentation, impacts on designated areas, and disturbance or displacement of protected or susceptible species.
- Potential impacts on cultural heritage, including impacts on site designation or direct impacts on underground archaeological sites as a result of land disturbance during construction.
- Impacts from material and personnel transport should be assessed in order to identify the most appropriate on-site transport route, minimizing impacts on the communities affected by the project.
- It should be performed the flood risk assessment to determine if there are areas with high flood risk associated with the terrain.

The first step involves reviewing the available environmental data on the project area and surrounding areas. This enables the identification of the issues verified during on-site identifying visits and also provides a preliminary idea about the nature, extent and time when the environmental issues will have to be addressed during the following stages. This will also help on identifying opportunities to avoid and/or minimize them early in the project cycle, so that the design process is properly updated.

The main objectives of the preliminary environmental and social assessment are as follows:

- To identify and confirm the presence of environmentally sensitive areas from secondary sources and preliminary on-site observation.
- To identify the potential negative and positive impacts; to clarify which issues will need to be addressed in general during the Environmental and Social Impact Assessment drafting which will be carried out during the design phase.

The main steps in drafting the initial environmental and social study are the following:

- I. To determine the purpose of the initial environmental and social study according to local standards. To carry out a preliminary assessment of the current legal and regulatory framework. The study shall take into account both criteria of the domestic regulation.
- II. Data shall be obtained from primary and secondary sources regarding the current conditions of environmental and social factors within the project area of influence.
 - Topography (general descriptions and maps);
 - Hydrology and hydro-geology (general descriptions and maps);
 - Flood risk involving events related to potential sea level rise;
 - Flora, fauna and ecosystems;
 - Natural Habitat, Primary Biodiversity Factors and Critical Habitat;
 - Protected areas (general descriptions and maps);
 - Land use and ecosystem services;
 - Cultural resources.

The initial data evaluation on target areas has been performed through a 'desktop' study based on available documents and other published data sources (structured literature study, Internet resources and public available data). It has identified all points or areas of interest, such as natural protected areas, important habitats and protected species, waters, sites or social, economic, tourist and cultural heritage sites, etc., that are likely to be found within the study area. The 'desktop' study also provided preliminary indications of what is likely to be present within the study areas, identified data gaps to guide the preparation of further steps such as mapping, stakeholder consultations and on-site surveys.

Based on the data and information obtained during the 'desktop' study, GIS maps have been prepared to show the spatial relationships between sources and those affected by environmental and social impacts.

- III. Identification of potential impacts (to the extent possible), selection of high-level measures that can help on managing these impacts cost-effectively, reduction of negative impacts;
- IV. Preparation of the Preliminary Environmental and Social Assessment report.

This report presents an Addendum ESIA study undertaken for Project Blue 1 to complement the information and analysis elaborated in the national EIA. The Addendum ESIA is specifically developed to demonstrate compliance with International Lender and required IFC requirements.

This Addendum ESIA is undertaken to establish the effects of a Project on the environment and the socio-economic implications for the local community, relating to the construction, operation and decommissioning of the proposed project. In line with National and international standards, the addendum ESIA study includes the outcomes and findings of the additional studies and detailed assessment conducted for the Project:

- Additional Baseline studies as necessary on biodiversity, hydrology, flooding, soil, and socio-economic aspects including road, traffic and village assessment, etc., to establish the state of the environment and socio-economic conditions prior to the implementation of the Project - presented in Sections 5, 6 and 7 of this report;
- Critical Habitat Assessment as a stand-alone document developed to identify and assess the biodiversity features that potentially trigger IFC's Performance Standard 6 (PS6) and EBRD's Performance Requirement 6 (PR6)
- Prediction of the potential impact on the established baseline conditions due to implementation of the proposed Project - presented in Section 8 of this report;
- Identification of mitigation and management techniques to mitigate any negative impacts - presented in Sections 8, 9 and 10 of this report;
- Development of an Environmental and Social Management and Monitoring Plan (ESMMP) and associated plans documenting the actions required to address the project's environmental and social impacts and issues, to be developed following the recommendations made as a stand-alone document in addition to this report;
- Monitoring of the environmental and social performance of the Project - to be undertaken during the construction and operational phases of the Project and presented in Section 12 of this report;
- Public consultation performed throughout the ESIA process - summary of consultation is provided in a stand-alone document, Stakeholder Engagement Plan (SEP) and Stakeholder Engagement (SER).

5. BIODIVERSITY BASELINE

Apart from its natural evolution, the Adriatic coast during the last 60 years has been under increasing pressure from a number of human activities, such as agriculture (reclamation work, water reservoirs, and drainage and irrigations schemes), urbanization, tourism, industry, and construction. Consequently, a good part of wetland habitats has been permanently lost, modified, altered, and turned into man-made or artificial habitats. Cumulative effects of such threatening factors are putting at risk a number of habitats and coastal wetland sites, whose ecological integrity has been significantly affected. Furthermore, climate change scenarios and sea-level rise predict that coastal habitats of the lowland Adriatic coast will be significantly impacted (Mullaj & et al., 2013).

The Project area represents a flat abandoned over the last 30 years of agricultural land, in the western part of Fieri City, near the coast of the Adriatic Sea. Before 1945 this huge wetland was drainage and cultivated for about 30 years, under an intensive agricultural regime. After the collapse of the communist regime, natural successions towards formerly brackish and salty marshes are taking place. Irrigation canals are destroyed, while the third-grade drainage canals are not maintained and secondary and primary canals drain the area towards the pumping station to “Hoxhara Hydrovor” pushing the water towards the Adriatic Sea. Proximity to the sea and the low altitude of the Project area, the operation regime of the pumping station, the seasonality in precipitation, and the evaporation rate during the dry summer season make the PV project site of a salty marshland and meadows rather than agricultural land. Most dominant plant species are salt and water-tolerant species such as *Salicornia europaea*, *Juncus maritimus*, *Tamarix dalmatica*, *Suaeda maritima*, *Limonium vulgare*, etc. Drainage channels and some temporary small rain-fed pools or ponds in depressions and along the third-grade not maintained drainage canals provide freshwater biotopes and habitats.

Transmission line route of Blue 1 PV are quite similar in term of habitats and sensitivity. They start at PDA of Blue 1 where abandoned agriculture land with natural successions to former brackish and salt marshes are taking place, and continue along the ditches of irrigation and drainage channels. These habitats provide feeding grounds for frogs, toads, pond turtles, tortoise, lizards and snakes, as well as feeding grounds and shelter for otter, jackal, badger and red fox.

5.1. Habitats and Flora

5.1.1. Habitats

In the study area exists a variability of terrestrial habitats characterized by a great human influence and unsustainable practices of land use. Once used for agricultural activities, today they have been abandoned leaving room for the re-installation of natural vegetation.

Within the Project area have been observed (i) Mediterranean salt marshes (mostly on the secondary drain canals) where the water stays for a longer time (Code 1310), (ii) salt meadows in drier places, and saline soils (code 1410) and (iii) drainage channels/reedbeds (code 72A0). The first is dominated by *Salicornia europaea*, the second by *Juncus maritima* and *Tamarix dalmatica*, and the third by the aquatic plants *Phragmites australis*, *Typha angustifolia*, *Scirpus lacustris*, etc.

Within the area of influence (AOI) are most common (i) Sea dunes of the Mediterranean coast (code 2110), (ii) Coastal Wetlands / Lagoons (code 1150), and (iii) Coastal Coniferous Forest (code 2110), (iv) Stream / River Habitat habitat-code 92A0, which represents the most natural and sensitive habitat, which in time has been significantly reduced, (v) Natural and semi natural grasslands (code 6510) representing abandoned agricultural land and turned into meadows for hay production and pastures; (vi) Mixed Mosaic Agricultural land. Of interest is the presence of a community with *Eucalyptus globulus* as a windbreak belt (artificial plantation) in the eastern part of the power line. *Eucalyptus globulus* is an exotic tree species.

Table 11. List of Habitat classified per EUNIS and Annex I of Habitat Directive

EUNIS Code (new / old)	EUNIS (Name)	Habitat code of Natura 2000	Annex I, Habitat Directive (Name)	Priority
Habitats within the Project Development Area				
MA2512	Tall rush saltmarshes dominated by <i>Juncus maritimus</i> and/or <i>J. acutus</i> Short rush, sedge, and clover saltmarshes (<i>Juncion maritimi</i>) and humid meadows behind the littoral, rich in annual plant species and Fabacea (<i>Trifolion squamosi</i>)	1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	No
A2.551	<i>Salicornia</i> , <i>Suaeda</i> , and <i>Salsola</i> pioneer saltmarshes	1310	Mostly salt marshes with <i>Salicornia</i>	No
		72A0	Reedbeds / Drainage channels.	
Outside Project Development Area (AOI)				
T3-939 / G3.74	Albanian stone pine forests	2270	Wooded dunes with <i>Pinus halepensis</i> and <i>Pinus pinea</i> L. (Coastal coniferous forests dominated by <i>Pinus halepensis</i>)	
T1-42 / G1.31	Mediterranean riparian <i>Populus</i> forests	92A0	Stream/River Habitat (Running Water)	
T2-A1 / G2.81	<i>Eucalyptus globulus</i> windbreak belt plantations	N	No Identifies	
B1.24	Sandy beach ridges with no or low vegetation	2110	Sea dunes of the Mediterranean coast	
E 2,2	Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>)	6510	Natural Grasslands (low lands Grasslands) and semi-natural grassland (Recently Abandoned Agricultural Areas)	
I 1.5	Bare tilled, fallow, or recently abandoned arable land	N	No identified	
B1.8	Moist and wet dune slacks	72A0	Reedbeds / Drainage channels	
	Ruderal vegetation		No identified	

The map of Habitats (based on the Habitat Directive) on the figure below is presenting

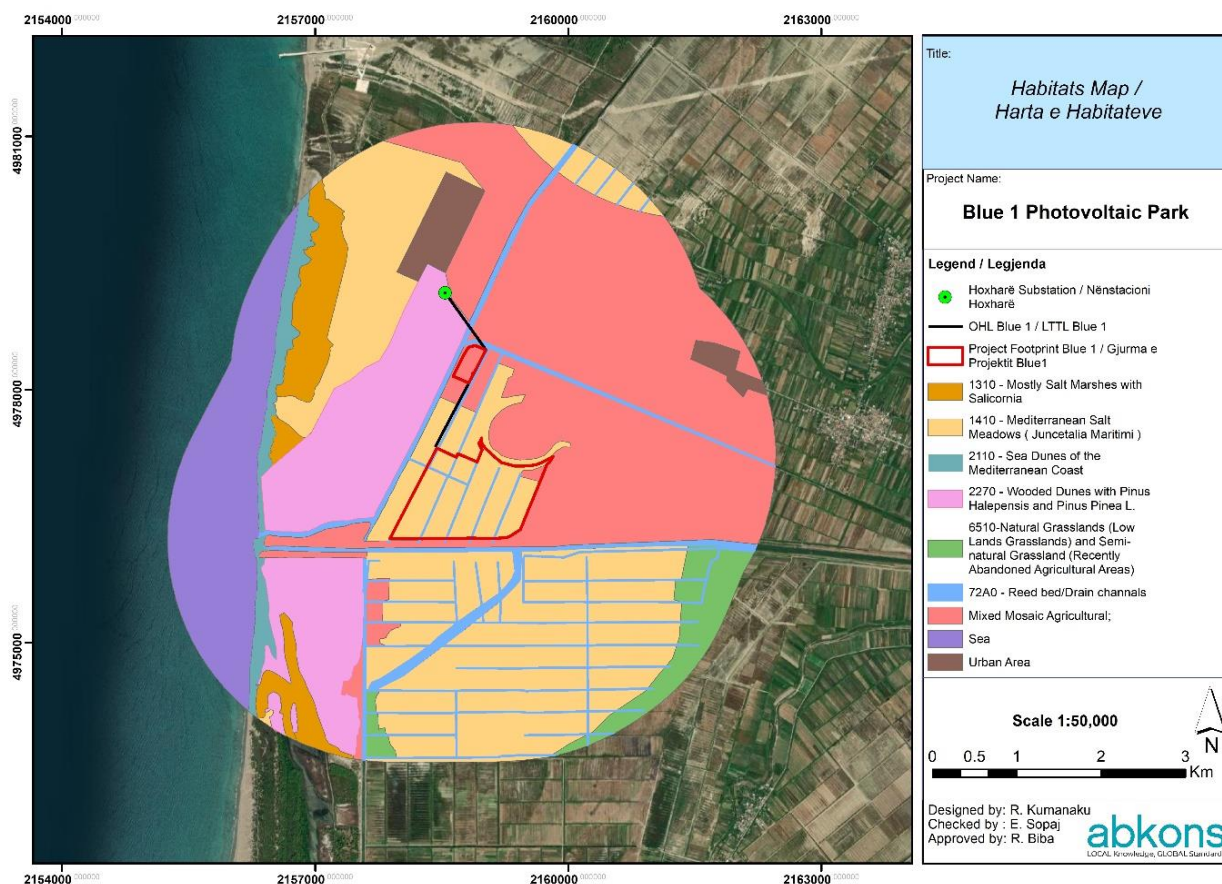


Figure 6 Habitats' Map

Here after a description per habitat type is presented:

Mediterranean salt meadows (code 1410)

In poor condition (i.e., extensively managed or altered from the natural state by human activity) and comprising a large proportion of species of non-native origin (and therefore considered as Modified Habitat). It is included under the code 15.51 and 15.52 (EUNIS) and code 1410, Mediterranean and thermo-Mediterranean salt meadows (*Juncetalia maritimi*) (Annex I of EU Directive). Almost all the PDA (Photovoltaic plant) is covered by this kind of habitat. It is the result of a natural rehabilitation after the abandonment of agricultural practices.

Various Mediterranean communities of the *Salicornia europaea maritime*, create a variability depending on the presence of salt and water content. Under this category is included type: *Salicornia* and other annuals colonizing mud and sand. The habitat mapping is difficult due to the heterogeneity and the creation of a kind mosaic shape.

This habitat includes salt marshes and meadows in the Mediterranean basin dominated by *Juncus* (rushes) especially *Juncus maritimus* (sea rush) tolerant of saline soils. It occurs widely along the coasts of the Mediterranean Sea. Assessed as "unfavourable" from all regions, poor in Atlantic and the Black Sea, and bad in Continental, Macaronesia, and the Mediterranean. Overgrazing, pollution of surface waters, and invasive alien species are noted as the most important threats.



Figure 7 Salt meadows and marsh of *Juncetalia maritime*

Mostly salt marshes with *Salicornia* (1310)

1310 *Salicornia* and other annuals colonizing mud and sand (small part).

In poor condition (i.e., extensively managed or altered from the natural state by human activity) and comprising a large proportion of species of non-native origin (and therefore considered as Modified Habitat). There are pioneer saltmarsh vegetation colonizes intertidal mud and sandflats close to coastal areas from strong wave action being an important precursor to the development of more stable saltmarsh vegetation. It develops at the lower reaches of saltmarshes where the vegetation is frequently flooded by the tide, and can also colonize open creek sides, depressions, or pans within saltmarshes, as well as disturbed areas of upper saltmarshes. Represent the vegetation of secondary and tertiary drain canals or nearby, nowadays out of the function, because the abandonment of the agricultural activities

Salt marshes are communities of emerged halophytic vegetation in areas alternately inundated and drained by tidal action. The term salt marsh summarizes the saline conditions of the habitat and the emergent vegetation that dominate it. Salt marshes are one of the most prevalent habitats in coastal areas, in the low-lying alluvial plain behind sandy dunes. These are submerged in winter and dry (partly or totally) in summer. Extended halophilous vegetation has developed around these salt marshes. Salt marshes are populated by halophytes, plants that can live under saline conditions. Within this habitat type, plant cover alternates with bare ground that, in areas of high salinity, is covered with crystallized salt. Salt marsh-related communities are characterized by differences in their dominant vegetation, location, and tidal flow and have been described as high marsh, *Salicornia* marsh, *Juncus* marsh, salt pan, tidal marshes, and transitional zone.



Figure 8. 1310 Mostly salt marshes with *Salicornia*

Reedbeds / Drainage channels (72A0)

In poor condition (i.e., extensively managed or altered from the natural state by human activity) and comprising a large proportion of species of non-native origin (and therefore considered as Modified Habitat). European Habitats include 72A0 Reed beds (Phragmito-Magnocaricetea). The study area is characterised by numerous drainage and irrigation channels. The formation of reed beds is more widespread in these channels. High trunk helophytes, such as Common reed (*Phragmites australis*), Lesser bulrush (*Typha angustifolia*), and *Scirpus lacustris*, are the dominant species. These are frequently accompanied by species such as Branched bur-reed (*Sparganium erectum*), Water plantain (*Alisma plantago-aquatica*), Spike rush (*Eleocharis palustris*), Purple loosestrife (*Lythrum salicaria*), Water speedwell (*Veronica anagallis-aquatica*) and Water mint (*Mentha aquatica*).

European Habitats include 72A0 Reed beds (Phragmito-Magnocaricetea). The main vegetation elements (amphibious vegetation) found in these habitats are those dominated by Common reed (*Phragmites australis*), Lesser bulrush (*Typha angustifolia*), Soft rush (*Juncus effusus*), Needle spikerush (*Eleocharis acicularis*), Brown galingale (*Cyperus fuscus*), *C. flavescens*, Toad rush (*Juncus bufonius*) and Branched centaury (*Centaurium pulchellum*) accompanied by hygrophilous shrubs such as White willow (*Salix alba*), Small-flowered tamarisk (*Tamarix parviflora*), etc.

The vegetation in these habitats is generally dominated by common plant species typical of freshwater wetlands. Most of the species recorded are relatively frequent in wetland habitats elsewhere in the general area. Although wetlands are generally of high ecological interest, these fragmented remnants (mostly artificial water bodies) occurring within the study area are small and of little botanical interest. They are considered to be common on both a local and national scale. The strictly botanical value of the vegetation encountered within the study area is generally medium; however, these habitats, just like the river and stream habitats are of high ecological interest.



Figure 9. Reedbeds vegetation / Drainage channels vegetation

Coastal Coniferous Forest - dominated by *Pinus halepensis* and *P. Pinea* (2270*)

In poor condition (i.e., extensively managed or altered from the natural state by human activity) and comprising a large proportion of species of non-native origin (and therefore considered as Modified Habitat). Forest stands with the dominance of, Aleppo pine, stone pine, and/or maritime pine (*Pinus halepensis*, *P. pinea*, *P. pinaster*) occur along almost all the low sandy coast of the study area (western AOI), extending from the first back dune to the last settled innermost dune environment.

This habitat occurs on AOI and is presented only by WP 103, WP-117, WP-119, WP-120, WP-121, WP-218, and WP-219 is extended on the western part of PDAs close to the coastal dunes of Semani Beach. It includes the EUNIS habitat type Code B1.74 (EUNIS Classification of 2012) or the habitat 2270 wooded dunes with *Pinus halepensis* and *Pinus pinea* L. (Habitat Directive). The forests are dominated by *Pinus halepensis* and *Pinus pinea*, densely growing on sandy soils.

Distribution patterns of understory assemblages of coastal pine stand on sand dunes are still little known, despite such forests being widespread along the Mediterranean coastline. The coastal pine forests show the lack of a clear floristic differentiation among different pine forest types at the community level. This pine

forest originated from plantations cultivated 40 – 50 years ago for sandy dune stabilization and as a windbreak belt to protect arable land. Currently, they represent habitats with priority status, included in Annex I to Directive 92/43/EEC. Their undergrowth is not always species-poor as usually described for pine forests. In clearings, shrubby and herbaceous understories exist, dominated by species such as *Rubus ulmifolius* Schott., as well as *Myrtus communis* L., *Erica manipuliflora* Salibs., *Lagurus ovata* L., etc. *Angelica sylvestris* L., *Calystegia sepium* (L.) R. BR., *Asparagus acutifolius* L. *Luzula forsteri* (Sm.) DC., *Vicia cracca* L., *Muscari comosum* (L.) Miller., *Ruscus aculeatus* L., *Smilax aspera* L., *Orchis morio* (L.) R.M. Bateman., *Rubia peregrina* L., *Galium aparine* L. *Myrtus communis* L., etc. The vegetation is dominated by common plant species typical of this kind of forest, with low plant species diversity.



Figure 10 Coastal Coniferous Forest of Aleppo and stone pines

Historically, the primary role of coastal pine forest stands was as a shelterbelt to protect cropland from salty sea spray. The forests are maintained by humans for coastal defense against waterproofing and soil erosion. These forests play a major ecological role in the region and have always been a fundamental factor in the life of its inhabitants.

Stream/ River Habitat, *Salix alba*, and *Populus alba* galleries (92A0)

Suffering from moderate disturbance or interference, but still comprising largely populations of native (Albanian) plant species and therefore of significant biodiversity value (and therefore considered as Natural Habitat); Mediterranean riparian poplar forests are riparian habitat types usually distributed along rivers and in their floodplains. Its presence depends on the underground water level, while occasional inundations are vital for its conservation. The soils are usually sandy clay formed from alluvial deposits, enriching them with nutrients.

There is located on the Northern (Semani River) and Southern (Primary drain canal) parts of the DPA (WP-201 and WP-205). It is classified under code T1-42 / G1.33. The poplar forests are usually the tall ligneous vegetation belt closest to the water in riverside catena. Mediterranean riparian *Populus* forests (EUNIS Classification 2012) or 92A0 Mediterranean riparian poplar forests, (Habitat Directive), or *Populus alba* and *Salix alba* galleries.

This habitat of broadleaved deciduous woodlands of periodically- or seasonally-flooded alluvial or gravelly deposits in river valleys and along streamside is typical of humid localities within the thermo- and meso-Mediterranean belts. *Populus* spp. is the commonest trees with different associates but are typically fast-growing, forming a tall canopy, with an understory beneath. The tree layer is usually stratified into two heights. The herb layer can be rich and the fern, bryophyte, and lichen floras can be especially diverse and luxuriant in deep humid gorges. The surface area of shrub and herbaceous layers varies, depending on the light conditions inside the forests.

Mediterranean multi-layered riverine forests of base-rich soils submitted to seasonal prolonged inundation with slow drainage, with *Populus alba*, *Populus nigra*, *Fraxinus angustifolia*, *Ulmus minor*, *Salix alba*, *Salix* spp., lianas, and often species of *Quercetalia ilicis*. Major pressures are related to human activities such as agriculture or modification of the hydrogeological conditions. Conservation demands maintenance or

restoration of the natural hydrological conditions and protection against alternative land use and development. However, as the habitat mainly includes annual, pioneer, well-adapted species to shoreline dynamics, it could recover naturally from modest damage.

This habitat is species-rich, with the richest botanical diversity point of view, in the study area. Many species are transgressive from other communities (*Periploca graeca*), indicators of disturbance (*Carduus acanthoides*). or highly invaded by *Amorpha fruticosa*. Although most of the species recorded are relatively frequent in stream/river habitats elsewhere in Albania, the river and stream vegetation and habitats are, by nature, much more limited in extension than most of the vegetation types. Consequently, river and stream habitats are considered sensitive habitats and high-value environments. It is considered a sensitive habitat and possibly potential CH.

The riparian woodlands are largely dominated by *Populus alba* L. colonizing poorly stabilized alluvial deposits. In these habitats they can form species-rich communities with the associated flora, including *Salix alba* L., *Populus alba* L., *Salix purpurea* L., *Salix elaeagnos* Scop, *Alnus glutinosa* L., *Fraxinus angustifolia* L., *Cornus sanguinea* L., *Crataegus monogyna* Jacq., *Vitex agnus-castus* L., *Rubus ulmifolius* Schott., *Hedera helix* L., *Clematis vitalba* L., *Symphytum bulbosum* C.Schimpt, *Aristolochia rotunda* L., *Arum italicum*, *Brachypodium sylvaticum*, *Carex pendula*, *Galium aparine*, *Tamus communis*, *Urtica dioica*, *Pteridium aquilinum*, *Clematis viticella* L., *Symphytum bulbosum* C. Schimpt, *Aristolochia rotunda* L. *Ulmus minor* Miller., *Carpinus orientalis* Miller., *Calystegia sepium* (L.) R. BR., *Prunella vulgaris* L., *Circaea lutetiana* L., *Brachypodium sylvaticum* (Hudson) P. Beauv., *Dactylis glomerata* L., *Vinca major* L., *Aristolochia clematis* L., *Carex distans* L., *Carex flacca* Schreber., *Carex remota* L., *Agrostis stolonifera* L., *Rhinanthus minor* L., *Gratiola officinalis*, etc.

Community of *Eucalyptus globulus* – Wind break belt (artificial plantation)

This group of habitats “Community of *Eucalyptus globulus* – Wind break belt (artificial plantation)” is presented by 3 WPs (WP-201, WP-205, WP-221).

In poor condition (i.e., extensively managed or altered from the natural state by human activity) and comprising a large proportion of species of non-native origin (and therefore considered as Modified Habitat).

It is a windbreak belt forest, build years ago in order to provide shelter from the wind, protect crops from strong sea winds, protect soil from erosion to strengthen the seawall, and protect agricultural land from floods. It is represented by WP-202 and WP-203. There is a wind-break belt; dominated by *Eucalyptus globulus*. *Eucalyptus* trees are known for their large stature. This biological belt is seriously damaged by illegal logging but still, continues to be an important shelter for birds and small animals. Specie composition is similar to the Stream/River Habitat and semi-natural grassland originated from the abandonment of agricultural land.



Figure 11 Wind break belt of *Eucalyptus globules*

The inventoried species were: *Eucalyptus globulus* Labill., *Avena fatua* L., *Aristolochia rotunda* L., *Arum italicum* Mill., *Plantago lanceolata* L., *Potentilla reptans* L., *Blackstonia perfoliata* (L.) Hudson., *Calystegia sepium* (L.) R. Br., *Clematis vitalba* L., (*Clematis viticella* L., *Dactylis glomerata* L., *Orchis mascula* L.,

Prunella vulgaris L., *Tamus communis* L., *Rubus ulmifolius* Schot., *Agrimonia eupatoria* L., *Alnus glutinosa* (L.) Gaertner., *Bidens tripartita* L., *Carex pendula* Hudson., *Crataegus monogyna* Jacq., *Juncus effusus* L., *Parietaria officinalis* L., *Periploca graeca* L., *Populus alba* L., *Prunus spinosa* L., *Pyracantha coccinea* M. J. Roemer., *Ranunculus ficaria* L., *Rosa sepervirens* L., *Salix alba* L., *Salix purpurea* L., *Saponaria officinalis* L., *Tamarix parviflora* DC., *Ulmus minor* Miller., *Vitex agnus-castus* L., *Hypericum perforatum* L., *Centaurium erythraea* Rafin., *Leontodon tuberosus* L., *Medicago lupulina* L., *Melampyrum barbatum* Waldst & Kit., *Rhinanthus minor* L., *Taraxacum officinale* Weber., *Asparagus aquatifolius* L., *Dorycnium pentaphyllum* Scop., *Galium aparine* L., *Phyllirea angustifolia* L., *Medicago marina* L.

Sea dunes of the Mediterranean coast (2110) - Beaches, dunes, and sand plains)

In poor condition (i.e., extensively managed or altered from the natural state by human activity) and comprising a large proportion of species of non-native origin (and therefore considered as Modified Habitat).

Beaches, dunes, and sand plains represent natural non-vegetated expanses of sand or pebble/gravel, in coastal locations, like beaches, and dunes; including beds of stream channels with torrential regimes. Vegetation covers a maximum of 10%. Formations of the coasts of the Mediterranean region represent the first stages of dune construction, constituted by ripples or raised sand surfaces of the upper beach or by a seaward fringe at the foot of the tall dunes. The sandy dunes in the study area cover a narrow belt of coastline, with a variable width that ranges from 10 to 50 meters and which reaches a maximum height of 1 meter. The presence of a dune system is the result of a number of factors, which determine the morphology of a sandy coast including sufficient fluvial or marine sand deposit and the presence of a strong, prevailing wind.

The study area is represented by WP 101 and WP108 (out of DPA). Represent a very narrow belt of coastline habitat, in the western part of the surrounding zone of the PV plant. It is included in code B1.24 of EUNIS habitat type (Sandy beach ridges with no or low vegetation) or code 2110 Embryonic shifting dunes (*Cakiletea maritima* & *Ammophiletea*). This habitat type includes the low sand dunes of the shoreline. They are characterized by the presence of organic material and plant remains washed up by the sea and also by incessant mobility and changing of shape, which ensure their low height (<1 m) and sparse vegetation cover. The presence of a dune system is the result of a number of factors, which determine the morphology of a sandy coast including sufficient fluvial or marine sand deposit and the presence of a strong, prevailing wind.

Sandy beach ridges can be bare or may host pioneer communities of the class *Ammophiletea* consisting mainly of geophytes and hemicryptophytes, e.g., the association *Agropyron juncei-Sporobolium pungentis*. They may sporadically be inundated by seawater during storms. The vegetation is ammonitrophilous, of the class *Cakiletea maritima*, enriched by many *Ammophiletea* species like *Echinophora spinosa*, *Elymus farctus*, *Eryngium maritimum*, etc. The floristic composition of the sandy dunes includes typical psammophytes such as *Eryngium maritimum* L., *Cakile maritima* Scop, *Echinophora spinosa* L., *Euphorbia peplis* L., *Ammophila arenaria* (L.) Link, *Salsola kali* L., *Inula crithmoides* L., *Sporobolus pungens* (Schreber). L., *Xanthium strumarium* L., etc. It comprises almost all vegetation on the beaches and shifting dunes, but often is degraded due to the pressure of summer bathers. Within the study area, the natural succession of the sand dune ecosystems has been disturbed by human activities, and the "true" dunes are not found. An obvious result of human impact is the extensive distribution of *Xanthium strumarium* L. (the specie was introduced from America and is perfectly adapted in these areas) and many invaders from neighboring disturbed grounds or cultivated habitats. Most common are: *Anagallis foemina* (Mill.) Manns & Anderb, *Trifolium angustifolium* L., *Avena sterilis* L., *Bromus hordeaceus* L., *Hordeum murinum* L., *Juncus conglomeratus* L., *Lagurus ovatus* L., *Silene colorata* Piret, *Cynosurus echinatus* L., *Erodium cicutarium* (L.) L'Hér. ex Aiton, and *Vitex agnus-castus* L. The presence of this vegetation is an important factor in slowing down the movement of sand pushed from the sea towards the land. The botanical and ecological value of this habitat is generally high. The botanical value of this habitat encountered within the study area is low.

6510 Natural and semi natural grasslands / Lowland hay meadows

In poor condition (i.e., extensively managed or altered from the natural state by human activity) and comprising a large proportion of species of non-native origin (and therefore considered as Modified Habitat).

Natural Grasslands (low lands Grasslands) and semi-natural grassland (Recently Abandoned Agricultural Areas). Habitat 6510 (Habitat directive), Code 38.2 (EUNIS Habitat Type) lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*). Species-rich hay meadows on lightly to moderately fertilised

soils of the plain to submontane levels, belonging to the Arrhenatherion and the Brachypodio-Centaureion nemoralis alliances. These extensive grasslands are rich in flowers and are not cut before the grasses flower and then only one or two times per year.

Species-rich hay meadows on little to moderately fertilized soils of the plain to submontane levels, belonging to the Arrhenatherion and the Brachypodio-Centaureion nemoralis alliances. These extensive grasslands are rich in flowers and are not reaped before the flowering of the grasses and then only one or two times per year. Such grasslands are sometimes managed as grazing or as winter food for livestock -cutting for hay or silage. They are generally meadow or pasture land. Because of their traditional management, they contain a high diversity of species native to the particular country.

Mixed Mosaic Agricultural land

In poor condition (i.e., extensively managed or altered from the natural state by human activity) and comprising a large proportion of species of non-native origin (and therefore considered as Modified Habitat). It represents code I1.5 of EUNIS Habitat type (Bare tilled, fallow, or recently abandoned arable land) or Mixed Mosaic Agricultural Areas (even recently abandoned arable land, urban and suburban construction, domestic gardens of villages, and urban peripheries). This habitat is represented in the study area by WP-116, WP-124, WP-125, and WP-212.

Croplands are planted for annually or regularly harvested crops other than those that carry trees or shrubs. They include fields of cereals, sunflowers and other oilseed plants, beets, legumes, fodder, potatoes, and other forbs. Croplands comprise traditionally and extensively cultivated crops with little or no chemical fertilization or pesticide application. Faunal and floral quality and diversity depend on the intensity of agricultural use and the presence of borders of natural vegetation between fields.

The majority of the land from the coastal area to Fieri Dermenas village consists of reclaimed wetlands agricultural lands. Typical elements of this landscape include arable land mainly farmed with traditional crops like maize, recently abandoned agricultural lands used as pastures, fruit tree plantations, and vineyards. Most agricultural areas are on fairly poor soils. The most important crops cultivated in these areas are *Zea mays* L, Hassell, *Medicago sativa* L. fruit trees, vineyards, fig trees, represent horticulture, etc. The biodiversity value of this habitat encountered within the study area is low.



Figure 12 Mixed mosaic agricultural land

Ruderal vegetation (vegetation of the roadside, settlements, villages, abandoned fields)

In poor condition (i.e., extensively managed or altered from the natural state by human activity) and comprising a large proportion of species of non-native origin (and therefore considered as Modified Habitat).

Ruderal vegetation represents a highly dynamic floristic/vegetational complex, which develops most often in human settlements and other environments which are permanently or temporarily exposed to anthropogenic influences. Anthropogenic factors are of key significance in the formation, survival, distribution, diversity, and dynamics of this type of vegetation. The different species composition and vegetation types of ruderal habitats are conditioned by their location. The presence of invasive species was often met on the ruderal vegetation.

Mostly we are referring to the vegetation on the roadside of the main road that runs through the middle of PDA. The presence of invasive species is a common phenomenon that seriously threatens to spread to agricultural or natural habitats, disrupting natural biological balances. *Amaranthus albus* L., *Amaranthus hybridus* L., *Dittrichia viscosa* L., *Robinia pseudoacacia* L., *Datura stramonium* L., *Ailanthus altissima* (Miller) Swingle., *Chenopodium album* L., *Conyza canadensis* L. are the most important invasive species which are meet on the ruderal areas.



Figure 13 Ruderal vegetation

5.1.2. Vegetation and Flora

The study area is part of the Western Lowland of the Adriatic Sea or Lowland of Myzeqe. The botanical inventory during the field survey and secondary data resulted in a relatively high degree of “ α diversity” (specific biodiversity) in the Project area. The subsequent botanical survey undertaken in June 2021 confirmed the presence of 299 vascular plant species, in the project area or AOI or c.a. 8% of Albania’s flora, distributed in 65 families.

The most representative families are Poaceae (44 species), Asteraceae (40 species), Fabaceae (23 species), Cyperaceae (14 species), Brassicaceae (11 species), Lamiaceae (9 species), Rosaceae, Apiaceae, Chenopodiaceae (of 8 species), Ranunculaceae and Scrophulariaceae (of 6 species), Caryophyllaceae, Polygonaceae, Amaranthaceae, Juncaceae, Convolvulaceae and Linaceae (of 5 species), etc.

Interesting is the variability of floristic cortege in biological forms analyse (Raunkier system of classification, using life-forms categories), which on the graph below is presented.

The Raunkiaer system is a system for categorizing plants using life-form categories. The low number (13%) of Phanerophytes (Ph) (12%) and high number of Hemycryptophytes (H) (36%) indicate a limited ecological condition for the growth of trees species (low soil fertility) and a high level of degradation of the vegetation because of unsustainable practices (agriculture and grazing).

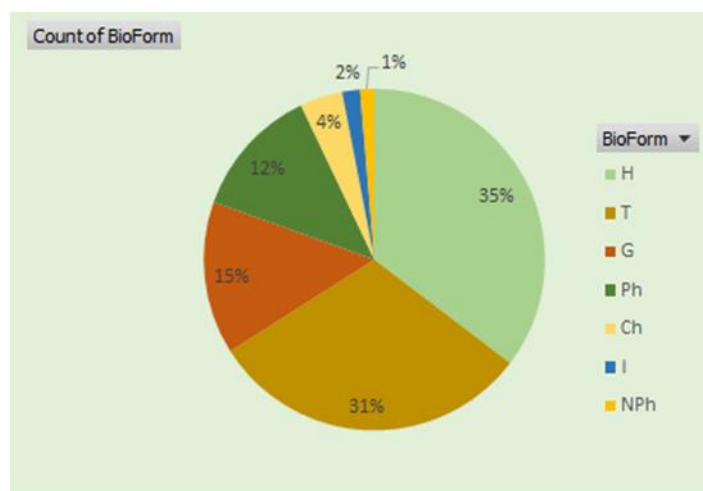


Figure 14 Biological spectrum

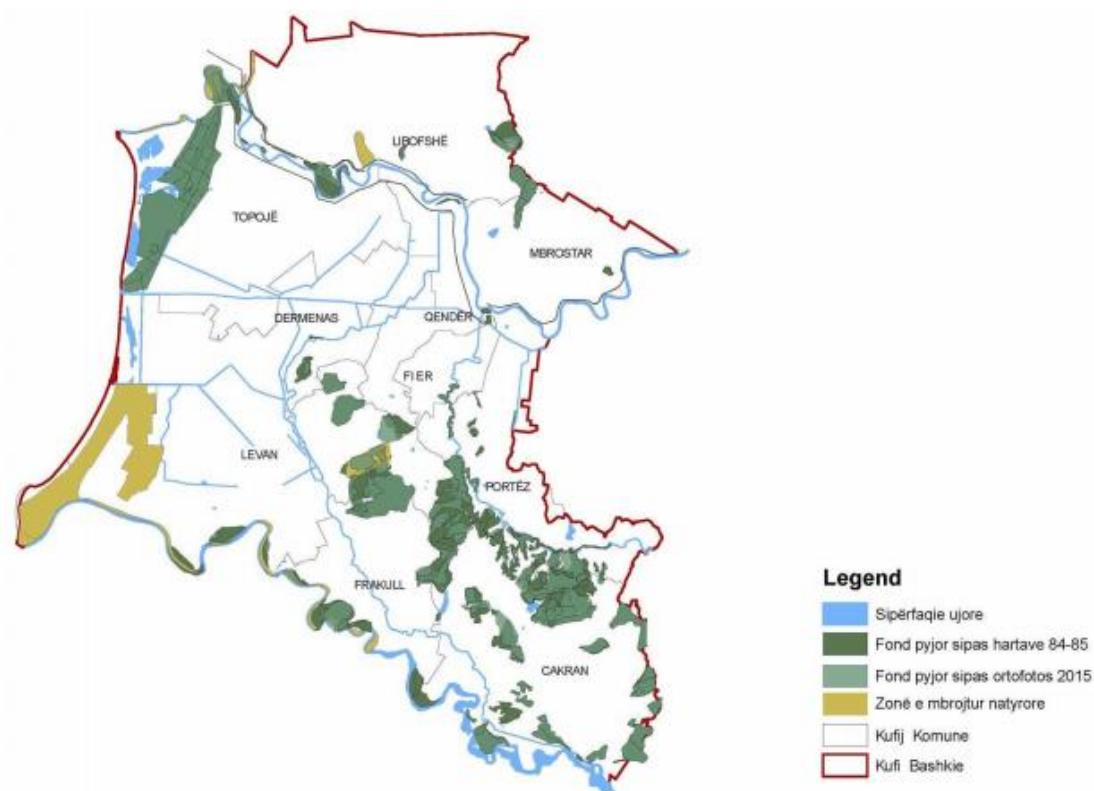


Figure 15 Forest Fund Map

5.1.3. Threatened plant species

From the species inventoried, in the study area, resulted that there are in total, 120 species under IUCN threatened status, from which 117 species are under LC Category, 5 species under DD category, and one species under the NT category. (IUCN, 2021)

Based on the Albanian Red List, within the zone of interest, there are 3 species are under the EN category and 8 species under the VU category. 7 species are under the A1b code (rapid decline > 50% in 10 years. Decrease/reduction, or area occupied by the species in question, and/or habitat quality), and 4 species under code A2b (Rapid decline> 50% in 20 years, expected decline shortly is based on

Decrease/reduction of spread, or area occupied by the species in question, and/or habitat quality). (MoE, 2013). For more information refer to Table 12).

Table 12. List and status of the threatened species

Latin name	English name	IUCN Red List 2021			Albanian Red List	
		Status	Level	Trend	Category	Code
<i>Ammophila arenaria</i> (L.) Link.	Marram grass				EN	A1b
<i>Hypericum perforatum</i> L.	Perforate St. John's wort	LC	Europe	Stable	EN	A1b
<i>Origanum vulgare</i> L.	Wild Marjoran	LC	Europe	Stable	EN	A1b
<i>Juniperus macrocarpa</i> Sibth. & Sm.	Red Barried Juniper	LC	Global	Stable	VU	A1b
<i>Orchis mascula</i> L.	Early-purple orchid	LC	Europe	Decreasing	VU	A1b
<i>Pinus pinea</i> L.	Stone pine	LC	Europe	Stable	VU	A2c
<i>Populus alba</i> L.	White poplar	LC	Europe	Stable	VU	A2b
<i>Sambucus nigra</i> L.	Common Elder	LC	Europe	Stable	VU	A1b
<i>Stachys maritima</i> Gouan	Sea Woundwort				VU	A1b
<i>Tamarix hampeana</i> Boiss. & Heldr.	Tamarix	LC	Europe	Stable	VU	A2b
<i>Ulmus minor</i> Miller.	Common Elm	DD	Europe	Unknown	VU	A2b
<i>Achillea millefolium</i> L.	Yarrow	LC	Europe	Stable		
<i>Aegilops geniculata</i> Roth.	Egg-Shaped Goat Grass	LC	Mediterranean	Stable		
<i>Aeluropus litoralis</i> (Gouan) Parl.	Aeluropus	LC	Mediterranean	Stable		
<i>Agrostis stolonifera</i> L.	Creeping Bent, Spreading	LC	Mediterranean	Stable		
<i>Alisma plantago aquatica</i> L.	Water plantain	LC	Mediterranean	Stable		
<i>Alopecurus pratensis</i> L.	Meadow foxtail	LC	Europe	Unknown		
<i>Ambrosia maritima</i> L.	Sea Ragweed	LC	Mediterranean	Stable		
<i>Arrhenatherum elatius</i> (L.) P.Beau	False oat-grass	LC	Europe	Stable		
<i>Artemisia campestris</i>	Field wormwood	LC	Europe	Decreasing		
<i>Artemisia vulgaris</i> L.	Mugwort	LC	Europe	Stable		
<i>Arundo donax</i> L.	Giant Reed	LC	Mediterranean	Increasing		
<i>Asparagus maritimus</i> (L.) Miller	Scabrous Asparagus	DD	Global	Unknown		
<i>Asphodelus aestivus</i> Brot.	Summer Asphodel	LC	Mediterranean	Stable		
<i>Ballota nigra</i> L.	Black Horehound	LC	Europe	Stable		
<i>Bidens tripartita</i> L.	Nodding BurMarigold	LC	Europe	Stable		
<i>Bolboschoenus maritimus</i> (L.) Palla	Sea clubrush	LC	Europe	Stable		
<i>Bromus erectus</i> Hudson	Erect Brome	LC	Mediterranean	Unknown		
<i>Callitriche stagnalis</i> Scop.	Common Water-Starwort	LC	Europe	Stable		
<i>Calystegia sepium</i> (L.) R. Br.	Lop-Grass,	LC	Global	Unknown		
<i>Capsella bursa-pastoris</i> L.	Shepherd's-purse	LC	Europe	Stable		
<i>Carex distans</i> L.	Distant sedge	LC	Global	Stable		

Carex divisa Huds.	Divided sedge	LC	Mediterranean	Stable		
Carex extensa Good	Long-bracted sedge	LC	Mediterranean	Stable		
Carex pendula Hudson	Pendulous Sedge	LC	Mediterranean	Stable		
Centaurium erythraea Rafin	Common Centaury	LC	Europe	Stable		
Centaurium spicatum G. Mans.	Schenkia spicata	LC	Mediterranean	Stable		
Crypsis aculeata (L.) Aiton	Sharp-leaved grass	LC	Mediterranean	Stable		
Cynanchum acutum L.	Acute swallow-wort	LC	Global	Increasing		
Cyperus capitatus Vandellii	Dune Galingale	LC	Mediterranean	Stable		
Daucus guttatus S. et S.	Bicoloured carrot	DD	Europe	Unknown		
Eleocharis palustris (L.) Roem. & Schult.	Common spike-rush	LC	Europe	Stable		
Elymus farctus (Viv.) Runemark ex Melder	Sand couch-grass	LC	Global	Unknown		
Equisetum telmateia Ehrh.	Giant Horsetail	LC	Global	Unknown		
Erianthus ravennae (L.) Beauv.	Ravenna cane	LC	Europe	Stable		
Erica arborea L.	Briar Tree Heath	LC	Europe	Stable		
Eryngium maritimum L.	Sea holly	LC	Europe	Decreasing		
Eucalyptus globulus Labill	Blue Gum	LC	Global	Stable		
Fraxinus angustifolia Vahl.	Narrow-leaved ash	LC	Europe	Decreasing		
Galega officinalis L.	Goat's Rue	LC	Europe	Stable		
Galium aparine L.	Goosegrass, Cleavers	LC	Europe	Stable		
Hordeum marinum L.	Squirrel tail-grass	LC	Europe	Unknown		
Hordeum murinum L.	Squirrel tail-grass	LC	Europe	Stable		
Imperata cylindrica L.	Wolly Grass	LC	Mediterranean	Stable		
Juglans regia L.,	Walnut	LC	Europe	Decreasing		
Juncus acutus L.	Spiny rush	LC	Europe	Stable		
Juncus compressus Jacq.	Round-fruited rush	LC	Mediterranean	Stable		
Juncus inflexus L.	Hard Rush	LC	Mediterranean	Stable		
Juncus maritimus Lam	Sea Rush	LC	Mediterranean	Stable		
Juncus subulatus Forssk	Multiflowered Rush	LC	Mediterranean	Stable		
Lepidium latifolium L.	Broad-leaved Pepperwort	LC	Europe	Stable		
Lolium perenne L.	Perennial ryegrass	LC	Europe	Stable		
Lycopus europaeus L.	Gipsy-Wort	LC	Mediterranean	Stable		
Lysimachia nummularia L.	Creeping jenny	LC	Europe	Stable		
Lythrum salicaria L.	Purple Loosestrife	LC	Mediterranean	Stable		
Marrubium vulgare L.	Common horehound	NT	Europe	Decreasing		

Medicago marina L.	Coastal medick	LC	Europe	Stable		
Medicago prostrata Jacq.,	Crippling alfalfa	LC	Europe	Stable		
Mentha aquatica L.	Water Mint	LC	Mediterranean	Stable		
Mentha longifolia (L.) Hudson	Long-Leaved Mint	LC	Mediterranean	Stable		
Myrtus communis L.	Common Myrtle	LC	Europe	Stable		
Nasturtium officinale R. Br.	Watercress	LC	Mediterranean	Stable		
Ononis spinosa L.,	Spring Rest-Harrow	LC	Europe	Decreasing		
Persicaria hydropiper (L.) Delarbre	Water-Pepper	LC	Mediterranean	Stable		
Phalaris arundinacea L.	Reed Grass	LC	Mediterranean	Stable		
Phalaris coerulescens Deaf	Sunolgrass	LC	Mediterranean	Stable		
Phragmites australis (Cav). Trin.	Common Reed	LC	Europe	Stable		
Pistacia lentiscus L.	Mastic Tree, Lentisk	LC	Europe	Stable		
Plantago lanceolata L.	Ribwort Plantain	LC	Europe	Stable		
Poa annua L.,	Annual meadow grass	LC	Global	Increasing		
Polygonum lapathifolium L.	Pale Persicaria	LC	Europe	Stable		
Polypogon maritimus Willd.	Mediterranean rabbitsfoot grass	LC	Mediterranean	Stable		
Polypogon monspeliensis (L.) Desf.	Annual beard-grass	LC	Mediterranean	Stable		
Portulaca oleracea L.	Common Purslane	LC	Mediterranean	Stable		
Potamogeton pectinatus (L.)	Fennel Pondweed	LC	Mediterranean	Increasing		
Prunella vulgaris L.	Self-Heal	LC	Europe	Stable		
Prunus spinosa L.	Blackthorn Tree	LC	Europe	Stable		
Puccinellia festuciformis (Host) Parl.	Alkali grass	LC	Mediterranean	Unknown		
Punica granatum L.	Pomegranate	LC	Global	Unspecified		
Ranunculus aquatilis L.	Common Water Crowfoot	LC	Global	Stable		
Ranunculus ficaria L.	Lesser Celandine,	LC	Mediterranean	Stable		
Raphanus raphanistrum L.	Wild Radish	LC	Europe	Stable		
Robinia pseudoacacia	Black lacust	LC	Global	Increasing		
Rumex crispus L.	Curled Dock	LC	Mediterranean	Stable		
Rumex hydrolapathum Hudson	Sorrel	LC	Europe	Stable		
Ruscus aculeatus L.	Butcher's Broom	LC	Europe	Stable		
Salix alba L.	White Willow	LC	Europe	Stable		
Salix purpurea L.	Purple Willow	LC	Europe	Stable		
Sambucus ebulus L.	Danewort,	LC	Europe	Stable		
Samolus valerandi L.	Brookweed	LC	Mediterranean	Stable		
Saponaria officinalis L.	Soapwort, Bouncing Bet	LC	Europe	Stable		
Schoenus nigricans L.	Black sedge	LC	Global	Stable		

Scirpus holoschoenus L.	Club rush	LC	Global	Unknown		
Scirpus maritimus L.	Maritime club-rush	LC	Europe	Stable		
Silybum marianum (L.) Gaertn.	Milk Thistle	LC	Europe	Stable		
Sinapis arvensis L.	Charlock	LC	Europe	Stable		
Sisymbrium officinale (L.) Scop.	Medical Rocket	LC	Europe	Stable		
Smilax aspera L.	Thorny Smilax	LC	Europe	Unknown		
Sonchus maritimus L.	Sow thistles	LC	Mediterranean	Stable		
Spergularia marina Besser.	Spergularia salina	LC	Global	Stable		
Tamarix dalmatica Baum.	Dalmat tamarix	LC	Mediterranean	Stable		
Tamarix parviflora DC.	Small-Flowered Tamarisk	LC	Europe	Unknown		
Tamus communis L.	Black Bryony	LC	Europe	Stable		
Taraxacum officinale Weber	Common Dandelion	LC	Europe	Stable		
Trifolium angustifolium L.	Narrowleaf crimson clover	LC	Europe	Stable		
Triglochin bulbosa L.	Barrelier's Arrow-Grass	LC	Europe	Stable		
Triglochin maritima L.	Marsh Arrow-Grass	LC	Mediterranean	Decreasing		
Typha angustifolia L.	Lesser Bulrush	LC	Europe	Stable		
Typha shuttleworthii Koch & Sander in Koch	Silver Grey Bulrush	DD	Europe	Decreasing		
Urtica dioica L.	Common nettle	LC	Europe	Stable		
Verbena officinalis L.	Vervain	LC	Mediterranean	Stable		
Vicia grandiflora L.	Large Flowered Vetch	LC	Europe	Stable		
Vitex agnus-castus L.	Chaste Tree	DD	Europe	Unknown		

These species are not part of plant species in Annex II & IV of EU Directive EEA.

5.1.4. Invasive Alien Species of Flora (IAS)

Invasive alien plant species (IAP) are species whose introduction and/or spread outside their natural distribution threaten biological diversity. They are non-native to an ecosystem and may cause economic or environmental harm. They impact negatively on biodiversity, including the decline or elimination of indigenous species – through competition for water and the disruption of local ecosystems and ecosystem functions. IAPs, introduced and/or spread outside their natural habitats, have affected natural biodiversity in almost every ecosystem type on earth and are one of the greatest threats to biodiversity.

Within the project area are identified more than 10 invasive species as, *Dittrichia viscosa* L., *Amaranthus albus* L., *Cuscuta campestris* Juncher., *Datura stramonium* L., *Erigeron canadensis* (L.) Conquist., *Xanthium strumarium* L., *Cercis siliquastrum* L., *Arundo donax* L. These species together with some thorny species like *Rubus ulmifolius* Schot., *Crataegus monogyna* Jacq., *Ononis spinosa* L., *Rosa sempervirens* L., etc., indicate a high level of human impact, and especially greasing impacts.



Figure 16 Plant Cover Picture

5.2. Fauna

Based on literature review and field work conducted in June and October 2021 and April 2022, a full list of terrestrial fauna was compiled. 31 species of mammals out of 86 terrestrial mammal species of Albania are hosted within the wider study area, out of which 18 species were recorded/observed during the field surveys, while the presence of other species is potential or presumed present due to habitat suitability and presence in the areas nearby. Three species of bats out of nine occurring in the wider study area (*Pipistrellus pipistrellus*, *P. kuhli*, *P. nathusii*) are observed and/or recorded through bat detecting, using the Blue 1 and 2 PV project site of as part of their forage grounds.

Table 13 Mammal species occurring in the wider Blue 1 PV study area

Mammal Species		Habitat (Atlas, 1997)	Protection status (IUCN, 92/43/EU)	Atlas of European Mammals, 1997	Bego, et al, (2018)	Benda et al. 2019	Albania Red List (2013)
Latin Name	Common name						
<i>Erinaceus roumanicus</i>	Eastern hedgehog	Agriculture land	none	X	X		
<i>Crocivura leucodon</i>	Bi-coloured white-	Agricultural landscapes	Bern Convention (III)	X			

Mammal Species		Habitat (Atlas, 1997)	Protection status (IUCN, 92/43/EU)	Atlas of European Mammals, 1997	Bego, et al., (2018)	Benda et al. 2019	Albani a Red List (2013)
Latin Name	Common name						
	toothed shrew						
<i>Crocidura suaveolens</i>	Lesser white-toothed shrew	Wide variety of habitats. Avoided dense forests	Bern Convention (III)	X	X		
<i>Suncus etruscus</i>	Pygmy white-toothed shrew	Olive groves and vineyards with old dry stone, low maquis and open forests	Bern Convention (III)	X			DD
<i>Talpa stankovici</i>	Balkan mole	Open habitats	none	X	X		
<i>Rhinolophus ferrumequinum</i>	Greater horseshoe bat	Warm caves, mines, permanent pastures and deciduous woodlands	Annex II & IV	X		X	LRcd
<i>Rhinolophus euryale</i>	Mediterranean horseshoe bat	Caves and artificial shelters	Annex II & IV, VU	X		X	VU
<i>Rhinolophus hipposideros</i>	Lesser horseshoe bat	Caves, riparian vegetation	Annex II & IV, NT	X		X	LRnt
<i>Myotis myotis</i>	Greater mouse-eared bat	Caves and mines	Annex II & IV	X		X	
<i>Pipistrellus kuhlii</i>	Kuhl's pipistrelle	Urban, lowland basins	Annex IV	X		X	
<i>Pipistrellus nathusii</i>	Nathusius Pipistrelle	Mixed and pine forests, riparian	Annex IV	X		X	
<i>Pipistrellus pipistrellus</i>	Common pipistrelle	Farmland, woodland, lakes	Annex IV	X		X	

Mammal Species		Habitat (Atlas, 1997)	Protection status (IUCN, 92/43/EU)	Atlas of European Mammals, 1997	Bego, et al, (2018)	Benda et al. 2019	Albani a Red List (2013)
Latin Name	Common name						
<i>Pipistrellus pygmaeus</i>	Soprano pipistrelle	Rooftops and houses, riparian	Annex IV			X	
<i>Lepus europaeus</i>	Brown hare	Open woodland, farmland, steppes	Bern Convention (III)	X			
<i>Sciurus vulgaris</i>	Red squirrel	forests	Bern Convention (III)	X		X	LRnt
<i>Apodemus flavicollis</i>	Yellow-necked mouse	woodlands	none	X	X		
<i>Apodemus sylvaticus</i>	Wood mouse	Extremely variable	none	X	X		
<i>Rattus norvegicus</i>	Brown rat	River banks	none	X			
<i>Rattus rattus</i>	Black rat	Farmland, islands, human settlements	none	X			
<i>Mus macedonicus</i>	Balkan short-tailed mouse	Wide range of habitats	none		X		
<i>Mus musculus</i>	Eastern house mouse	Agriculture, meadows, shrublands, buildings	none		X		
<i>Microtus thomasi</i>	Thomas pine vole	Grasslands and crop fields below 600 m als	none	X	X		LRnt
<i>Glis glis</i>	Fat dormouse	Forests of beech, oak and chestnut	Bern Convention (III)	X	X		LRlc
<i>Muscardinus avellanarius</i>	Common dormouse	Mixed deciduous forests	Annex IV	X	X		DD

Mammal Species		Habitat (Atlas, 1997)	Protection status (IUCN, 92/43/EU)	Atlas of European Mammals, 1997	Bego, et al., (2018)	Benda et al. 2019	Albani a Red List (2013)
Latin Name	Common name						
<i>Vulpes vulpes</i>	Red fox	All types of forests and open landscapes	none	X			
<i>Canis aureus</i>	Golden jackal	Open terrains and landscapes, wetlands and marshes	Annex V	X			VU
<i>Mustela nivalis</i>	Weasel	Wide range of habitats	Bern Convention (III)	X			
<i>Mustela putorius</i>	Western polecat	Lowland habitats, sand dunes, forest fringes and river valleys	Bern Convention (III)	X			EN
<i>Martes foina</i>	Beech Marten	Mountains, farmlands, woodlots, suburban areas	Bern Convention (III)	X			LRnt
<i>Meles meles</i>	Badger	Deciduous and mixed woods, coniferous, hedges, scrub, agriculture, suburban areas	Bern Convention (III)	X			EN
<i>Lutra lutra</i>	Otter	Rivers, streams, lakes, wetlands and coasts	Annex II & IV	X			VU

Presence of otter (*Lutra lutra*), badger (*Meles meles*) and golden jackal (*Canis aureus*) was confirmed within the PV project sites (Blue 1) and adjacent drainage channels along the OHL routes, including Semani river, while red fox is most widespread in the whole study area. Semani river, together with network of primary and second grade drainage channels provide important habitats for otter, as they provide feeding grounds and commuting corridors for the species. (See pictures in the Annex 2, at the end of this report)

A high number of mammals, especially small mammals (rodents and insectivores), are linked with mosaic agriculture land and human settlements (synanthropic species), and therefore they are abandoned and of low conservation interest. Some of them are even considered pest animals (rats and mice).

Herpetofauna (Amphibians and Reptiles) of the PV project site and associated TLs is composed of six amphibians (out of 16 amphibian species recorded in Albania) and 23 reptiles (out of 43 species reported in Albania). Two frog species (*Rana dalmatina* and *Hyla arborea*) are Annex IV of EU HD, while one species (*Pelophylax shqipericus*) is an endemic species of Albania and Montenegro, estimated recently as (VU) by the IUCN. This species has a limited distribution range along the coastal area of the two countries and its presence in the PV project site, drainage and irrigation channels network inside the project footprint is very likely. Presence of three frog species (*Pelophylax kurtmuelleri*, *Rana dalmatina* and *Hyla arborea*) was confirmed in the PDA and along the drainage channels intersected by or parallel to the OHL/TL route (see Annex 2).

From 22 reptile species, the presence of 9 species was confirmed during the field surveys of June and October, 2021. However, the presence of other species in the Blue 1 and 2 PV project footprint is certain provided the suitable habitats and presence of the species reported by other surveys in the site. 12 species meet criteria of PBFs, and the presence of 6 species inside the project footprint was confirmed (*Testudo hermanni*, *Emys orbicularis*, *Podarcis muralis*, *Podarcis turcicus/ionicus*, *Zamenis longissimus*, *Natrix tessellata*), while the presence of the remaining species is very likely inside the project footprint. One of the species of special conservation value is the Balkan terrapin (*Mauremys rivulata*), who is assessed as vulnerable (VU) in Albania. The presence of the species is also very likely in the stagnant waters along the drainage channels of the Blue 1 and 2 PV project site and its proximity. The European pond turtle (*Emys orbicularis*) presence was confirmed in many places along the drainage channels of the Blue 1 PV and OHLs and an indication that this species is more common than terrapin (see Annex 2).

Table 14. Amphibian and reptile species occurring in the wider study area of Blue 1 PV area and OHL

Amphibian and Reptile Species		Habitat (IUCN)	Protection status (IUCN Red List, 92/43/EU)	Szabolcs et.al. (2017)	Mizsei et. Al. (2017)	Albania Red List (2013)
Latin Name	Common name					
Amphibians						
Pelophylax shqipericus	Albanian water frog	Wetlands (inland)	VU (Native of Albania and Montenegro)	X		NE
Pelophylax kurtmuelleri	Balkan frog	Terrestrial, Freshwater (=Inland waters)	LC	X		NE
Bufo bufo	Common toad	Terrestrial, Freshwater (=Inland waters)	LC	X		LRnt
Bufotes viridis/variabilis	European green toad	Terrestrial, Freshwater (=Inland waters)	LC	X		LRnt
Rana dalmatina	Agile frog	Terrestrial, Freshwater (=Inland waters)	Annex IV, LC	X		LRlc
Hyla arborea	European tree frog	Terrestrial, Freshwater (=Inland waters)	Annex IV, LC	X		LRcd

Amphibian and Reptile Species		Habitat (IUCN)	Protection status (IUCN Red List, 92/43/EU)	Szabolcs et.al. (2017)	Mizsei et. Al. (2017)	Albania Red List (2013)
Latin Name	Common name					
Reptiles						
Ablepharus kitaibelli	European copper skink	Forest, Grassland, Shrubland, Artificial/Terrestrial	Annex IV, LC		X	NE
Anguis fragilis/graeca	Slow worm	Shrubland, Artificial/Terrestrial, Forest, Grassland	LC		X	NE
Dolichophis caspius	Caspian whipsnake	Shrubland, Artificial/Terrestrial, Rocky areas (eg. Inland cliffs, mountain peaks), Forest, Grassland	Annex IV, LC		X	NE
Elaphe quatuorlineata	Four-lined snake	Shrubland, Wetlands (inland), Artificial/Terrestrial, Forest	Annex II & IV, NT		X	CR
Emys orbicularis	European pond turtle	Terrestrial, Freshwater (=Inland waters)	Annex II & IV, NT		X	LRnt
Hemidactylus turcicus	Mediterranean house gecko	Artificial/Terrestrial, Shrubland, Marine Intertidal, Rocky areas, Caves and Subterranean Habitats (non-aquatic)	LC		X	LRcd
Hierophis gemonensis	Balkan whip snake	Artificial/Terrestrial, Shrubland	LC		X	NE
Lacerta trilineata	Balkan green lizard	Artificial/Terrestrial, Shrubland	Annex IV, LC		X	LRcd
Lacerta viridis	European green lizard	Shrubland, Artificial/Terrestrial, Forest, Grassland	Annex IV, LC		X	LRcd
Malpolon insignitus	Eastern Montpellier snake	Shrubland, Artificial/Terrestrial, Rocky areas (eg. Inland cliffs, mountain peaks), Forest, Grassland, Desert	LC		X	NE

Amphibian and Reptile Species		Habitat (IUCN)	Protection status (IUCN Red List, 92/43/EU)	Szabolcs et.al. (2017)	Mizsei et. Al. (2017)	Albania Red List (2013)
Latin Name	Common name					
<i>Mauremys rivulata</i>	The Balkan terrapin	Terrestrial, Freshwater (=Inland waters)	Annex II & IV, LC		X	VU
<i>Mediodactylus kotschy</i>	Kotschy's gecko	Artificial/Terrestrial, Shrubland, Rocky areas (eg. Inland cliffs, mountain peaks)	Annex IV, LC		X	NE
<i>Natrix natrix</i>	Grass snake	Terrestrial	LC		X	NE
<i>Natrix tessellata</i>	Dice snake	Artificial/Aquatic & Marine, Artificial/Terrestrial, Wetlands (inland), Grassland, Marine Coastal/Supratidal, Marine Neritic	Annex IV, LC		X	NE
<i>Platyceps najadum</i>	Dahl's whip snake	Shrubland, Artificial/Terrestrial, Rocky areas (eg. Inland cliffs, mountain peaks), Forest, Grassland	Annex IV, LC		X	LRcd
<i>Podarcis muralis</i>	Common wall lizard	Shrubland, Artificial/Terrestrial, Forest, Rocky areas (eg. Inland cliffs, mountain peaks), Grassland	Annex IV, LC		X	NE
<i>Podarcis tauricus/ionicus</i>	Balkan wall lizard	Artificial/Terrestrial, Shrubland, Grassland	Annex IV, LC		X	LRnt
<i>Pseudopus apodus</i>	Giant glass lizard	Shrubland, Artificial/Terrestrial, Forest, Grassland	Annex IV, LC		X	LRnt
<i>Testudo hermanni</i>	Hermann's tortoise	Artificial/Terrestrial, Shrubland, Forest	Annex II & IV, NT		X	LRnt
<i>Vipera ammodytes</i>	Horned viper	Shrubland, Artificial/Terrestrial, Rocky areas (eg. Inland cliffs, mountain peaks), Forest	Annex IV, LC		X	LRnt

Amphibian and Reptile Species		Habitat (IUCN)	Protection status (IUCN Red List, 92/43/EU)	Szabolcs et.al. (2017)	Mizsei et. Al. (2017)	Albania Red List (2013)
Latin Name	Common name					
Zamenis longissimus	Aesculapian Rat snake	Shrubland, Artificial/Terrestrial, Forest, Rocky areas (eg. Inland cliffs, mountain peaks), Grassland	Annex IV, LC		X	EN
Zamenis situla	Leopard snake	Artificial/Terrestrial, Shrubland	Annex II & IV, LC		X	CR

All terrestrial fauna species are assessed against criteria and conditions of PBF and CH accordingly, following EBRD PR 6 and IFC PS6. Priority was given to threatened species at global, European, Mediterranean and national scale. IUCN Red List and National Red List (2013) threat status of the species has been taken into consideration, along with distribution range of the species at global, regional and national scale, so as to assess the ecological importance of the study area for threatened terrestrial fauna species. The full list of terrestrial fauna species identified as priority biodiversity feature occurring in the Blue 1 and 2 PV project site and OHL/TL routes.

Table 15. List Terrestrial fauna identified as Priority Biodiversity Features inside the study area

Mammal Species		Protection status (92/43/EU), Bern Convention	IUCN Red List (2020)	Albania Red List (2013)
Latin Name	Common name			
Mammals				
Rhinolophus ferrumequinum	Greater horseshoe bat	Annex II & IV	NT	LRcd
Rhinolophus euryale	Mediterranean horseshoe bat	Annex II & IV	VU	VU
Rhinolophus hipposideros	Lesser horseshoe bat	Annex II & IV	NT	LRnt
Myotis myotis	Greater mouse-eared bat	Annex II & IV	LC	NE
Pipistrellus kuhlii	Kuhl’s pipistrelle	Annex IV	LC	NE
Pipistrellus nathusii	Nathusius Pipistrelle	Annex IV	LC	NE
Pipistrellus pipistrellus	Common pipistrelle	Annex IV	LC	NE
Pipistrellus pygmaeus	Soprano pipistrelle	Annex IV	LC	NE
Muscardinius avellanarius	Common dormouse	Annex IV	LC	DD
Canis aureus	Golden jackal	Annex V	LC	VU

Mammal Species		Protection status (92/43/EU), Bern Convention	IUCN Red List (2020)	Albania Red List (2013)
Latin Name	Common name			
<i>Mustela putorius</i>	Western polecat	Bern Convention (III)	LC	EN
<i>Meles meles</i>	Badger	Bern Convention (III)	LC	EN
<i>Lutra lutra</i>	Otter	Annex II & IV	NT	VU
Amphibians				
<i>Pelophylax shqipericus</i>	Albanian water frog	Native of Albania and Montenegro	VU	NE
<i>Rana dalmatina</i>	Agile frog	Annex IV	LC	LRlc
<i>Hyla arborea</i>	European tree frog	Annex IV	LC	LRcd
Reptiles				
<i>Elaphe quatuorlineata</i>	Four-lined snake	Annex II & IV	NT	CR
<i>Emys orbicularis</i>	European pond turtle	Annex II & IV	NT	LRnt
<i>Lacerta trilineata</i>	Balkan green lizard	Annex IV	LC	LRcd
<i>Lacerta viridis</i>	European green lizard	Annex IV	LC	LRcd
<i>Mauremys rivulata</i>	The Balkan terrapin	Annex II & IV	LC	VU
<i>Platycephalus najadum</i>	Dahl's whip snake	Annex IV	LC	LRcd
<i>Podarcis tauricus/ionicus</i>	Balkan wall lizard	Annex IV	LC	LRnt
<i>Pseudopus apodus</i>	Giant glass lizard	Annex IV	LC	LRnt
<i>Testudo hermanni</i>	Hermann's tortoise	Annex II & IV	NT	LRnt
<i>Vipera ammodytes</i>	Horned viper	Annex IV	LC	LRnt
<i>Zamenis longissimus</i>	Aesculapian Rat snake	Annex IV	LC	EN
<i>Zamenis situla</i>	Leopard snake	Annex II & IV	LC	CR

In conclusion, some 13 species of mammals, including 8 bats, one rodent (*Muscardinus avellanarius*) and 4 carnivores (*Lutra lutra*, *Meles meles*, *Mustela putorius*, *Canis aureus*) are fulfilling the criteria of the Priority Biodiversity Features, being either Annex II and /or Annex IV EU Habitat Directive or species listed in the

National Red List. In these tables species that meet the criteria of priority biodiversity feature (PBF) are marked in orange color.

There are no important roosting sites for Bats in the PDA for Blue 1 and areas intersected by the OHL routes. Bats recording during night show that both Blue 1 PV and OHL routes are used as foraging area for dozens of individuals of bats belonging to Pipistrelle species.

PDA, Semani river and drainage channels of primary and second grade provide feeding grounds and commuting corridors for otter (*Lutra lutra*), Annex II species, and vulnerable species in the National Red list of Albania (2013).

PDA and most of OHL routes are part of the foraging area for European badger (*Meles meles*) and golden Jackal (*Canis aureus*), both red-listed in the National Red list of Albania (2013).

Temporary ponds artificially created by sand extractions as well as rain-fed ponds behind the wooded sand dunes inside the Blue 1 PDA and along the OHL routes are important breeding sites during spring and early summer for toads and frogs. The presence of the Albanian water frog (*Pelophylax shqipericus*) has been confirmed during April, 2022. This species of globally threatened and it has a limited distribution range. The principle of "Avoidance" should be applied to maintain and preserve these types of biotopes that are critical habitats for this endemic frog species.

Drainage channels in the Blue 1 PDA area and those intersected by the OHLs are important and sensitive habitats for aquatic life, including frogs, toads, terrapin and pond turtles as they provide freshwater breeding and feeding grounds for a number of species, including otter.

Banks of the drainage channels provide shelter, breeding and feeding grounds for a number of reptiles, including *Testudo hermanni*, *Emys orbicularis*, *Podarcis tauricus/ionicus*, *Podarcis muralis*.

5.3. Aquatic Ecology

As part of the baseline information on aquatic ecology, covering fish, macro-invertebrates, aquatic vegetation, and associated habitats in the project development area (PDA) of Blue 1 Photovoltaic (PV), and Transmission Line (TL) corridor, this section describes:

- Aquatic related species richness within the broader study area and in the area that is directly or indirectly influenced by the PV project during construction and operation phases;
- Identification of the priority biodiversity features (PBFs) related to aquatic fauna recorded in the study area and critical habitats (if triggered and appropriate), and
- Further implications of the PBFs with the PV project and TL.

On the Mediterranean scale, as a result, it is now known that from 1970 to 2015, about 35% of the natural wetlands have disappeared and 36% of coastal wetland-dependent species have decreased (Gardner et al., 2018). Further on, the quality of wetland water bodies has experienced negative trends due to nutrient run-off from intensive agriculture and the release of urban pollutants from the wastewater treatment plants, and untreated wastewater discharges (Pascual-Aguilar et al., 2015). This trend of development has faced also the PDA located between River Semani and Hoxhara Channel, where the agriculture development, associated run-off, and habitat conversion was started in 1965.

According to Vera-Herrera et al. (2022) in this context, Mediterranean coastal wetlands are examples of the fragility of these areas. Ecologically, these wetlands are recognized as biodiversity hotspots, especially for birds, serving as a refuge during migratory processes. In addition, they have a high economic value, as they are linked to important economic activities such as fishing, salt production, and farming (Leberger et al., 2020). Climate change has increased mean temperatures by 1.4°C in the region since the preindustrial period and has also increased the frequency of severe drought events, contributing to the desertification of these natural areas (Leberger et al., 2020). Overall, it is estimated that 50% of Mediterranean wetlands have been lost in the last century (Geijzendorffer et al., 2018). Moreover, they all depend on complex hydrological cycles, determined mainly by groundwater and irrigation networks. All these factors imply the complexity of managing these ecosystems, which makes challenging to develop monitoring, conservation, and environmental restoration strategies.

The aquatic fauna composition of the drainage channels, lagoon system, and coastal aquatic bodies in the Blue 1 project area is directly connected with Adriatic coastal water species and continental water communication system including large rivers (River Semani), irrigation channels originating with rivers, and springs at the surrounding upland areas (Hoxhara large drainage channel), etc.

Macro-invertebrate and fish assemblages in these systems change both at temporal and spatial scales in relation to environmental parameters, such as water chemical-physical factors like temperature, dissolved oxygen, and salinity or parameters related to habitat structure like depth, substrate type and submerged vegetation.

Based on field data collected, this survey emphasizes the importance of the transitional water bodies including drainage channel areas of the project site to numerous fish species, including those of commercial and conservationist interest. Furthermore, the results also highlight that fish communities differed according to the different habitat types identified and environmental quality.

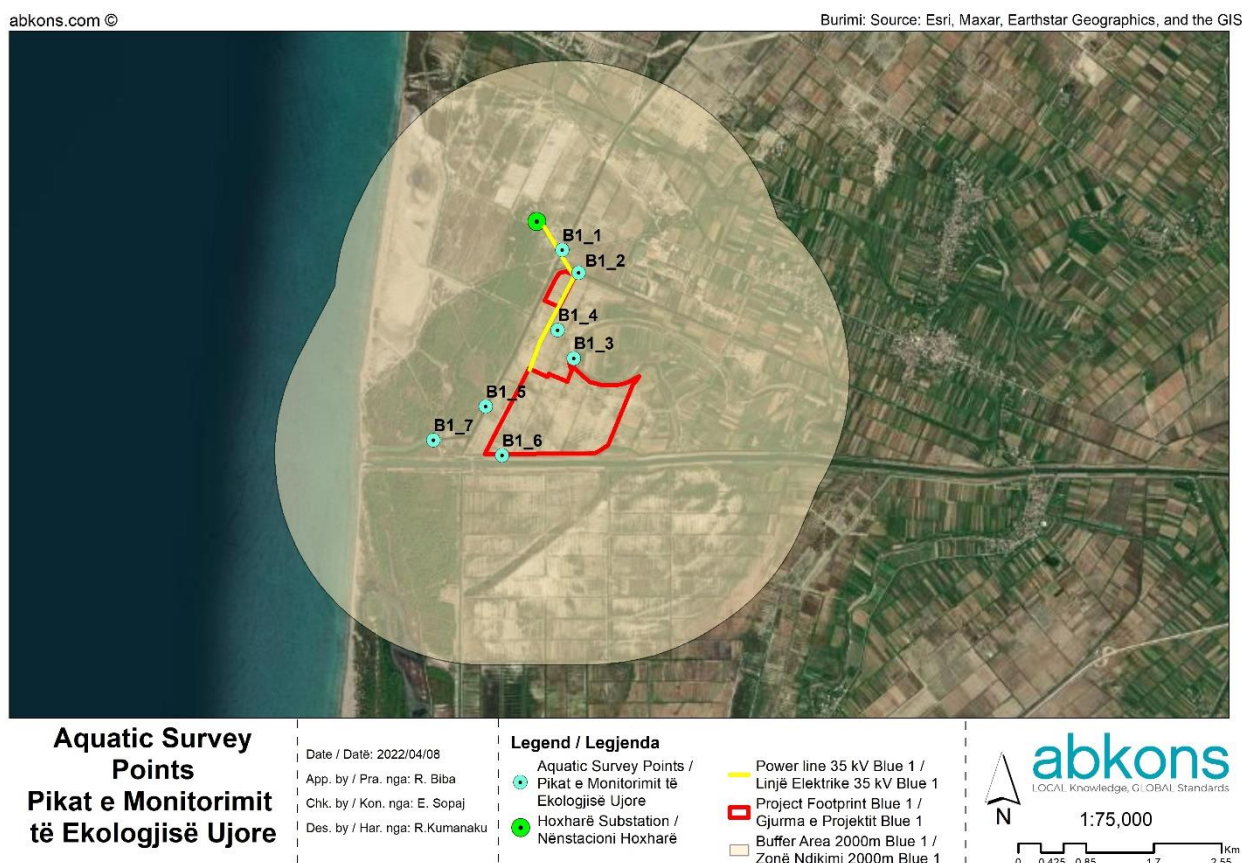


Figure 17 Aquatic ecology survey points (B1-Blue 1; and TL-Transmitting line)

5.3.1. Habitat's characterization

During the field survey and data analyses in the PDA were identified the following habitats:

- 1310 Salicornia and other annuals colonising mud and sand
- 1410 Mediterranean salt meadows (*Juncetaliamaritimi*)
- 1420 Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocorneteafruticosi*)
- 6430 Hydrophilous tall herb fringe communities of plains and the montane to alpine levels
- 1150 Coastal lagoons

Salt marsh

European Habitats include 1310 Salicornia and other annuals colonizing mud and sand, 1410 Mediterranean salt meadows (*Juncetaliamaritimi*), and the 1420 Mediterranean and thermo-Atlantic

halophilous scrubs (*Sarcocorneteafruticosi*), 92D0 Saline tamarisk thickets (*Nerio-Tamaricetea*). Salt marshes are one of the most prevalent habitats in coastal areas, in the low-lying alluvial plain behind sandy dunes. These are submerged in winter and dry (partly or totally) in summer. Salt marshes are populated by halophytes, plants that can live under saline conditions. Within this habitat type, plant cover alternates with bare ground that, in areas of high salinity, is covered with crystallized salt. The most common salt marsh plant is glasswort (*Salicornia europaea*), which has worldwide distribution. Salt marshes provide many habitats for species uniquely adapted to changes in salinity and water levels. They are important storehouses of biodiversity and extremely productive habitats. They serve as depositories for a large amount of organic matter, which feeds a broad food chain of organisms from bacteria to mammals as it decomposes.

Drainage and irrigation channels

European Habitats include 72A0 Reed beds (*Phragmito-Magnocaricetea*). The study area is characterised by dominated drainage and irrigation channels. The formation of reed beds is more widespread in these channels. High trunk helophytes, such as Common reed (*Phragmites australis*), lesser bulrush (*Typha angustifolia*), Round-headed club-rush (*Scirpuslacustris*), Club-rush/bulrush (*Schoenoplectuslacustris*) are the dominant species. These are frequently accompanied by submersed species such as Two-leaf watermilfoil (*Myriophyllumheterophyllum*), Hornwort (*Ceratophyllumdemersum*), Curled pondweed (*Potamogeton crispus*), Common duckweed (*Lemna minor*) and other species.

Coastal lagoons

The European Habitats include 1150 Coastal lagoons. Laguna e Darezezes/Petritit one of the coastal lagoons is part of the entire system of PDA situated in the boundary of the project area. The main vegetation type present in this lagoon is the seagrass beds dominated by eelgrass (*Zostera noltii*). Where these do occur, eelgrass is the most dominant species usually with very few other vascular species but often with abundant algae. In more shallow areas, sea grass is outcompeted by spiral tassel weed (*Ruppia cirrhosa*). The seagrass beds contain few species but reach enormous quantities of biomass, and a large number of plankton and benthos organisms live in these communities. Fluctuating algae populations of green seaweed (*Ulva rigida*) settle on soft, muddy substrata while the gut weed (*Enteromorpha sp.*) lives on harder (sandy) substrata. Such beds play an important role in influencing the shape and stability of the shoreline, regulating dissolved oxygen and filtering suspended matter. They can enhance the biodiversity of a lagoon by providing a physical refuge from predation and also serve as nursery and feeding habitats for a variety of organisms. The value of the habitat is generally high [they correspond to habitats with priority status, included in Annex I to Directive 92/43/EEC].

5.3.2. The aquatic plants

The vegetation of the drainage channels in the project area is composed of both emergent and submersed plant species. The most dominant species of emergent type were: Lesser bulrush (*Typha angustifolia*), Common reed (*Phragmites australis*), Club-rush/bulrush (*Schoenoplectuslacustris*), and floating plant of Common duckweed (*Lemna minor*). Out of several submersed plants, the most dominant was Two-leaf watermilfoil (*Myriophyllumheterophyllum*), Hornwort (*Ceratophyllumdemersum*), and Curled pondweed (*Potamogeton crispus*).

Table 16: Dominant aquatic species and their conservation status of identified species following National Conservation Status (Albanian Red List of 2013) and International Conservation Status (IUCN)

NO	LATIN NAME	COMMON NAME	NAT. CONS. STAT. (ALB. RED LIST, 2013)	INT. CONS. STAT. (IUCN)
AQUATIC PLANTS				
1	<i>Myriophyllumheterophyllum</i>	TWO-LEAF WATER MILFOIL	-	LC
2	<i>Myriophyllum spicatum</i>	Watermilfoil	-	LC
3	<i>Ceratophyllum demersum</i>	HORNWORT	-	LC
4	<i>Typha angustifolia</i>	Lesser bulrush	-	LC
5	<i>Phragmites australis</i>	Common reed	-	LC
6	<i>Sparganium erectum</i>	Branched bur-reed	-	LC

7	<i>Berula erecta</i>	Lesser water-parsnip	-	LC
8	<i>Veronica becabunga</i>	Brooklime	-	-
9	<i>Scirpus holoschoenus</i>	ROUND-HEADED CLUB-RUSH	-	LC
10	<i>Schoenoplectus lacustris</i>	Club-rush/bulrush	-	-
11	<i>Mentha pulegium</i>	Pennyroyal	-	LC
12	<i>Potamogeton crispus</i>	Curled pondweed	-	LC
13	<i>Potamogeton pectinatus</i>	Fennel pondweed	-	LC
14	<i>Polygonum hydropiper</i>	Water-pepper	-	LC
15	<i>Lemna minor</i>	Common duckweed	-	LC

5.3.3. The macroinvertebrate species

Mollusks are the most dominant component of the aquatic fauna of the coastal part of the project area of influence. As it is well known they are an important part of marine communities in the Mediterranean, comprising up to 15–25% of the benthic macrofauna (Sabelli et al., 1990; Zenetos, 1997). In fact, during our survey, it has been proven that in both coastal and also lagoon systems these animals that are mainly benthic, play important roles in the ecosystem structure and biodiversity.

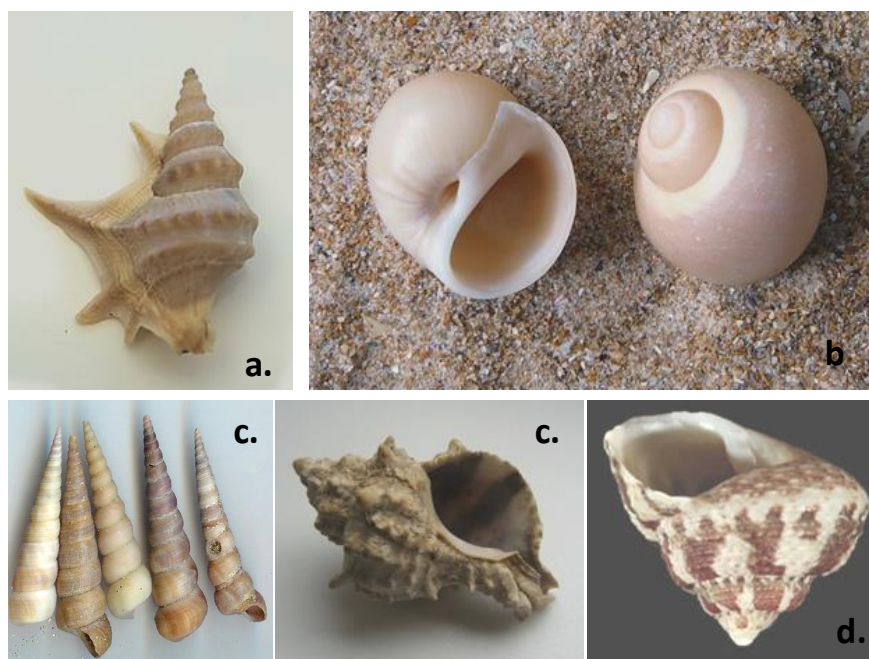
The list of identified species is presented in Table 17. The most dominant species from gastropoda were: *Turritella communis* (Risso, 1826), *Nassarius mutabilis* (Linnaeus, 1758), and *Hexaplex trunculus* (Linnaeus, 1758), while from the Bivalvia were: *Mactra glauca* (Born, 1778), *Venus verrucosa* (Linnaeus, 1758), *Glycymeris glycymeris* (Linnaeus, 1758), *Mytilaster lineatus* (Gmelin, 1791), *Mytilus galloprovincialis* (Lamarck, 1819), *Anomia ephippium* (Linnaeus, 1758), *Loripes lucinalis* (Lamarck, 1818), *Donax trunculus* Linnaeus, 1758, *Tellina pulchella* (Lamarck, 1818), etc.

Table 17 The list of identified mollusk species in the project area of influence

Species name	Common name	Albanian Red List 2013	IUCN Red List (Not evaluated)
Gastropoda			
<i>Gibbula albida</i> (Gmelin, 1791)	The whitish gibbula	-	
<i>Gibbula ardens</i> (Salis, 1793)	The ardens gibbula	LRnt	
<i>Turritella communis</i> (Risso, 1826)	Turritelle	-	
<i>Aporrhais pespelecani</i> (Linnaeus, 1758)	Pelican's foot	VU C2a	
<i>Euspira catena</i> (da Costa, 1778)	The large necklace shell	-	
<i>Hexaplex trunculus</i> (Linnaeus, 1758)	Banded dye-murex	LRnt	
<i>Nassarius mutabilis</i> (Linnaeus, 1758)	The mutable nassa	-	
<i>Bulla striata</i> (Bruguère, 1792)	Atlantic bubble	LRnt	
<i>Alpysiadepilans</i> (Gmelin, 1791)	Sea hare		
Bivalvia			
<i>Ruditapes decussates</i> Linnaeus, 1758)	Palorude clam	DD	
<i>Barbatia barbata</i> (Linnaeus, 1758)	Arc clam	-	
<i>Glycymeris glycymeris</i> (Linnaeus, 1758)	Bittersweet clams	LRnt	
<i>Glycymeris bimaculata</i> (Poli 1795)	-	LRnt	
<i>Mytilaster lineatus</i> (Gmelin, 1791)	-	-	
<i>Mytilus galloprovincialis</i> (Lamarck, 1819)	Mediterranean mussel	-	
<i>Anomia ephippium</i> (Linnaeus, 1758)	European jingle shell	-	
<i>Ctena decussata</i> (Costa O.G., 1829)	-	-	
<i>Loripes lucinalis</i> (Lamarck, 1818)	-	DD	
<i>Acanthocardia paucicostata</i> (Sowerby, 1834)	Poorly ribbed cockle	LRnt	
<i>Cerastoderma glaucum</i> (Bruguère, 1789)	Olive green cockle lagoon	-	
<i>Tellina pulchella</i> (Lamarck, 1818)	-	-	

<i>Donax trunculus</i> (Linnaeus, 1758)	The truncate donax	-	
<i>Abra segmentum</i> (Récluz, 1843)	-	DD	
<i>Scrobiculariacottardii</i> (Payraudeau, 1826)	-	-	
<i>Mactra glauca</i> (Born, 1778)	-	-	
<i>Venus verrucosa</i> (Linnaeus, 1758)	Warty venus shell warty	-	
<i>Pholas dactylus</i> (Linnaeus, 1758)	Common piddock	LRnt	
<i>Solen marginatus</i> (Pulteney, 1799)	Grooved razor	LRcd	
<i>Ensis ensis</i> (Linnaeus, 1758)	Sword razor	LRcd	

In the coastal part of the lagoon system the most dominant species were: *Cerastoderma glaucum* (Bruguière, 1789), *Abra segmentum* (Récluz, 1843), *Scrobiculariacottardii* (Payraudeau, 1826), *Venus verrucosa* (Linnaeus, 1758), *Turritella communis* (Risso, 1826) etc.



a. *Aporrhais pespelecani*; b. *Euspira catena*; c. *Turritella communis*; d. *Hexaplex trunculus*; e. *Gibula albida*

Figure 18 The most dominant Gastropoda species

It is worth mentioning that during our survey in the littoral part of the study area was observed the sea hare (*Alpysiadepilans* Gmelin, 1791). The sea hare occurs in the Mediterranean Sea, including Adriatic. It can be found mostly in the shallow water of about 1.5 to 10 m usually it avoids the intertidal zone because the animals cannot absorb atmospheric oxygen and so die after stranding relatively quickly (Figure 19).



Figure 19 The sea hare (*Alpysiadepilans*Gmelin, 1791).

Following the Albanian Red List (2013) all species are evaluated as LR except *Aporrhaispespelecani* (Linnaeus, 1758) which is considered as VU C2a.



a. *Mytilaster lineatus*; b. *Mytilus galloprovincialis*; *Glycimeris bimaculata*;
d. *Anomia ephippium*; e. *Loripes lucinalis*; F. *Acanthocardia echinata*

Figure 20 The most dominant Bivalvia species

In the Long-list of aquatic species of conservation interest is also listed the species connected to freshwater systems.

5.3.4. Coastal and lagoon and communication channels fishes

Sea waters, coastal lagoons, and inner waters (ditches and channels) are used by a variety of fish species. Within fish species, the most common in terms of a number of species are represented by Mugilidae (*Mugil cephalus*, *Liza ramada*, *Liza salienes*, and *Chelon labrosus*) as the dominant family. The resident species are numerically prevalent with the two species *Atherinaboyer* and *Aphanius fasciatus* showing the highest abundances in these types of ecosystems. Other present species are *Anguilla anguilla*, *Syngnathus spp.*, *Gobiusbucchichi*, *Belone belone*, *Dincentrarchuslabrax*, *Sparus aurata*, etc. (Crivelli 1996, Peja et al. 1996)

The commercial fish species in coastal Adriatic areas are typical of Mediterranean lagoons with two groups of species: the migratory and sedentary (Bourquard, 1985; Crivelli et al., 1996). The top commercials include European eel (*Anguilla anguilla*), species of Family Mugilidae (*Mugil cephalus*, *Liza ramada*, *Liza salienes*, and *Chelon labrosus*), Sea bream (*Sparusaurata*), Sea bass (*Dincentrarchuslabrax*), etc. Following discussions with old local fishermen, the two more commercial species sand smelt (*Atherinaboyer*) and lagoon crab (*Carcinusaestuaries*), was part of the catch but poorly marketed. They were part of the market before the year 1970 (*personal communication with old local fisherman*). Later on (1970-1985) these species were caught for animal feeding.

The migratory species are representatives of *Sparidae*, *Mugilidae*, *Moronidae*, *Soleidae*, *Anguillidae* and *Belonidae*, while the sedentary one by *Gobiidae*, *Cyprinodontidae*, *Atherinidae* and *Syngnathidae*.

The lead and responsible institution for the management of the fishery sector is the Ministry of Agriculture and Rural Development (MARD) through its Department for Fishery and Aquaculture Policy within Fishery and Aquaculture Service Directorate.

Following the current settings, MARD develops policies toward the management and protection of fishery resources in the sea, inland waters, and aquaculture in order to ensure sustainable development of the whole sector. It also conducts policies relating to the fisheries management infrastructure, strengthening competitiveness and economic growth, promoting social benefit for business operators that practice sustainable and responsible fishery and aquaculture, the formalization of the sector and fighting against illegal, unregulated, and unreported fishing, improving the market supply of fishery products, and improving the value of products derived from fishing and aquaculture by improving the handling/processing/trading standards of fish products.

It is worth mentioning that in the application of Article 9 of the FAO CCRF in the Mediterranean region (FAO, 1995; 1999), the concerns of interactions and potential conflicts between resource users in the Mediterranean were highlighted. On this occasion, the role played by coastal lagoons as important elements for Mediterranean aquaculture in its extensive practices was recognized. Following Pedini and Freddi (2000) and Kristensen (2000), the Article 9, on Aquaculture Development, is dealing with four main sections: (i-9.1) Responsible development of aquaculture, including culture-based fisheries, in areas under national jurisdiction; (ii- 9.2) Responsible development of aquaculture, including culture-based fisheries, within transboundary aquatic ecosystems; (iii- 9.3) Use of aquatic genetic resources for aquaculture including culture-based fisheries and (iv 9.4) Responsible aquaculture at the production level.



Figure 21 Commercially important species caught in Blue lagoon area/Darezeza and coastal water
 (a) Eel (*Anguilla anguilla*); (b) Gilthead seabream (*Sparus aurata*); (c) Sand smelt (*Atherinaboyeri*); (d) Mediterranean killifish (*Aphanius fasciatus*); (e) Gudgeon (*Gobiussp.*); (f) Common sole (*Solea vulgaris*); (g) Flathead grey mullet (*Mugil cephalus*); (h) European sea bass (*Dicentrarchus labrax*); (i) Karamote prawn (*Melicertus kerathurus*);

Following Munari et al. (2010) the situation is especially dramatic in the Albanian western lowlands through which flow most of the rivers. Further on this region became heavily populated and large industrial centers

and intense agriculture developed. Most urban and industrial waste is disposed of without treatment directly into the rivers. Neither liquid nor solid waste is controlled, nor are samples taken regularly of surface and groundwater. Monitoring has been irregular and the information given is often not reliable or even contradictory (Cullaj et al., 2005).

5.3.5. The disturbance and impacts caused by the spread of alien species

The distribution and spread of the Atlantic blue crab (*Callinectes sapidus*) are reported from marine, transitional and freshwater environments along the coasts of the Adriatic Sea (Albania, Eastern Mediterranean Sea). Increased abundance of the invasive blue crab was recorded from 2011 to 2021 in the wider area.

The first records of presence of the blue crab *Callinectes sapidus* in Albania have been documented by Beqiraj and Kashta (2010) and were based on specimens collected in the Lagoon of Patok. Further the species has been expanded with its presence on entire Albanian coast going parallel in similar patterns with other Mediterranean and Black Sea countries (Castejón and Guerao, 2013; Carrozzo et al., 2014; Orhan et al., 2014; Cilenti et al., 2015; Daban et al., 2016; Mancinelli et al., 2016). According to Streftaris and Zenetos (2006), the Atlantic blue crab stands among the most invasive species within the Mediterranean Sea.

The damage caused by non-native crab expansion is already documented and a problem that fishers face primarily. The rapid expansion of *C. sapidus* in the coastal and transitional water may cause severe impacts on local biodiversity and economic activities since the invading lagoons in the region support commercial fisheries and aquaculture activities. Mancinelli et al. (2017) showed that the blue crab can interact, by competition or predation, with a wide spectrum of native crab and fish species resulting in potentially high ecological impacts. The fishers of Karavasta repeatedly report damage to nets, catching fish on nets, consumption of bivalves, and many other unknown biota components.

Valonia aegagropila (Chlorophyta) is a species found in warm regions (subtropical to tropical latitudes) where it occupies lagoons and closed bays with low hydrodynamic (Grillas&Shumka, 2015). It is found in oligotrophic habitats between 1 and 7 meters in-depth and is more tolerant to high than low salinity (below 20psu). *V. aegagropila* can double biomass in favorable conditions so climate changes might lead to serious changes within the ecology of the ecosystem.

The climate variations can also be responsible for the invasion of unusual species in the lagoon and jellyfish *Aurelia aurita* and *Rhizostomapulmo*. In the year 2015 presence of *Rhizostomapulmo* has been recorded in the Lagoon of Karavasta. The increased abundance may affect fishing activities or even affect the fish's commercial value (Molinero et al., 2009).

5.3.6. Continental water fish species

The large drainage and irrigation system, and communication with freshwater continental ones enable the presence of numerous fish species. The gradient of presence in the direction of the coastal areas is connected with levels of salinity, while marine fish's migrating corridors are extended towards channels and then river system including River Semani. During our survey eight recorded species are non-native; this includes those that obviously established their own sub-population, that includes *Pseudorasbora parva*, *Carassius gibelio* and *Cyprinus carpio*. The other species as *Alburnus scoranza*, *Pachychilon pictum*, *Squalius platycephalus* and *Condrostoma spp.*, are also part of the PDA, while species that were found in a restricted range of occurrence were *Alburnoides ohridanus*, *Gobio sacdarensis* and *Cobitis ohridana*.

Table 18: Coastal and Lagoon fish species and their conservation status

Family	Species	Common name	IUCN Global	Albanian Red List	Habitat Directive	Bern Convention	CITES
Anguillidae	<i>Anguilla anguilla</i> (Linnaeus, 1758)	European eel	CR (A2bd+4bd)				II
Atherinidae	<i>Atherinaboyer</i> (Risso, 1810)	Big-scale sand smelt	LC				
Blenniidae	<i>Salariapavo</i> (Risso, 1810)	Peacock blenny	LC				
Carangidae	<i>Lichia amia</i> (Linnaeus, 1758)	Leer fish	LC	EN			
Callionymidae	<i>Callionymuspusillus</i> (Delaroche, 1809)	Sailfin dragonet	LC				
Clupeidae	<i>Sardina pilchardus</i> (Walbaum, 1792)	European pilchard	LC				
Cyprinodontidae	<i>Aphanius fasciatus</i> (Valenciennes, 1821)	Mediterranean banded killifish	LC	EN	III	II	
Gobiidae	<i>Pomatoschistus sp.</i>						
	<i>Gobiuscobitis</i> (Pallas, 1814)	Giant goby	N/A				
	<i>Gobiusniger</i> (Linnaeus, 1758)	Black goby	LC				
Moronidae	<i>Dicentrarchuslabrax</i> (Linnaeus, 1758)	European bass	LC				
Mugilidae	<i>Chelon labrosus</i> (Risso, 1827)	Thick lip grey mullet	LC				
	<i>Mugil cephalus</i> (Linnaeus, 1758)	Flathead grey mullet	LC				
	<i>Liza aurata</i> (Risso, 1827)	Thinlip grey mullet	LC				
	<i>Liza saliens</i> (Risso, 1810)	Leaping mullet	LC				
Mullidae	<i>Mullus barbatus</i> (Linnaeus, 1758)	Red mullet	LC				
Pleuronectidae	<i>Platichthysflessus</i> (Linnaeus, 1758)	European flounder	LC	VU			

Poeciliidae	<i>Gambusia holbrooki</i> (Girard, 1859)	Eastern mosquitofish	LC				
Soleidae	<i>Solea solea</i> (Linnaeus, 1758)	Common sole	DD				
Sparidae	<i>Diplodus puntazzo</i> (Walbaum, 1792)	Sheephead bream	LC				
	<i>Diplodus sargus</i> (Linnaeus, 1758)	White seabream	LC				
	<i>Sparus aurata</i> (Linnaeus, 1758)	Gilthead seabream	LC				
	<i>Sarpa salpa</i> (Linnaeus, 1758)	Salema	LC				
Syngnathidae	<i>Syngnathus abaster</i> (Risso, 1827)	Black-striped pipefish	DD				
	<i>Syngnathus typhle</i> (Linnaeus, 1758)	Broadnosed pipefish	LC				

In conclusion, the results show that the aquatic ecosystems of the wetland are in eutrophic conditions, with poor ecological potential. The wetland is nutrient (phosphorus and nitrogen)-overloaded during the entire intensive agriculture cultivation period. The input into the wetland of good quality water is deficient, since the river network already contains high levels of nutrients and pollutants, especially in the eastern area due to connectivity with residential areas, where, in addition, the poor water quality from the main channels is mixed with direct runoff and wastewater discharges.

In the current circumstances, the impact of agriculture and the water management intensively affects entire and different aquatic ecosystems within PDA, influencing thus to both species and habitats. This is a sensitive habitat of flux and the accumulation of pollutants could end up in the Adriatic Sea. The connectivity of the hydrological system in this coastal ecosystem implies a complex cause-and-effect effect from the water catchment areas to the sea. For all these reasons, the implementation of appropriate environmental measures is considered necessary. This could involve extensive and continuous monitoring of the human uses and activities in the wetland and taking action on the sources of pollution. It is important to emphasize the need to increase the ecological inputs provided by fluvial systems with higher water quality and the importance of waste water treatment facilities.

- The identified habitats related to aquatic ecosystems in the study area include: (i) 72A0 Reed beds (Phragmito-Magnocaricetea); (ii) 92A0 White willow (*Salix alba*) and White poplar (*Populus alba*) galleries; (iii) Salicornia and other annuals colonizing mud and sand (1310) and (iv) 1150 Coastal lagoons.
- During the survey of Spring and autumn of 2021, there have been recorded 23 aquatic plant species (both submersed and emergent), 32 macro-invertebrate species connected mostly with benthic environments, and 37 fish species (including the freshwater one mainly in River Semani). Out of them, there are two species of conservation concern the Mediterranean kill-fish (*Aphanius fasciatus*) considered Critically Endangered (CR) according to the Albanian Red List of 2013, and the European eel (*Anguilla anguilla*), Scadargudgen (*Gobio scadarensis*) considered as Endangered (EN) according to IUCN).
- After habitat degradation, invasive species are the second leading cause of biodiversity loss, particularly in freshwater ecosystems. Based on the current dominant presence of the mosquitofish (*Gambusia holbrooki*) a cyprinodontiform fish species of the Poeciliidae family in the Karavasta Solar Project area, it is clear that the degradation and lack of water management lead to a serious situation. The aggressive nature, high reproductive potential, fast maturation rate, flexible behavior, and broad environmental tolerances have contributed to their success as invaders, and the species is considered to pose a serious threat to native fishes in many countries.
- The current population of European eel (*Anguilla anguilla*) is unknown. The local status is currently facing two major impacts, the first is habitat degradation due to different human activities and the second one is the lack of water management and affected hydrological connectivity.
- The coastal lagoon nearby the project location (Laguna e Darezezes/Petritit) is an important part of the area, with a capacity of hosting a large number of birds during wintertime. Numerous fish species characteristic of the lagoon ecosystem, such as flat head mullet (*Mugil cephalus*), thin-lip mullets (*Liza ramada* and *L. saliens*), gilt-head bream (*Sparus aurata*), and Mediterranean sand smelt (*Atherina hepsetus*), Mediterranean killfish (*Aphanius fasciatus*) etc., are present there.

5.4. Avifauna

This section provides baseline information on bird species in the Project Development Area (PDA), Area of Project Influence (API), and Transmission Line route for the project of “Blue 1 Solar Power Plant” as a contribution to the ESIA of the proposed “Blue 1 Solar Power Plant”. The information covers bird species present in the project area during June and October 2021 including areas of national and international concern such as Divjaka-Karavasta National Park and Vjose-Narta Landscape Protected Area.

The composition and richness of different bird species were assessed through line-transect surveys that suit better to open habitats such as the photovoltaics plot and wetland areas.



The project site or the project development area is composed of two major types of habitats: (i) the abandoned arable land in the form of opened grounds covered by sparse halophytic vegetation such as *Salicornia sp.*, *Juncus sp.* and other euryhaline species, and (ii) the secondary and tertiary different drainage ditches covered by vegetation adapted to brackish waters. The drainage ditches provide an input of fresh or brackish water in an area otherwise covered by euryhaline vegetation.

The surveys conducted here in June and October 2021 registered the presence of 39 bird species representing different groups of birds using the area as a breeding ground or a foraging ground.

5.4.1. Relative importance of the PDA for breeding birds

The surveys conducted in June 2021 identified 26 bird species. 9 species were considered non-breeding despite their presence in the PDA. The habitat is not suitable for their breeding requirements while the species use it as a foraging ground. Some major representatives of this group are the Grey Heron (*Ardea cinerea*), Little Egret (*Egretta garzetta*), Eurasian Collared-Dove (*Streptopelia decaocto*), etc.

One species, the Kentish Plover (*Charadrius alexandrinus*) is assessed as Possible Breeding species meaning that its presence was registered but there is not enough evidence it is either probably breeding or confirmed breeding.

Another species, the European Roller (*Coracias garrulus*) is assessed as Probable Breeding. A pair of rollers was observed in suitable nesting habitats during the breeding season. Nevertheless, further surveys later in the breeding season did not produce enough evidence to confirm its breeding.

15 species were assessed as confirmed breeding. They specialised in breeding in reeds (Great Reed Warbler *Acrocephalus arundinaceus*, Eurasian Reed Warbler *Acrocephalus scirpaceus*), shrubs (Cetti's Warbler *Cettia cetti*, Eastern Olivaceous Warbler *Iduna pallida*, Common Nightingale *Luscinia megarhynchos*, Common Whitethroat *Sylvia communis* etc), Tamarix trees (Hooded Crow *Corvus cornix*, Eurasian Magpie *Pica pica*) as well as in the ground (Corn Bunting *Emberiza calandra*, Crested Lark *Galerida cristata*, European Bee-eater *Merops apiaster*), etc.

5.4.2. Relative importance of the PDA for migratory birds

25 species of birds were recorded in the Project Development Area in October 2021 corresponding with the autumn migration season. The majority of birds belonged to the group of passerine species such as Cetti's Warbler (*Cettia cetti*), Crested Lark (*Galerida cristata*), Eurasian Magpie (*Pica pica*), Hooded Crow (*Corvus cornix*), European Goldfinch (*Carduelis carduelis*) etc. Most of the species present in the area are indeed resident species while a few others represent typical wintering species such as Meadow Pipit (*Anthus pratensis*), and Water Pipit (*Anthus spinoletta*). The presence of the above birds in flocks in the open grounds of the PDA demonstrates that the area serves as a foraging ground for at least 25 species during October 2021.

Again, the drainage ditches were important for waterbirds (Common Moorhen *Gallinula chloropus* and Little Grebe *Tachybaptus ruficollis*) as well as for a number of passerines.

Furthermore, the visits registered the presence of one species part of Annex 1 of the Birds Directive and two species considered as Vulnerable both in the National Red list of Bird species.

5.4.2.1. Buffer zone of Blue 1

The area of project influence was defined as the surrounding area of the PDA within a distance of 2 km from the PDA. It is a more complex site with several habitats such as arable land, abandoned arable land, temporary marshes, the brackish wetlands of Semani, and the pine forest separating the agricultural land from the Adriatic Sea.



Some 77 bird species were registered in this part during the survey conducted in June and October 2021 (Error! Reference source not found./ section Error! Reference source not found.).

5.4.3. Relative importance of the buffer zone of Blue 1 for breeding birds

The June survey identified 51 bird species within the buffer zone. 31 species were Confirmed Breeding, 10 species as Probable Breeding, 2 species as Possible Breeding, and 8 species as non-Breeding.

The most important habitats for breeding birds lay west of the PDA where the buffer zone includes different types of habitats such as pine forests, coastal lagoons, and brackish water marshes.

The pine forest offers breeding habitats for a variety of species including Common Chaffinch (*Fringilla coelebs*), Great Tit (*Parus major*), Common Cuckoo (*Cuculus canorus*), the Globally Vulnerable Turtle Dove (*Streptopelia turtur*), European Goldfinch (*Carduelis carduelis*), etc.

The coastal lagoon of Hoxhara was inhabited by many waterbirds including the breeding Kentish Plover (*Charadrius alexandrinus*), Black-winged Stilt (*Himantopus himantopus*), Little Tern (*Sternula albifrons*), Common Tern (*Sterna hirundo*) and other passage species such as Curlew Sandpiper (*Calidris ferruginea*), Eurasian Oystercatcher (*Haematopus ostralegus*), Caspian Tern (*Hydroprogne caspia*), Eurasian Spoonbill (*Platalea leucorodia*), Sandwich Tern (*Thalasseus sandvicensis*), Gull-billed Tern (*Gelochelidon nilotica*) etc.

These drainage ditches and the lagoon reedbed could be important for nesting birds and foraging birds such as Common Tern and Little Tern. The maintenance of these habitats is also important for small migratory birds and other birds using it as a foraging ground.

5.4.4. Relative importance of the area of project influence for migratory and wintering birds

The project development area was visited in October 2021 and mid-January 2022, a period coinciding respectively with migratory and wintering birds. During the October surveys, the coastal lagoon of Semani sheltered the majority of species represented mostly by waterbirds such as the Caspian Tern (*Hydroprogne caspia*), Ruff (*Calidris pugnax*), Dunlin (*Calidris alpina*), Black-headed Gull (*Chroicocephalus ridibundus*), Yellow-legged Gull (*Larus michahellis*) and Sandwich Tern (*Thalasseus sandvicensis*).

Almost the same panorama was observed in January 2022, with the exception that in January, the observers noted a high presence of Lapwing (*Vanellus vanellus*), Little Grebe (*Tachybaptus ruficollis*), Common Coot (*Fulica atra*), Eurasian Wigeon (*Mareca penelope*), Great Cormorant (*Phalacrocorax carbo*), Greater Flamingo (*Phoenicopterus roseus*), etc.

The presence of the waterbirds demonstrates that the wetland sites within the area of project influence serve as important habitats for birds during migration and wintering periods.

5.4.5. Transmission Line Routes

The proposed routes for the transmission line are similar with regard to habitat characteristics as they occur within the PDA of Blue 1 and Buffer zone of Blue 1. The transmission line crosses through two types of habitats including (i) the abandoned arable land, and (ii) the drainage ditches and channels.

5.4.5.1. Relative importance of the transmission line routes for breeding birds

Some 24 bird species were observed in the overhead line Blue 1.

The surveys conducted in June show that the bird community in the transmission lines is composed of 1 non-breeding species, 1 possible breeding and 22 confirmed breeding.



The breeding bird's community is composed of species typical to agricultural land such as Tawny Pipit (*Anthus campestris*), Short-toed Lark (*Calandrella brachydactyla*), Crested Lark (*Galerida cristata*), Zitting Cisticola (*Cisticola juncidis*) etc. The vegetation along the drainage channels is inhabited by breeding Great Reed Warbler (*Acrocephalus arundinaceus*), Eastern Olivaceous Warbler (*Iduna pallida*), Cetti's Warbler (*Cettia cetti*) etc. Adjacent pine forest habitats are a breeding ground for European Goldfinch (*Carduelis carduelis*), Greenfinch (*Chloris chloris*), Cuckoo (*Cuculus canorus*), Icterine Warbler (*Cuculus canorus*), Golden oriol (*Oriolus oriolus*) etc.

5.4.5.2. Relative importance of the transmission line route for migratory birds

Some 19 species of birds were recorded in route 3 of the transmission line in October 2021. As it was the case for the PDA, the majority of birds belonged to the group of passerine species including the Water Pipit, Long-tailed Tit, Cetti's Warbler, Zitting Cisticola, Sardinian Warbler, White Wagtail, Common Firecrest, Common Starling and Eurasian Blackcap.

Again, the drainage ditches were important for waterbirds (Common Sandpiper, Common Kingfisher, Black-headed Gull, and Common Moorhen) as well as for a number of passerines.

5.4.6. Bird species of conservation concern

Detailed information on the presence of protected species of birds is provided in Annex 2. This information shows that the area under survey during the field work conducted in June, October 2021, and January 2021, shelters at least 31 species of Conservation Concern including:

- One Globally Vulnerable species of the Turtle Dove (*Streptopelia turtur*),
- 20 species of national conservation concern (either Critically Endangered, Endangered, or Vulnerable) and
- The 23 species of Annex 1 of the EU Birds Directive.

Some of the species, as demonstrated in Table 199, are of conservation concern for three different categories including Global concern, National Concern, and part of Annex I of the Birds Directive.

Table 19. Species of Conservation Concern and their ecological characteristics (BirdLife International 2021)

No.	Species	Conservation Concern	Ecological characteristics
1	Eurasian Sparrowhawk (<i>Accipiter nisus</i>)	Endangered Nationally	<p>This species has an extremely large range and the global population trend appears to be stable. The population size is extremely large. The global population is placed in the band 2,200,000 to 3,300,000 mature individuals (BirdLife International 2021).</p> <p>While the global population is suspected to be stable, the national population was considered in decline due to poaching. Therefore, the species is considered Nationally Endangered.</p> <p>It mainly inhabits forests interspersed with open areas. Small birds make up the vast majority of their diet. In Albania is seen mostly in the coastal and lowland areas during winter.</p> <p>Sharp declines in Europe in the 1950s-1960s were driven by the use of harmful organochlorine pesticides, which causes direct mortality of adults as well as reduced breeding success. The species is still trapped in its thousands annually in Turkey, where it is used by falconers, but habitat alteration</p>



			is thought to be the major contemporary. In Albania the major threat used to be poaching although other factors mentioned above might contribute to the decline.
2	Tawny Pipit (<i>Anthus campestris</i>)	Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is extremely large. A very preliminary estimate of the global population size is 4,550,000-8,600,000 mature individuals (BirdLife International 2021). The global population is suspected to be stable.</p> <p>The Tawny Pipit is found in open dry habitats, from sand dunes, sandy heaths, dry grassland, and clear-felled areas to artificial habitats such as gravel pits, steppe, and semi-deserts in central and eastern parts of the range. It favors areas with dwarf shrubs and low-growing trees for song posts as is the case of the PDA. The breeding season is from mid-April to mid-August.</p> <p>It is monogamous and the nest is a cup of grass stems, leaves, and roots, lined with finer plant material and hair and built in a scrape or a hollow on the ground or in a tuft of grass. The diet is mainly insects, although other invertebrates and seeds are also taken, as well as rarely small vertebrates. The species is almost wholly migratory with eastern populations generally moving to the Arabian Peninsula and southern Asia, east to the north-west Indian subcontinent.</p> <p>The species is threatened by habitat loss as a result of afforestation of open habitats, scrub encroachment, intensification of agriculture, and eutrophication of cultivated land. In addition, the use of pesticides may also be a threat through the reduction of food availability. Climate change may also have an impact on this species.</p>
3	Great White Egret (<i>Ardea alba</i>)	Endangered Nationally and Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large. It is considered endangered in Albania due to its limited number in the breeding season.</p> <p>The European population is estimated at 20,700-34,900 pairs, which equates to 41,500-69,900 mature individuals (BirdLife International 2015).</p> <p>The Great White Egret inhabits all kinds of inland and coastal wetlands although it is mainly found along the coast in the winter or during droughts. In aquatic habitats, its diet consists of fish, amphibians, snakes, aquatic insects, and crustaceans although in drier habitats terrestrial insects, lizards, small birds, and mammals are more commonly taken.</p> <p>The species is threatened by wetland habitat degradation and loss for example through drainage, grazing, clearing, burning, increased salinity, groundwater extraction, and invasion by exotic plants</p>



4	Grey Heron (<i>Ardea cinerea</i>)	Vulnerable Nationally	<p>The species has an extremely large range and the global population size is very large.</p> <p>The global population is estimated to number c.790,000-3,700,000 individuals (Wetlands International 2015).</p> <p>The overall population trend is uncertain, as some populations are decreasing, while others are stable, increasing, or have unknown trends. The European breeding population is thought to have undergone a short-term decline between 2000 and 2012 (BirdLife International 2015).</p> <p>In Albania, the species has been designated as vulnerable due to the decrease in the number of breeding pairs.</p> <p>The Grey Heron is a generalist in its habitat use, although shallow water, relatively large prey, and four or five months of the ice-free breeding season are among the essential characteristics of its habitat.</p> <p>Its diet consists predominantly of fish and eels 10-25 cm long, as well as amphibians, crabs, molluscs, crustaceans, aquatic insects, snakes, small rodents, and small birds.</p> <p>In Europe, the species was heavily persecuted in the nineteenth century due to its consumption of fish, which resulted in competition with fishermen and fish farmers. In Albania was mostly endangered by persecution and disturbance of breeding colonies.</p>
5	Common Buzzard (<i>Buteo buteo</i>)	Vulnerable Nationally	<p>The species has an extremely large range and the global population size is very large.</p> <p>The global population size is placed in the band 2,100,000-3,700,000 mature individuals.</p> <p>In Europe, which holds approximately 75% of the global population, the population size is estimated to be stable (BirdLife International 2015). In Albania, the species has been designated as vulnerable due to persecution and a decrease in the number of breeding pairs.</p> <p>It inhabits a wide variety of habitats but requires at least some tree cover for nesting and roosting; the ideal habitat appears to be forest edge, or mosaics of forest and open areas.</p> <p>Diet It is versatile depending on the prey animals available, with small mammals usually predominating, but in some areas, invertebrates make up the majority.</p> <p>The most important historical threat has been from persecution, including through poisoned bait traps, with pesticides and habitat loss also causing some declines.</p>



6	Greater Short-toed Lark (<i>Calandrella brachydactyla</i>)	Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large.</p> <p>In Europe, the breeding population is estimated to number 9,460,000-18,100,000 mature individuals (BirdLife International 2015).</p> <p>In Europe, trends between 1998 and 2013 show that populations were stable (EBCC 2015).</p> <p>This species prefers dry areas with low and sparse vegetation cover, on level or undulating terrain, with sandy or stony soils. In the Mediterranean basin, it breeds mostly in fallow lands but also on dry pastures, tobacco fields, dirt tracks, and olive groves. In south-east Europe it lays eggs from mid-April.</p> <p>The nest is built of grasses, rootlets, and similar vegetation, lined with softer material and placed in a shallow scrape on the ground, usually beside a shrub or grass tuft. It often has a small rampart of sticks or stones. Clutch size ranges from two to five eggs. It feeds mainly on invertebrates in the spring, supplementing them with seeds and the green parts of plants in the other seasons, and nestlings are fed solely on invertebrates. The species is mostly migratory and departs on a broad front from mid-August through to September and October. European populations winter in Africa between 10° and 20°N.</p> <p>The main threats are agricultural intensification (leading to loss of fallows, increased number of irrigation schemes, increase in surface area covered by crops, etc.) and afforestation of wastelands.</p>
7	Kentish Plover (<i>Charadrius alexandrinus</i>)	Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large.</p> <p>The population is therefore placed in the band 100,000-499,999 mature individuals.</p> <p>The overall population trend is decreasing. The European population is estimated to be decreasing by less than 25% in 15 years (three generations) (BirdLife International 2015).</p> <p>The species occupies its breeding grounds chiefly from March to October, dispersing from late June immediately after the young fledge, with the southward migration peaking in September.</p> <p>It nests solitarily or in loose semi-colonial groups, usually in densities of 0.5 to 20 pairs per hectare, and sometimes in association with other species. Outside of the breeding season the species feeds singly or in small flocks.</p> <p>During all seasons the species is predominantly coastal and is usually found on sand, silt or dry mud surfaces. It also shows a preference for sparsely vegetated and sandy areas when breeding.</p>



			<p>Diet consists mainly of insects and their larvae (e.g. beetles and flies), gammarids, crabs, other crustaceans and brine shrimps, bivalve and univalve molluscs, polychaete worms, spiders, and small pieces of seaweed.</p> <p>The nest is a shallow scrape positioned near the water on bare earth or in sparse vegetation, often on slightly raised ground and partly sheltered by plants or near conspicuous objects such as grass clumps or shrubs.</p> <p>The species is threatened by the disturbance of coastal habitats (e.g. tourists trampling nests and disturbing roosts on beaches). It is also threatened by the degradation and loss of wetland habitat through environmental pollution, land reclamation, the declining river flows, unsustainable harvesting of benthic fauna, urbanization, and a reduction in the amount of sediment being carried into coastal areas by rivers (Barter 2006).</p>
8	Western Marsh Harrier (<i>Circus aeruginosus</i>)	Vulnerable Nationally and Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large.</p> <p>The global population size is placed in the band 500,000 to 999,999 mature individuals.</p> <p>In Europe, the population size is estimated to be increasing (BirdLife International 2015) while it was considered decreasing in Albania due to persecution.</p> <p>The species inhabits extensive areas of dense marsh vegetation, in fresh or brackish water, generally in lowlands</p> <p>It is a generalist predator taking a variety of prey types, with small birds generally preferred but mammals such as voles, rabbits, and rats being more important in parts of its range.</p> <p>The nest is a pile of reeds built in dense marsh vegetation.</p> <p>Major threats include wetland desiccation and drainage; persecution by shooting; pollution, especially from excessive pesticide use in and around wetlands (although widespread bans have reduced this threat somewhat), and poisoning by heavy metals, notably the consumption of lead-shot through feeding on contaminated waterbirds.</p>
9	Montagu's Harrier (<i>Circus pygargus</i>)	Endangered Nationally and Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large.</p> <p>The global population size is placed in the band 100,000 to 499,999 mature individuals.</p> <p>The population is thought to be decreasing owing to over-use of pesticides and improved locust control, agricultural intensification and destruction of nests by farm machinery, and loss of small mammal and</p>



			<p>bird prey species due to changing agricultural practices.</p> <p>It is a migratory species, wintering in sub-Saharan Africa and southern Asia. It leaves its breeding grounds in August and September, beginning its return in March and April.</p> <p>In Albania is thought to be migratory with nesting still to be proved by stronger nesting evidence.</p> <p>It is a bird of the open country, usually in the lowlands. Diet is composed of small birds and mammals; voles are a particularly dominant food source locally in abundant areas.</p> <p>It nests in tall vegetation on the ground.</p> <p>It is currently in decline owing to the conversion of its habitat to agricultural land. In Albania the main threat is persecution.</p>
10	Little Egret (<i>Egretta garzetta</i>)	Vulnerable Nationally and Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large.</p> <p>The global population is estimated at 660,000-3,150,000 individuals.</p> <p>The overall population trend is increasing, although some populations may be stable and others have unknown trends (Wetlands International 2006). The European breeding population trend is estimated to be decreasing (BirdLife International 2015) or stable (EBCC 2015) in the short term.</p> <p>It is increasing also in Albania with two large and medium colonies found after 2014 (Bino and Bego <i>pers. comments</i>)</p> <p>The Little Egret usually nests in colonies sometimes of thousands of pairs and often with other species. As it is the case of a mixed colony in the northern part of Divjaka-Karavasta National Park.</p> <p>It inhabits fresh, brackish, or saline wetlands and shows a preference for shallow waters (10-15 cm deep) in open, unvegetated sites where water levels and dissolved oxygen levels fluctuate daily, tidally, or seasonally, and where fish are concentrated in pools or at the water's surface.</p> <p>Diet It is a highly variable, taking mainly small fish under 20 g in weight and less than 10 cm long (averaging 4 cm), aquatic and terrestrial insects (e.g. beetles, dragonfly larvae, mole crickets, and crickets), and crustaceans (e.g. Palaemonetes spp., amphipods, phytopods, crabs and exotic species of crayfish) as well as amphibians, molluscs (snails and bivalves), spiders, worms, reptiles, and small birds.</p> <p>The species is threatened by wetland degradation and loss through drainage for agriculture (e.g. rice-farming and fishing), changes in current</p>



			management practices (e.g. of rice-farming), and contamination from agricultural and industrial operations.
11	Common Kestrel (<i>Falco tinnunculus</i>)	Vulnerable Nationally and Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large.</p> <p>The global population size is placed in the band 4,000,000-6,500,000 mature individuals.</p> <p>In Europe the population size is estimated to be decreasing by less than 25% in 16.2 years (three generations) (BirdLife International 2015).</p> <p>In Albania the species was designated as Vulnerable due to persecution.</p> <p>The species tolerates a wide range of open and partially forested habitats.</p> <p>It feeds mainly on small mammals, particularly in northern Europe, with insects possibly more important in Africa and the Mediterranean.</p> <p>The locations of nests are variable, with rock ledges, buildings, and abandoned corvid nests being commonly reported sites.</p> <p>A nest is found at the Aol and the species uses the PDA as a foraging ground.</p> <p>The population in much of the rest of Europe has shown a more recent steady decline, thought to be due to agricultural intensification.</p>
12	Black-winged Stilt (<i>Himantopus himantopus</i>)	Endangered Nationally and Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large.</p> <p>The global population is estimated to number c.450,000-780,000 individuals (Wetlands International 2015).</p> <p>The overall population trend is unclear, some populations may be stable, increasing, or have unknown trends (Wetlands International 2015). The European population is estimated to be stable (BirdLife International 2015).</p> <p>The Black-winged Stilt breeds in shallow freshwater and brackish wetlands with sand, mud, or clay substrates and open margins, islets, or spits near water level. Suitable habitats include marshes and swamps, shallow lake edges, riverbeds, flooded fields, irrigated areas, sewage ponds, and fish ponds. The species may also breed around alkaline and high-altitude (montane) lakes or in more saline environments such as river deltas, estuaries, coastal lagoons, and shallow coastal pools with extensive areas of mudflats, salt meadows, saltpans, coastal marshes, and swamps.</p> <p>Its diet is strongly seasonal but generally includes adult and larval aquatic insects (e.g. Coleoptera, Ephemeroptera, Trichoptera, Hemiptera, Odonata,</p>



			<p>Diptera, Neuroptera, and Lepidoptera), molluscs, crustaceans, spiders, oligochaete and polychaete worms, tadpoles and amphibian spawn, small fish, fish eggs and occasionally seeds.</p> <p>The nest is a depression or shallow scrape positioned on the hard ground near the water on a hummock or amongst grass and sedge. Alternatively, the nest may be a more elaborate platform of vegetation constructed on a floating mass of aquatic vegetation. The species nests singly or in loose colonies, showing a preference for open areas close to foraging sites with good all-round (360 degrees) visibility.</p>
13	Red-backed Shrike (<i>Lanius collurio</i>)	Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large.</p> <p>The global population size is estimated at 24,800,000-47,700,000 mature individuals.</p> <p>The population is estimated to be declining overall following a dramatic decline in the west and northeast of its breeding range from 1970 to 1990 at least (Harris and Franklin 2000). However, in Europe, trends between 1980 and 2013 show that the population is stable (EBCC 2015).</p> <p>The species breeds in temperate and Mediterranean climates. It requires sunny, warm, usually dry, and level or gently sloping terrain, with scattered bushes, shrubs, or low trees providing hunting posts overlooking areas of short grass, heath, or bare soil. High-quality habitats tend to feature mosaic-like grassy vegetation with alternating areas of tall and short growth and bare areas, with perches. In agricultural areas, it occupies neglected overgrown patches, heaths, open downs, overgrown orchards and gardens, hedgerows, and scrub along railways or roadsides. It is also found in temporary steppe-like habitats, such as military training areas, burned forests, forest clearings, and spruce (<i>Picea</i>) plantations.</p> <p>Egg-laying occurs from May to July and clutches are generally three to seven eggs. The untidy-looking nest is a loose foundation of often green plant stems, roots, grass, lichen, hair, or similar, compactly lined with grass, hair, moss, fur, reed (<i>Phragmites</i>), or reedmace (<i>Typha</i>) flowerheads, plant down and similar material, situated in dense, often thorny bush such as hawthorn (<i>Crataegus</i>), blackthorn (<i>Prunus spinosa</i>), bramble (<i>Rubus</i>) or dog-rose (<i>Rosa</i>). It is an opportunistic feeder, feeding mostly on insects and other invertebrates as well as small mammals, birds, amphibians, and reptiles. The species is migratory, wintering in eastern and southern Africa.</p> <p>The species is probably threatened by the loss and fragmentation of habitat resulting from afforestation</p>



			and agricultural intensification, and the increased use of pesticides causing loss of food resources.
14	European Bee-eater (<i>Merops apiaster</i>)		
15	Pygmy Cormorant (<i>Microcarbo pygmaeus</i>)	Critically Endangered Nationally and Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large.</p> <p>The global population is placed in the band 45,000-139,999 individuals.</p> <p>The overall population trend is increasing, although some populations have stable trends (Wetlands International 2015). The European population is estimated to be increasing (BirdLife International 2015).</p> <p>The species breeds in south-east Europe (east of Italy), Russia, Iran, Kazakhstan, Tajikistan, Turkmenistan, and Uzbekistan, and winters primarily in Albania, Greece, the Balkan states, Turkey, Cyprus, Iraq, Iran, Azerbaijan, and also Israel, Bulgaria, Romania, and Syria.</p> <p>The species occurs in reedbeds, transition zones between reedbeds and open waters, extensively grazed or mowed shores and wet meadows, and, in winter, in coastal wetlands, along rivers, and sometimes on inland lakes. The preferred nesting habitat is willow <i>Salix</i> trees but, in Albania, birds breed mainly in <i>Tamarix</i>. The species breeds between April and July in large mixed-species colonies.</p> <p>Diet consists predominantly of fish up to 15 cm long.</p> <p>The species is threatened by the degradation of wetlands through drainage for agriculture and changes in hydrological regimes. In south-east Europe and Albania, conservation measures have ameliorated the most important threats, although concern still exists regarding habitat destruction and persecution in its wintering range. It is also susceptible to marine pollution, such as biocides and pesticides caused by agricultural run-off.</p>
16	Common Tern (<i>Sterna hirundo</i>)	Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large.</p> <p>The global population is estimated to number c.1,600,000-3,600,000 individuals (Wetlands International 2015).</p> <p>The overall population trend is unclear. In Europe, the population is estimated to be increasing (BirdLife International 2015).</p> <p>The Common Tern is a strongly migratory coastal seabird. It breeds between April and June in solitary pairs or colonially in groups of up to several thousand pairs. Palearctic breeders migrate south</p>



			<p>after breeding between August and October, returning to the breeding grounds in March or April.</p> <p>The species breeds in a wide variety of habitats in coastal and inland areas. Along the coast, it shows a preference for nesting on flat rock surfaces on inshore islands, open shingle, and sandy beaches, dunes and spits, vegetated inter-dune areas, sandy, rocky, shell-strewn, or well-vegetated islands in estuaries and coastal lagoons, saltmarshes, mainland peninsulas, and grassy plateaus atop coastal cliffs.</p> <p>In Albania, the majority of the breeding population breeds on sandy islands situated in coastal wetlands.</p> <p>Its diet consists predominantly of small fish and occasionally planktonic crustaceans and insects.</p> <p>The nest is a shallow depression on open substrates with little or no vegetation placed near a vertical object (e.g. rock, shell, plant, or artifact) to provide shelter for chicks and to facilitate nest identification. Nest sites include the edges of bare sand amongst vegetation, rocks, or logs, open areas on the margins of vegetation on beaches, the edges of mats of vegetation in marshes, and grassy or rocky substrates on rocky islets. The species will also readily nest on artificial rafts.</p> <p>During the breeding season, the species is vulnerable to human disturbance at nesting colonies. The flooding of nest sites as a result of naturally fluctuating water levels can also result in complete breeding failure of the affected colony.</p>
17	Little Tern (<i>Sternula albifrons</i>)	Annex 1 Birds Directive	<p>The species has an extremely large range and the global population size is very large.</p> <p>The global population is estimated to number c.190,000-410,000 individuals (Wetlands International 2015).</p> <p>The overall population trend is decreasing, although some populations have unknown or increasing trends (Wetlands International 2015). In Europe, the population size trend is unknown (BirdLife International 2015).</p> <p>The Little Tern is a strongly migratory coastal seabird, which usually fishes in very shallow water only a few centimetres deep. It breeds between May and July in solitary pairs or small monospecific groups usually of 1-15 pairs (rarely over 40 pairs), occasionally amidst colonies of other terns.</p> <p>The species breeds on barren or sparsely vegetated beaches, islands and spits of sand, shingle, shell fragments, pebbles, rocks or coral fragments on seashores or in estuaries, saltmarshes, salt pans, offshore coral reefs, rivers, lakes and reservoirs. It</p>



			<p>may also nest on dry mudflats in grassy areas, but shows a preference for islets surrounded by saline or fresh water, where small fish can be caught without the need for extensive foraging flights.</p> <p>Its diet consists predominantly of small fish (e.g. <i>Ammodytes spp.</i>, Sand-smelts (<i>Atherina spp.</i>), Gobies <i>Pomatoschistus spp.</i>, Roach <i>Rutilus rutilus</i>, Rudd <i>Scardinius erythrophthalmus</i>, Carp <i>Cyprinus carpio</i>, and Perch <i>Perca fluviatilis</i>) and crustaceans 3-6 cm long as well as insects, annelid worms and molluscs.</p> <p>The nest is a bare scrape positioned on the ground in less than 15 % vegetation cover on beaches of sand, pebbles, shingles, shell fragments, coral fragments, or rock above the high tide line and often only a few metres away from shallow clear water. Alternatively, in marshy habitats (e.g. coastal saltmarshes), the species may build a nest of shells or vegetation. The species nests in small loose colonies, with neighboring nests, usually placed more than 2 m apart.</p> <p>Habitat loss and degradation through the development of foreshore poses a significant threat to the Little Tern, with relative sea-level rises predicted due to climate change also threatening beach-nesting habitats. Little Terns are vulnerable to disturbance from birdwatchers, photographers, and the general public, leading to nest failures.</p>
18	European Turtle Dove (<i>Streptopelia turtur</i>)	Vulnerable Globally	<p>This species is listed as Vulnerable. It has undergone rapid declines in much of its European range, whilst in Russia and Central Asia, it is thought to have experienced further severe declines. Declines are thought to be driven by a number of factors including loss of foraging and nesting sites as well as disease and hunting along its migration routes.</p> <p>The global population size is 19,300,000-71,400,000 individuals. This roughly equates to 12,800,000-47,600,000 mature individuals.</p> <p>The population is suspected to be in decline owing to ongoing habitat destruction and unsustainable levels of exploitation. In Europe, the population size is estimated to be decreasing by 30-49% in 15.9 years (three generations) (BirdLife International 2015).</p> <p>The species is a widespread migrant breeder across much of central and southern Europe, Central Asia, the Middle East, and North Africa, wintering mainly in the Sahel zone of Africa.</p> <p>The species uses a wide variety of woodland types, as well as steppe and semi-desert, frequently relying on agricultural land for feeding. It may use hedges, borders of forest, groves, spinneys, coppices, young</p>



			<p>tree plantations, scrubby wasteland, woody marshes, scrub, and garigue. It tolerates humans but does not breed close to towns or villages. It generally breeds at low altitudes not exceeding 500 m in the temperate zone and up to 1,000-1,300 m in Mediterranean areas. Breeding commences in April and can last until September. It lays one to two eggs. The nest is a small platform of twigs lined with plant material and placed in the lowest parts of trees and shrubs and hedges. The species mainly feeds on the ground, taking seeds and fruits of weeds and cereals, but rarely also berries, fungi, and invertebrates. It is strongly migratory, wintering south of the Sahara from Senegal east to Eritrea and Ethiopia (Tucker and Heath 1994), where survival is strongly linked to cereal production.</p> <p>Transformation of agricultural land, including the destruction of hedges and areas of scrub, is thought to be an important factor in the decline of this species as well as the loss of semi-natural habitats. Changes in agricultural practices have several impacts on the species, as they can reduce both food supply and nesting habitat availability, and the decline in food is likely the main limiting factor rather than a decline in nest site availability. Widespread use of chemical herbicides appears to also be a very serious factor, with a consequent decline or elimination of many food plants and an increased reliance upon cultivated grain. Hunting is also significant during migration and in its wintering range, with a legal annual estimate in France computed at c. 40,000 birds. There is believed to be an annual illegal hunting take of 0.6 million individuals across 27 Mediterranean countries.</p>
19	Northern Lapwing (<i>Vanellus vanellus</i>)	Vulnerable Nationally	<p>This species is suspected to be decreasing at a moderately rapid rate. It is therefore classified as Near Threatened at a global level.</p> <p>The global population is estimated to number c. 5,600,000-10,500,000 individuals (Wetlands International 2012).</p> <p>The overall population trend is decreasing, although some populations have unknown trends (Wetlands International 2015). In Europe, trends since 1980 show that populations have undergone a moderate decline; this is supported by recent data from Europe, suggesting the European population is decreasing by 30-49% in 27 years (three generations) (BirdLife International 2015). A strong decline is also reported for the European and western Asian population between 1988 and 2012, based on annual mid-winter counts (Nagy et al. 2014).</p> <p>The species shows a preference for breeding on wet natural grasslands, meadows, and hay meadows with short swards and patches of bare soil at low</p>



			<p>altitudes. It will also breed on grassy moors, swampy heaths, bogs, and arable fields. The nest is a shallow scrape in short grass vegetation.</p> <p>During the winter the species utilises large open pastures for roosting and forages on damp grassland, irrigated land, stubble and ploughed fields, riverbanks, lake shores, fresh and saline marshes, drainage ditches, estuaries, and mudflats (Africa). Its diet consists of adult and larval insects (e.g. beetles, ants, Diptera, crickets, grasshoppers, dragonflies, mayflies, cicadas and Lepidoptera), spiders, snails, earthworms and frogs. Most populations of this species are fully migratory and travel on a broad front out of Europe although some breeding populations in more temperate regions are sedentary. The species breeds from April to July in solitary pairs although pairs may also nest close together in optimal habitat.</p> <p>The species suffered past declines as a result of land-use intensification, wetland drainage and egg collecting. Land-use intensification remains a problem: today it is threatened by reduced breeding productivity as a result of intensifying and changing agricultural practices, especially the improvement of grasslands (e.g., by drainage, application of inorganic fertilizers and reseeded), increased growth of winter crops and loss of field margins and semi-natural habitat.</p> <p>Clutch destruction may also occur during spring cultivation (using machinery) on arable fields. The species may suffer from predation and nest predation by native and introduced predators, corvids, herons, gulls, and foxes.</p>
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5.4.7. Key / Focus Species relevant to Project

35 species fulfil the criteria for enlisting them as Priority Biodiversity Features (PBF).

Most importantly the Project Development Area shelters 18 PBF species while the area of the transmission Line is inhabited by 13 PBF species. Meanwhile, the area of Project Influence is used by 23 PBF species.

All the species enlisted in Table 20 should be subject to a specific focus aiming to assess the direct, indirect, and cumulative impacts and to ensure the avoidance and mitigation of potential impacts due to construction and operation.

Table 20: Bird species of Conservation Concern

No	Species	Scientific name	IUCN Red List	National Red List	Annex 1 Bir. Dir.
1	Eurasian Sparrowhawk	<i>Accipiter nisus</i>		EN	
2	Common Kingfisher	<i>Alcedo atthis</i>			I
3	Tawny Pipit	<i>Anthus campestris</i>			I
4	Great Egret	<i>Ardea alba</i>		EN	I
5	Grey Heron	<i>Ardea cinerea</i>		VU	



6	Eurasian Bittern	<i>Botaurus stellaris</i>		VU	I
7	Common Buzzard	<i>Buteo buteo</i>		VU	
8	Greater Short-toed Lark	<i>Calandrella brachydactyla</i>			I
9	Ruff	<i>Calidris pugnax</i>			I
10	Kentish Plover	<i>Charadrius alexandrinus</i>			I
11	Western Marsh Harrier	<i>Circus aeruginosus</i>		VU	I
12	Montagu's Harrier	<i>Circus pygargus</i>		EN	I
13	European Roller	<i>Coracias garrulus</i>		CR	I
14	Little Egret	<i>Egretta garzetta</i>		VU	I
15	Common Kestrel	<i>Falco tinnunculus</i>		VU	
16	Gull-billed Tern	<i>Gelochelidon nilotica</i>			I
17	Eurasian Oystercatcher	<i>Haematopus ostralegus</i>		VU	
18	Black-winged Stilt	<i>Himantopus himantopus</i>		EN	I
19	Caspian Tern	<i>Hydroprogne caspia</i>			I
20	Mediterranean Gull	<i>Ichthyaetus melanocephalus</i>			I
21	Little Bittern	<i>Ixobrychus minutus</i>			I
22	European Bee-eater	<i>Merops apiaster</i>		EN	
23	Pygmy Cormorant	<i>Microcarbo pygmaeus</i>		CR	I
24	Pygmy Cormorant	<i>Microcarbo pygmaeus</i>		CR	I
25	Little Tern	<i>Sternula albifrons</i>			I
26	European Turtle Dove	<i>Streptopelia turtur</i>	VU		
27	Sandwich Tern	<i>Thalasseus sandvicensis</i>		VU	I
28	Sandwich Tern	<i>Thalasseus sandvicensis</i>		VU	I
29	Eurasian Hoopoe	<i>Upupa epops</i>		VU	

None of the species trigger the critical habitat criteria.

5.5. Protected Areas

The area where the Blue 1 Photovoltaic Park will be built is not included in the Protected Areas or areas with Special Status.

This area is not included in the Natural or Cultural Monuments protected by law.

In the area around the project area, in the north, at a distance of 7.8 km there is Divjaka-Karavasta National Park and the Sandy Dunes are at a distance of 5.5 km from the Natural Monument, in the south, at a distance of 5.13 km there is the protected area Pishë-Poro and in the north-east, at a distance of 11.4 km there is the Natural Monument Kurrora.

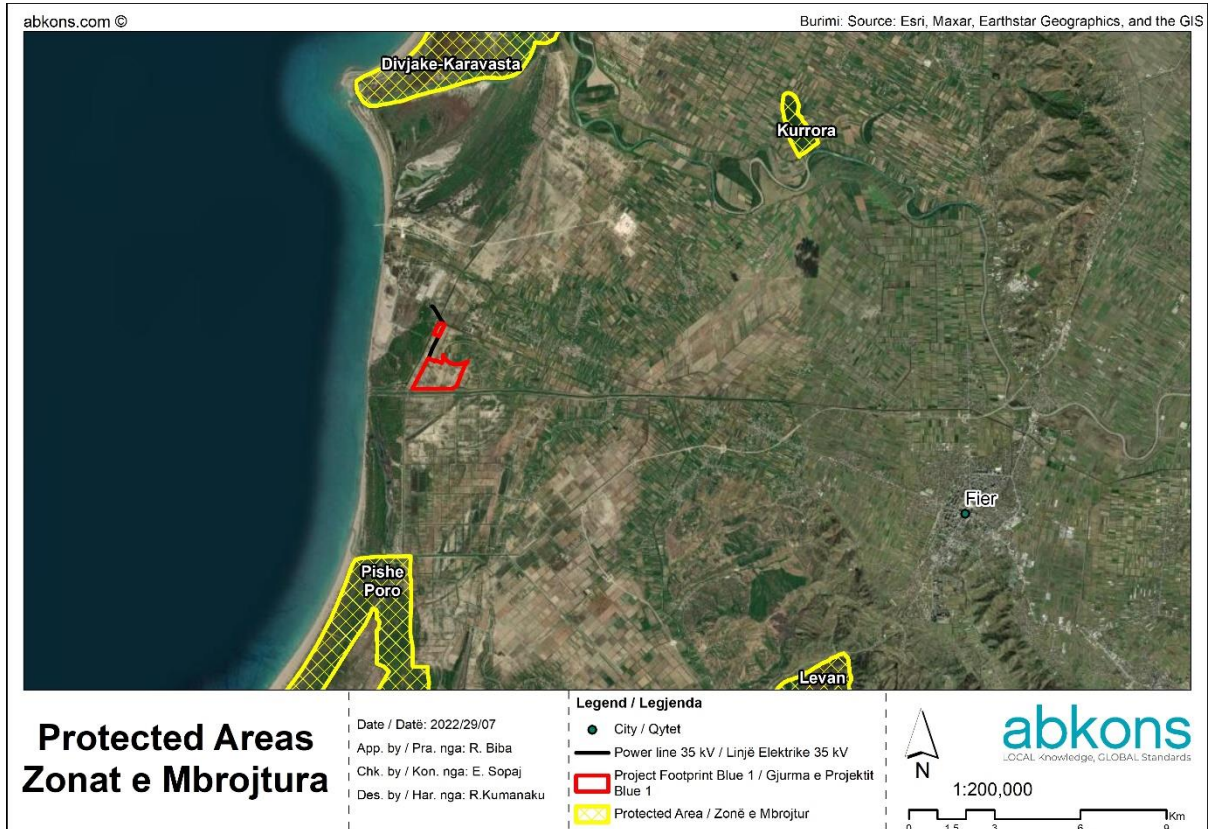


Figure 22 Map of Protected Areas

5.5.1. The landscape and natural heritage in Divjake-Karavasta National Park

In 2003, in the area of Divjakë-Karavasta, these protected areas were present: Strict Protected Reserve of Karavasta Lagoon, Pine of Divjaka National Park, Kulari Management Zone. By the last Decision of Council of Ministers (DCM) no. 687, dated 19.10.2007) was defined only a protected area of the second category: Divjake-Karavasta National Park. According to this decision (DCM no. 687, dated 19.10.2007) the park area is 22230.2 hectares divided into:

- Forest area (forests, rare forests, alluvial forests and shrubs, reforestation, forest and aquatic vegetation land) 5310.00 hectares;
- Agricultural area (agricultural land, orchards, olive groves and vineyards) 9078.42 hectares;
- Aquatic area (lagoons, rivers and catchment basins) 6408.90 hectares;
- Non-productive area (sandy and bare) 1120.71 hectares;
- Urban area of mixed farmland, orchards and woodland 312.21 hectares.

For administration purposes the park is divided into four areas:

- Core Subzone, with an area of 4189.70 hectares: Pine of Divjaka; Kulari habitats, Godulla of Dajlan; nesting islands of curly Pelican.
- Sustainable Use Subzone, with an area of 7788.44 hectares: Karavasta Lagoon, area between two banks of Shkumbin river; Kulari and Sulzotajt territories; territories between catchment basins of Myzeqe and Seman
- Traditional use subzone, with an area of 9261.87 hectares. Agricultural territories; areas around the dwelling centres; Bedati; Divjaka hills. Traditional economic activities are allowed.
- Recreation subzone, with an area of 990.23 hectares: coastal line and beach area and the pine forest area. Divjakë - Karavasta National Park has 8 natural monuments. According to Directory of Biodiversity and



- Protected Zones, CMD no. 413 dated 22.08.1994 No. Site 781, dated 29.11.1995 Karavasta Lagoon Wetlands Pine of Divjaka (Adriatic coast) are part of the World List of Ramsar Convention. This list includes the wetlands of Butrint, (Ionian coast) and Skadar lake area-Buna-Velipojë (Adriatic coast).

The Divjaka-Karavasta National Park is designated as National Park, Ramsar Site, Important Bird and Biodiversity Area (IBA), Key Biodiversity Area (KBA) and it is a Candidate Emerald Site and a Natura 2000 Pilot site. Divjaka-Karavasta is most known for birds. The number of bird species registered up today is 263 species of birds. The area is a major wintering ground for waterbirds with an average number of circa 37,000 wintering waterbirds reported during the counts of International Waterbird Census undertaken during 1993-to 2021 (EWetlands International).

The area is a major site for breeding birds too with circa 12,000 breeding pairs estimated in 2017 (Bino & Xeka 2017, as a contribution for the European Breeding Bird Atlas 2). Divjaka-Karavasta is also a major hub for migratory birds and particularly waterbirds with many of them following the migratory route of the Eastern Adriatic Flyway.

The site is regularly inhabited by seven species of global conservation concern:

- Common Pochard (*Aythya ferina*) – Regular wintering bird considered Vulnerable by IUCN. The average number for 1993-2020 is c. 325 individuals. Min 24 ind. Max 1325 ind.
- The Greater Spotted Eagle (*Clanga clanga*) is – Regular wintering bird considered Vulnerable by IUCN. With at least 1-2 specimens in the last five years of 2015-2020.
- Long-tailed Duck (*Clangula hyemalis*) – Wintering bird considered Vulnerable by IUCN. Observed in 2017 with 3 wintering individuals.
- Velvet Scoter (*Melanitta fusca*) – Wintering bird considered Vulnerable by IUCN. Observed respectively in 1995 and 1996 with one specimen.
- White-headed Duck (*Oxyura leucocephala*) - Wintering bird considered Endangered by IUCN. Observed in 1995 with 4 individuals.
- Yelkouan Shearwater (*Puffinus yelkouan*) – Resident bird in the Mediterranean considered Vulnerable by IUCN. Regularly observed at the coast of the Ramsar Site.
- Turtle Dove (*Streptopelia turtur*) – Regularly breeding bird considered Vulnerable by IUCN. Present in the area with c. 100-150 breeding pairs.

Divjaka-Karavasta holds more than 1% of the regional population for five bird species:

- Dalmatian Pelican (*Pelecanus crispus*) - > 3% of the regional resident population
- Pygmy Cormorant (*Microcarbo pygmaeus*) - > 2% of the regional population
- Greater Flamingo (*Phoenicopterus roseus*) - > 1% of the regional population
- Eurasian Wigeon (*Mareca penelope*) - > 2% of the regional population and
- Collared Pratincole (*Glareola pratincola*) - > 2% of the regional population

The area is also an important site for 85 bird species part of Annex 1 of the Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 “On the conservation of wild birds”, as amended by Directive 2013/17/EU). Annex 1 comprises a List of particularly vulnerable species of wild birds which are the subject of special habitat conservation measures. According to Article 4.1 of the Directive “The species mentioned in Annex I shall be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution.”

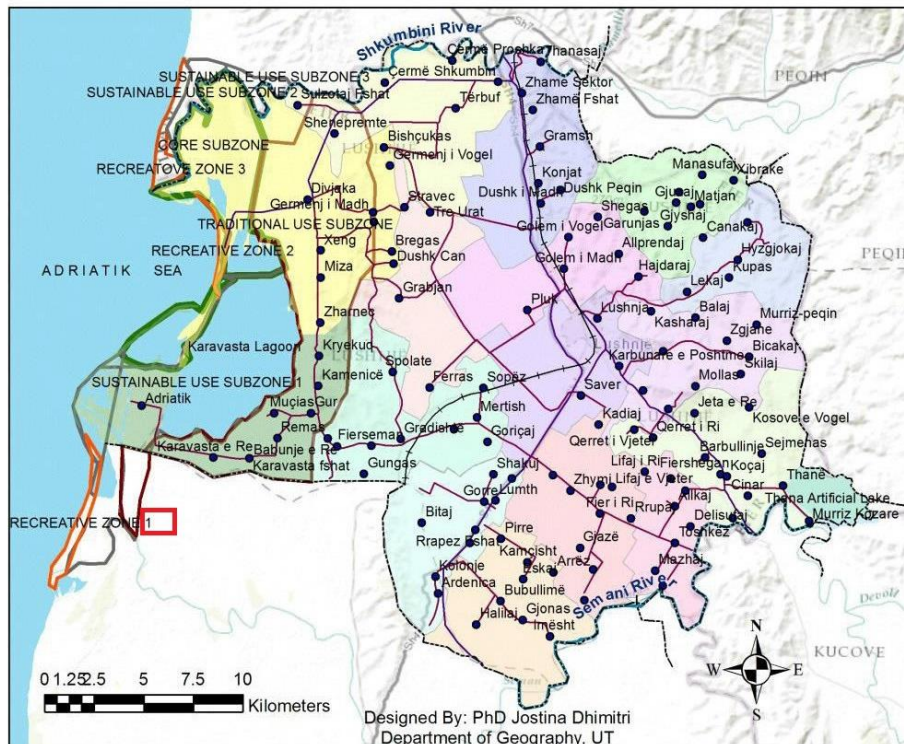
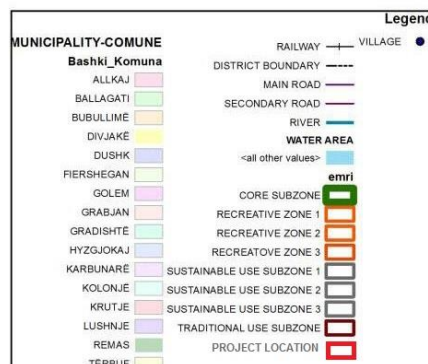


Figure 23 Map of zoning of Divjaka-Karavasta National Park

5.5.2. Pishë-Poros Protected Area

Protected Area Category IV Managed Nature Reserve, 1499.10552 ha, promulgated by DCM Reg.MB no.1, dated 27.7.1977. Pishë-Poros (Vlora) area, is rich in flora and plant associations. This reflects the suitable physical-geographical conditions, topography, geology, etc. Provided this area continues to have a rich vegetation, it should be protected and not overused. Among the plant associations that have been identified with the relevant status are the following:

- Tamarici-Calicetum purpurae (VU);
- Juncus maritimus-acutus (VU) Limonetum vulgare (VU);
- Limonetum vulgare (VU);
- Ammophila arenaria-Medicago marina (VU).

The flora of this area is closely related to the habitats that this area contains, which includes natural and aquatic habitats. Natural habitats consist of different types of ecological units classified according to functional and descriptive criteria such as the presence/absence of water, salinity level and vegetation

physiognomy. While aquatic habitats consist of many sub-habitats such as semi-permanent aquatic ones, drainage and irrigation canals, marshes, freshwater reservoirs and river bed are covered by alluvial forests.

5.5.3. Divjaka Oasis Dunes (Natural Monument)

They are located in Divjaka beach. They represent groups of dunes created by accumulating activity of wind on the sand beach. They are about 600 m long, 25 m wide and 1.5 m high.

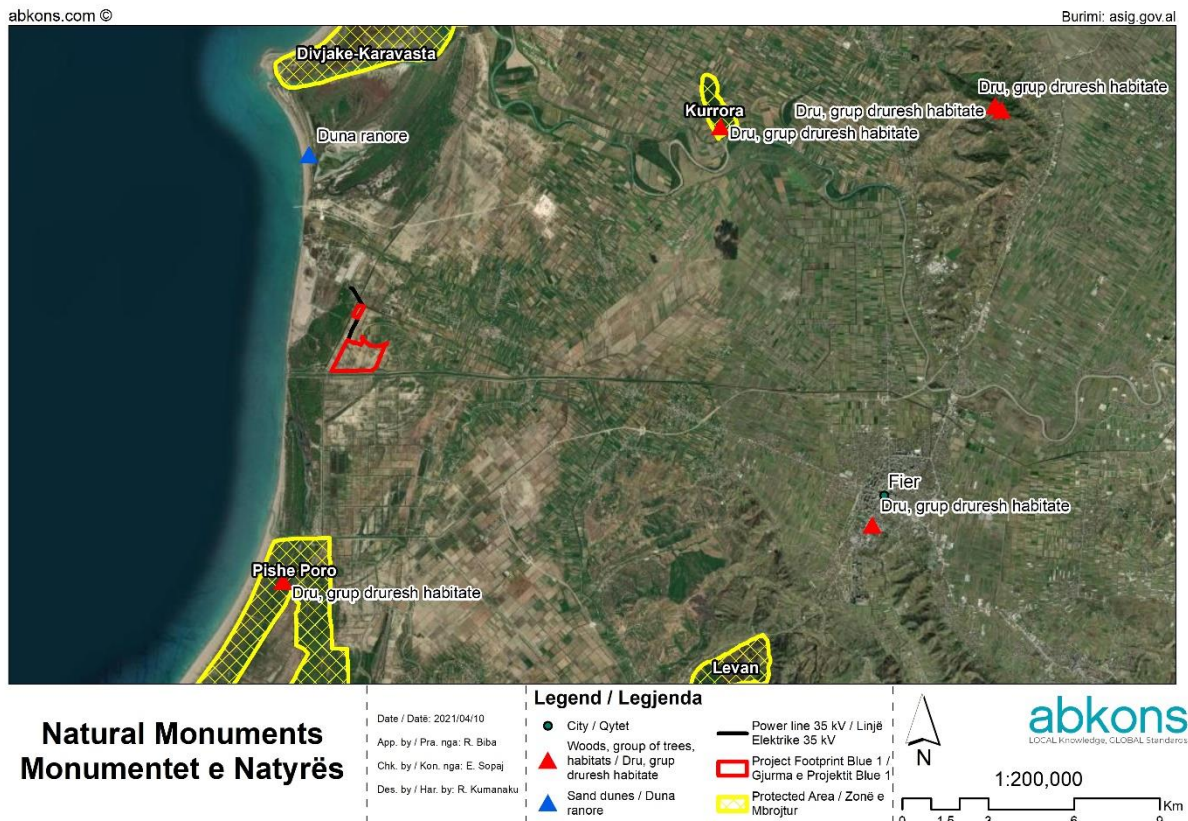


Figure 24 Natural Monuments Map

5.5.4. Landscape Protected Area of Vjose-Narta

The project area is 20 km north of Vjose-Narta Landscape Protected Area, Important Bird and Biodiversity Area (IBA), Key Biodiversity Area (KBA) and it is a Candidate Emerald Site and a Natura 2000 Pilot site.

Narta shelters at least 228 bird species with several of them of conservation concern.

Four species, the Common Pochard (*Aythya ferina*), the Greater Spotted Eagle (*Clanga clanga*), the Velvet Scoter (*Melanitta fusca*) and the Turtle Dove (*Streptopelia turtur*) have an unfavourable global conservation status and are registered as Vulnerable by IUCN.

Data collected during mid-winter waterbird counts of 1993-2020 show that the site shelters every year an average number of circa 19,500 waterbirds representing 66 species of waterbirds.

Some of the waterbird species are registered here in numbers of international importance and trigger the 1% threshold of the regional population:

- Greater Flamingo (*Phoenicopterus roseus*) – more than 2% of the regional population
- Pied Avocet (*Recurvirostra avosetta*) – 1.5-2.5 % of the regional population.

Finally, from 228 bird species, 76 of them belong to Annex I of the Birds Directive (Directive 2009/147/EC



of the European Parliament and of the Council of 30 November 2009 “On the conservation of wild birds”, as amended by Directive 2013/17/EU). Annex 1 comprises a List of particularly vulnerable species of wild birds which are the subject of special habitat conservation measures. According to Article 4.1 of the Directive “The species mentioned in Annex I shall be the subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution.”

5.6. Summary of the Critical Habitat Assessment

A Critical Habitat Assessment (CHA) was completed for the Blue 1 - 50 MW Solar Park, Albania, to identify and assess the biodiversity features that potentially trigger IFC’s Performance Standard 6 (PS6) and EBRD’s Performance Requirement 6 (PR6). The analysis is based on the interpretation of global and regional datasets, available literature, and field data from baseline studies on flora and fauna, and aquatic biodiversity.

Criteria and thresholds for Critical Habitat determination were applied separately for terrestrial and aquatic scoping areas.

This assessment confirms:

- 17 species that meet the CH thresholds for Criteria 1-3 / Criteria ii-iv, where only 6 species are confirmed within EAAA; The wetland habitats within the Karavasta KBA are CH for Dalmatian Pelican and Pygmy Cormorant; wetland and aquatic habitats within the PV plant and along the transmission line route are CH for the Albanian Water Frog; wetland habitats within the Karavasta KBA are CH for six species of fish; habitats within the Karavasta KBA are CH for seven species of plants; habitats within the Karavasta KBA are CH for one species of insect.
- The Project area meets the IFC definition of modified habitat.
- Two habitats and 49 species are identified as PBFs, as defined by EBRD PR6;

While this CHA has identified CH-qualifying species and PBFs, available information suggests that the Dalmatian Pelican, the Pygmy Cormorant, and four species of fish occupy coastal lagoons and water surfaces that do not overlap with the Project.

Available data suggests that drainage ditches in the Project area have suitable habitat for the Albanian Water Frog.

5.6.1. Implications and next steps

For Projects operating in Critical Habitat, IFC PS6 requires project proponents to ‘fully exercise the mitigation hierarchy, with an emphasis on measures aimed at avoiding and minimizing impacts. Where significant residual impacts remain, additional remediation and offset measures may be required to deliver a Net Gain for all CH-qualifying features.

The presence of species that qualify areas as Critical Habitat does not necessarily mean that a project will significantly impact these species. Several scenarios are possible, from negligible impacts, readily avoided or temporary, to those that are significant, long-term, and challenging to mitigate. It is also important to consider whether any features need a species-specific focus or if they can be collectively addressed through a broader consideration of habitat management and taking a landscape-level perspective (e.g., using particular habitats as a proxy for a suite of similar species).

Even where no measurable impacts are anticipated to CH-qualifying biodiversity after mitigation, projects need to undertake monitoring to verify this, which can either be described in a Project-specific Biodiversity Monitoring and Evaluation Plan (BMEP) or within other documents. Where monitoring indicates that there are unforeseen impacts, adaptive management measures should be in place to address these.

The PV plant is located in an area with a mixture of Critical and Modified Habitat and therefore PS6 paragraphs 12 and 17-19 are applicable (IFC 2012). In areas of Modified Habitat, a project should minimize



impacts on biodiversity and implement mitigation measures as appropriate. In areas of Critical Habitat, projects are required to demonstrate:

- No other viable alternatives within the region exist for the development of the project on Modified or Natural Habitats that are not critical;
- The project does not lead to measurable adverse impacts on those biodiversity values for which the Critical Habitat was designated, and on the ecological processes supporting those biodiversity values;
- The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and,
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program are integrated into the client's management program.

Where the Project could have significant, adverse, and irreversible impacts to PBFs, the Project should (EBRD 2014a, paragraph 13) not implement any project-related activities unless:

- There are no technically and economically feasible alternatives;
- The overall benefits outweigh the project's impacts on biodiversity;
- Stakeholders are consulted in accordance with PS 10;
- The project is permitted under applicable environmental laws, recognising the priority biodiversity features; and,
- Appropriate mitigation measures are put in place, in accordance with the mitigation hierarchy, to ensure no net loss and preferably a net gain of priority biodiversity features over the long term, to achieve measurable conservation outcomes.
- Demonstrating that Project's operations within the protected area are in line with national law;
- Developing the Project in a manner that is consistent with any management plans that exist for the area;
- Consulting with protected area staff, or officials responsible for the management of the area; and
- Developing, and implementing, additional programmes to 'promote and enhance the conservation aims of the area'.

It is therefore recommended that the Project develops:

- a Biodiversity Management Plan that details the mitigation and monitoring measures that will be implemented during the construction and operation phases of the Project to avoid, minimise and restore biodiversity values on-site and verify the levels of impacts occurring; and,
- a Biodiversity Action Plan that quantifies the residual impacts to identified priority species and proposes conservation actions that would support the Project meet its net gain commitments for CH-qualifying species and no net loss commitments for PBFs, and promotes the conservation aims and effective management of the Karavasta KBA near which the Project operates.



6. BASELINE INFORMATION ON PHYSICAL ENVIRONMENT

This section presents the physical baseline of the project area under the following headings:

- Climate and meteorology;
- Air quality;
- Noise in the Project Area;
- Surface and groundwaters
- Topography and Geology;
- Hydrology and flooding;
- Soils;

Baseline data has been collected based on desktop research of available information (secondary data), as well as primary data collected on site, as part of field studies undertaken in the Project area. Secondary data was collected from various government agencies.

6.1. Climate and Meteorology

Climatic data from Fier meteorologic station on temperature, wind and extremal weather conditions was obtained from the Institute of Geo-Sciences, Energy, Water and Environment (IGEWE).

The climate in the coastal plain is typical Mediterranean, with a low annual rainfall (average rainfall of 893 mm) in the Project area, with 70 to 75% of rainfall occurring from October to March. The average annual temperature is 18.8°C, with a mild winter.

Maximum and minimum temperatures are observed in August (maximum) and January, while the lowest rainfall was in August and the highest in November. The highest evapotranspiration is in July and August while the lowest is predictably in the winter months. The humidity deficit, as in the whole Mediterranean area, is in the summer and autumn seasons until November.

Evaporation estimated from climatic data of Vlora station (Hydrometeorological Institute, 2001) reach an annual value of about 1200 mm. This means that the nearby lagoon and hence surrounding area has always faced strong seasonality in its water regime and salinity, as is usually the case for Mediterranean coastal lagoons.

Table 21. Average monthly temperature

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ndermenas	9	10.5	12.5	15	18.5	22.5	25.5	26.5	23	18.5	15	10.5
Fier	8.5	9.4	11	14.2	18.1	22.1	24.2	24.1	21.3	17.2	13.4	10.2
Fier Seman	8.3	9.3	11.1	14.1	18.2	22.2	24.1	24.1	21.2	17.1	13.2	9.9

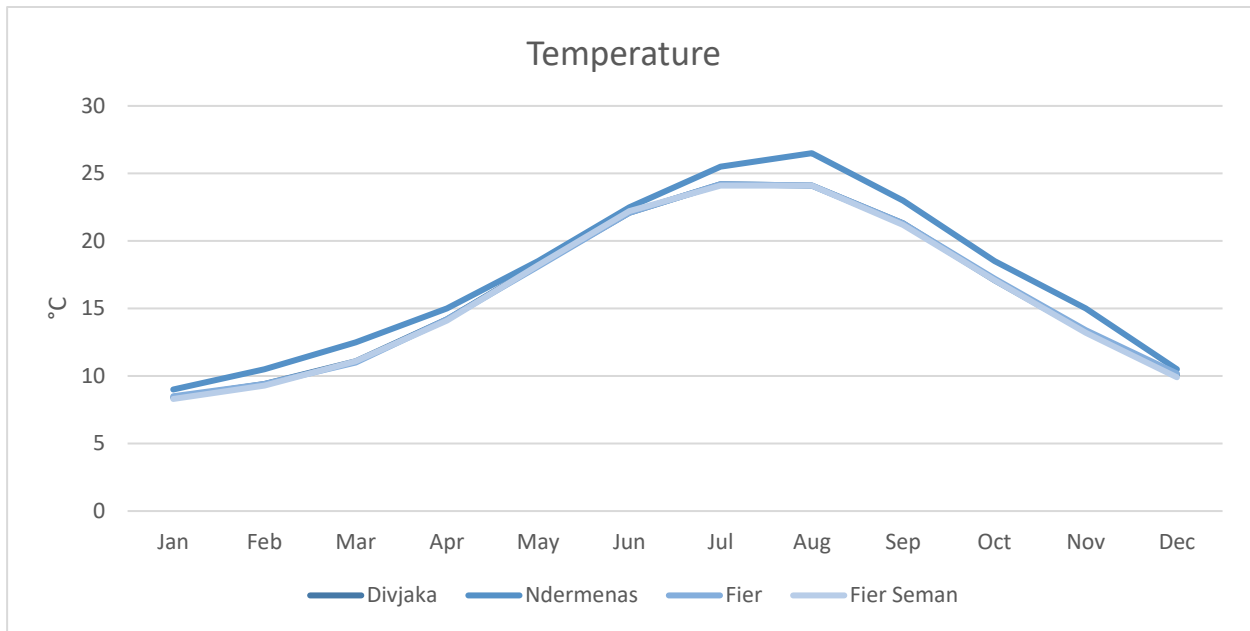


Figure 25 Average monthly temperature in the project area¹⁴

Table 22 Average monthly precipitation¹⁵

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ndërmenas	128	105	90	73	63	38	24	31	63	105	155	133
Fier	129	104	85	69	62	34	20	29	61	105	155	135
Fier Seman	128	105	88	73	66	38	23	31	63	104	154	131

¹⁴ Institute of Geo-Sciences, Energy, Water and Environment

¹⁵ Institute of Geo-Sciences, Energy, Water and Environment

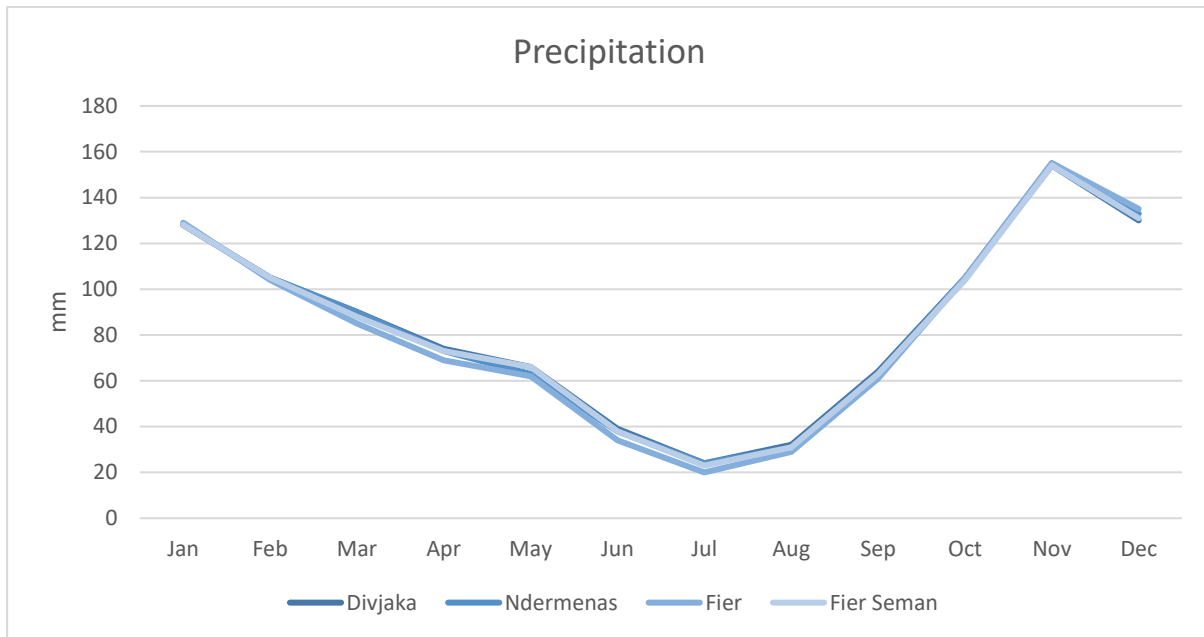


Figure 26 Average monthly precipitation in the project area¹⁶

The wind rose (Figure 27) shows that two main directions prevail: South - North and North - South with dominance that South-North.

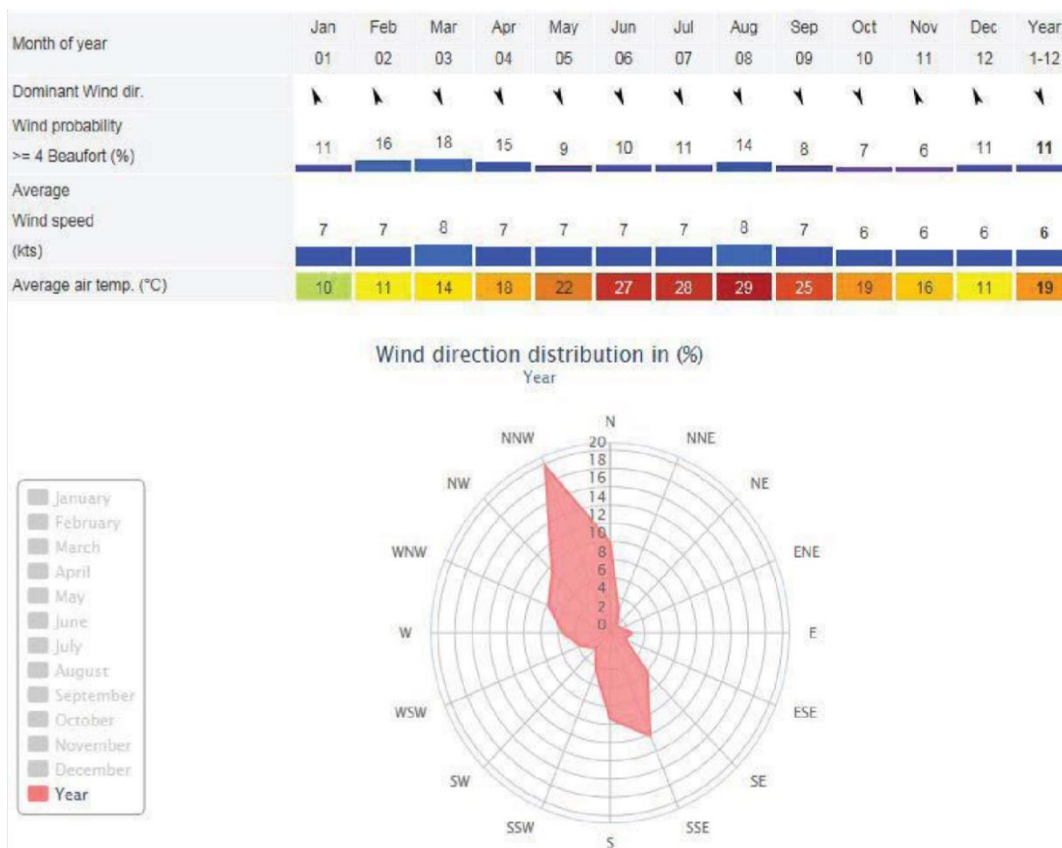


Figure 27 Predominant wind direction in the project area¹⁷

¹⁶ Institute of Geo-Sciences, Energy, Water and Environment

¹⁷ Institute of Geo-Sciences, Energy, Water and Environment



6.2. Air Quality

This is a rural area with limited emission sources and therefore a generally reasonable air quality in the area. The main sources of air pollution near the project area are from transport vehicles used in the area by the local residents and agricultural activities. These activities generate dust (particulate matter, PM) and noise. Air pollution from vehicle traffic is currently unmeasured. The poor condition of the roads, particularly in rural areas, can create large quantities of dust, especially in the dry periods (summer months).

6.3. Noise in the Project area

Along the project area the baseline noise environment varies insignificantly as it extends through uncultivated and undeveloped areas. The majority of the potential receptors are villages which can be considered sensitive. The sensitive receptors that may be affected by the Project were identified through a desktop analysis of the local cartography and satellite imagery.

Current anthropogenic noise in the vicinity of the project area is related to agricultural (humans working, machinery and animals), human domestic activities, vehicular traffic along the rural roads and pathways. In general, for the area, ambient noise levels would be expected to be slightly higher during the dry season due to the arrival of emigrants, increase of traffic movement and agriculture activities. In rural areas, there is no published data for ambient noise levels. In order to present an accurate description of the noise environment at sensitive receptors, the closest urban settlements (houses) in the surrounding villages closest to the areas where the proposed construction activities will occur (near the PV footprint and along the main road axis) were considered within the potential area of influence for noise.

6.4. Surface Waters

The area has several water resources: part of the Adriatic Sea, Shkumbin River), Seman River, Tërbuf area (21 km in the north of the project) and Myzeqe (11 km in the north of the project), etc.

Seman River (about 6.46 km in the north of the project) is one of the most important and most interesting rivers in the Albanian hydrography. It has a catchment basin of $F = 5649 \text{ km}^2$, height $H = 889 \text{ m}$ and length $L = 281 \text{ km}$. It has two branches: Osum River ($F = 2073 \text{ km}^2$, $H = 852 \text{ m}$) and Devoll River ($F = 3122 \text{ km}^2$, $L = 193 \text{ km}$). The average annual inflow-discharge module for the Seman River catchment area is $q_0 = 16.4 \text{ l / s} \cdot \text{km}^2$, while the average inflow coefficient is $\alpha_0 = 0.49$. The maximum flow mass with probability $p = 1\%$ for Devolli (in Kozara) is $Q_{p1\%} = 1790 \text{ m}^3 / \text{s}$, while for Osumi (at Ura Vajgurore) is $Q_{p1\%} = 1290 \text{ m}^3 / \text{s}$. The total mass of sediment discharge for the Seman River is $WT = 15630 \times 10^3 \text{ tons/year}$, of which about 20%, (or $P = 3130 \times 10^3 \text{ tons / year}$), is the bed load, while about 80%, ($WF = 12500 \times 10^3 \text{ tons / year}$), is the suspended sediment.

Shkumbin River (about 10.8 km south of the project) has its source in the east the Valamara Mountains (south-east of Albania) and flows within a narrow and deep valley between the Mokra and Shebenik Mountains, to the east, and the Polis Mountains in the West. Shkumbin River has a catchment area of 2459 km^2 , with a flow velocity of $48 \text{ m}^3/\text{sec}$, an average annual flow of $6.78 \times 10^6 \text{ tons}$ and is 187.4 km long. At the end of the flow the river passes through the Myzeqe Plain for about 35-40 km, winding through it and forming a small delta in the Karavasta Lagoon.

Both the Seman River and the Shkumbin River have undergone various interventions by humans such as: destruction of the riparian zone, use of inert material (sand, gravel, stones), embankment collapses, which have led to the alienation of their hydro-morphology. These interventions and climate change, have caused the following consequences: i) the lowering of the river bed due to its lower erosion, ii) flooding in the lower area, iii) erosion of agricultural land, iv) destruction of embankments, and v) reduction of groundwater level in water sources.

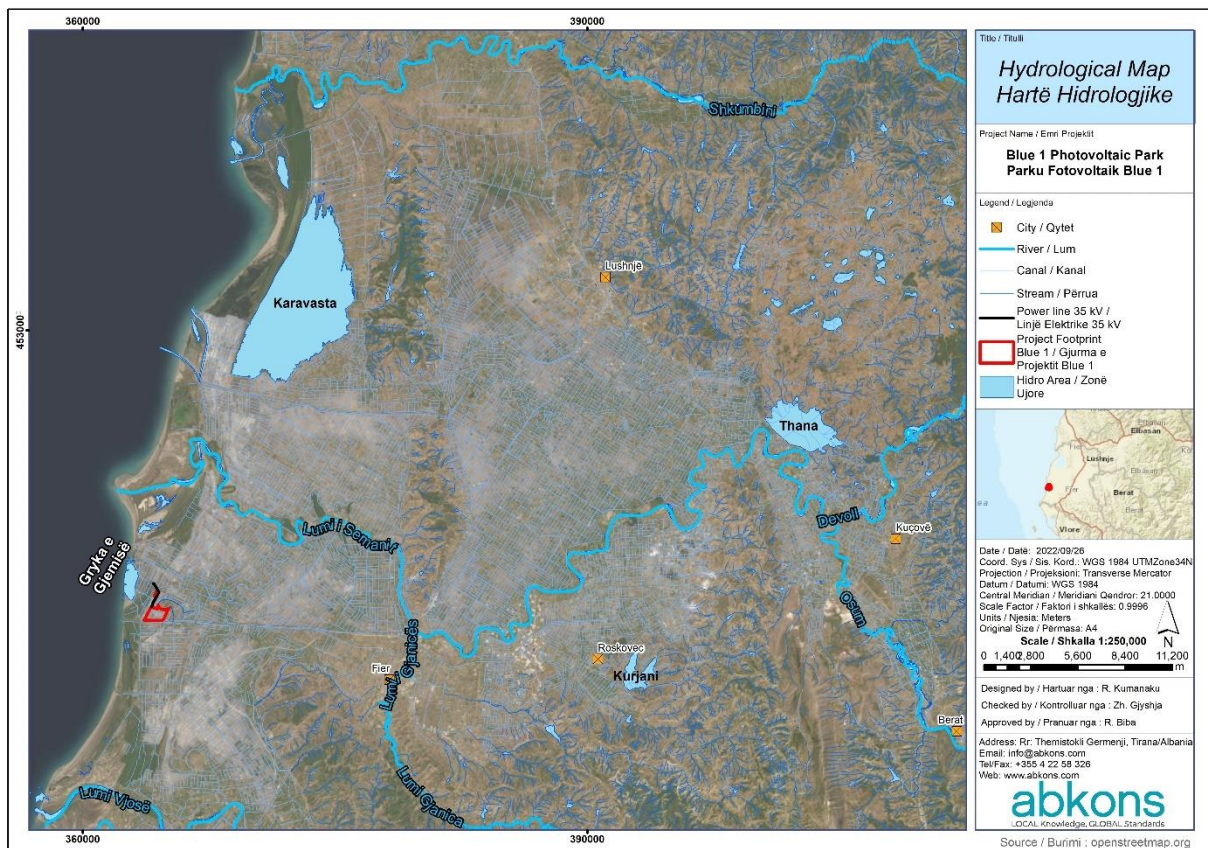


Figure 28 Hydrographic Map

Green belt (riparian) damage is observed almost along the entire course of the Seman River. The lack of a green belt at the river mouth (in the Topoja area) has also allowed the penetration of saline water into the plain area, making agricultural land uncultivable. Agricultural soil erosion has been observed mainly in the downstream area and in some segments in the middle course (from the Patos-Marinza area to the estuary).

The irrigation-drainage system includes the first, second and third drainage and irrigation canals, where the Tërbuf area (about 21 km north of the project) and Myzeqe (about 11 km north of the project) are the main ones in the region. The area of Karavasta e Vogël, Divjaka-Karavasta and the area of the former Tërbuf swamp were released from water due to the reclamation during the period 1946-1983 and the establishment of a protective embankment along the river banks. The irrigation-drainage system is not as functional as it was before the 1990s and the agricultural plain area occasionally suffers from flooding.

Karavasta Lagoon (about 15 km in the north of the project) is one of the newest water resources in Albania's hydrographic network, recently formed as a result of the accumulation of solid discharges of the Seman and Shkumbin rivers. The general wetland complex, consisting of lagoons, sand dunes and river mouths, has an area of 10000 ha. It is located between the Shkumbin River and the Tërbuf Canal in the north, and the Myzeqe Canal and the Seman River in the south. The complex is surrounded in the east by Divjaka hills. Karavasta Lagoon is the largest area (4,100 ha) of this wetland complex, with a length of 15.4 km and a width of 4.1 km. The maximum depth is 1.3 m, with an average depth of 0.7 m. The lagoon is separated from the sea by the pine forest of Divjaka and the Godulla lagoon. The lagoon is bordered by agricultural land. The coastal morphology of the Karavasta lagoon has been very dynamic over the last 135 years due to changes that have occurred in the Shkumbin and Seman River deltas (Mathers and others., 1999). The biggest events occurred when the Seman River changed its direction moving north in the 1950s, then it moved back south in the late 1970s. The erosion of its abandoned delta progressively created a rising seaward to the north, which was closed within a few years creating the small Godulla lagoon. Karavasta is connected to the sea through three canals (Brew, 2003). The northern entrance, at the



moment, is completely blocked and detached from the sea. The central and southern entrances communicate with the Godulla lagoon which is connected to the sea by two other shallow canals. The construction of the Tërbuf and Myzeqe drainage canals in the 1980s, together with the related irrigation and drainage schemes, has isolated Karavastana from a significant part of its former drainage basin area. At the beginning of its formation, around 1860, the Karavasta Lagoon covered twice the area it occupies at the moment.



Figure 29 View of Hoxhara Pumping Station in the west of the project



Figure 30 The drainage canal on the western boundary of the property

6.5. Groundwaters

The type of alluvial aquifer is only present in the study area and its surroundings which lies on both sides of the downstream of the Seman River and has cross-granular porosity and medium water permeability. The aquifer is composed of gravel and sand, mainly with carbonate composition and less magmatic composition. This aquifer is known for good quality groundwater except for the Ndërmenas - Metaj area where it has been preserved the presence of low-quality water, probably due to the intervention of swamp water in the groundwater aquifer. The water amount is at a low level and can only be used to supply potable water to small villages.

The significant demographic growth over the last 30 years, especially in the pre-Adriatic plateau and coastal area, has been accompanied by an extremely high increase in the need for drinking water, agriculture and technology. The pumping levels increase above the aquifer capacity, caused hydraulic parameters disturbances of the aquifer, deterioration of groundwater quality, etc. Oil exploitation and agricultural development have led to the pollution of the main rivers (Seman River) and, consequently, the groundwater of the alluvial aquifer which has hydraulic connection with the river bed water.

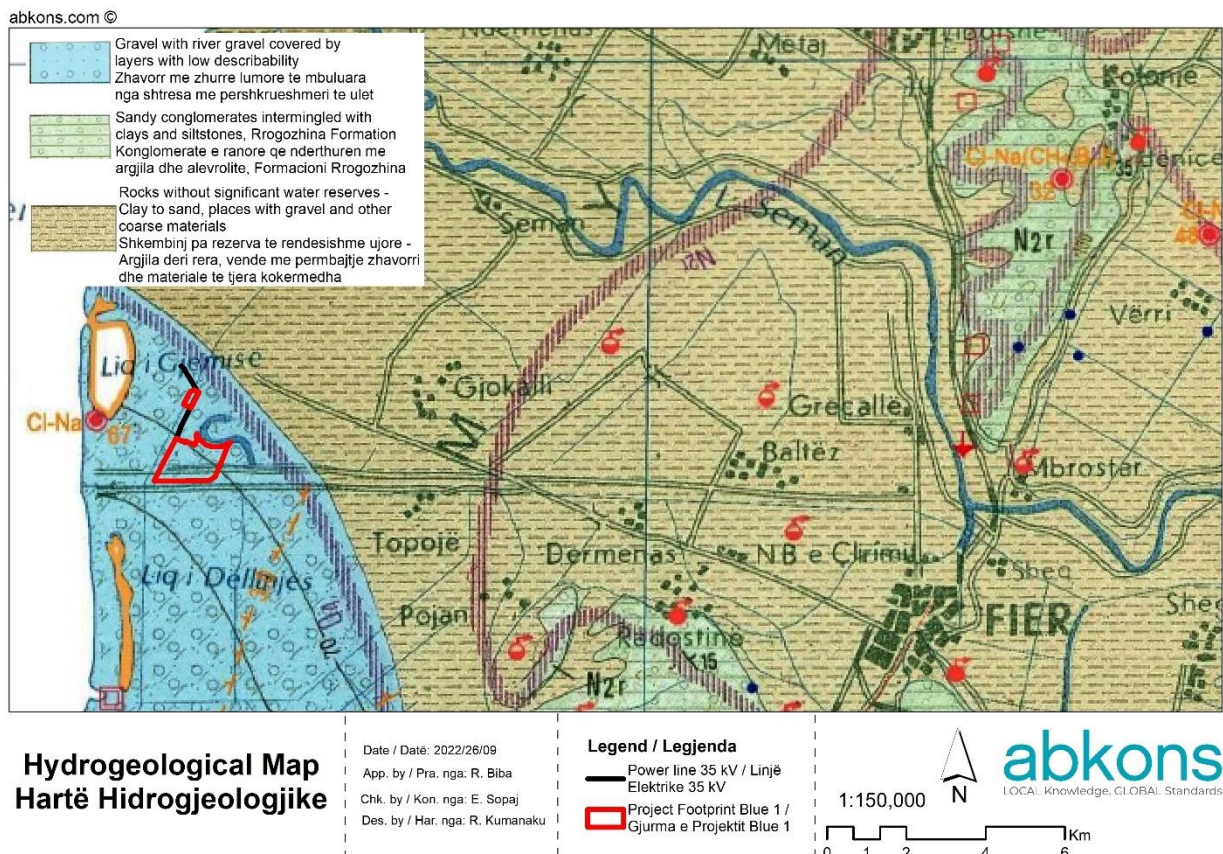


Figure 31 Hydrological Map of the Project area

6.6. Topography

The main morphological elements developed in the region of Sheq Marinas, Topoja, Topoja Commune, Fier are a large plain area, the Divjaka small hills, and the coastal lagoon of Karavasta, (north-west of the project area) the Seman and Shkumbin delta, (respectively south-west and north-west), sand dunes and sandy beaches. We are generally dealing with a plain region with an elevation of 0-100 m above the sea



level and with highly fertile lands. Generally, there are smooth hilly reliefs suitable for agricultural use. Gray-brown soils develop in flat areas.

There are special types of alluvial soils in the Seman and Vjosa valleys, saline soils that lie in Hoxhare and swampy soils of Roskovec.

In the Fier District lies a part of Myzeqe e Madhe, Myzeqeja e Vogël and the fields of Frakulla and Cakran. Fier, like the whole country of Albania, is part of the Mediterranean climate belt, and is distinguished for its more noticeable Mediterranean features, which are characterized by hot and dry summers with considerable sunshine and mild winters with heavy rainfall. Frosts and snow are extremely rare occurrences. The heat starts in mid-spring and lasts until the end of October. The climate of Fier is warm because Fier is washed by the sea and in the eastern part is protected by cold winds. Fier is distinguished for the high number of sunny days averaging 2,800 hours per year.

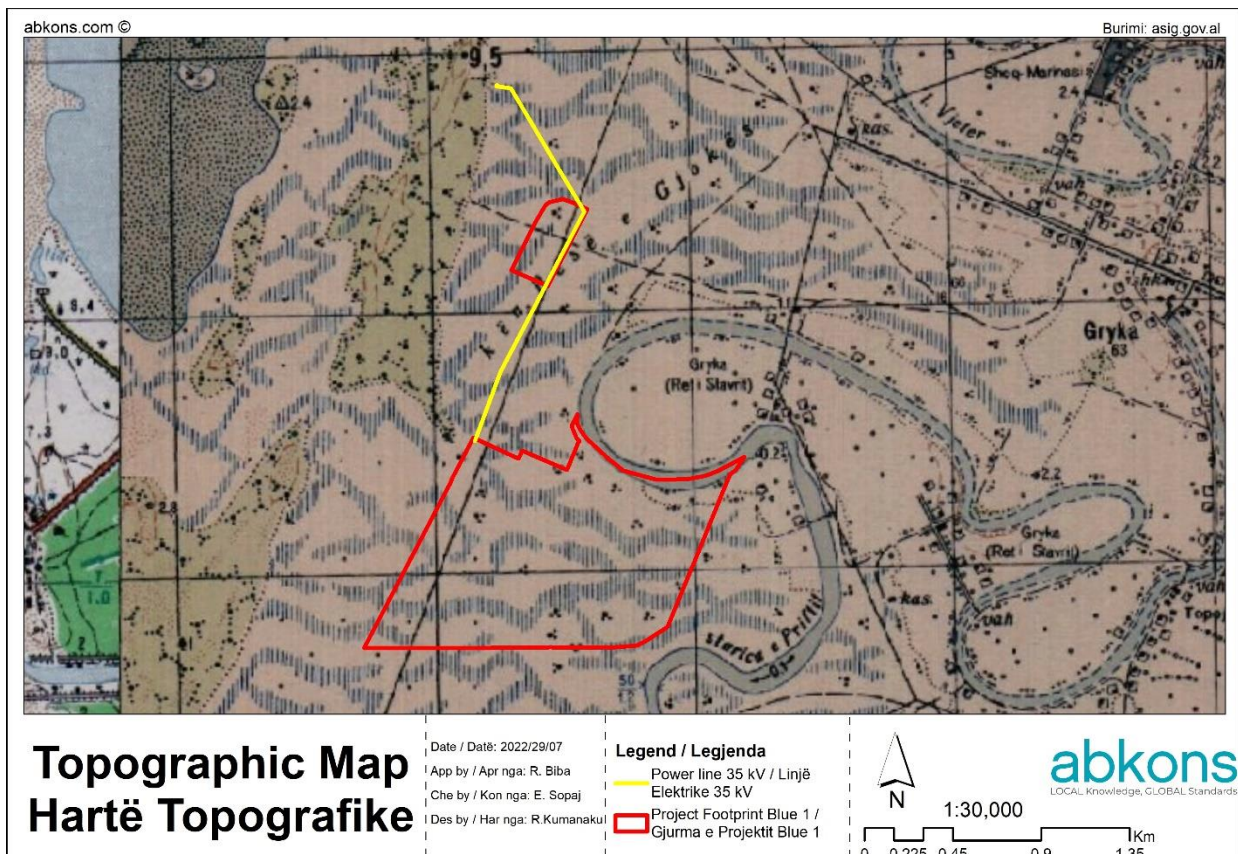


Figure 32 Topographic map

The dunes along the coastline of Seman beach (south-west of the project area) are a typical element of coastal morphology. According to the report of the National Environmental Agency (2015), dunes are 1 km long, 15 m wide and 6 m high. Climate change and human activity have significantly affected their position and dimensions. From Povelca (north-west) to the beginning of Seman beach (south-west), the dunes are fragmented with a height of not more than 1.5 m. The highest dune (6.0m) is located at the bottom of the Seman beach section.



Figure 33 The highest Dunes segment (over 4 m) along the Municipality of Fier coastline (Co-PLAN, 2016)

The Municipality of Fier is characterized by a lowland terrain with an average elevation of 20 meters above sea level and is bordered by municipalities of: Divjakë, Lushnjë, Roskovec, Patos, Mallakastër, Selenicë dhe Vlorë. The Municipality of Fier has a strategic position in the Albanian territory enabled by several cross-sectoral advantages. It comprises 5.7% of the agricultural land; it is bordered by two main rivers, Semani in the north and Vjosa in the south, which have protected natural areas near their estuaries; It owns the Apollonia National Archaeological Park; It has industrial and oil-bearing areas and enjoys a strategic position in terms of potential gasification, upon the implementation of the Trans Adriatic Pipeline (TAP) that passes in its territory.

The area of the Municipality of Fier is mainly lowland, but there are also hills in the eastern part and few in the northern part. The lowland area continues from the Adriatic coast where there are located most of the settlements. The elevations in this area vary from 0 to 100 m above the sea level. The area slope in the lowland area is very low and varies from 0-6%. There are also numerous settlements in Levan and Frakull in the part where the terrain height begins to increase. The area extent is at levels 110-220 m above sea level and the slope varies from 6.1-15.6%. In the border of the Municipality of Fier with the Municipality of Mallakastër, we have the highest hills that range from 220 to 550 m. In this part, the area slope is even greater and ranges from 15.7-43%. The lowland part is divided into two sub-zones which are: i) the coastal lowland sub-unit and ii) the pre-mountain lowland sub-unit. The coastal lowland sub-unit lies along the Adriatic Sea and is known for the slope and elevation at the sea level. In some areas, such as Divjaka, the elevation goes below the sea level. This area is distinguished for the Osum River deltas and the estuary of the Ngjala canal and many other irrigation canals. In the area near the coast are sand dunes, marshes (lands almost flooded by the Adriatic Sea found mostly in the Karavasta Lagoon) and the latter are those parts of the coast that are under the influence of ebbs and tides.

In the coastal sub-unit, there is a considerable part of the Myzeqe e Madhe Plain, Myzeqe e Vogël Plain (Frakulla, Roskovec, Bubullima, Fier, Pojan and Hoxhara Plain) which are covered by a dense sewerage system and used for cultivation of agricultural crops. The elevation of these lowlands' ranges from 0 to 5m above the sea level. The pre-mountain lowland sub-unit includes the territory used for the development of the cities of Fier and Lushnjë (and Ballsh). This sub-unit includes from flat areas to hills up to 700m high. The hilly morphological unit develops in the central, eastern and south-eastern area of the region territory. As soon as the lowland unit ends, there appear the hill forms (the hills of Divjaka-Ardenica, Karbunara, Frakulla and Mallakastra) which have quotas from 10 m.n.d. up to 700 m.n.d. The hill and hillock slopes of



this morphological unit have slopes from 5 to 350 and variable downhill directions. Slopes are often rounded due to modelling caused by surface water flows. In the '70s and' 80s of the last century, this system of hills underwent the process of terracing, a process which has destructed their natural view. In most cases, these hills are planted with fruit trees, but there may be the cases when there are natural forests. It is precisely this morphological unit that is heavily affected by erosion and landslide-type slope phenomena of soil and rocks.

6.7. Geology

The deposits of Serravalian, Upper Miocene (Messinian), as well as Quaternary deposits have been found in and around this area.

Serravalian deposits

These deposits can be found in the south-eastern part of the area, in Kasnica and are characterized by a combination of massive clays, with massive sandstone bundles. In most cases, clays have no clear stratification or textural structure. Among them, there have been noticed interweaving layers of lithothamnium limestone. The Serravalian deposits thickness varies from 200-700 m.

Upper Miocene deposits

These deposits are placed transgressively over the older Patos-Verbas anticline deposits. They make the southern part of the Patos monocline, from the Kraps hills in Visoka to Ruzhdie. While in depth, these deposits have been found in almost all drilled wells for oil and gas exploration. Lithologically, there are two lithophagies: clay-sand lithophagy and gypsum-bearing lithophagy.

Clay-sand lithophagy is characterized by a combination of sandstone packages, with clay packages. The packages thickness is 6-7 m but occasionally reaches up to 15-20 m. Sandstones are of different kinds, with sloping stratification, rarely with small particles. The clays have a more silty, grey view. Among them are some macro faunistic horizons of the Ostrea type, distinct at great distances. The gypsum-bearing lithofacies consists of, all around, clay and aleurolites intertwined with thick-layer gypsum. Rare layers of sandstones are noticed among them. Gypsums have the shape of lenses, up to several meters thick. The Messinian deposits thickness varies from 200-2000 m.

It should be noted that all the following oil-bearing suites are associated with Upper Miocene deposits: Bubullima, Marinza, Driza, Gorani, Polovina-Kuçova as well as a series of bituminous sand layers that constitute an important industrial object.

Quaternary deposits

Quaternary deposits, in the area that we have studied, occur in 2/3 of the surface, occupying the central and northern part. They are characterized by the Late Holocene alluvial deposits (about 3500 years). In the Early Holocene period, the Seman River flowed into the Adriatic Sea, passing through Fier Shegan towards Karavasta. The Seman delta, near this village, was one of the earliest scaffoldings of this region, called the Pirgos Scaffolding. Furthermore, about 3500 years ago, the Seman River must have changed direction, passing through the Mbrostar gorge, filling the Seman plain. In general, alluvial deposits have a fine composition, characterized by fine sands, alluviums and clays, with a thickness that does not exceed 100 m. In addition to alluvial deposits, there were encountered proluvial deposits in the hills of the studied area, especially in Zharrëza hills. Their thickness reaches 30-40 m and they have a limited spread.

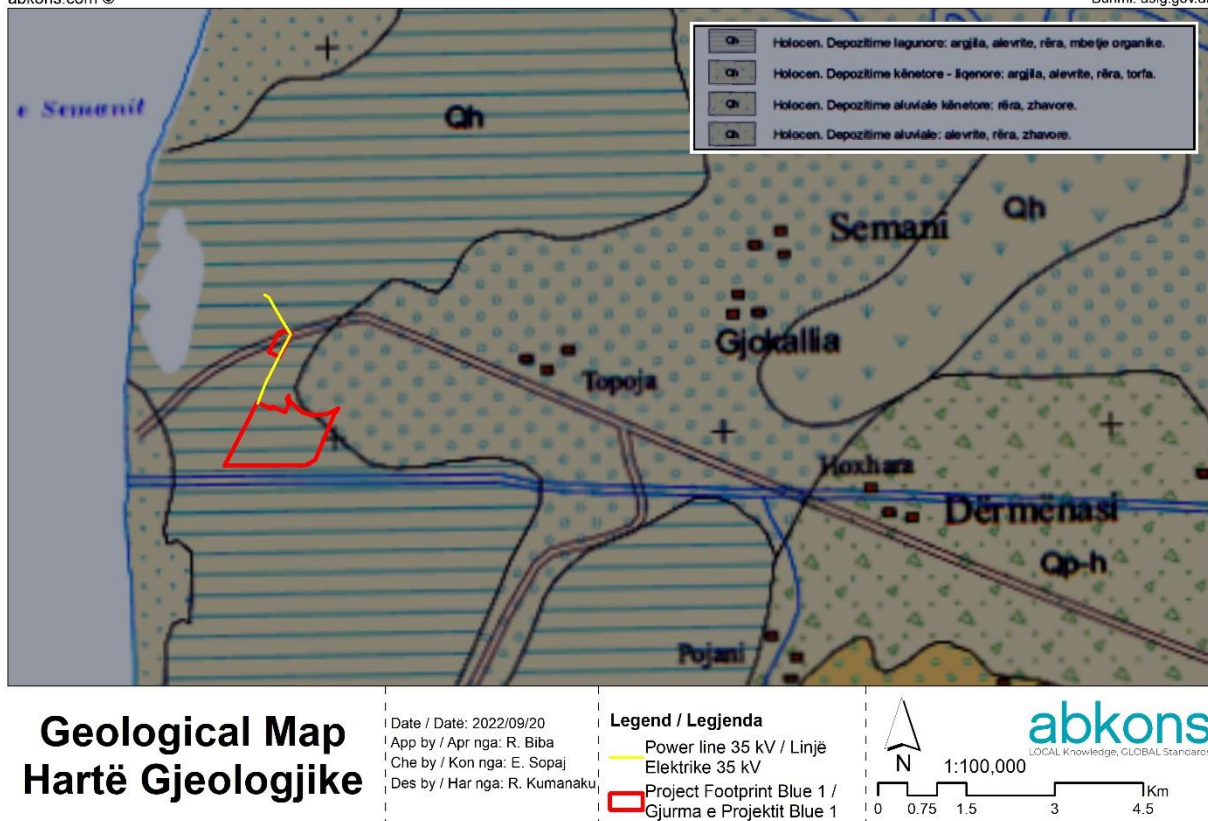


Figure 34 Geological Map of the Area

6.8. Hydrographic network

Albania can be considered a country with abundant water. The hydrographic basin of Albania has a maximum length of 360 km, and a width of 172 km. The total area of this basin is 43305 km² of which, 28850 km² are within the Albanian territory. Almost the entire surface of Albania discharges water flows into the Adriatic and Ionian Seas. Albania's rivers generally have a direction from East to West, following the direction of the ranges.

The average density of the hydrographic network can affect the hydrograph shape of a river during a rainstorm. Rivers that have a high hydrographic density often have a hydrograph with a full peak higher than the low-density one, and is an indicator that signals a greater risk of flooding. The highest values of hydrographic density are found in the Mati, Semani and Erzeni basins, with 3.4, 2.5 and 2.1 km / km², respectively. As the most important climatic elements, which affect the water flow, we consider atmospheric precipitation and air temperature. In addition, we do not exclude the effects of the influence of atmospheric pressure, humidity and wind. Flows formed by atmospheric precipitation, in hydrological terms, are the main source of food for rivers.

6.8.1. River Seman

The Project Area is part of the Seman River Basin. The Seman River Basin is one of the most complicated natural areas in Europe due to its physic geographical conditions: mountainous region, poor vegetation, strong presence of flysch formations, and a typical Mediterranean climate.

Semani is one of the most important and interesting rivers in Albanian hydrography. The catchment area of this river is also the length. The general direction of water flow is from East to West with a general

tendency to converge to the Coastal Lowland finally flowing into the Adriatic Sea through a very active estuary. Many partial studies have been conducted to evaluate the hydrological aspects of the Seman river system.

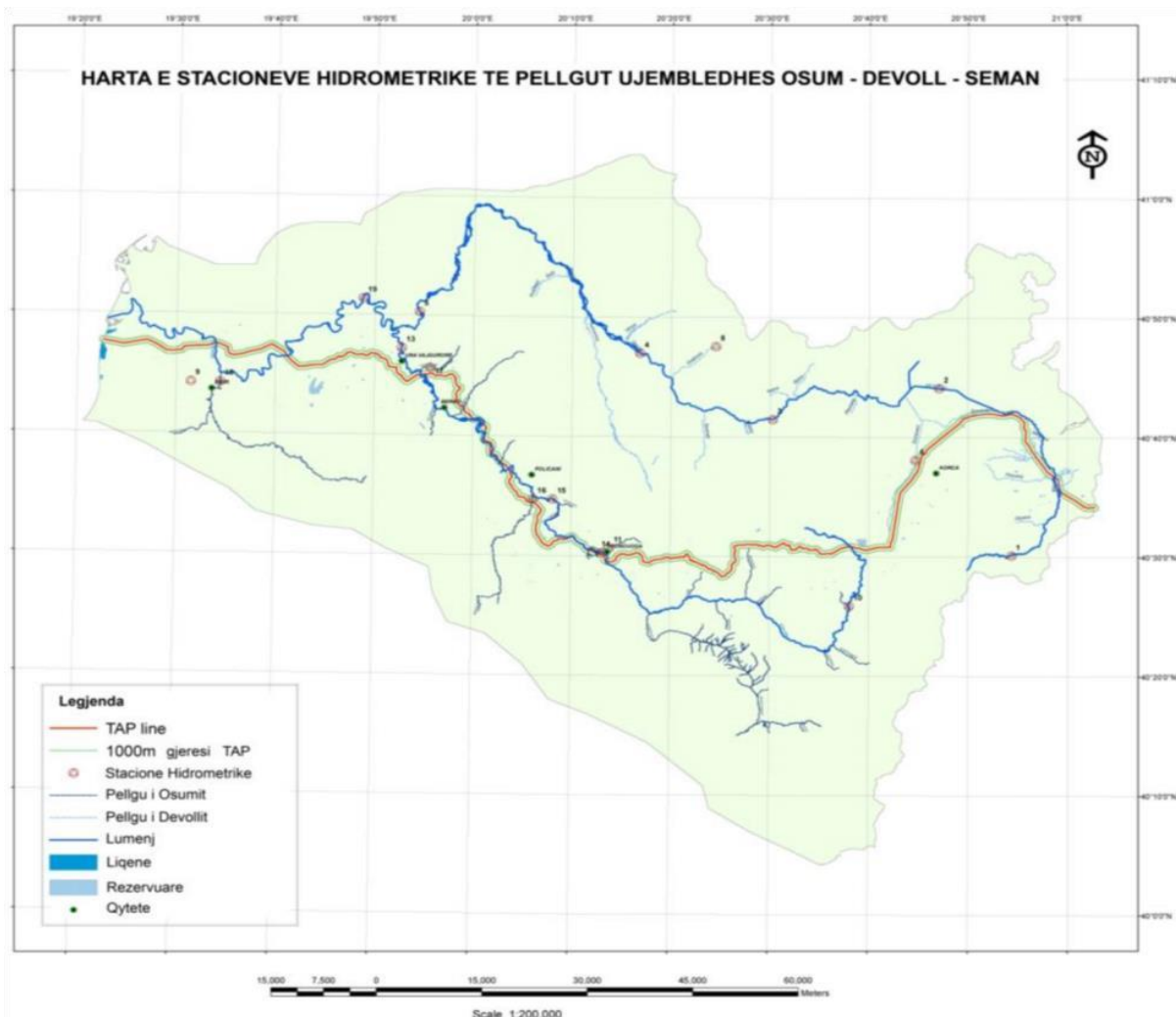


Figure 35 Hydrographic map of the Seman River catchment area

Seman River and its two main tributaries: Osum and Devoll rivers flow through almost all tectonic zones of Albania which are characterized by a complex structure with permeable soils with 21% of the total catchment area, semi-permeable of 51% even impermeable by 28%.

The high and almost approximate values of the average heights of the catchments of the rivers Osum (825 m) and Devoll (950 m) show that not only Semani in general, but also its two main tributaries in particular are characterized by the same mountainous nature of catchment configuration.

The Seman River (about 500 m to the west, 1 km to the north and 500 m to the east of the project) is one of the most important and interesting rivers in the hydrography of Albania. It has a catchment area of $F = 5649 \text{ km}^2$, altitude $H = 889 \text{ m}$ and length $L = 281 \text{ km}$.

There are two tributaries: Osum River ($F = 2073 \text{ km}^2$, $H = 852 \text{ m}$) and Devoll River ($F = 3122 \text{ km}^2$, $L = 193 \text{ km}$). The average annual inflow-discharge module for the Seman River catchment area is $q_0 = 16.4 \text{ l / s} \cdot \text{km}^2$, while the average inflow coefficient is $\alpha_0 = 0.49$. The maximum flow mass with probability $p = 1\%$ for Devolli (in Kozara) is $Q_{p1\%} = 1790 \text{ m}^3 / \text{s}$, while for Osumi (at Ura Vajgurore) it is $Q_{p1\%} = 1290 \text{ m}^3 / \text{s}$. The total mass of sediment discharge for the Seman River is $WT = 15630 \times 10^3 \text{ tons / year}$, of which about 20%, (or $P = 3130 \times 10^3 \text{ tons / year}$), is the bed load, while about 80%, ($WF = 12500 \times 10^3 \text{ tons / year}$), is a suspended sediment (Hydrology of Albania 1985).

6.8.2. Drainage network in project areas

Between the estuaries of the rivers Seman and Vjosa there are several small lagoons (Godulla, Petriti, Cerëza, Gryka e Gjemës) and inland land reclamation works have been carried out, which carry sea water and cross two main canals, the canal of Hoxhara in the north and the Povelça canal in the south. The coastline in recent years has had a retreat to the north and an advance to the south.

Erosion in the north is noticed by some bunkers that are in the water today. In the coastal subunit there is a good part of the Field of Myzeqe e Madhe, Myzeqe e Vogël (Frakulla, Roskovec, Bubullima, Fier, Pojan and Hoxhara fields) which are crossed by a dense sewerage system and are used for cultivation of agricultural crops. The altitude above sea level of these fields ranges from 0 to 5m above sea level.



Figure 36 View of the main drainage channels and embankments

At the southwestern border of the area near the hydropower plant (pumping station) the drainage channel is about 35 m wide. The embankment is not functional and the cleaning performed by the drainage board throws the waste on it. There is vegetation, waste from cleaning and it is open for access to certain places.

The pre-mountain plain sub-unit includes the territory used for the development of the cities of Fier and Lushnja (and Ballsh). This sub-unit includes from flat territories to hills up to 700m high.

The hilly morphological unit develops in the central, eastern and southeastern areas of the county territory. As soon as the field unit ends, the forms of the hills appear (the hills of DivjakaArdenica, Karbunara, Frakulla and Mallakastra) which have quotas from 10 m.n.d. up to 700 m.n.d. The slopes and hillsides of this morphological unit have a slope of 5 to 350 and variable downhill directions.

The land intended for construction is divided by drainage canals in northeast-southwest direction which are located about 180 m away from each other. The width of these canals is about 10 m wide and about 1.5-2 m deep. The canals are not maintained and are not in function, there is vegetation, and in some places, it is filled to create access roads.

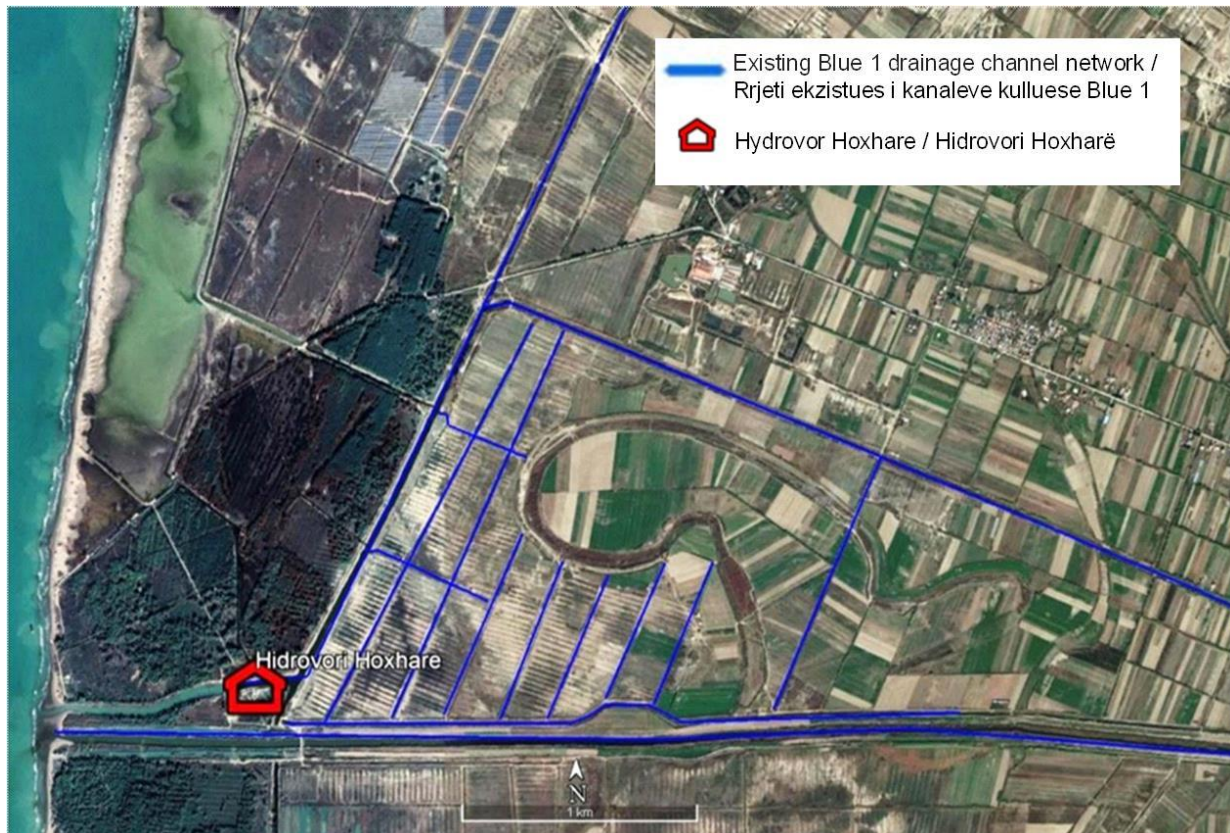


Figure 37 Existing Blue 1 drainage channel network

In the plots, there are smaller drainage channels perpendicular to the main channels with dimensions 30x15 cm as well as with a slope towards the main channels which are about 25 m apart. In most of the plots, vegetation is observed, which indicates the presence of groundwater near the surface and the possibility that the soil does not drain and retains water during the rainy season. From discussions with residents of the area it was confirmed that in 2018 most of the land has been flooded.

The drainage canal on the south side that collects high waters from Berat, Ura Vajgurore, Roskovec, and Fier, is maintained with an embankment in good condition. On the east side, the land is bordered by the former river bed or drainage canals which are dry and with dense vegetation.

6.8.3. Flood Risk

Albania is a country affected by natural disasters of floods. In recent years, floods have become more frequent and have expanded the map of problems, damage or danger to human life. This problem, considering the expected climate change, is expected to increase significantly in our region. For the very features and characteristics of our rivers, these projections of the expected changes make Albania the most endangered country in the Balkan region.

Flood risk maps contain; the location of rivers, residential areas, buildings, infrastructure, population areas, and the economic activity that takes place near them. Flood analyzes are reassessed and improved periodically. They contain various flood and impact scenarios, including cause and source, water level, duration, flow or velocity of flow.

The risk map includes how much surface can be flooded, how many people, how many homes, how many businesses are affected and damaged, what is the level of pollution on land, in water, and what is its source. River floods have a special impact on the agricultural areas of the western lowlands in Albania.

The degree of flood damage in agriculture depends on the season in which they occur, their duration, the level and speed of water in the flood plan, geography, drainage network, soil, and vegetation. Floods in the western lowlands cause more damage when they last for periods of several days or weeks than when the water is removed in a short time overnight. The first river defences, as a large mass of investments, in Albania began after the historic floods of 1962-1963.



Figure 38 Flood plan in the rivers: Shkumbin and Seman

The investments in flood protection have continued for a period of 15 years and after the 1980s, these investments were mainly focused on the maintenance of flood protection infrastructure.

For a period of 40-50 years, there have been no significant investments in flood protection infrastructure, and investments have focused mainly on local maintenance, or remediation, regardless of the entire river operation scheme and flood management.

In the Seman River in Ura e Kuçit, the flood of 1970-1971 has been considerable. The flood of 1962-1963, has been with a recurrence period of 1 time in 30 years, while for Osumi in Ura Vajgurore, year 1962-1963, there is a time period of repetition 1 time in 60 years, and for Devolli in Kokël, which is located almost in the upper part of Seman, the maximum flow of 1962 -1963, has a period of repetition approximately 1 time in 100 years. (Mukeli 1964)



Figure 39 Embankments erected on the Seman River

The new embankments played a major role in reducing the impact of floods in the winter of 1970-71 (Selenica, 2010). Embankments, in those years were calculated with the conviction that with these measures' floods with a return period of fewer than 50 years, would not cause floods in the lowlands, in the western lowlands of Albania, but the facts of floods of the years the latter, have shown that the maximum flow calculations have changed, therefore a reconceptualization of the probabilistic calculations is required.

The Seman River has undergone various interventions by human hands: demolition of the riparian zone, exploitation of inert material (sand, gravel, stones), and collapse of the embankment, which have led to the alienation of their hydro-morphology. These interventions, together with climate change, have brought some consequences, such as: i) lowering of the river bed due to its lower erosion, ii) flooding in the lower area, iii) erosion of agricultural land, iv) destruction of embankments, and v) reduction of groundwater level in water sources.

Damage to the green belt (riparian) is observed almost along the entire course of the Seman River. The lack of a green belt at the mouth of the river (in the Topoja area) has also allowed the penetration of salt water into the plain area, making agricultural land uncultivable. Erosion of agricultural land has been observed mainly in the downstream area and in some segments in the middle course (from the Patos-Marinza area to the estuary).

The drainage water system requires drainage and the first, second, and third water canals, from this area of Tërbuf (about 14 km north of the project) and Myzeqe (about 4 km north of the project) is the main in the region. The area of Little Karavasta, the area of Divjaka.

The irrigation-drainage system is not as functional as it was before the 1990s and the plain area is occasionally after flooding. During the period 1962-1963, a limb of 26738 ha of the plateau was flooded on both sides of the Seman River and remained underwater for 35.

According to the UNDP, after 1962-1963, there are measures at the local level some structural preventive measures and measures for flood control (including dams), to extend the flood period to 50 years. These measures include the reconstruction of new embankments in the start course of major rivers.

Floods with a return period of 50 years are predictable, as evidenced by the floods of 1970-1971 where severe consequences were successfully prevented. Meanwhile, in the Municipality of Fier, no measures have been taken for a flood return period of 100 years. The consequences of this type of flood, as predicted by UNDP for the Municipality of Fier, would improve the topography of the flood area.

It is estimated that floods would multiply if they occurred in several ponds simultaneously. The forecast for the impact of floods in our country was realized in 2003, but during this 17-year period, the rainfall regime changed.

It is thought that the consequences of floods with a return of 50 or 100 years should be further considered. To this end, in addition to the appropriate measures taken to prevent floods, newer and more up-to-date studies are needed. The tides have little impact on the Adriatic coast as their amplitude in this part of the Mediterranean is less than 1.0 m. This is reflected in the type of landforms that hold the conserved waters along the coast, which are dominated by deltas, landmarks, and beaches, formed mainly by the river and wave processes.

6.8.3.1. Flood Risk from events related to Possible Sea Level Rise

Sea level change has been analysed by Pirazzoli (1986) and showed that there is an increase in the Adriatic Sea level ranging from less than 1 mm/year to over 2 mm/year, but that there is also an increasing trend due to climate change. For the period 1961-2003, the data show an average increase from 1.3 to 2.3 mm/year, while during the period 1993-2003 there was an average increase from 2.4 to 3.8 mm/year. At the World Climate Change Summit (IASB / ICCP 2007) it has been reported that during 1980-1999 and 2000-2099, the average sea level rise will be between 0.18 m - 0.59 m due to melting glaciers. Sea levels rise causes changes in the position of the coastline and will have an enormous impact on the lowlands near the sea and river deltas. The measurements carried out at several stations in the Adriatic Sea during the period 1993-2014, show that the maximum value ($7.13 + -1.67$ mm / year) of the Adriatic Sea level rise has been measured at Ravenna (Italy), station while the minimum value ($2.48 + -1.53$ mm / year) has been measured in Zadar, Croatia.

6.8.4. Floods

For the study and hydraulic modeling of the Seman River alignment the digital terrain model (DTM) was used, with a soil resolution of 2 meters, supplied by ASIG (Geospatial Information Authority).

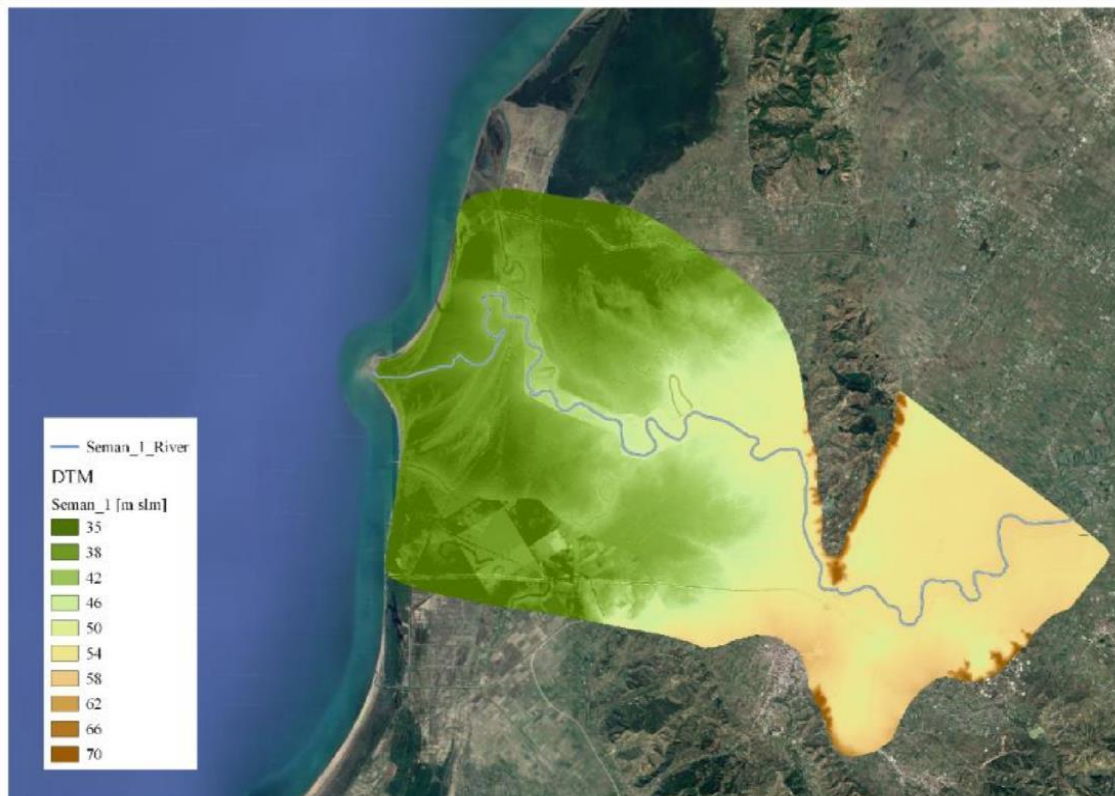


Figure 40 Digital Terrain Model (DTM)

By analysing the maximum inflows and precipitations in the basin, the period of maximum possible inflows was extended and the area of the basin in the area of hydraulic calculations was increased, achieving higher values of inflows with different safety as follows:

Table 23. Maximum design inflows plumber

Return period	50 years' flow	100 years' flow
Semani Estuary	2589	3248
Hoxharë Channel	250	300

The hydraulic model linked in the current study is the two-dimensional TELEMAC-2D hydrodynamic model¹⁸, created to simulate horizontal flows as free surfaces in two dimensions, neglecting vertical velocity systems. (<http://www.opentelemac.org>). The following maps present the modelling results of water depth and velocity with return period of 50 years and 100 years.

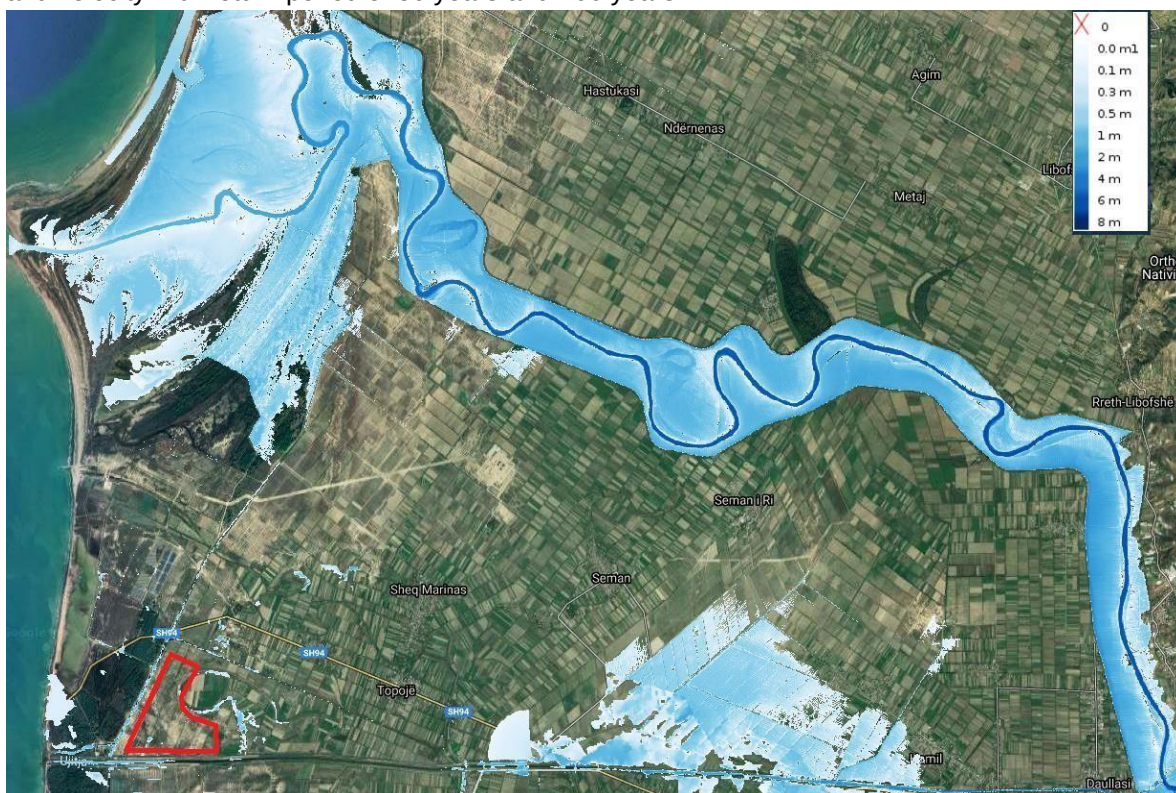


Figure 41 Modelling results Water Depth with return period 50 years (flood plan)

¹⁸ TELEMAC-2D was born in 1987 as a commercial program created by the Laboratory National Laboratory of Hydraulics and Environment (Laboratoire National d'Hydraulique et Environnement - LNHE) of the Research and Development Department of Électricité de France (EDF-R & D).



Figure 42 Modelling Water Depth with return period 50 years Blue 1

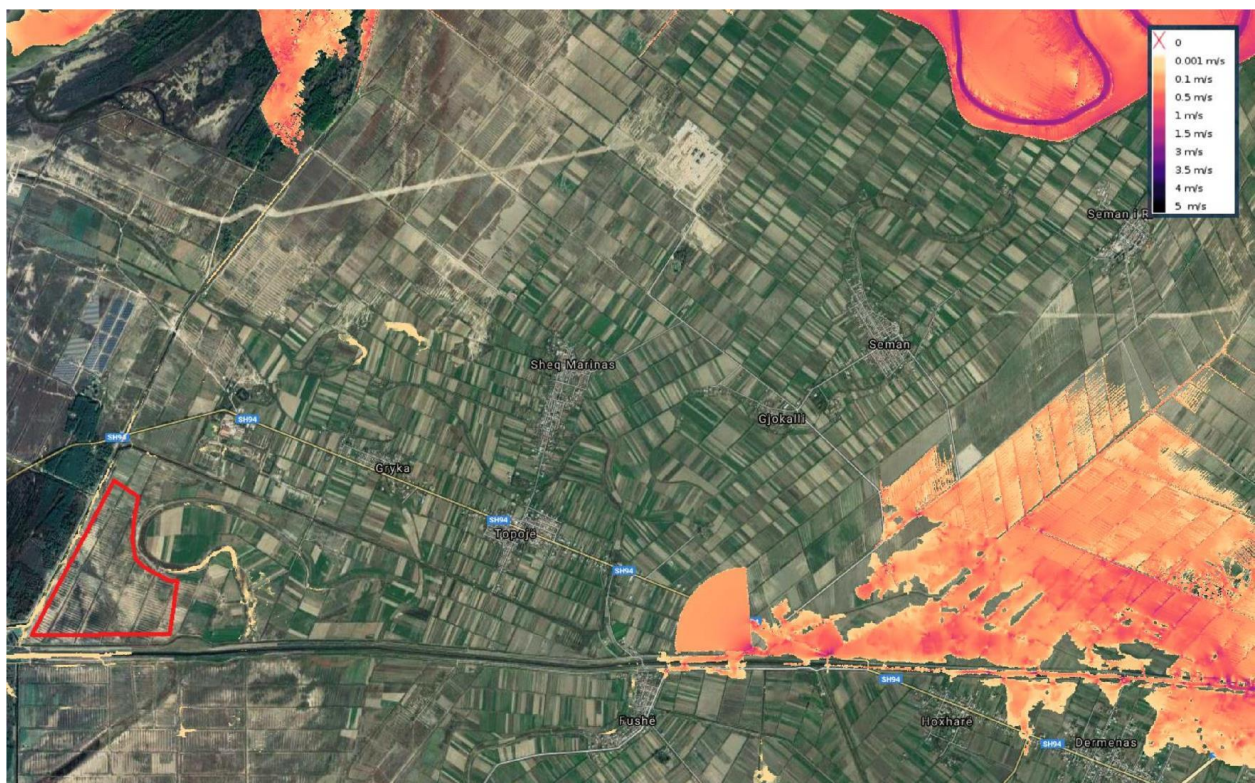


Figure 43 Modelling results Water Velocity with a return period of 50 years Blue 1



Figure 44 Modelling results Water Depth with return period of 100 years (flood plan)



Figure 45 Modelling results Water Depth with return period 100 years Blue 1

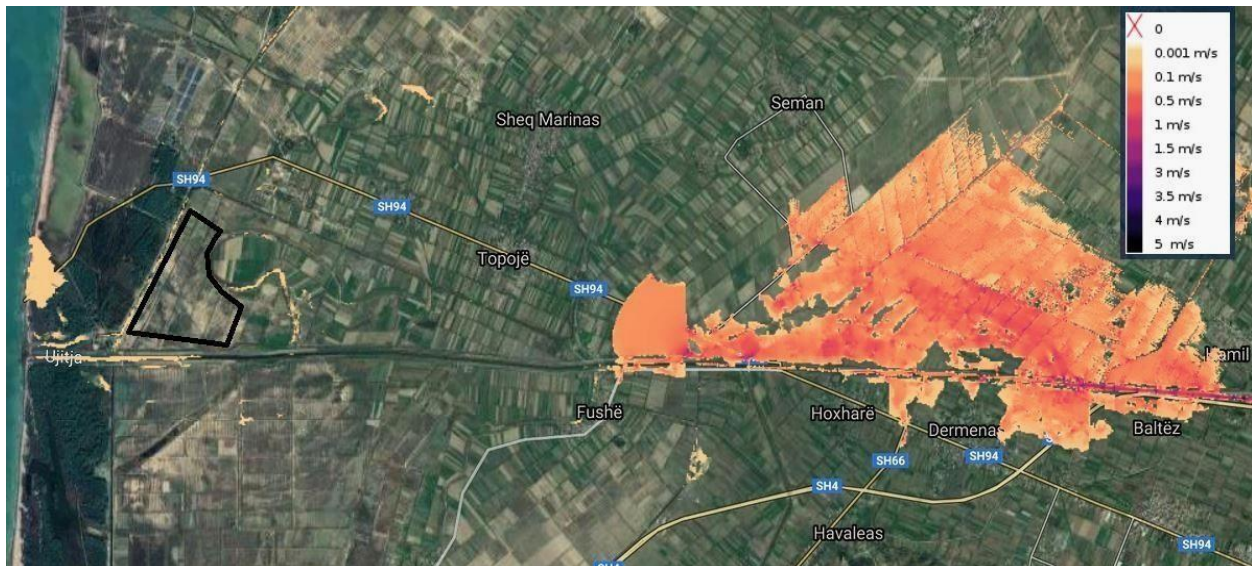


Figure 46 Modelling results Water velocity with return period 100 years Blue 1

6.8.4.1. Flooding from hydropower nonfunction

Being areas in very low quotas in the project areas which discharge water through the Hoxhare Hydropower Plant, there is a possibility of flooding even when the hydropower plant does not work or when it works with reduced capacities. This hydropower plant has a hydro module of about 5-6 litres / sec / ha, referring to the removal of water from agricultural lands, which according to the standard in force, the calculation of safety of drainage channels and drainage pumping stations (hydropower) is 20% (approximately 70-80 mm of rain is accepted for 24 hours).

In terms of the development of other economic activities (except agricultural activities) drainage infrastructure whether by gravity or mechanical lifting should be considered safer, to avoid frequent flooding of drainage areas. Even for the concrete case of the activity of photovoltaic stations, in the fields in the Hoxhare area (which are also low areas), it is necessary to shell the drain first according to the designed standard, which means drainage channels (first second, and third) to be cleaned and the hydropower plant to operate at full capacity and secondly to increase safety.

Based on the technical condition of the Hoxhara hydropower plant to enable the maintenance and improvement of the existing hydropower module, its complete reconstruction and installation of new electric pumps in the period 2021-2022 are foreseen. This will ensure better drainage of the surfaces that drain with this hydropower plant. (Fier Drainage Board)

From the historical observations and in conversation with the Fier Drainage Board, the maximum water level achieved since the construction of the hydropower plant has been determined, has been +60 cm, in the years 1984, 1985, and 1986, mainly as a result of a continuous malfunction of the hydropower plant, due to lack of electricity. Considering this possibility of flooding, it is suggested that the sensitive infrastructure from the presence of water be placed minimally at a height of +0.6 meters from the ground level.

6.9. Soil

There are identified two types of soils in the Project area: Saline clay soils are dominant in the construction area of the solar energy plant and Fluvisol (Eutric/Vertic Fluvisol¹⁹) on the eastern borders of the building surface, a few meters above sea level. In a belt of about 300 meters, a mixture of saline soils with fluvisol

¹⁹ Soil Atlas of Europe (2005). European Soil Bureau Network, European Commission, 128pp.

soils results slightly saline clay soils (Salic Fluvisol²⁰). The soils of the first group due to the presence, although low, of salt (sodic) and clays possess low agronomic fertility while the soils of the second group are generally soils with average agronomic fertility

6.9.1. General Characterization

Saline soils are dried and fissured in different deepness depending on the content of salt during summer. During winter, soils become very sticky and the adsorption complex is dominated by Na chlorides. Water permeability is very low and the capillarity is very strong. These are heavy soils: up to 50% clay. Their texture is mostly clay-silty and they are cultivated but not planted for more than 20 years, turned into pasture, with rare presence of plants of saline soils (Figure 47).



Figure 47 The saline soil on the Project area

Fluvisols are common in periodically flooded areas such as alluvial plains. Fluvisols shows the layering of the sediments rather than pedogenic horizons. Their characteristics and fertility depend on the nature and sequence of the sediments and the length of periods of soil formation after or between flood events (Figure 48).



Figure 48 The Fluvisol planted with alfalfa (left) and mixed soil lightly salted (right)

Both soils are in a flat plain and their parent rock comes from the alluvial deposits of the Seman and Vjosa Rivers; depending on level sea altitude and communication with salt groundwater their chemical

²⁰ Soil Atlas of Europe (2005). European Soil Bureau Network, European Commission, 128pp.



characteristics are different; the first type is high potentiality soils versus moderate and low agronomic for saline soil.

Soil Profile

Saline soils have a differentiated profile into horizons. Their profile is mainly A-B-C-g. Underground waters are shallow and salts are intensively accumulated on the superficial soil layers or close to the surface, mainly on solonch soils. Below, the profile follows horizon A with a thickness of up to 25 cm with a bluish-blue color, with rust stains and the brilliance of thin salt crystals, with low content of organic matter. Horizon B is thick, intensely blue, clayey and very compact. They are formed under the conditions of rare natural vegetation, mainly halophytes, are represented by *salicornia europea*, *statice gmelina*, *Hordeum murinum*, *Tamariz parviflora* and *Alnus glutinosa*. Salt comes from the sea water in these soils through capillary rise. Under natural conditions, they serve well as natural ecosystems with a particular flora and fauna.

The **Fluvisol soil** profile is deep and sand and silt fractions predominate. The mother rock consists of alluvial material brought by watercourses (in this case the Seman River) and the profile is stratified according to river deposits with periodic floods. Although they originate from alluvium, the soils are developed in generally hydromorphic conditions and alternate with rinsing of oxides and fine particles, therefore in the depth of the profile, hydromorphic clays are found.

According to a study in 2011²¹ the description of Fluvisol profile is following:

- **Ao** - there is no distinct humus layer due to the small and unstable content of organic matter but also due to the mixing of layers by plots during cultivation.
- **Ap 0-30 cm**: grayish to whitish, fresh, with spaces and porous structure, with the presence of roots, with a gradual transition to the horizon below, foams with HCl.
- **B 30-65 cm**: darker in color, fresher, with less presence of roots, more compact and less porous, with particle structure, gradual transition.
- **BC 65-90 cm**: grayish-brown in color with slight traces of gleying phenomenon and iron oxides, low presence of gravelly grains, compact, fresh and with a more clay texture.

²¹ Sulce, S. & Kullaj, E., 2011, Soil Type and their Agricultural Values, Trans Adriatic Pipeline ESIA study (Soil Quality and Land use section), 64p.

7. SOCIO-ECONOMIC BASELINE

7.1. The Project Development Area

The Project Development Area (PDA) includes the settlements/villages and commercial units located within 2km for the Solar Power Plant and 1km (0.5 km each side) for the OHL, which is considered also the buffer area as indicated in Figure 48 below. The buffer area is evaluated based on other similar projects and best international practices, although a wider assessment area has been taken into consideration on traffic impacts in the surrounding areas. The Project Area location is in Topojë AU, subordinate of Fier Municipality. The nearest settlements are Gryka, Topojë and Sheq Marinas which are respectively located 1,850 meters, 2,500 meters and 3,200 meters away from the project area, while the villages of Fushë in the south-east and Darëzezë e Re are respectively located 4.7 km and 5.1 km away from the project area.

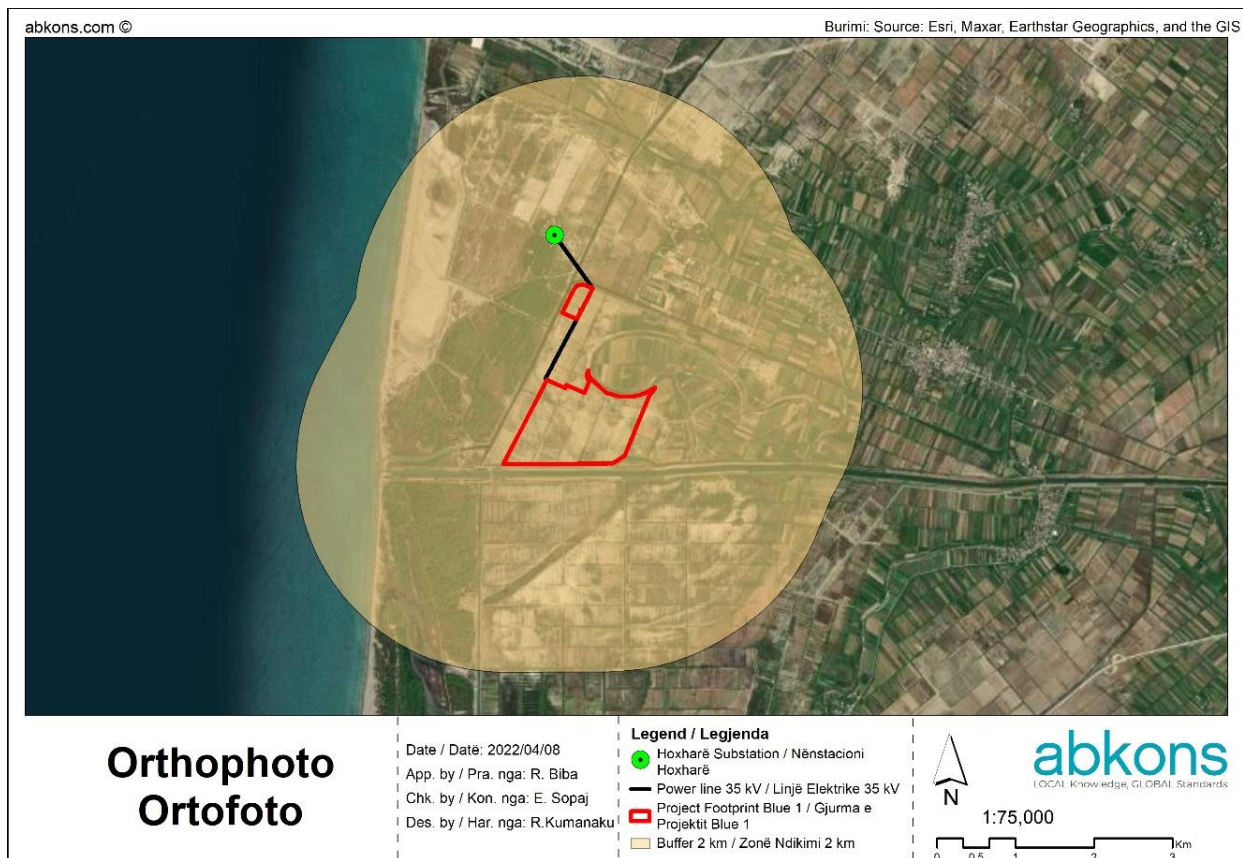


Figure 49 Project Location with Buffer Area

7.2. Methodology of socio-economic baseline

The first step of the project commitment to impact mitigation and to enhance the benefits for local communities in the project area is to conduct a Social Baseline Assessment. These data have been used to understand the social characteristics, issues and opportunities in the area prior to the implementation of the project. In addition, they will create a clear understanding of surrounded communities' awareness, perceptions and opinions related to the project activities.

The socio-economic study aims to:

- To gather social and economic baseline information regarding existing social and economic characteristics, opportunities and issues, as well as people perceptions in the project area;



- To gather inputs from people in the project area about potential positive and negative impacts from the project planned activities;
- To provide the baseline indicators that will be used to develop plans for impact mitigation, stakeholder communications and community development activities.

This section presents the socio-economic profile of the communities living in the project area. The findings are based on data from secondary literature, walkthrough, visual survey and direct contacts and the local representatives in the villages of Topoja, Sheq Marinas, Grykë and Topojë AU personnel.

The main data provided in the socio-economic baseline refers to the secondary information collected through desk research on the available information. The secondary data were complemented with the data collected from the primary resources through stakeholders' meetings, key informant interviews and field surveys.

The data collection plan aimed to cover all project-affected groups within the project impact area. The data collected are considered to be adequate to inform the assessment of impacts and development of mitigation measures for the areas described in the socioeconomic baseline. If there is any indicator that needs to be monitored and has limited data at socio-economic baseline, they may be subject to further data collection as the project progresses. Some of them are as follows:

- The lack of information related to the implementation of the projects defined in the development strategy of Fier Municipality.
- The lack of information for the development of other projects in the area;
- The level of employment and unemployment in the agriculture sector. The employment level in this sector is fictive and does not reflect the real figures.
- The lack of adequate data for the village level as they are reported only at the level of the Administrative Unit.

The data for the Social Baseline Assessment refers to the villages and Administrative Unit in the project Area of Influence. The data, were collected from December 2021 to July 2022.

Data collection for this Social Baseline Assessment was done in Topojë AU and Fier Municipality, as part of the Stakeholder Engagement Process with local authorities and communities. Data has been collected using various methods often parallel to consulting with stakeholders including:

Primary data:

- Key Informants Interviews (KII) and Focus Group Discussions (FGD): Key informants meetings were organized including representatives from health and education services. Meetings were used to inform about project activities and collect social data about each village. The list of key informants who participated in these meetings is available in Annex 1.
- Meetings with local leaders (Head of the villages), Education Institutions and Topojë AU.
- Statistical data from Topojë AU collected through administrative data questionnaire.

Secondary data:

- Some data have been collected through reports that the Municipality made available such as a recent socio-economic and environmental assessment report which was made as part of the preparation of the General Local Plan for Fier Municipality.
- The National Census of 2011 was used to collect data at national and local level.

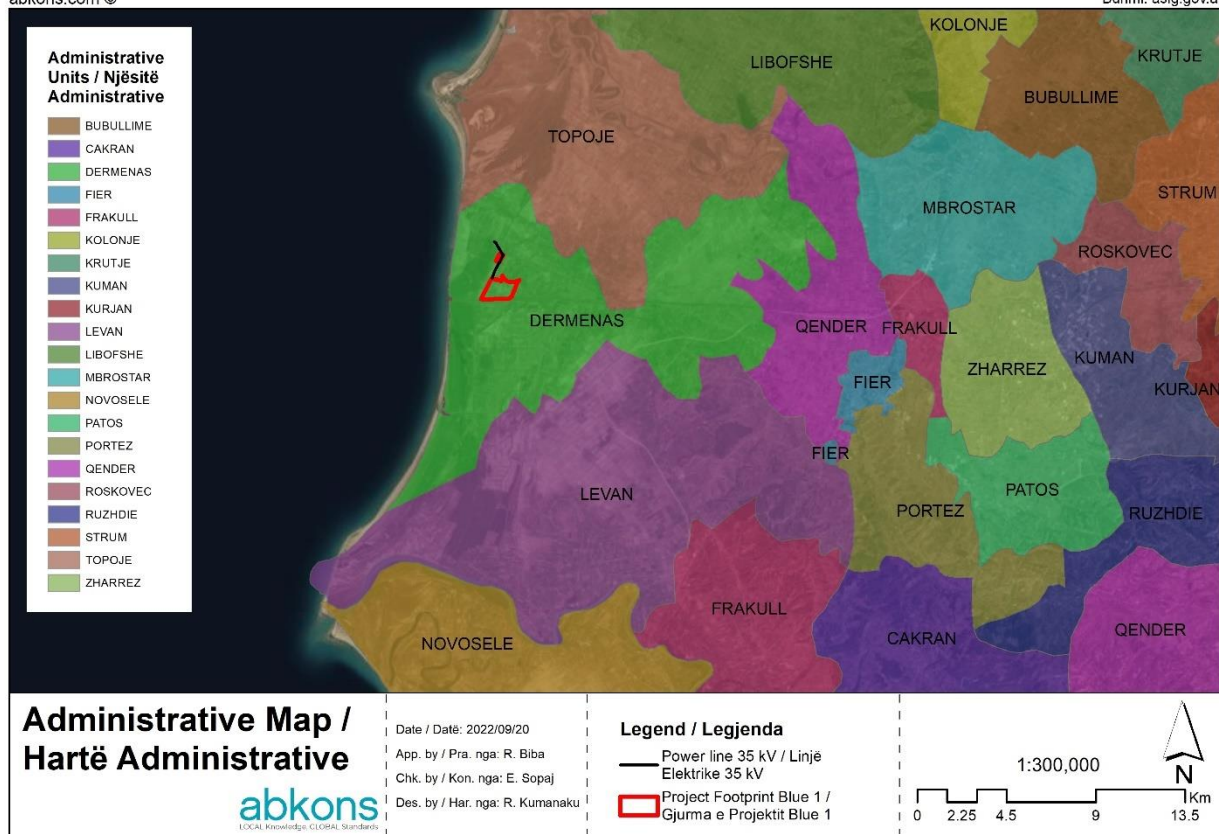


Figure 50 Administrative Map of Project Area

7.3. National, Regional and Local Development Plans

In terms of the development plans, the Government of Albania has approved the National General Plan (NGP) "Albania 2030", which is the highest territorial planning instrument in Albania, which leads the planning issues, by viewing Albanian territory as one whole. The National General Plan is not only a legal obligation but also a necessity for the Government to achieve the objectives to increase the well-being of citizens and the economic growth of the country, by alleviating inequalities, strengthening strategic partnerships with neighbouring countries and implementing policies that strengthen the competitiveness of the economic sectors, thereby guaranteeing integration into the European Union. Besides the NGP, the Area of Influence of the "SPV Blue 1" Project, is influenced also by the other sectoral and local plans that are described below.

National General Plan

This is a document drafted by the Ministry of Urban Development in collaboration with the National Planning Agency and aims to provide a clear vision of the development of the territory of Albania for the period 2015-2030. It focuses on specific strategic goals which aim at sustainable development of the territory, evaluation of potential, protection of public and private interests as well as promoting harmonized planning of the territory. From the economic and infrastructural point of view, Fieri is considered one of the primary economic centres in the regions of Fier-Vlora, multimodal nodes with tendencies for consolidation, densification and reinforcement in the urban part, and consolidation and reinforcement towards the sectors of ecotourism along the coastal strip.

Integrated Intersectoral Plan for Coastline

The plan intends to serve as a regulatory framework to ensure standards in the territorial planning of the coastal area and will promote sustainable economic development, social integrity and protection of natural resources for the next 15 years. In this strategy, the coastal area is considered a national asset and as such is not only the subject of interest of the owners and residents living in this territory but of all Albanians.

The coastal area of Fier Municipality, respectively, the Administrative Units of Dërmenas, Topojë and Libofshë of Fier Municipality are indicated by this plan.

National Sectoral Plan for the Trans Adriatic Pipeline

National Sectoral Plan for the Trans Adriatic Pipeline with the decision of the National Territorial Council no. 1, dated 04.07.2013, which designates the conditions that all planning authorities should consider the National Sectoral Plan for the Trans Adriatic Pipeline in their design of planning instruments, that extends also along the territory of Municipality of Fier, along the AU of Mbrostar, Libofshë, Topojë and Qendër. This project, based on DCM No. 2, dated 10.12.2012, has been declared an Object of National Importance in National Territorial Planning.

General Local Plan of Fier Municipality

Fier Municipality has an approved General Local Plan on the decision of the National Territorial Council no. 5, dated 29.12.2016. This plan is amended by decision no.1 "For the approval of the revision of the General Local Plan, Fier Municipality dated 26.01.2021. According to this plan and its respective amends, the Structural Unit where is planed the development of our project belongs to structural unit no. 10/57 with the current description for the structure 100 % for agriculture category, while the allowed uses in it are for agriculture infrastructure, waters and existing developments.

7.4. Local Administration and Population

Following the Administrative Territorial Reform of 2015, Albania is divided into 12 districts and 61 municipalities. The municipalities are responsible for the geographical, economic, social and cultural purposes inside the counties. The 12 districts were created on 31st of July, 2000 to replace the former division into 36 districts. In 2015 new administrative divisions were introduced and the number of municipalities was reduced to 61. There are 2980 villages or communities in the entire country, formerly known as localities. The municipalities are the first level of local governance.

In addition, each village is represented by a village head, which is subordinate to the mayor. Traditionally, village heads were elected among generally elder people and solved disputes between residents and counselled the villagers on different matters, however nowadays their role is more as a villager's representative in administrative matters.

For the period 2015-2031 it is forecasted a decrease in resident population number in our project area, which is part of Topojë AU in Fier Municipality. This decrease maintains the same average declining rate as the municipality and comes as a consequence of the national trend of migrating from rural to urban areas. During the period 1989-2011, Topoja's AU population change was -21.85%, while at the national level the population change was -12.0%²². The migration trend from rural areas to urban areas has been mainly caused by the structural shift of the Albanian economy since 1999 away from agriculture and more towards manufacturing and services. The population density in Topojë AU is 47.37 person/km², which is lower compared to the national population density of 97.4 persons/km²²³.

For the period 2011-2031, migration will be consisting of a continuous departure of young people away from the agricultural sector, students' migration which will be transformed into long-term stays beyond studies, as well as migration of young age women due to following patriarchal norms in starting a family.²⁴

Table 24. The projections of populations in Topojë AU²⁵

Government Unit	2011	2015	2016	2021	2026	2031
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²² INSTAT Census 2011

²³ INSTAT Census 2011

²⁴ General Local Plan Document Municipality of Fier December 2016

²⁵ Source of data: General Local Plan Document, Municipality of Fier, December 2016

Fier Municipality	126,305	122,475	119,776	114,004	108,501	103,277
Topojë AU	4,246	4,310	4,215	4,012	3,818	3,634

The religious composition of the project area: The baseline data indicate that the population of Topojë AU is mainly Christian Orthodox, making 43.7% of its entire population (Census 2011)²⁶.

Meetings with community representatives suggest that all religious groups live together harmoniously. This result aligns with national level information, where all religions are known to co-exist in a secular society.

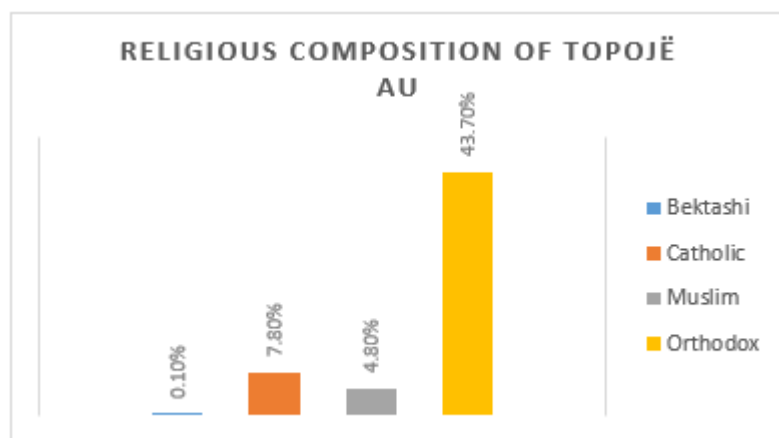


Figure 51 Religion composition of Topojë AU

The data of the Topojë AU shows that there are about 24 households belonging to the Roma community. They live in Sector-Seman village which is outside the project area.

Table 25. Demographic profile of villages in project area in Topojë AU

No	Village	Average household size (persons)	Number of households ²⁷	Number of populations	Growth trend
1	Topojë	3-4	343	1200	Decreasing
2	Sheq Marinas	3-4	314	1100	Decreased
3	Grykë	3-4	114	400	Decreased

Source: Key Informant Interviews

7.5. Livelihood and Local Economy

Albania is a middle-income country with a population of 2.9 million. The poverty rate (at US\$5.5 per day) was projected to fall in 2021 by 1.8 percentage points relative to 2020. Although the extent of the poverty increases in 2020 is not confirmed, projections suggest that by the end of 2021, poverty rate could be 0.9 percentage points below its 2019 estimated value. The strong projected rebound in GDP growth in 2021 is subject to a smooth vaccination rollout, no further lockdowns, and a continuous recovery of the service

²⁶ * The 2011 census population do not include the estimated number of refusals

²⁷ Calculations of the authors of the study

sector, led by tourism and construction sectors. If labour participation and employment pick up again, poverty could continue to decline, where in an optimistic scenario, it could fall to 30% by 2022.

The municipality of Fier includes the most important agricultural areas of the country, as well as a significant part of the industry related to oil refining. More than half of the population of the municipality live in rural areas, which shows the importance of the agricultural sector in the economic life of the municipality. The agricultural production of this area is diverse from cereals to vegetables, melons, livestock and its by-products. The municipality has a considerable coastline that stretches from the Vjosa River to the Seman River estuary at the borders of the Divjaka-Karavasta National Park. Also, an important touristic attraction is the Archaeological Park of Apollonia, along with other cultural heritage sites.

The economic activities of the project study area are mainly focused on farming. According to the available data provided by the Topojë AU, this Unit has an 8 km coastline; 5,050 ha land; 1,500 ha forest; 18 ha other land; and about 1 ha public parks distributed in the villages of its territory.

The main sources of income for families living in Topojë AU are paid work and self-employment at 58.7%, followed by pensions at 42.52%, remittances at 17.17% and social care at 6.05%.²⁸ Agriculture is still the main economic activity for the residents of villages in the project area.

Land for agriculture is sub-divided within families. Consequently, the land available for household farms reduces with each new generation of farmers. Therefore, farmers often have to rent land from other households that no longer use their land. During the engagement meetings with the residents of Grykë, Topojë and Sheq Marinas villages, they expressed that the biggest challenges for local farmers in the area include the low land quality and the high level of salt. Also, the lack of access roads to the agricultural parcels and lack of an adequate irrigation system results in low productivity of the land. For this reason, farmers have no interest in cultivating these types of land.

Table 26. Land surface benefited person in villages of project area - Topojë AU²⁹

No	Village	Number of agriculture households	Surface of land based on Law 7501 (ha/person)
1	Topojë	322	0.38
2.1	Sheq Marinas (cooperative)	216	0.45
2.2	Sheq Marinas (agriculture enterprise)	85	1.07-1.1
3	Grykë	103	0.45-0.5

The main cultivated crops include grain, fodder, maize, beans, fruit trees and vegetables grown in open fields. The most common livestock are cows, sheep and goats. The crops and livestock products, which are produced locally, are sold in the markets of the city of Fier and for personal consumption.

Table 27 Land infrastructure and use in the villages in project area - Topojë AU³⁰

No	Village	Land surface with irrigation (ha)	Land surface without irrigation (ha)	Total land surface (ha)	Arable land (ha)	Orchards (ha)	Vineyards (ha)
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²⁸ INSTAT Census 2011

²⁹ Administrative data provided by Topojë AU

³⁰ Administrative data provided by Topojë AU



			(ha)				
1	Topojë	360	200	560	550	4	6
2	Sheq Marinas	300	162	462	452	3	7
3	Grykë	200	60	260	250	4	6

Along the access road of the project are operating several local businesses such as a bakery and flour mill, a cane producer that exports abroad, a brick factory that produces for the local infrastructure, as well as small businesses in the service sector such as grocery stores, bars, coffee shops and restaurants.

7.6. Health Profile

Throughout the past decade, Albania has experienced a considerable improvement in health indicators including life expectancy, which is now 78.2 years³¹, as well as a considerable reduction in maternal mortality and under-5 infant mortality. Within this context, access to healthcare in the project area is considered to be good and offers basic health care services. All villages in the project area have a health clinic in good condition attended by either a doctor or nurse. The nearest hospital to treat more serious illnesses is in Fier city.

The situation regarding the public health in Fier County seems to be good compared with other regions and with National level indicators. Neonatal mortality rate for Fier County in 2019 was 3 per 1,000 live births, which is below the national target level of 3.2.³²

The table below shows the figures of mortality rate attributed to cardiovascular disease, cancer, diabetes and chronic respiratory disease for Fier County in 2019 and compares to the Albanian National health situation.

Table 28 The figures of mortality rate attributed to chronic diseases for Fier County in 2019³³

No.	Disease	Fier County indicator	Compared to Albanian National indicator
1	Cancer	13 %	=
2	Circulation system	51%	<
3	Respiratory system	7%	<
4	Undefined cause	19%	>
5	Others	10%	=

Also, in the PA it was reported by the health care personnel that the main diseases in the area are reported to be diabetes and circulation system connected diseases and heart related issues.

7.7. Infrastructure and Public Services

Between 90–100% of houses in the project area, respectively in the villages of Grykë, Topojë and Sheq-Marinas, are connected to the water supply system, dedicated for each village. However, during the engagement meetings with the residents and village leaders, it was reported by them that supplied water

³¹ <https://www.worldbank.org/en/country/albania/overview#3>

³² INSTAT: Good Health and wellbeing 2019

³³ INSTAT: Good Health and wellbeing 2019

via the water system does not meet their family needs. For this reason, about 80-90% of the families living in the above-mentioned villages ensure their drinking water from water deposits.

The cleaning service in Topojë AU is provided by the Cleaning Enterprise of Fier Municipality. The wastes of families and businesses are collected in trash containers placed on the site of the main roads of the villages.

Households in the villages of the project area use several sources of energy such as firewood, electricity, and bottled gas. Residents use private vehicles, minibuses or buses to reach public utilities that are not offered in Topojë AU, such as high schools, hospitals, and administrative offices.

Topojë AU has benefited from a number of projects contributing to improving the social environment and infrastructure. The main project, namely TAP Project in Albania contributed to the following:

Educational projects, including the construction and/or renovation of Sport Facilities of Seman School;
Developing an awareness campaign on road, home and work safety, targeting local communities, as well as providing 2 extinguishers, firefighting uniforms and equipment to Fier Municipality;
Developing projects in agriculture, such as rehabilitating irrigation systems in Fier Municipality;
Improving road infrastructure in the villages of Seman, Topojë, Sheq Marinas, etc.

Table 29 Infrastructure utilities in Topojë AU

No	Village	Connection with water system	Connection with sewage system	Regional Rural roads asphalted (km)	Regional Rural roads not asphalted (km)
1	Topojë	Yes	No	4.8	0
2	Sheq Marinas	Yes	No	5.8	0
3	Grykë	Yes	No	4.8	0

On the site of the main road passing through the villages of Topojë and Grykë are placed the trashed containers property of Cleaning Enterprise of Fier Municipality responsible for cleaning service in Topojë AU.



Figure 52 The presence of a trash container and sheep in the main road

7.7.1. Water Supply

Currently, the water supply and urban wastewater sector operates through the regional joint stock company UK Fier sh.a. which provides the service in Fier Municipality and Cakran, Mbrostar, Libofshë, Qendër, Dërmenas, Topojë, Levan, Frakull, Protëz.

The quality of the water used to supply the population appears to be quite good, but in some cases, pollution has been found, which is mainly caused by the lack of buffering areas and hygieno-sanitary protection near wells. 81% of the Administrative Units in Fier Municipality have water supply infrastructure in their territory, but especially the Levan, Topojë, Dërmenas and Protëz AU need improvement of the service offered by the Water Enterprise to the population. In these areas, water is provided through the wells and natural water sources, but the water network does not cover all households. AU Topojë is supplied from the Pish Poro water supply system that supply the villages of Topojë, Seman, Gjokalli, Sheq Marinas, Sheq, Grykë, Seman i ri, Kavaklli from three water wells and water pumping station in Pishë-Poro, $Q = 30 \text{ l/s}$.

Table 30 Water supply system Topojë AU

No.	Village	Mechanical lifting system	Free flow system	Number of water supply systems	Number of the pumping systems
	Seman i Ri	-	Yes	1	1
	Seman	-	Yes	1	-
	Kavaklli	-	Yes	1	-
	Gjokalli	-	Yes	1	-
	Sheq-Marinas	-	Yes	1	-
	Sheq	-	Yes	1	-
	Topojë	-	Yes	1	-
	Grykë	-	Yes	1	-
	Fushë	-	Yes	1	-

Table 31 Water Production Topojë AU

No.	Village	Water production (m3/year)	Max Capacity of production (l/sec)	Length of the distribution system (km)	Length of the external system (km)	Storage capacity (m3)	Beneficiaries (Households)
1	Seman i Ri	12250	25	4.2	18	12250	259
2	Seman	12250		3.8	16.7	12250	336
3	Kavaklli	12100		2.5	16.7	12100	187



4	Gjokalli	500		1.3	17.7	500	67
5	Sheq-Marinas	12160		4.6	15.2	12160	357
6	Sheq						
7	Topojë	12160		6.3	13.6	12160	408
8	Grykë	12160		3	15	12160	149
9	Fushë	36500		3.2	11.4	36500	258
	Topojë AU	110080		30	123.8	110080	2021

7.7.2. Sewage System in Topojë AU

The sewerage service of urban wastewater is provided only in the city of Fier and almost not at all in the AU. The service offered is unsatisfactory, this is because the wastewater sewage system is old and constructed with concrete material pipes where the connection between the sections is made with mortar. This system is combined and collects both waste water discharges also high water. No sewage treatment provided; they discharge in the nearest surface water bodies.

Rural Areas: There is no sewage system in the rural areas of Fier Municipality. The dirty waters of each house are deposited in individual septic tanks in the yards of the houses which do not respect the technical-sanitary standards of septic tanks with or without filtration.

In many cases, the dirty waters discharge in the open channels that pass near their houses, which are also in contrary of the sanitation conditions for their removal.

Table 32 Sewage system Topojë AU

#	Village	Main network (km)	Secondary network (km)	Number of ditches	Pumps	Septic tanks	Beneficiaries (Households)
1	Seman i Ri	300	-	8	-		120
2	Seman	-	-	-	-		-
3	Kavaklli	300	-	8	-		50
4	Gjokalli	-	-	-	-		-
5	Sheq-Marinas	-	-	-	-		-
6	Sheq	-	-	-	-		-
7	Topojë	-	-	-	-		-
8	Grykë	-	-	-	-		-
9	Fushë	-	-	-	-		-

#	Village	Main network (km)	Secondary network (km)	Number of ditches	Pumps	Septic tanks	Beneficiaries (Households)
	Topojë AU	600	-	16	-		170

7.7.3. Roads and transport

The construction of the bypass Mbrostar – Levan has brought development to the western part of the city of Fier, turning it into one of the main mobility points of Corridor VIII. It refers to the construction of an interurban highway type with a length of approximately 22 km, and a width of 22 m (2X2 lanes), in the amount of 60 million Euros financed by EBRD and EIB.

In terms of access, Fier municipality has optimal connections with the municipalities of Vlorë, Patos, Gjirokastrë, and Lushnja, where we can mention the Highway "100-Anniversary of Independence" (Levan-Vlorë), the connection Levan-Tepelenë, part of the Blue Corridor (Adriatic-Ionian Highway), as well as the Mbrostar-Levan Highway. These have been the most important infrastructure investments done in recent years in Fier Municipality. In the north, the Municipality of Fier has an important connection with the Municipality of Lushnjë (part of Corridor VIII) and a connection with the Municipality of Divjakë.

The physical condition of the infrastructure, in terms of the quality of paving, the presence of sidewalks, signage, etc. in the Municipality of Fier, results in those roads with good quality are mainly in the city of Fier, in a part of the centers of rural units, as well as in the main and secondary interurban segments.

Potential risk points: are all the points where the highway, the main interurban roads or secondary roads intersect with local roads. Their number is relatively high, so, it should be taken into account that the movement on the main axes of Fier should be done cautiously on the turns towards the local roads. Among the most axes problematic we can mention the Lushnje-Fier in the north as well as the connection with Patos in the east. Mbrostar-Levan highway has 6 entrance and exits points.

Overall, access roads to the project site were observed to have regular traffic including cars, tractors, bicycles, motorcycles, and sheep herd. During the summer period, this road is also used by private vehicles and buses transporting daily tourists that frequent the Seman seaside.

Table 33 Road network Topojë AU

No.	Village	Regional rural roads (km)		Communal rural roads (km)		Neighborhoods' roads (km)		Squares (m ²)	
		Asph. ³⁴	Not asph. ³⁵	Asph.	Not asph.	Asph.	Not asph.	Asph.	Not asph.
1	Seman	5	3.8	1	2.4	0	3	0	0
2	Kavaklli	5	3.8	1	1.8	0	2	0	0
3	Gjokalli	6	1	0	1	0	1	0	0
4	Topojë	3.8	1	0	2	0	4	0	0

³⁴ Asphalted

³⁵ Not asphalted



No.	Village	Regional rural roads (km)		Communal rural roads (km)		Neighborhoods' roads (km)		Squares (m ²)	
		Asph ³⁴ .	Not asph. ³⁵	Asph.	Not asph.	Asph.	Not asph.	Asph.	Not asph.
5	Fushë	2.7	0	0	1.47	0	3	0	0
6	Grykë	4.8	0	0	2	0	2	0	0
7	Sheq-Marinas	5.8	0	0	3	0	4	0	0
8	Sheq	0	0	0	0	0	1	0	0
9	Seman i Ri	3	3	0	1.8	0	5	0	0
	Topojë AU		10.6	2		0	25	0	0

Transport of passengers on suburban lines is a regular transport service, which completes population movement needs between villages. The road leading to the project site passes through Grykë and Topojë villages and is in good conditions. As the entry roads of the project site, will be used the existing parcel roads with some adjustments where needed. The main road that passes through the villages is used by some local school children from Grykë, Topojë, Sheq Marinas and Shën Pjetër villages who walk to go to Topojë school and return back home.

7.7.4. Energy supply

The public lighting in AU Topojë covers all villages that have public lighting. In total there are a considered number of pillars, but half of them is in function because of the lack of connecting cable to the electric cabins.

Table 34 Energy supply Topojë AU

No.	Village	Main Net TL (km)	LV network (km)	Number of electric cabins	Number of Transformers	Collective boxing (Measure s devices)	Individual devices	Beneficiaries (Households)
1	Seman i Ri	15	6	2	2	0	336	336
2	Seman	12	5.1	3	0	0	259	259
3	Kavaklli	12	4	1	3	0	187	187
4	Gjokalli	11	2.3	0	3	0	67	67
5	Sheq-Marinas	10	7.6	3	4	1	357	357
6	Sheq							



No.	Village	Main Net TL (km)	LV network (km)	Number of electric cabins	Number of Transformers	Collective boxing (Measure s devices)	Individual devices	Beneficiaries (Households)
7	Topojë	6	9	2	5	1	408	408
8	Grykë	5	4.2	0	3	0	149	149
9	Fushë	9	7	2	3	0	258	258
	Topojë AU	80	45.2	13	23	2	2021	2021

7.7.5. Irrigation System

Drainage and irrigation system: The actual irrigated area in Fier Municipality is excessively low compared to the irrigation capacity of the Municipality's irrigation infrastructures, which comes as a consequence of the lack of maintenance of irrigation canals, and pumping and drying stations of reservoirs. Meanwhile, the priority area for improvements in irrigation is the administrative units of Qender, Libofshë, Portëz, and Topojë.

Table 35 Irrigation system data Topojë AU

No.	Village	Hectars Overwater	Hectars Underwater	Main network (km)	Secondary network (km)	Tertial network (m)	Number of beneficiaries (Households)
1	Seman i Ri	1300	75	4	2	600	50
2	Seman	350	60	4	2	600	50
3	Kavaklli	250	33	3	1	400	40
4	Gjokalli	140	0	0	0	0	0
5	Sheq-Marinas	300	162	5	3	800	140
6	Sheq	1100	100	6	2	700	40
7	Topojë	360	200	4	3	1000	160
8	Grykë	200	60	6	3	700	60
9	Fushë	300	60	3	2	700	57
10	Topojë AU	4300	750	35	18	5500	597



7.7.6. The drainage

The new Law no. 24/2017, “On the administration of irrigation and drainage”, reflects changes in decentralization and governance reforms, specifically municipal functions for irrigation and drainage and are in the study process from the MARD that it presents criteria and rules made for the administration of irrigation and drainage infrastructures and floods protection.

Regulation of drainage systems is under the responsibility of the MARD. Implementation of drainage functions is linked with the operation and maintenance of collectors and main drainage canals, hydrovoires, water control structures and flood protection. While, the responsibility of managing and the ownership of all the remained drainage infrastructure is transferred to relevant municipalities according to CDM no. 1108, date 12.30.2015, “On the transfer from Ministry of Agriculture and Rural Development to municipalities of the irrigation and drainage infrastructure, staff and movable and not movable assets of regional drainage boards”.

MARD will be responsible for the maintenance, rehabilitation and reconstruction of structures for flood protection, including responsibility for interception of runoff and river embankments.

The drainage activities by responsible structures for irrigation and drainage depending on MARD are financed by the state budget. MARD has the following key responsibilities:

- Clean and maintain drainage canals;
- Operate and maintain hydrovoires;
- Control the quality of water that enters drains and re-enters productive land, urban areas, and environmentally important wetlands;
- Inspect, and supervise drainage structures for protection against flooding;
- Prepare rapid response plans to threats of flooding;
- Maintain protective structures against flooding of river and sea;
- Manage rivers and streams, where necessary, to prevent excessive soil erosion.

The Hydrovoir of Hoxhara, located on the southwest part of the project site is constructed in 1966 and serves for the bonification of the land of Myzeqeja Field. Currently, the Hydrovoir and the main drainage channel are administrated by the Directory of Irrigation and Drainage of Fier depending on the MARD.

A new investment of around 1.6 million euros has been made in the Hoxharë Power Plant (Electrical Substation), as well as for the reconstruction and strengthening of the segments of the 35kV transmission line from TEC (Thermal Power Plant) Fier - Hoxharë.

In 2018, the area experienced big floods as a result of the problems with the electrical supply of the Hoxhara Hydrovoir. The Albanian Government's investment in the electrical Substation will avoid the interruption of the electrical supply and floods because of the non-functioning of the pumps of the Hydrovoir pumping station.

7.7.7. Education

Albania has made specific efforts to improve education provision and access to education facilities, although there is still a long way to go. Only 2.28%³⁶ of GDP (lower than the EU average of 5.4%) was spent on education in 2018. The number of students registered in the system of pre-university education for the academic year 2020-2021 is reduced with 13% compared to the number of students registered in this system for the academic year 2016-2017³⁷.

Topojë AU has several education institutions including six kindergartens, five primary schools and one secondary school serving for the entire AU located in Seman village. The kindergarten of Grykë village was closed as a result of the lack of the minimal number of children.

³⁶ Ministry of Education Sports and Youths: Budget Report of 2017, 2018 and revised budget of 2019.

³⁷ <http://www.instat.gov.al/al/statistikat-n%C3%AB-shkolla/arsimi-n%C3%AB-shqip%C3%ABri/>

**Table 36 School facilities**

No.	Village	No. of the 9-year schools	No. of high schools	No. of kindergartens	Number of teachers in kindergarten
1	Seman	0	0	1	2
2	Kavaklli	1	1	0	
3	Gjokalli	0	0	0	
4	Topojë	1	0	1	2
5	Fushë	0	0	0	
6	Grykë	0	0	0	
7	Sheq-Marinas	0	0	1	2
8	Sheq	0	0	0	
9	Seman i Ri	1	0	1	1
	AU	3	0	4	7

The primary school “Lili Stavre”, Topoje is located on the side of the main road of Topojë village. This school is frequented by pupils of the age between 3-15 years old from villages of Topojë, Sheq Marinas, Grykë and Shën Pjetër as well from kids of Topojë kindergarten. The number of pupils frequenting the school, as well as the number of kids in kindergarten is decreasing.

The table below shows the number of children in primary school “Lili Stavre”, Topojë village for the period 2018-2022.

Table 37 The number of students in the primary school Lili Stavre, Topojë village³⁸

Year	Number of students in primary school	Number of children in kindergarten
2018 - 2019	169	-
2019 - 2020	138	-
2020 - 2021	132	-
2021- 2022	124	48

³⁸ Administrative data provided by KII

Table 38 Social infrastructure Topojë AU

No.	Village	Health centres	Cultural Canfers	Sport Canfers	Home for the elderly	Post-service	Church/ Mosque	Markets	Funeral Office
1	Seman	1	0	0	0	0	0	0	0
2	Kavaklli	0	1	1	0	1	1	0	0
3	Gjokalli	0	0	0	0	0	0	0	0
4	Topojë	1	0	1	0		1	1	0
5	Fushë	1	0	0	0	0	1	0	0
6	Grykë	0	0	1	0	0	0	0	0
7	Sheq-Marinas	1	1	1	0	0	0	0	0
8	Sheq	0	0	0	0	0	0	0	0
9	Seman i Ri	1	0	1	0	0	0	0	0
	AU	5	2	5	0	1	3	1	0

7.8. Vulnerable groups and social care support

The social services in the territory of Topojë AU are covered by the Directory of Social Care in Fier Municipality. These services include:

Social Service - information, assistance and early counselling for the women, youth and other groups.
Community based services, daily and multifunctional centres, emergency services, and service for the homeless persons.

Long term residential services for the elders and orphans.

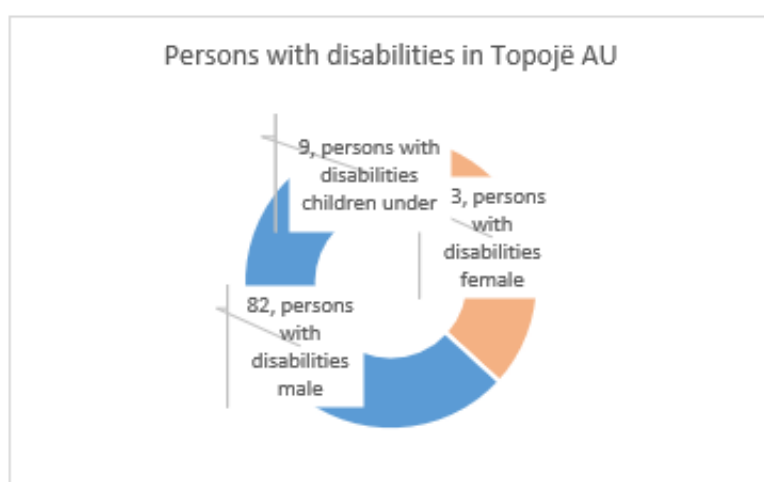


Figure 53 Persons with disabilities in Topojë AU

7.8.1. Social Care Support

Currently, there are 54 households³⁹ within Topojë AU receiving social support. Social support is given to recipients registered as living in poverty, with irregular income and limited or no land assets. However, social support recipients do not explain the full extent of poverty. There may be households that hold land assets and are therefore not eligible for social support but may still not be able to work or receive a regular income and therefore may be living in poverty.

Table 39 The number of households with social support in villages of project area, Topojë AU ⁴⁰

No.	Village	Number of families with social support
1	Topojë	14
2	Sheq Marinas	4
3	Gryke	3

Another important indicator in the PA is the number of households headed by women, which is 15 as indicated by the KII. Of these, 3 of them receive social assistance⁴¹.

In summary, the levels and causes of vulnerability for different stakeholders are as follows:

- **Women**, including female-headed households:
- **Roma**: Roma communities are considered vulnerable across a range of diverse indicators ranging from access to services (including education and health care), level of education and literacy, participation in decision-making, risk of marginalisation and access to financial resources.
- **Children**: Vulnerable children may be present throughout the study area where they are not adequately cared for and protected by an adult and are potentially participating in work that is hazardous or prevents them from continuing education. Levels of vulnerability vary greatly, and are likely to be linked to additional factors such as overall household income and ethnicity.
- **Youth**: Youth is reported to be potentially vulnerable in rural areas due to their lack of land ownership or another method of securing a livelihood, particularly where they have a young family. They may also be vulnerable to poor labour practices due to a lack of experience.
- **Elderly/retired**: The elderly has specific vulnerabilities relating to income levels and limited ability to change or increase access to additional finances and access to health care. Elderly residents in settlements with limited accessibility and/or transport.
- **Households with low income including subsistence farmers**: Low-income households are vulnerable.
- **Physical /mental health and disability**: Disabled people throughout the study area are vulnerable in terms of participation in decision-making and access to employment opportunities. Disabled people may also experience varying levels of social exclusion and community marginalisation.
- **Households with no legal rights to land**: Vulnerability is linked to 2 specific indicators: participation in decision-making about land use changes and access to land in terms of quality, availability and overall management.
- **Households' dependent on limited land of low productivity**: Some households have very limited land that is adequate for production. Such households will generally have a lower income and have fewer resources available to cope with any alteration to available land.

³⁹ Source: Social Care Plan Fier Municipality 2019-2023

⁴⁰ Administrative data provided by Topojë AU

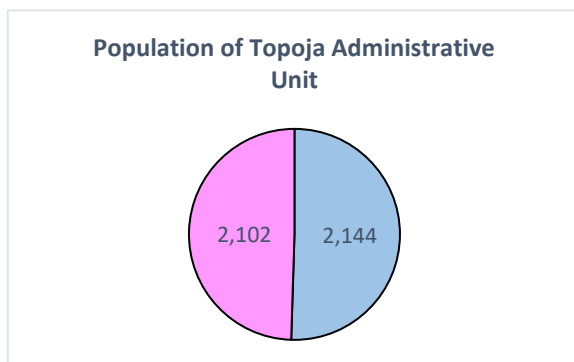
⁴¹ Source: Social Care Plan Fier Municipality 2019-2023

7.8.2. Gender Analysis and Security & Crime

The social-economic baseline is fully included in the consultations' activities for women living in the project area. The questionnaire used to collect administrative data and the questions used to collect inputs from community members have respectively gender disaggregated questions and sections. In addition, the consultation process and data collection plan included a meeting with women to explore some gender issues in the project area.

Albania faces many challenges in increasing the role of women in the economy, increasing their participation in decision-making, and eradicating widespread violence against women.

Since 1995 there have been many developments, but the most important ones in gender equality, antidiscrimination, and domestic violence are dated after 2006. The legal framework for the promotion of legal equality has been considerably improved by the ratification of a series of important international documents and improvements in Albanian Legislation. The gender-disaggregated data below, which are obtained by national and local statistics, are used to show that there is not a significant gender gap in Topojë AU.



Topojë AU Total residents 4,246
Females ♀ 2102; 49.51%
Males ♂ 2144; 50.49 %

Figure 54 Topojë AU Female, Male Population⁴²

The statistics below show the population number in Topojë AU according to gender: women and men, and age group: 0-14 years old, 15-65 years old, and over 65 years old. The data shows that 67% of men and 68% of women in Topojë AU are in the 15-65 age group⁴³.

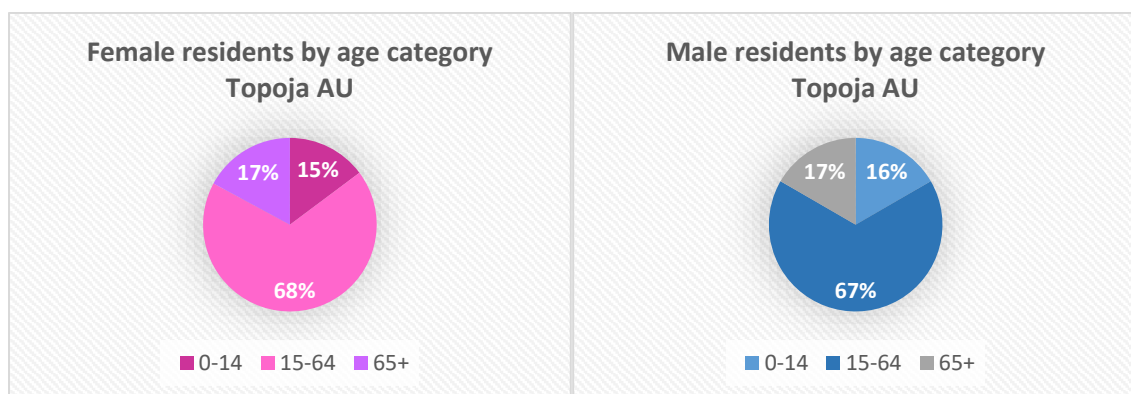


Figure 55 Female and male populations by age category in Topojë AU

During consultation meetings in Topojë AU, women were presented as the main labour force in the area, mainly working in the agriculture sector. In the last years, a lot of women from Topojë area are working in garment manufacturing located in Fier city. A small number of women are working in the education sector and in public administration. The average estimations show that their contribution to the incomes of their

⁴² INSTAT Census 2011

⁴³ INSTAT Census 2011



families is about 50%. Besides working outside the household, women are also responsible for all the housework. Women play an important role in the economic activity of the area, and their unemployment is 39%, while the unemployment of men is 21.4%⁴⁴.

The number the victims of domestic violence in Topojë AU was reported to be 8 in 2018. Women play a small role in family and community decision-making, reflected also in the low numbers of elected women in the municipality council or other elected community structures. From the consultation meetings with the head of villages and the Administrator of the AU of Topojë, there were no reported cases of thievery or property damage from the residents in the area, which is considered to be quite peaceful and calm.

7.9. Land Use, land tenure and Ecosystem Services

7.9.1. Land use and landscape

The project area is an agricultural area. No buildings or other agricultural infrastructures. It is a parceled surface with drainage channels that have recently been functional thanks to the intervention for their rehabilitation and the full function of the water reservoir.

The lands are abandoned and not distributed to the private sector due to the very low productivity they possess. In the 60s and 70s years of the last century, they were reclaimed and an attempt was made through a plan to desalinization them and place them in agricultural cultivation; unsuccessful test due to deposition of large amounts of salt during dry months. Despite the efforts for cultivation, the yields of wheat and fodder that were planted were low and very low, with high and very high costs, so with very low effectiveness. Today they are not under culture but modern fruit tree cultivation techniques (creation of high plant planting and irrigation / artificial fertilization enables their cultivation for specific trees, however at a high cost. The salinity rate is medium saline (6- 12 g/L-1) and high saline (more than 12 g L-1) of water filtered from the soil.

The presence of vegetation varied from 30 to 80% and was dominated by *Salicornia Europea* (in 50-70% of vegetation) followed by *Spartina alterniflora* and *Spartina spartinae*. Salt-affected soils commonly contain a mixture of cations of sodium, calcium, magnesium, and potassium and anions of chloride, sulfate, bicarbonate, or carbonate. The total salt, individual salt, or combination of salts in the soil is high enough to retard plant growth, injure plant tissue, and/or decrease yields, the soil is referred to as salt affected;

The Project area is located on flat land with a height of up to 2 m above sea level and the slope on the whole surface varies from 0.5 to 1.0%. Soil drainage is functioning.

Fluvisols are planted 100% with annual crops dominated by fodder, alfalfa, and cereals. These are lands with high agronomic potential and are classified in categories II and III. They are irritable and drained.

The main activities are agriculture and farming, which also conditions the use of land for farming and agricultural purposes. Climatic, geological and morphological factors have conditioned the area where grey-brown soils predominate. The poor soil humus has conditioned their use as poor pastures.

The area is subject to human activity impact. The hill's vegetation has been burned several times in order to create new lands, which have been planted with fruit trees and mainly with olives. In the past, about 18 oil and gas wells have been drilled in this area, but currently, none of them operates.

7.9.2. Land Tenure

In 1991, Law no. 7501, dated July 19, 1991 'On Land' stipulated the reallocation and privatization of the agricultural land owned by former agricultural cooperatives, which amounted to around 570,000 ha. DCM no. 452, dated October 17, 1992 'On the restructuring of Agricultural Enterprises' allocated the lands of state agricultural farms (152,000 ha) to former farm workers. Following Law no. 8053, dated December 21,

⁴⁴ Source: Social Care Plan Fier Municipality 2019-2023



1995 'On transferring ownership of agricultural land without compensation the land became privately owned except areas that remain under the status of 'in use,' as not based on law.

In 1991, Law no. 7501, dated July 19, 1991 'On Land' stipulated the reallocation and privatization of the agricultural land owned by former agricultural cooperatives, which amounted to around 570,000 ha. DCM no. 452, dated October 17, 1992 'On the restructuring of Agricultural Enterprises' allocated the lands of state agricultural farms (152,000 ha) to former farm workers. Following Law no. 8053, dated December 21, 1995 'On transferring ownership of agricultural land without compensation the land became privately owned except areas that remain under the status of 'in use,' as not based on law.

Although they have received an ownership title under Law 7501, farmers often carry out agricultural activity on the properties they owned before the agrarian reform and in a tacit agreement amongst themselves.

Table 40 Land structure Topojë AU

No.	Village	Land structure	Field (ha)	Hill (ha)	Mountain (ha)
1	Seman	Light	410	0	0
2	Kavaklli	Light	283	0	0
3	Gjokalli	Light	140	0	0
4	Topojë	Light	560	0	0
5	Fushë	Light	360	0	0
6	Grykë	Light	260	0	0
7	Sheq-Marinas	Light	462	0	0
8	Sheq	Light	1200	0	0
9	Seman i Ri	Light	1375	0	0
	Topojë AU		5050	0	0

Table 41 Land cultivation Topojë AU

No.	Village	Agriculture Land (ha)				Forests (ha)	Pasture (ha)	Other (ha)
		Arable (ha)	Orchard (ha)	Olive trees (ha)	Vineyards (ha)			
1	Seman	400	3	-	7	-	-	-
2	Kavaklli	276	2	-	5	-	-	-
3	Gjokalli	131	3	-	6	-	-	-
4	Topojë	550	4	-	6	-	-	-
5	Fushë	353	3	-	4	-	-	-
6	Grykë	250	4	-	6	-	-	-



No.	Village	Agriculture Land (ha)				Forests (ha)	Pasture (ha)	Other (ha)
		Arable (ha)	Orchard (ha)	Olive trees (ha)	Vineyards (ha)			
7	Sheq-Marinas	452	3	-	7	-	-	-
8	Sheq	1198	1	-	1	-	-	-
9	Seman i Ri	1368	2	-	5	-	-	-
AU		4978	25	-	47	-	-	-

Table 42 Land quantity Topojë AU

No.	Village	Number of households benefited /(farms)	Land benefited by law 7501 (dy/person)
1	Topojë	322	3.8
2	Sheq Marinas (Part of Cooperative)	216	4.5
	Sheq Marinas (Part of Agriculture Enterprise)	85	10.7-11
3	Grykë	103	4.5-5
4	Seman	355	
5	Gjokalli	62	
6	Sektor Seman	202	
7	Shën Pjeter	212	
8	Total	1557	

7.9.3. Ecosystem Services

This section presents the identification, and screening of ecosystem services associated with the construction and operational phases of the Project.

The ecosystem services identification process included as follows:

- Desk-based review of existing information
- Site visits during the socio-economic survey, village and road assessment
- Consultation with stakeholders.



Fishing is one of the main ecosystem services identified and reported in the vicinity of the project site. Near the Project area, small-scale artisanal fishing in rivers and along the shore is conducted by residents in the settlements of Sheq Marinas, Seman and Kavaklli, in the commune of Topojë. In the social baseline data session of the ESIA of TAP Project at the local level, have been identified some small-scale artisanal fishing in rivers and along the Adriatic shore is conducted by residents in the settlements of Sheq Marinas, Seman and Kavaklli, in the AU of Topojë. However, the fishing is primarily conducted as an additional livelihood activity for households in this area, rather than as the main economic activity. In this respect TAP conducted a focus group with a group of fishermen living in Kavaklli in Topojë AU who reported that there are 25 families belonging to these settlements who own small boats along the shore close to the mouth of the Semani River.

Along the channel, in the western boundary of the Project site, there are some small wood platforms that are used by local residents for fishing for the entertainment purpose.

Table 43 Natural Resources of Topojë AU

No.	Natural Resource	Unit	Quantity	% of use
1	Coastline	Km	8	100%
2	Rivers	Number	1	3%
3	Lakes	-	0	-
4	Reservoirs	-	0	-
5	Lagoon	Number	1	20%
6	Agricultural land	Ha	5050	55%
7	Forests	Ha	1500	46%
8	Pastures	-	-	-
9	Other lands	Ha	18	100%
10	Parks, green spaces	Ha	1	100%
11	Mineral Resources	-	-	-

The PV Plant Area includes saltmarsh / meadow, which are also extensively found in the surrounding area. Saltmarsh /meadow is a recognised foraging habitat for pollinators including honeybees.

A total of 4 households of Village Gjokalli and Sheq Marinas were confirmed in participating in apiculture via the ecosystem services assessment and meetings (in June 2022) with the heads of the villages and head of AU Topoja. All four households were located around 5-6km distant from the PV plant area and the total number of beehives ranged from 80-100 and used for personal consumption.

In the western side of the project development area is the Adriatic Sea, with a coastline length about 8 km that start from the Pump Station (hydrovor) channel in the south up to the delta of Seman river in the north. The coastline has many sand beaches and rare temporary constructions without access to public infrastructure and is frequented by the daily tourists that come from Fier city and villages around. As the result of the sea advancing at the beach located in the south part of the seaside (near the hydrovor channel), the main beach area for tourists is moved in the north part, however there are some tourists that still continue to frequent that beach, as there has been the old Seman beach and also there are

some small restaurants and services. The access road that this group of tourists use to arrive in the beach is the same with the main access road of Project.



Figure 56 View from Seman Beach

The forest is degraded because of the lack of maintenance and the occasionally fires. Currently, this part of the forest does not offer any tourist attractions, and its flora and fauna are poor. In addition, in the area is not found or cultivated any medicinal plants. The local residents from villages of Gryke, Topoja, and Sheq Marinas come and collect the dry, burned, or cut trees that they use for heating or fire.

In the area two businesses are using the natural resources for their raw materials:

- The first business has a production line that cleans and packages the canes collected in the area.
- Another small business, use the clay for the production of solid bricks with the usage in the construction of the road infrastructure.

As a regulating ecosystem service, it can be noted the hydrology processes dependent on service provision. The Project area is situated within a significantly larger area with extensive, poorly maintained irrigation channels. The whole area is at a certain risk from a number of different flood events, caused by the Seman river, drainage channel flooding, or surface flooding during intense rainfall.

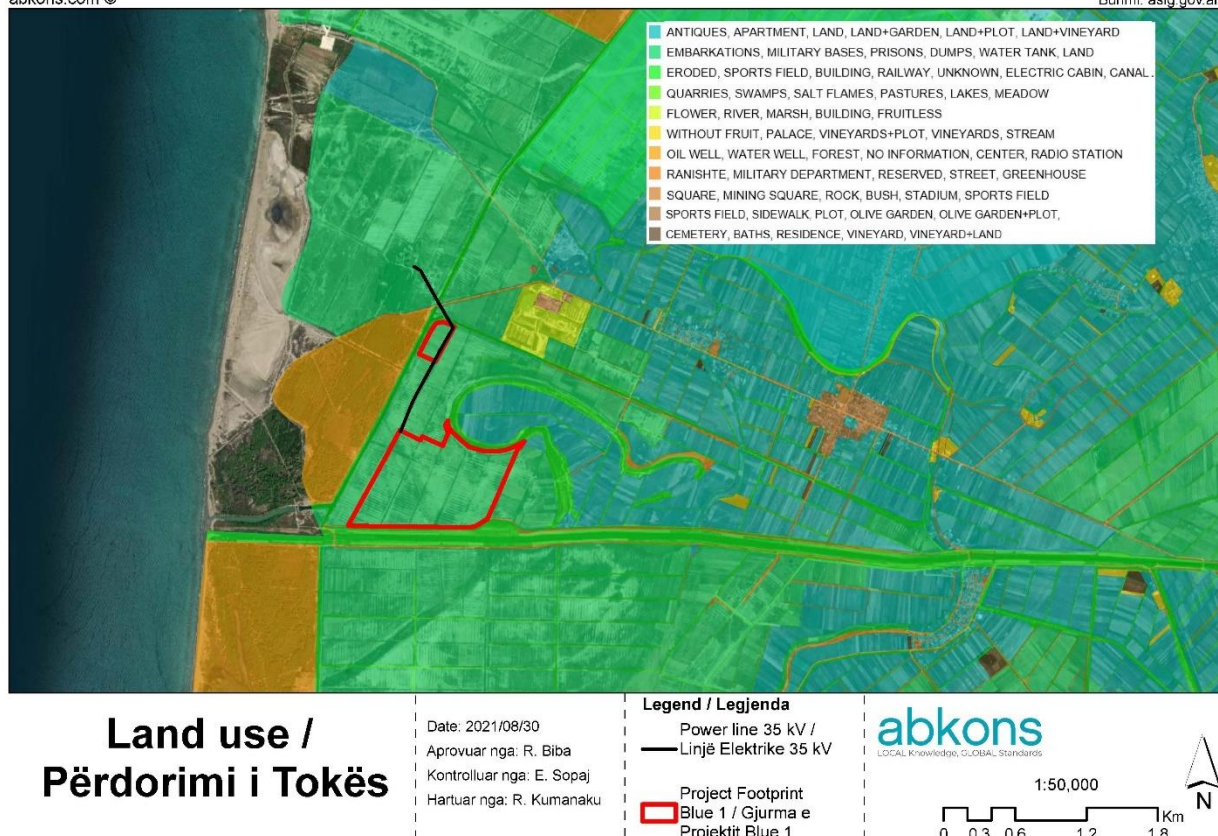
The table below shows the main ecosystems and ecosystem services present, including those 'produced' or 'consumed' elsewhere:

Table 44. Ecosystem Services

Ecosystem Services					
Supply	Presence	Regulator	Presence	Cultural	Presence
Food	Yes (fishing)	Regulation of climate and air quality	No	Recreation and mental and physical health	No



Ecosystem Services					
Supply	Presence	Regulator	Presence	Cultural	Presence
Raw materials	Yes	Carbon sequestration	No	Tourism	Yes
Freshwater	no	Control during natural disasters	No	Aesthetic values and inspiration for culture, art and design	Yes
Genetic resources	No	Sewage treatment	No	Spiritual experience and sense of belonging	No
Medicinal	No	Protection from erosion and preservation of soil fertility	Yes	Cultural heritage value	No
		Pollination	No		No
		Biological control	No		No

Figure 57 Land use map⁴⁵

7.9.4. Projects being developed in the area

Other projects identified near to the project site and that have the potential to interact with the Project are described in Table below:

Table 45 Projects present or being developed in the area and interaction with Blue 1

Project	Description of the project	Possibility of interaction with Blue 1 SPV
TAP Trans Adriatic Pipeline	<p>TAP has completed the construction works and since November 2020 has started the commercial operations. The main activities in the field are related to inspecting, maintaining and repairing for the pipeline.</p> <p>The Future Expansion plans⁴⁶ of TAPs are related to increasing the current operational capacity that needs the addition of two compressor stations and modification to the existing compressor stations.</p>	<p>No</p> <p>The Trans Adriatic Pipeline maintenance programme uses a range of monitoring methods for early warning of any deterioration or damage.</p> <p>There is no information on any activities related to the expansion plans in the near future.</p>

⁴⁵ Referring to Asig the land surface is classified as Barren Land

⁴⁶ <https://www.tap-ag.com/infrastructure-operation/how-tap-operates#:~:text=health%20and%20safety,-Future%20expansion,-TAP%E2%80%99s%20current%20operational>



Photovoltaic Plant, Seman1 Power Plant, constructed by "AED Solar" sh.p.k. with an installed capacity of 2 MW;	The project is operational and is located near the Hoxharë electric substation, nearly 1.5 km from the SPV Blue 1 and covers an area of 34 Ha.	No The Photovoltaic Plant of Topojë is in the operating phase since 2019 and the main activities in the field relates to the maintenance.
A new project, "Natyral Energy System", sh.p.k. approved by MEI for the construction of Eolic plant with a capacity of 3 MW, in Grykë village, Topojë AU, Fier Municipality and;	There has not been set a date for the start of the construction of the Eolic plant, although the DCM was approved on 31 st March 2022 and the developer has a period of 2 years to start construction. The plant is situated nearly 1.8 km from the PDA.	Yes During the transport of the materials, it is assumed that developers of these projects will use the same transport roads.
Water Pumping Station and related Power Plant (Hoxharë Hidrovor)	Implementation of drainage functions is linked with the operation and maintenance of collectors and main drainage canals, water pumping stations, water control structures and flood protection. Fier Municipality is responsible for the administration of the assets and the maintenance of the infrastructure related to the drainage. MARD is responsible for the maintenance, rehabilitation and reconstruction of structures for flood protection, including responsibility for interception of runoff and river embankments.	Yes To the existing drainage infrastructure in the Blue 1 SPP project site requires consultations with the respective authorities during the design, implementation and monitoring stages of the project. To the works for the maintenance of the drainage channels from the municipality or Responsible Regional Structure of MARD generate soil that is left on the side of the channels that were cleaned.

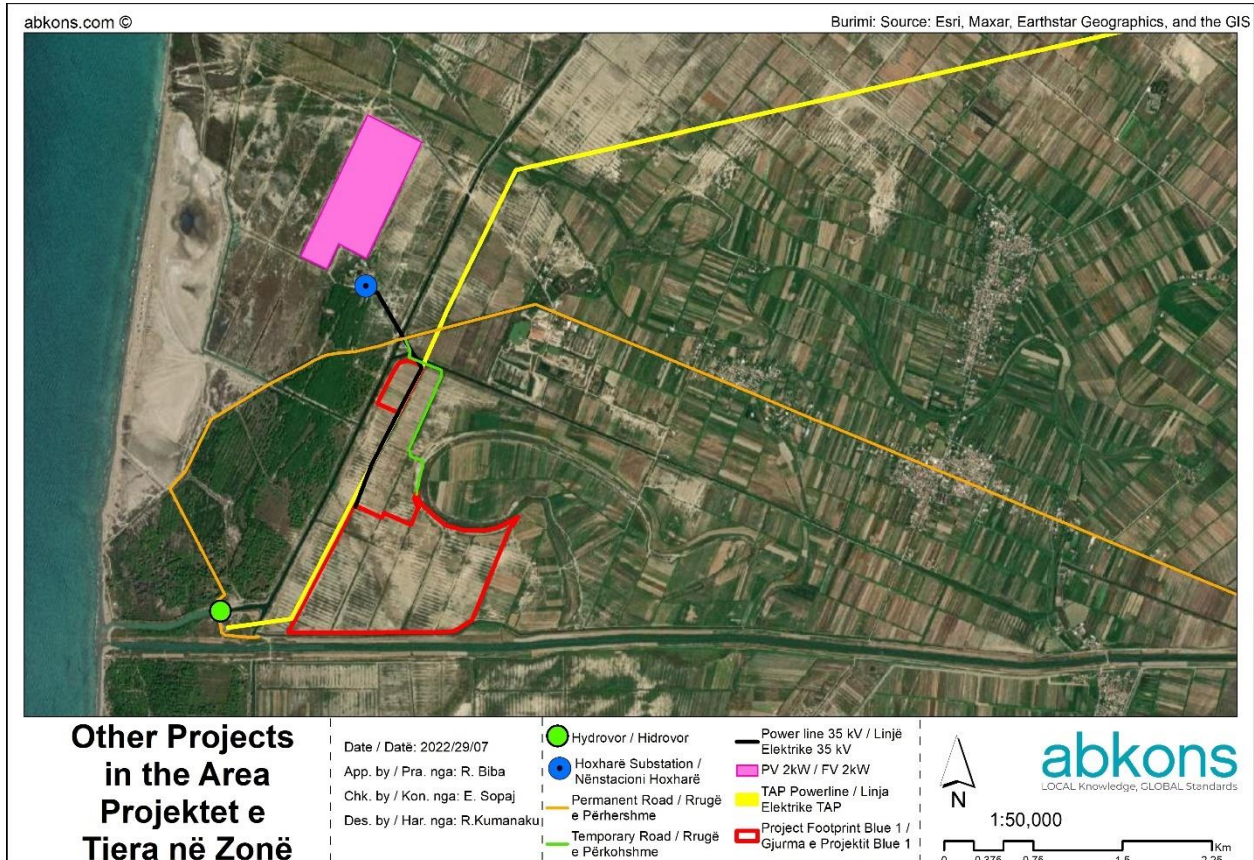


Figure 58 Other projects being developed near the Project area

7.10. Cultural Heritage

Geographically, the project area is located in the western part of Albania, in the municipality of Fier. The Municipality of Fier is a crossroad of both, ancient and modern streets. In the past, its territory has been the location of one of the earliest colonies of the Adriatic coast, known as Apollonia of Illyria, while nowadays it is the largest archaeological park of the western Albanian lowlands and one of the most visited. Apollonia is an archaeological park with high development potential for sightseeing and educational tours, but for years, the lack of a management plan has stooped the park operations with project developments that have not always been in harmonization with each other or in many cases have overlapped each other. Currently, the archaeological park has a good preservation and conservation condition but at the same time it has an urgent need for specific and key restoration interventions in its monuments that belong to all eras. European Union-funded restoration projects are an essential part of the positive change but there is still no transparency of road lines which will connect the Fier by-pass with Apollonia, and how much this axis will facilitate the access of visitors but also local inhabitants. In antiquity an important branch of Via Egnatia derived from Apollonia. The city is certainly the destination of many visitors, who travel not only by car but by bicycles too, and there is plenty of space for itineraries from where you can guide visitors to the Adriatic Sea, as well as itineraries between the villages which are located in the east of Apollonia towards the city of Fier. The Municipality of Fier also has the potential of the presence of the monastery of St. Cosmas in Kolkondas, a monument that is naturally part of the itineraries of the Byzantine churches of the western lowlands because it bears the history of St. Cosmas and the feeling of historical pilgrimage. The combination of rich cultural resources and road infrastructure improvement but also the tourist one, inevitably brings sustainable local economic development and the increase of residents' interests for the values that surround them. It is defined a surrounding protection area regarding the cultural monuments, in accordance with their architectural values and their urban-aesthetic suitability. The body that declared the

cultural monument has determined the area dimensions where any construction intervention is not allowed according to a study conducted by the Institute of Cultural Monuments.

The cultural monuments are as follows:

- St. Nicholas Church, Vanaj;
- St. George Church, Libofsha;
- St. Cosmas Church, Kolkondas;
- St. Paraskevi Church, Hoxharë;
- The Roman Villa, Plyk;
- St. Mary Monastery, Pojan;
- Apollonia ancient city, Pojan;
- The Ancient Temple, Shtyllas.

The main areas of historical value are as follows:

- Apollonia;
- St. Mary Monastery;
- Ardenica Monastery (is not part of the current municipality, but it is nearby).

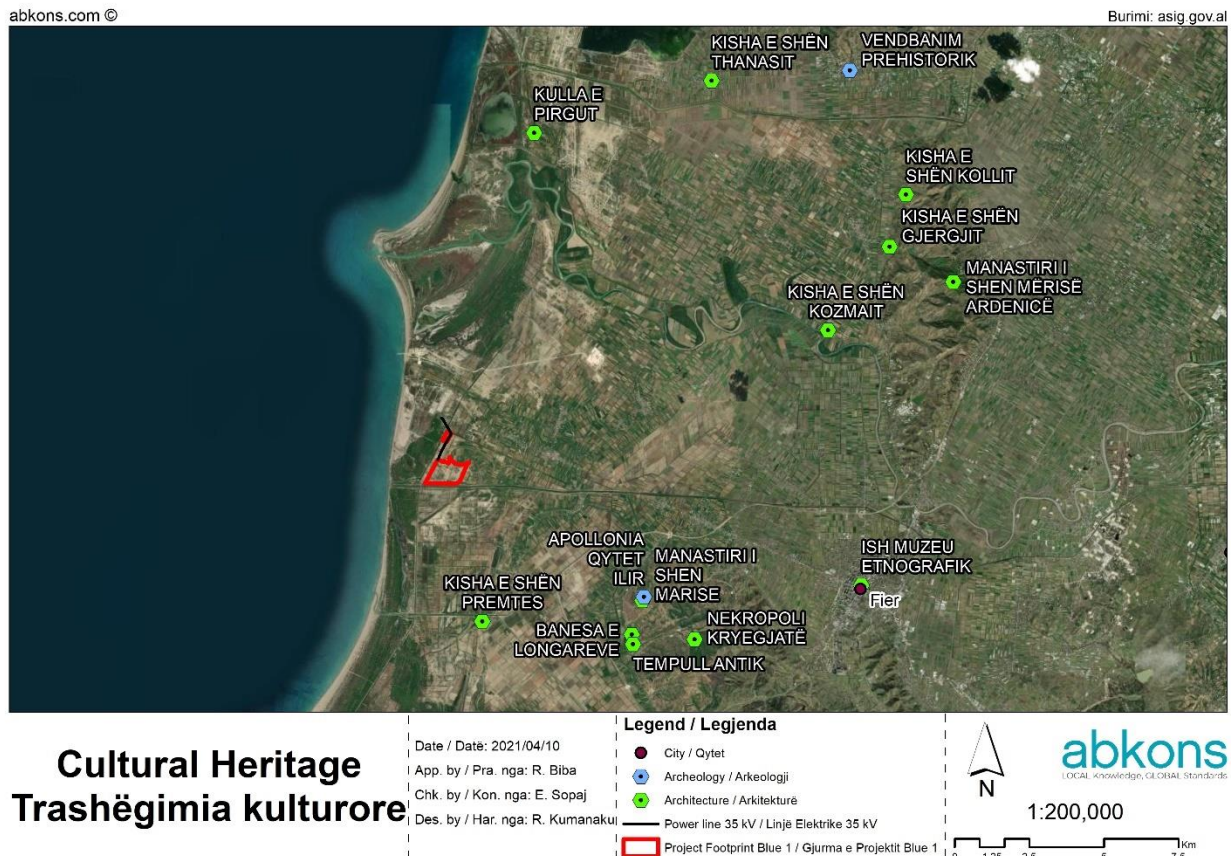


Figure 59 The Area Cultural and Historical Map

Apollonia Park has been archived for consideration as a UNESCO World Heritage Site by the Ministry of Environment. Apollonia Park has an area of 81 Ha, which boundary has been designated as a protected archaeological site, consisting of an area with high archaeological intensity (A) and (B) an area for the protected area development. In addition to Apollonia Archaeological Park, there are 17 cultural monuments of the first category in the Municipality of Fier. St. Mary Church is located above the Pojan village, in St. Mary Monastery in Apollonia. This church is one of the most important architectural monuments of the



medieval cult in Albania. Due to the lack of a basic inscription proving the exact date of construction, scholars have tried to draw indirect conclusions, obliged to rely on paintings, inscriptions and architectural styles, that this monastery preserves. The Monastery of the Blessed Virgin Mary complex consists of the church of St. Mary, the chapel of St. Demetrius and the sacristy (place of cult objects), which are attached to the north side of the church. Three scholars of this monastery such as Alexudhi, Leon Hezej and Dome think that St. Mary church must have been built on the foundations of Apollo shrine (temple)⁴⁷.

The ancient city of Apollonia is thought to have been founded around 600 BC. The Illyrian tribes located near Apollonia were the Bylines, the Dassareti, and Taulanti. Apollonia was known as a river port and had the greatest income from trade relations. A strong earthquake which shifted the Vjosa River flow and increased the distance of Apollonia from the Adriatic Sea, caused the fall to begin. Economic causes along with the strengthening of other ancient settlements made Apollonia to lose its value. During later periods, Apollonia was no longer used as a settlement, but stones were often carried from there to build other works further in the field. Apollonia was also known as the starting point of the southern part of the Egnantia road, which connected the Roman Empire with the deepest Balkans regions⁴⁸.

The column of Shtyllas consists of worked limestone. It consists of 7 cone-shaped stone blocks. The column is located on a hill about 50 m above the sea level from where the Pojan temple and St. Paraskevi Church can be clearly seen. The column is located in a small plateau with an area of 5700 m² and it is thought that there were other constructions nearby⁴⁹.

⁴⁷ Article: "Fieri, me kujtesën e gëlltitur historike" by Ben Andoni. Writings of the historian Ilirjan Gjika

⁴⁸ Book: "Historia e Arkeologjisë Shqiptare" led by Pierre Cabanes, presented by Muzafer Korkuti, Apollon Baçe, Neritan Ceka.

⁴⁹ Ministry of Culture.



8. IDENTIFICATION AND ASSESSMENT OF NEGATIVE ENVIRONMENTAL IMPACTS OF THE PROJECT

This section assesses the way in which the project will interact with physical, ecological or social environment elements to impact on resources/receptors. It has been organized according to the different phases of the Project life cycle to understand the risks and impacts associated with each phase.

Table 46 The identified environmental interactions that are likely to bring about significant impacts

Source/receptor	Potential significant impacts:
Environmental air quality	<ul style="list-style-type: none"> • Mobile dust emissions due to machinery and vehicles movement. • Mobile emissions due to the use of pile drivers. • Air emissions due to the operations of diesel generator sets and machinery.
Environmental noise level	<ul style="list-style-type: none"> • Noise generation due to vehicles and machinery movement. • Noise generation due to the use of pile drivers.
Land Use	<ul style="list-style-type: none"> • Permanent land use changes due to installation of photovoltaic panels, Central Monitoring Station, Marshalling Yard, access roads. • Temporary land use changes due to temporary on-site office and material storage yard.
Impacts on hydrology and soil	<ul style="list-style-type: none"> • Topography and micro drainage drain change due to construction of the project area. • Sedimentation in nearby water bodies as a result of soil erosion and reduced soil quality due to vegetation cover loss. • Storage and treatment of hazardous materials and waste generated by the use of construction equipment and machinery and their maintenance may lead to soil pollution due to leaks/spills.
Aquatic Environment	<ul style="list-style-type: none"> • Impact on water quality due to construction works. • Accidental discharge of hydrocarbons from transport and work vehicles and pollution due to oil, lubricant and hazardous waste spills. • Use of groundwater or surface water for construction activities and for cleaning photovoltaic panels. • Surface and groundwater pollution due to inadequate on-site waste water disposal.
Occupational Safety and Health	<ul style="list-style-type: none"> • Occupational health risks due to dust and noise pollution. • Safety risks due to improper use of construction machinery, working at height. • Workers exposure to electromagnetic field (EMF) while working near charged power lines during operation and maintenance.
Local Ecology	<ul style="list-style-type: none"> • Impact due to Vegetation Clearing - removal of vegetation from agricultural land, shrubland for the site construction and ancillary facilities will affect shrub species and loss of connection between habitats or resources within a habitat. • Impacts from excavation and construction activities on habitats and species, specifically impacts on nest-building species, and the effect of sediment and contaminant deposition on surrounding water bodies. • Installation of project access and internal roads and installation of transmission lines and towers. • Impacts on birds that use transmission towers for nests by building them all over wires or using tower holes.



Source/receptor	Potential significant impacts:
	<ul style="list-style-type: none"> Impacts on water birds by possibly colliding with photovoltaic panels.
Local communities near the project site and local economy	<ul style="list-style-type: none"> Social and community health - increase of spread of the illness that comes from the influx of construction workers and the heavy traffic. Restriction of access to agricultural land and resources of common and private property surrounded by the project area. Impact on local employment opportunity.
Cumulative impacts	<ul style="list-style-type: none"> It is expected that there will be a cumulative impact on the air and noise from the increased traffic during the construction, as the Hoxhare substation, the line connecting TAP with the Hoxhare substation and our project will be built at the same time. Cumulative impact on biodiversity (avifauna) during construction and especially during operation is expected from the fact that several Seman 1, Karavasta Solar photovoltaic plants are being installed in the area. The impact on water bodies and flooding depends directly on the good functioning of the pumping station in the area and maintenance of the drainage system.

8.1. Impact Assessment Methodology

8.1.1. Introduction (Area of Influence)

Risks and impacts will be analysed in the context of the project's area of influence. The area of influence encompasses, as appropriate⁵⁰:

- the primary project site (s) and related facilities of the project;
- associated facilities (funding may be provided separately by the client or by third parties including the government), and whose viability and existence depend exclusively on the project and whose goods or services are essential for the successful operation of the project;
- areas potentially impacted by cumulative impacts from further planned development of the project, any existing project or condition, and other project-related developments that are realistically defined at the time the Social and Environmental Assessment is undertaken; and
- areas potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.

The Area of Influence of the SPV Blue 1 project includes:

The Plant composed of:

- Photovoltaic panels on mobile structure, single axis trackers;
- Office building;
- Overhead line (OHL);
- Access road and a parking area; and
- The public infrastructure and utilities including:
 - The transport road;
 - Electricity, Water, Sewage and Wastes;

The areas impacted by cumulative impact of the other projects developed or planned to be developed in the area:

The TAP Project;

⁵⁰ IFC Performance Standard 1, Social and Environmental Assessment and Management Systems



- Photovoltaic Plant of Topojë constructed by “AED Solar” sh.p.k. with an installed capacity of 2 MW;
- A new project, “Natyral Energy System”, sh.p.k. approved by MEI for the construction of Eolic plant with a capacity of 3 MW, in Grykë village, Topojë AU, Fier Municipality and;
- Hydrovor of Hoxharë (Power Plant and Pumping Station).

The proposed project may pose impacts on the environmental and social aspects during the project phases. Potential impacts may be regarded over the project footprint and area of influence. Based on the activities involved, an impact interaction matrix and methodology has been prepared for the project. The impacts of the proposed project are evaluated for the three project phases as follows:

- Mobilisation/Pre-construction phase: such as site preparation, mobilisation of equipment and materials to the project area.
- Construction and Installation: including civil and electrical works and equipment installation.
- Operation: plant operation and routine maintenance.
- Decommissioning:

8.1.2. Impact Assessment Methodology

Impact identification and assessment starts with scoping and continues through the remainder of the EIA Process. Interactions with the potential for significant effects are subjected to a detailed impact assessment. The principal EIA steps comprise the following:

- **Impact prediction:** to determine what could potentially happen to resources or receptors as a consequence of the Project and its associated activities.
- **Impact evaluation:** to evaluate the significance of the predicted impacts by considering their magnitude and likelihood of occurrence, and the sensitivity, value and/or importance of the affected resource or receptor.
- **Mitigation and enhancement:** to identify appropriate and justified measures to mitigate negative impacts and enhance positive impacts.
- **Residual impact evaluation:** to evaluate the significance of impacts assuming effective implementation of mitigation and enhancement measures.

8.1.3. Identification and Characterization of Impacts

An ‘*impact*’ is any change to a resource or receptor caused by the presence of a project component or by a project-related activity. Impacts can be negative or positive and are described in terms of their characteristics, including the impact’s type and the impact’s spatial and temporal features (namely extent, duration, scale and frequency). Impact characteristics are defined in the subsections below.

Type of Impact

- *Direct:* applies to an impact which can be clearly and directly attributed to a particular environmental or social parameter (e.g., dust generation directly affects air quality).
- *Indirect:* applies to impacts which may be associated with or subsequent to a particular impact on a certain environmental or social parameter (e.g., high levels of dust could entail nuisance and health effects to workers on site).
- *Induced:* applies to impacts that result from other activities (which are not part of the Project) that happen as a consequence of the Project.
- *Cumulative:* applies to impacts that arise as a result of an impact and effect from the Project interacting with those from another activity to create an additional impact and effect.

Duration of impact



- Temporary: applies to impacts whose effects are limited to a period of less than 3 years, or only associated with Project pre-construction or construction phases.
- Short-term: applies to impacts whose effects are limited to a five-year period.
- Long-term: applies to impacts whose effects last longer than a period of five years, but limited to within the project lifetime.
- Permanent: applies to impacts whose effects last longer than the life of project – i.e., irreversible.

Extent of impact

- On-site: impacts that are limited to the PDA.
- Local: impacts that are limited to the PDA and adjacent properties.
- Regional: impacts that are experienced at a regional scale.
- National: impacts that are experienced at a national scale.
- Trans-boundary/International: impacts that are experienced outside of Albania.

Scale of impacts

The scale of an impact is a quantitative measure, such as the size of the area damaged / impacted or the fraction of a resource that is lost / affected, etc. It is generally described using numerical values and units rather than assigned fixed designations.

Frequency of impacts

The frequency of an impact the measure of the constancy or periodicity of an impact, described using numerical values or a qualitative description.

Likelihood

Likelihood is a measure of the degree to which the unplanned event (e.g., incidents, spills) is expected to occur. The likelihood of an unplanned event occurring is determined qualitatively, or when data is available, semi-quantitatively. Definitions of likelihood as applied in the ESIA are provided as follows:

- Unlikely: The event is unlikely but may occur at some time during normal operating conditions.
- Possible: The event is likely to occur at some time during normal operating conditions.
- Likely: The event will occur during normal operating conditions (i.e., it is essentially inevitable).

8.1.4. Evaluation of impacts

A consistent approach to the assessment of impacts will be followed to enable E&S impacts to be broadly compared across the ESIA. A set of generic criteria are used to determine significance and are applied across the various environmental and social parameters.

As far as possible, E&S impacts will be quantified. Where it is not possible to quantify impacts, a qualitative assessment will be conducted using professional judgement, experience and available knowledge, and including the consideration of stakeholder views. Where there are limitations to the data, and / or uncertainties, these will be recorded in the relevant chapters, along with any assumptions made during the assessment.

In order to determine the significance of each impact, two overall factors are considered:

- Magnitude and nature of impacts;
- The importance and/or sensitivity of the environmental and social receiving parameter, as determined during the assessment of baseline conditions.

Magnitude of impact



Once impacts are characterised (see section 8.1.3 above) they are assigned a 'magnitude'. Magnitude is typically a function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

- Extent;
- Duration;
- Scale;
- Frequency.

Magnitude (from small to large) is a continuum. Evaluation along the continuum requires professional judgement and experience. Each impact is evaluated on a case-by-case basis and the rationale for each determination is noted. Magnitude designations for negative effects are: negligible, small, medium and large. The magnitude designations themselves are universally consistent, but the definition for the designations varies by issue. In the case of a positive impact, no magnitude designation is assigned as it is considered sufficient for the purpose of the impact assessment to indicate that the Project is expected to result in a positive impact.

Some impacts will result in changes to the environment that may be immeasurable, undetectable or within the range of normal natural variation. Such changes are regarded as having no impact, and characterised as having a negligible magnitude.

In the case of impacts resulting from unplanned events, the same resource/receptor-specific approach to concluding a magnitude designation is used.

The likelihood factor is also considered, together with the other impact characteristics, when assigning a magnitude designation.

For biophysical impacts, the semi-quantitative definitions for the spatial and temporal dimension of the magnitude of impacts used in this assessment are provided as follows:

- **High Magnitude Impact:** affects an entire area, system (physical), aspect, population or species (biological) and at sufficient magnitude to cause a significant measurable numerical increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) or a decline in abundance and/ or change in distribution beyond which natural recruitment (reproduction, immigration from unaffected areas) would not return that population or species, or any population or species dependent upon it, to its former level within several generations (physical and biological). A high magnitude impact may also adversely affect the integrity of a site, habitat or ecosystem.
- **Moderate Magnitude Impact:** affects a portion of an area, system, aspect (physical), population or species (biological) and at sufficient magnitude to cause a measurable numerical increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) and may bring about a change in abundance and/or distribution over one or more plant/animal generations, but does not threaten the integrity of that population or any population dependent on it (physical and biological). A moderate magnitude impact may also affect the ecological functioning of a site, habitat or ecosystem but without adversely affecting its overall integrity. The area affected may be local or regional.
- **Low Magnitude Impact:** affects a specific area, system, aspect (physical), group of localised individuals within a population (biological) and at sufficient magnitude to result in a small increase in measured concentrations or levels (to be compared with legislated or international limits and standards specific to the receptors) (physical) over a short time period (one plant/animal generation or less, but does not affect other trophic levels or the population itself), and localised area.



- **Negligible Magnitude Impact:** affects a very small specific area, system, aspect (physical), group of localised individuals within a population (biological) at such a rate that can be deemed to be unimportant or insignificant.

For socioeconomic impacts, the magnitude considers the perspective of those affected by taking into account the likely perceived importance of the impact, the ability of people to manage and adapt to change and the extent to which a human receptor gains or loses access to, or control over socio-economic resources resulting in a positive or negative effect on their well-being. The quantitative elements are included into the assessment through the designation and consideration of scale and extent of the impact.

Sensitivity of receiving parameter

In addition to characterising the magnitude of impact, the other principal step necessary to assign significance for a given impact is to define the sensitivity of the receptor. There are a range of factors to be taken into account when defining the sensitivity of the receptor, which may be physical, biological, cultural or human. Where the receptor is physical (for example, a water body) its current quality, sensitivity to change, and importance (on a local, national and international scale) are considered. Where the receptor is biological or cultural (i.e., the marine environment or a coral reef), its importance (local, regional, national or international) and sensitivity to the specific type of impact are considered. Where the receptor is human, the vulnerability of the individual, community or wider societal group is considered. As in the case of magnitude, the sensitivity designations themselves are universally consistent, but the definitions for these designations will vary on a resource/receptor basis. The universal sensitivity of receptor is low, medium and high.

For ecological impacts, sensitivity is assigned as low, medium or high based on the conservation importance of habitats and species. For socio-economic impacts, the degree of sensitivity of a receptor is defined as the level of resilience (or capacity to cope) with sudden social and economic changes. Criteria for deciding on the value or sensitivity of biological and socioeconomic receptors are presented as follows:

- **High:** For ecological receptors, specifically protected under the Albanian legislation and/or international conventions e.g., species listed as rare, threatened or endangered e.g., IUCN. For social receptors, those affected will not be able to adapt to changes and continue to maintain pre-impact status.
- **Medium:** For ecological receptors, not protected or listed, but may be a species common globally but rare in Albania with little resilience to ecosystem changes, important to ecosystem functions, or one under threat or population decline. For social receptors, those able to adapt with some difficulty and maintain pre-impact status but only with a degree of support.
- **Low:** For ecological receptors, not protected or listed as common / abundant; or not critical to other ecosystem functions (e.g., key prey species to other species). For social receptors, those affected are able to adapt with relative ease and maintain pre-impact status.

8.1.5. Mitigation Potential and Residual Impacts

A key objective of an ESIA is to identify and define socially, environmentally and technically acceptable and cost-effective measures to manage and mitigate potential impacts. Mitigation measures are developed to avoid, reduce, remedy or compensate for potential negative impacts, and to enhance potential environmental and social benefits.

The approach taken to defining mitigation measures is based on a typical hierarchy of decisions and measures, as described in **Error! Reference source not found.** The priority is to first apply mitigation measures to the source of the impact (i.e., to avoid or reduce the magnitude of the impact from the associated Project activity), and then to address the resultant effect to the resource/receptor via abatement or compensatory measures or offsets (i.e., to reduce the significance of the effect once all reasonably practicable mitigations have been applied to reduce the impact magnitude).

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above.

Table 47 Mitigation hierarchy

Avoid / reduce at source: avoiding or reducing at source through the design of the Project (e.g., avoiding by siting or re-routing activity away from sensitive areas or reducing by restricting the working area or changing the time of the activity).
Abate on Site: add something to the design to abate the impact (e.g., pollution control equipment).
Abate at Receptor: if an impact cannot be abated on-site then control measures can be implemented off-site (e.g., traffic measures)
Repair or Remedy: some impacts involve unavoidable damage to a resource (e.g., material storage areas) and these impacts require repair, restoration and reinstatement measures
Compensate in Kind; Compensate Through Other Means where other mitigation approaches are not possible or fully effective, then compensation for loss, damage and disturbance might be appropriate (e.g., financial compensation for degrading agricultural land and impacting crop yields)

Residual impact assessment

Once mitigation measures are declared, the next step in the impact assessment process is to assign residual impact significance. This is essentially a repeat of the impact assessment steps discussed above, considering the assumed implementation of the additional declared mitigation measures.

8.1.6. Assessing the significance of impacts

In order to assess the significance of an impact, the sensitivity of the receiving environmental or social parameter is considered in association with the magnitude of the impact, according to the matrix shown in the table below.

Table 48 Impact significance matrix

Magnitude of impact	Sensitivity of receiving receptor		
	Low	Medium	High
Negligible	Negligible	Negligible	Negligible
Low	Negligible	Minor	Moderate
Medium	Minor	Moderate	Major
High	Moderate	Major	Major

While the above matrix provides a framework for the determination of significance and enables comparison across environmental and social parameters, a degree of professional judgement must be used and some parameter-specific factors considered in deciding of impact significance. The ESIA will provide additional guidance to the degrees of significance.

In the section below, it is provided additional guidance to the degrees of significance in the ESIA. Positive impacts provide resources or receptors, most often people, with positive benefits. Note that impacts can be either positive or negative.

- **Major significance:** an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of IA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual



impacts after all practicable mitigation options have been exhausted (i.e., ALARP⁵¹ has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholders to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

- **Moderate significance:** has an impact magnitude that is within applicable standards, but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.
- **Minor significance:** a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the resource/receptor is of low sensitivity/ vulnerability/ importance. In either case, the magnitude should be well within applicable standards.
- **Negligible significance:** a resource/receptor (including people) will essentially not be affected in any way by a particular activity or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

8.1.7. Cumulative Impacts

A cumulative impact is one that arises as a result of an impact from the Project interacting with an impact from another activity to create an additional impact. How the impacts and effects are assessed is strongly influenced by the status of the other activities (e.g., already in existence, approved or proposed) and how much data is available to characterise the magnitude of their impacts.

The approach to assessing cumulative impacts is to screen potential interactions with other projects on the basis of:

- Projects that are already in existence and are operating;
- Projects that are approved but not as yet built or operating;
- Projects that are a realistic proposition but are not yet built.

The cumulative impact assessment will take due regard of these existing facilities and their current impact on the local environment

8.2. Impact on physical environmental components

8.2.1. Impacts on Air Quality

During the construction phase, temporary impacts on air quality in the vicinity of the project area will be caused. These impacts are caused by the following:

- Excavation and earthworks;
- Material transport;
- Personnel transport belonging to the construction phase;
- Use of machinery and workplaces.

Air pollutants emitted during the construction phase are related to dust emissions, due to excavations, earthworks and heavy vehicles and machinery movement, as well as emissions caused by the use of

⁵¹ ALARP, which stands for “as low as reasonably practicable” is a principle that aims to reduce residual risk while not incurring unrealistic costs or effort.



engines of machinery, heavy vehicles and cars. Dust emissions can cause serious problems, especially when the project takes place near residential areas. In this case, there is a need for appropriate mitigation measures to minimize these environmental impacts.

During the movement of diesel vehicles, the most problematic air pollutants that are emitted are as follows: PM10 and PM2.5, CO₂ from combustion, CO from improper combustion, hydrocarbons (HC or VOC) which are also generated by improper combustion and NO_x which are produced at high temperature combustion.

During the operational phase of the photovoltaic park, there will be emissions of air pollutants by:

- Air emissions due to the use of the maintenance vehicle that comes once every few months to the site.

8.2.1.1. Potential impacts during construction phase

The main sources of air emissions during this phase will be associated with vehicle movements (transport of materials, and equipment), earthworks and potential use of generators for work activities. The principal emissions in air during construction are related to the generation of dust. Dust comprises of large airborne particles of material, which are resident in the atmosphere for short periods of time after release, as they are heavy enough to fall out of suspension in the air relatively quickly. Therefore, effects of these emissions will be localized and they do not pose long-term or wide spread changes to local air quality, but they may be a source of nuisance and complaints from communities if located close to inhabited areas and/ or properties. This is of particular importance in the summer period close to working sites and across the sections of roads that are in poor conditions or unpaved.

It is notable to highlight that the majority of the dust emissions are likely to occur during the working hours of construction activity. The precise behaviour of the dust movement, its concentration in the atmosphere, and the distance it may reach depends upon a number of factors, including wind direction and strength, rainfall, local topography and the presence of screening structures (buildings, trees etc.) that may intercept dust before it reaches sensitive locations.

The US EPA⁵² reveals *“that precipitation of greater than >0.2 mm/hr will effectively attenuate dust and wind speeds of more than >5.3 m/s are typically required to lift dust from open surfaces. This will be lower for dust generated by mechanical means (i.e., during excavation and due to the movement of vehicles over unpaved surfaces), at around 3 m/s”*. Based on this statement, the US EPA concludes that:

During the most extreme wind events and speeds, dust will typically travel a maximum of 200 m from source before falling from the air column;

At the highest wind speeds, dust is unlikely to travel more than 500 m from source; and,

Precipitation of >0.2 mm/h are likely to effectively weaken dust emissions.

Table 49. Dust Nuisance Assessment Matrix

Likely magnitude of impacts	Conditions
Likely high significance of impact	Dust generating activities for >12 months; Receptor within 200 m of dust source; Downwind for >10 percent of the year where wind and rainfall conditions promote dust generation.
Likely medium significance of impact	Dust generating activities for <12 months; Receptor within 200 m of dust source;

⁵²

https://www.miga.org/sites/default/files/archive/Documents/Vol%20II_Annex%20C_Air%20Quality_Final_Sept%202016.pdf



Likely magnitude of impacts	Conditions
	Downwind for >10 percent of the year where wind and rainfall conditions promote dust generation.
Likely low significance of impact	Dust generating activities for <12 months; Receptor within 200 m of dust source; Downwind for 2-5 percent of the year where wind and rainfall conditions promote dust generation; or, Dust generating activities for >12 months; Receptor within 500 m of dust source; Downwind for 2-5 percent of the year where wind and rainfall conditions promote dust generation.
Negligible impact	Receptor > 500 m of dust source; Receptor 200 m – 500 m from dust source; Downwind for <2 percent of the year where wind and rainfall conditions promote dust generation.

Referring to the baseline conditions in the average wind speed in the project area varies from 6-8 knots which if converted results from 3.1 - 4.1 m/s. For the PV solar site closest communities (houses) and receptors are located approximately 1 km in distance. The impact on the permanent PDA Access Road will be permanent and will be more significant during the preconstruction and construction phase, due to the number of materials and panels to be transported. During the preconstruction and construction phase will be a temporary road that will be used only for this phase, impact of this road will be temporary. The impact on OHL access roads will be temporary only during construction. This means that potential impacts from dust generation will be likely low to negligible impact prior to mitigation. The OHL route will be less than 1 km and will be replacing an existing OHL route so we assume that will not be necessary work for ground levelling, also this line has opened access road. So, from a total evaluation we assume that construction of OHL and PDA will not impact sensitive air receptors.

The other potential source of air pollution is that arising from exhaust emissions associated with road traffic, vehicular movement, and operation of machinery; the principal pollutants of concern are NO_x, PM₁₀ and PM_{2.5}. Exhaust emissions from vehicles and machinery will be fairly limited in quantity and duration, with overall negligible-minor impact significance, therefore not considered to contribute considerably to baseline levels. For static sources, potential impacts caused by diesel combustion engine emissions will vary in intensity according to the distance of potential receptors (human receptors) from the source.

The potential for impacts on air quality from traffic associated with construction of the proposed project will be felt in the inhabited areas/ villages adjacent to the principal means of access for construction traffic. Dust generation due to vehicle movements and exhaust air pollutant emissions may cause temporary disturbance to the local communities during the busiest periods of construction activity. The Developer predicts that an average of 7 trips of heavy vehicles per day will be occurring on untarred and paved roads around the project areas of the PV plant and OHL route. Higher levels of traffic are anticipated to occur between April-September, which most likely will be the peak months for construction activities. As a result, potential impacts are predicted on air quality due to increased traffic and disturbance effects on local communities.

Aspect					
Site clearance and preparation works, excavation and traffic movements					
Type	Duration	Extent	Frequency	Likelihood	Magnitude



Direct	Temporary (weeks)	Local	Daily	Possible	Medium – PV plant and OHL
Receptor					Sensitivity
Local residents in agricultural zone and along the Route of the OHL.					Medium - PV Plant and OHL
Overall Significance of Impact					
Moderate – PV Plant and OHL					

Management and Mitigation

Company should develop a Construction Traffic Management Plan (CTMP) and has incorporate all relevant mitigation measures for vehicle movement nearby and within the project areas (PV plant and OHL).

The most effective way to manage and prevent dust generation and vehicular emissions and traffic is through effective control of the potential sources; specific mitigation measures and management to ensure that these sources are minimized are listed below:

- Minimise open excavation areas;
- Minimise stockpiling of soil and earthen material through coordination of earthworks and excavation activities (excavation, grading, compacting, etc.);
- When there is visible dust being generated by vehicles and other activities, implement dust suppression techniques, such as applying water to dusty areas (e.g., site, access road, etc.) through water spraying tanks;
- Minimise vegetation clearance (when is possible) to reduce exposure of bare soil, and revegetate cleared areas as soon as possible;
- For stockpiles left for long periods, apply grass seed or other covers;
- All construction machinery and equipment to be maintained in good working order and not left running when not in use;
- Burning of any material anywhere on construction sites is banned;
- Restrict vehicle speeds on construction sites and all access roads to minimize potential generation of dust;
- Vehicles carrying aggregate material and workings will be sheeted at all times;
- If any complaints or grievances are received from local community, investigate complaint and take action to remediate or clean up impacted receptor and take measures to reduce dust generation.

Mitigation of impacts in relation to generation of dust and vehicle / machinery emissions will be managed through the development of the ESMP/CEMP and CTMP for the construction phase which will specify appropriate measures for the management of site clearance, excavation and construction activities, such as those listed above.

Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

Minor – PV Plant and OHL



8.2.1.2. Potential impacts during operation phase

Operation phase of the PV Solar Plant and transmission line does not pose any risks associated with emissions on air. No excavations are required post construction phase and traffic generation is minimal, limited to daily operation of the PV Plant, occasional visits to sections of the line to undertake inspection and maintenance activities. Impacts relating to dust generation and vehicle emissions are therefore not significant. Maintenance vehicles will be required to follow designed access routes. Overall impact significance for this phase is:

Negligible – PV Plant and OHL

8.2.1.3. Potential impacts during decommissioning phase

Decommissioning activities will give rise to dust generation, vehicle emissions and increased traffic for of a similar intensity and duration as during construction; as a result, impacts will be similar to those experienced during the construction phase (see section 8.2.1.1 above). Prior to mitigation impacts on air quality are rated to be of moderate significance. Management and mitigation measures will be similar to those during construction phase. Therefore, residual impact after management and mitigation measures is:

Minor – PV Plant and OHL

8.2.1.4. Cumulative impact

There will be cumulative impact as a result of construction activities and a minor impact can be during operational phase. It is expected cumulative impacts during construction phase due to the fact that the access road is used from some projects and utilities such as Semani PV Plant, Hoxhara substation, Hoxhara power station and TAP powerline to be connected with Hoxhara substation. However, the project traffic management plan has considered them and mitigate. So, we expect more traffic and a minor impact on air during all the phases associated with the transport and maintenance of PV element of the project.

It is recommended that the Project liaises with OST and TAP to understand the scheduling of the TAP 100kV line and finalization of Hoxhara substation and discuss a collaborative approach to minimise potential impacts and disturbance to local communities along the OHL route during construction.

Minor – PV Plant and OHL

8.2.2. Climate Change Resilience and Adaption

The adverse impacts on climate change from project are likely to occur during construction phase. For the operation phase the project will have a moderate positive impact on climate change referring to tons of CO₂ emissions avoided per year as Solar is a clean Energy.

Project itself is situated below sea level and near a flooded area. The impacts from Global Climate change to floods as described in section 4.1.8.4 can minorly influence the PDA area. Sea level change was analysed by Pirazzoli (1986) and showed that there is an increase of the Adriatic Sea level that ranges from less than 1 mm/year to over 2 mm/year, but it also indicates an increasing trend due to climate change.

Being areas in very low quotas in the project areas which discharge water through the Hoxhare Hydroplant, there is a possibility of flooding even when the hydro does not work or when it works with reduced capacities. This hydropower plant has a hydro module of about 5-6 litres / sec / ha, referring to the removal of water from agricultural lands, which according to the standard in force, the calculation of safety of drainage channels and drainage pumping stations (hydropower) is 20% (approximately 70-80 mm of rain is accepted for 24 hours).

Receptor Sensitivity

With regards to receptor sensitivity/ value, it can be estimated that the climate in the study area is of very low sensitivity. The following is taken into account:



- The area that will be cleared for the construction of the project components is covered 100% by Fallow Land in the PDA area and 94 % Fallow Land and 6 % canals and infrastructure in the OHL Area so the total area is without too much vegetation. Residential areas and infrastructures cover a small percentage of the study area.
- For the construction of PDA and OHL the clearance of vegetation at a total area of about 83.3 Ha is required.
- The majority of the wider area is covered by Fallow Land and natural vegetation in the area.
- The climate of the area is determined by several components, such as topography, morphology and position near the sea and so much lagoons.
- The area occupied by the project is a small percentage of the wider area.

Therefore, it was estimated that a smaller area has a greater tolerance to accommodate changes, as the climate is determined by the existing situation at a greater area.

The receptor sensitivity (in the level of the broad study area) was not estimated to be medium or high, as climate and climate change is determined by various other factors referring to a wider area and therefore climate and climate change cannot be considered of limited capacity to accommodate changes.

8.2.2.1. Potential impacts during construction phase

The following was taken into account, with regards to the impacts of the construction phase of the project on climate and climate change:

- Emissions from land use, largely agriculture, forestry and land clearing, make up some 22% of the world's greenhouse gas emissions.
- Land-based ecosystems absorb the equivalent of about 22% of global greenhouse gas emissions. This happens through natural processes that store carbon in soil and plants, in both farmed lands and managed forests as well as in natural "carbon sinks" such as forests, seagrass and wetlands.
- The climate impact of the actual construction processes - from material extraction to finished building or facility - is seldom taken into account. Studies show that the climate impact is significant, but more work must be done to improve knowledge and awareness. When constructing roads and building, the input of materials such as steel or cement and asphalt, and the management of excavated materials are the largest contributors to material-related greenhouse gas emissions.

The construction of the proposed PV, accompanying works (rehabilitation of existing access roads and transmission line) and rehabilitation works are not related to direct impacts on the climate of the study area. In overall, the construction works are not expected to cause significant negative impacts and changes in the climatic and bioclimatic characteristics of the study area.

During the construction phase, as a result of construction works (heavy machineries operation, vehicles and road traffic) negative impacts are related due to the release of air pollutants and dust generation (particulate matter). The primary contributors to air emissions and CO₂ would arise from mobile and/or stationary sources, such as on and off-road vehicles, diesel generation sets, use of heavy equipment, etc.

Construction activities can influence also water quality or modify flooding patterns and surface water flow over a certain period of time. The project may not avoid access road construction on wetlands/swamp. Construction activities could also cause an increase in suspended solids in wetlands and aquatic environments, which could result in siltation of feeding sites and breeding grounds of some species, particularly for fish species.

However, it can be anticipated that potential negative impacts will not be significant and will be reduced to a degree, with proper mitigation measures.

Impact Magnitude

The clearance of vegetation in the area of the project is associated with negative impacts, with regards to CO₂ emissions, as well as the reduction of greenhouse gas emissions absorbed through natural processes.



Taking into account the size of the area that will be cleared, the type of vegetation in area, and the limited extent to which vegetation is required to be cleared for constructing the project, the overall impact significance of the construction of the project on the climate of the area can be characterized as negligible.

Aspect					
Site clearance and preparation works, excavation and traffic movements					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary (weeks)	Local	Daily	Likely	Low - PV Plant Low - OHL
Receptor					Sensitivity
Local residents within OHL corridor. Project workers.					Low - PV Plant Medium - OHL
Overall Significance of Impact					
Negligible (climate changes) – PV Plant and OHL					

Management and Mitigation

Management and mitigation measures will be implemented during the construction phase of the project for the minimization of the impacts of the project related with dust emissions.

We recommend the use of modern, well-maintained and efficient machinery and vehicles meeting applicable emission performance standards during construction that would minimize emissions.

Good Environmental Practices will be recommended within the Construction Environmental Management Plan (CEMP). The use of best/international construction techniques and management and maintenance will help improve overall efficient use of resources and fuel.

Other specific mitigation measures include:

- A speed limit of 20 km/hr. will be enforced on the construction site/access road
- Regularly maintain all diesel-powered equipment and reduce idling time to avoid emissions and improve fuel efficiency
- Implement best practice procedures to control vehicle / equipment air emissions (such as turning off equipment when not in use)
- Vehicle / equipment exhausts observed to be emitting significant black smoke from their exhausts will be serviced/ replaced.

Residual Impacts

Taking into account the mitigation measures foreseen the residual impacts of the project on climate, during the construction phase can be characterized as **negligible**.

Negligible – PV Plant and OHL

8.2.2.2. Potential impact during Operation phase

The operation of the proposed project, accompanying works and rehabilitation works are not expected to have direct impact on the climate of the broad study area but will have impact on fugitive form and deforestation activities during line maintenance. The substation operation will emit through the use of ancillaries and hence the predicted impacts are minor.

So, we are expecting to have positive impact regarding reduced GHG compared to energy production from fossil hydrocarbons and negative impact from fugitive form and deforestation activities during line maintenance.

Positive impact on climate change

Photovoltaic (PV) technologies have shown remarkable progress recently in terms of increasing annual production capacity and life cycle environmental performance. Based on the production data of PV 2014-2016, hereinafter are calculated the life cycle greenhouse gas emissions, pollutant emission criteria and emissions from the multi-crystalline silicon PV. Life cycle emissions have been determined using average power coefficients in Europe.

Producing energy by burning fossil fuels releases many pollutants and carbon dioxide into the environment. Indeed, all anthropogenic ways of generating energy, including solar energy, generate pollutants when their entire life cycle is taken into account. Life cycle emissions are generated as a result of hydrocarbon-based energy use. Previous life cycle studies reported a wide range of primary energy consumption for the production of solar panels. Alsema⁵³ estimated greenhouse gas (GHG) emissions in the range of 39-110 g CO₂ - equivalent/kWh and EPBT from 3-6 years.

According to the international literature, it is generally accepted that PV generation is involved in low CO₂ power generation methods, taking into account emissions related to the construction, maintenance and demolition of substations. Among the available bibliographic data, the amount of carbon produced during the life cycle, for different energy production methods varies, depending on individual evaluations and the uses of different technologies.

The following figure shows the production (in the life cycle) of an equivalent amount of CO₂ per KWh generated for different energy production methods.

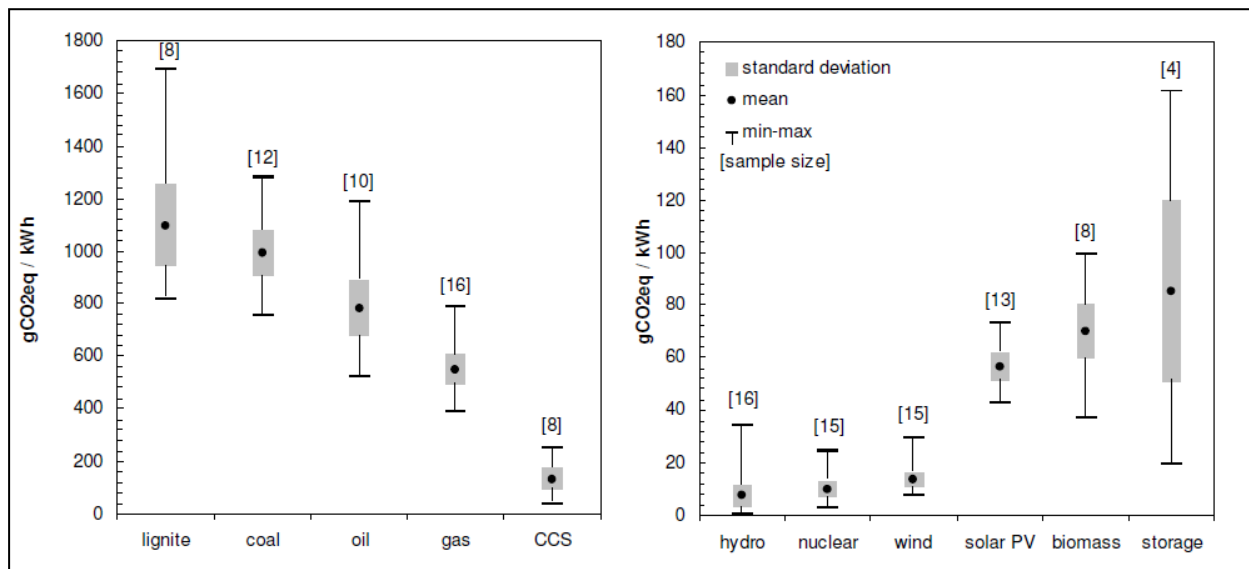


Figure 60 Production (in the life cycle) of an equivalent amount of CO₂ per KWh generated for different energy production methods⁵⁴.

⁵³ <https://onlinelibrary.wiley.com/doi/full/10.1111/j.1530-9290.2011.00439.x>

⁵⁴ Daniel Weisser, A guideline to life cycle (GHG) greenhouse gas emissions from PESS/IAEA power supply technologies, Wagramer Strasse 5, 1400, Vienna, Austria



The figure above summarizes the results of various life cycle studies for photovoltaic systems, which range between 43-73 gCO₂eq / kWh. There are typically evaluated the following four systems: monocrystalline, polycrystalline, amorphous, and CIGS (Copper Indium Gallium Diselenide). In contrast to fossil fuel systems, most GHG emissions occur in the first part of the life cycle with most emissions releasing during panel production (approximately 50-80%). Other important GHG emissions in the initial stages have to do with the PV station construction and the inverter. Operation, end-of-life cycle and transport activities do not result in significant cumulative GHG emissions. Out of the four systems, the single-crystal PV can, on average, emit GHGs ranging between 43-62 gCO₂eq/kWh. Other PV systems can emit between 50-73 gCO₂eq/kWh throughout the GHG life cycle. The result changes can be for a range of factors, such as the silicon amount and degree, the panel life cycle and efficiency, as well as the radiation conditions. Distinctions regarding installation such as integrated and non-integrated systems, as well as facades, flat roofs and solar roof tiles, or the peripherals efficiency, such as the balance of system (BOS), also significantly affect the life cycle emissions in the case studies presented. It is also important to note that the studies summarized in this document are based on different assumptions of solar radiation (due to different geographies), orientation and angle of the solar panel. Future improvements regarding to cumulative GHG emissions from PV are likely to result from improvements in panel efficiency, increased longevity, less silicon per panel mass, and lower power use for the production process. In this regard, it may be important to note that solar PV technology is a relatively improved technology and new LCA studies are often published in order to keep pace with the progress (this applied to other RETs, such as wind turbines).

The above figure shows the very high equivalent values of CO₂ production accompanied by conventional hydrocarbon combustion plants (400-1800 gCO₂eq/KWh). In contrast, PV generation is characterized by facilities with very low CO₂ equivalent emission (40 gCO₂eq/KWh). These assessments approve the major contribution of PV GHG generation reduction projects to reduce the phenomena of climate change from fossil fuel combustion.

The project under review is estimated to provide the network with a total of about 129,000,000 KWh/year. It is expected that GHG emissions in a year will be as follows: 40 gCO₂eq / KWh* 129,000,000KWh/year= 5,160,000,000gCO₂eq/year= 5160 TCO₂eq/year.

The calculated emission rate is within the norms of air emissions, Albanian and international norms.

If it is considered that this energy would have been produced by a thermal power plant, the amount of CO₂ eq emitted would be on average (1000 gCO₂eq/KWh* 129,000,000 KWh/year=129,000 Ton CO₂eq/year.

In order to estimate the avoided CO₂ emissions associated with the operation of the project the document "Methodologies for the Assessment of Project GHG Emissions and Emission Variations" (European Investment Bank, 2014) was taken into account. The coefficients presented in the table that follows, are derived from the above-mentioned document.

Table 50 Purchased Electricity: Country Grid Emissions Factors (IEA CO₂ Statistics 2009).

Country	Country Grid Factor	High Voltage Grid +2%	Medium Voltage Grid +4%	Low Voltage Grid +7%	Operating Margin
Albania	3	3	3	3	0

In the above table, five different values are presented, for national country electricity grids with all figures expressed in grams CO₂ per kilowatt hour (g CO₂ / kWh). The figures are net production data based on IEA national gross electricity and heat production statistics⁵⁵. A preliminary estimation of avoided g CO₂/year for the operation of the project is presented in the table that follows.

Table 51 Avoided g CO₂/year for the operation of the project

⁵⁵ "Methodologies for the Assessment of Project GHG Emissions and Emission Variations" (European Investment Bank, 2014)



Criteria	Blue PV
Energy Production GWh/year	129 GWh
Avoided ton CO ₂ /year	75

In conclusion, the operation of the project is associated with the avoidance of production of significant amounts of CO₂ per operation year. Therefore, the climate change impact during the operational stage is considered to be minor, assuming that the maintenance shall be conducted appropriately.

Considering the positive impact that this type of energy production reduces CO₂ carbon equivalent the general impact on Climate change can be considerate minor to moderate positive one.

Table 52. Estimation of project magnitude of impacts on climate change during the operation phase

Aspect					
Green gases emission					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary (weeks)	Regional	Long	Possible	Moderate
Receptor					Sensitivity
Local residents in agricultural zone and along the Route of the OHL.					Low - PV Plant Low - OHL
Overall Significance of Impact					
Minor to Moderate Positive – PV Plant and OHL					

The significance of the operation of the project on climate change can be characterized as moderate (positive), taking into account the projections referring to the territory of Albania. This does not concern only the broad study area but also Albania and the global level.

Residual impacts

Taking into account the mitigation measures the residual impacts of the project on climate, during the operation phase can be characterized as **positive**.

Minor to Moderate Positive – PV Plant and OHL

8.2.2.3. Potential impacts during decommissioning phase

There will be no direct Climate change impact as a result of decommissioning phase activities. Treatment of PV modules and transformers are taken in consideration in the paragraph above:

Negligible – PV Plant and OHL

8.2.3. Potential impacts from Climate Change Adoption during Operation phase

Solar Power plant Solar photovoltaics (PV) plays an essential role in decarbonizing the energy system due to the fact that energy produced by them has a low GHG emission. However, PV outputs are also affected by air temperature, with cooler conditions generally improving PV cell performance and hotter conditions



reducing it, and by surface wind speed because air flow typically cools the PV module. All these parameters (clouds, aerosols, temperature, and wind) are changing with climate.

Solar photovoltaic panels have an operating lifetime of 20 or more years and photovoltaic systems are vulnerable to hail, wind, and extreme temperatures (Patt et al. 2010). Blue 1 project is vulnerable only to extreme temperatures and wind.

Solar cell output is usually rated at 25°C with output typically decreasing by about 0.25% (amorphous cells) to 0.5% (most crystalline cells) for each temperature rise of 1°C. Cell temperatures for roof-mounted arrays in warm climates can easily reach 50°C–75°C. At 50°C, output can be 12% below rated output (Solar Facts, undated).⁵⁶ Studies consistently show that the inverter, which converts direct current power output into alternating current (DC to AC), is the most unreliable component of a photovoltaic system, accounting for up to 69% of unscheduled maintenance costs (Patt et al. 2010). However, Blue 1 Solar Power Plant is not usually directly exposed to the weather and are not especially vulnerable to climate change. During cloud cover, solar photovoltaic panel output can decrease by 40%–80% within a few seconds, increasing just as dramatically when the sky clears (Kleissl 2010). Another climate impact is exposure to higher wind speeds that can increase dust particle deposits, which decrease solar photovoltaic cell output (Goossens and Van Kerschaever 1999), but higher winds can also cool the modules, increasing efficiency and output. In arid regions, higher wind speeds can also result in panel damage from increased abrasion.

Adaptation Measures for Solar Photovoltaic Systems

The main climate impacts on photovoltaic systems are likely to be due to temperature increases, increased cloud cover, and extreme events. Adaptation measures (Michaelowa et al. 2010, Patt et al. 2010) include the following:

- Assure structures are strong enough to withstand higher winds (although roof-mounted structures cannot be more robust than the building on which they are located).
- Use designs that improve passive airflow beneath photovoltaic mounting structures, reducing panel temperature and increasing power output.
- For locations where temperature increases or significant heat waves are expected, choose modules with more heat-resistant photovoltaic cells and module materials designed to withstand short peaks of very high temperature.
- Consider distributed systems (rather than feeding power into a single part of the grid), which can improve grid stability (although mobile repair teams may be needed to repair damage from extreme events).
- Where possible, site solar photovoltaic systems where expected changes in cloud cover are relatively low, although this is difficult to accurately predict.
- Where snowfalls are heavy or likely to increase, assure free space so that snow can slide off the panel.
- Where solar energy is likely to become more diffuse with changes in cloud cover, rough surfaced photovoltaic modules are more efficient and output can be improved under overcast conditions by selecting an appropriate tilt angle.
- Where clouds are likely to pass over modules more quickly, consider micro-inverters for each panel (in place of small numbers of large centralized inverters) to improve stability and increase power output.

⁵⁶ The energy output of 15 monocrystalline home solar systems in Sydney, Australia, where array temperatures can reach 30°C–40°C above ambient, decreased by 6% when ambient temperature rose from 25°C to 36°C (Watt et al. 2004).

However, some modules are reported to exhibit outstanding performance even under extremely high ambient temperatures (Protogeropoulos et al. 2010).



However, in total the area is not expected to have higher temperatures and extreme weather events so the impact from climate change adaptation is negligible.

Negligible – PV Plant and OHL

8.2.3.1. Cumulative impact

There will be minor positive cumulative impact as a result of operation activities due to the fact that the area will produce low GHG energy.

Minor Positive to negligible – PV Plant and OHL

8.2.4. Noise Impacts

Noise-generating equipment shall comply with the applicable EU noise standards relating to these equipment as described in EU Directive no. 2000/14/EC of the European Parliament and of the Council of 8 May 2000 on the approximation of the laws of the Member States relating to the noise emission in the environment by equipment for use outdoors. All noise-generating equipment will be properly maintained to minimize the impact of noise in the area, while in sensitive areas, noise protection measures may be applied.

This section assesses the potential impacts from noise and vibration generation as a result of the Project activities. Noise and vibration emissions are likely to occur during construction and preparatory phase, operation and decommissioning phases. Potential receptors in the study area consist mainly of the residential population living near the proposed site of the PV Solar plant and Overhead Transmission Line (OHL) route. Fauna species may be also disturbed due to noise and vibration emissions.

The noise caused construction activity can be severe for a short period of time. Noise levels caused by construction activities can vary considerably, depending on the construction phase and the specific tasks performed. The noise generated during the construction phase is mainly caused by the following:

- The use of construction machinery/vehicles; Noise and vibration emissions due to earthworks for the PV solar plant, OHL and any potential rehabilitation of access roads in the area nearby;
- The movement of heavy vehicles from/to construction sites; Noise and vibration emissions from vehicle movement, transportation activities and working machineries involved in Project construction (i.e., excavators, bulldozers, trucks, roller, etc.);
- Increased traffic causes noise and vibration impacts. Project related traffic is limited to daytime, therefore impacts from light pollution are minimal;
- Erection of towers and conductors for the OHL;
- Noise emissions from the use of equipment during work activities (e.g., generators).

Machinery and vehicles used in construction works are considered to be the main source of noise. The impact from the additional noise generated due to movement of heavy vehicles movement on the area road network is in most cases at a medium level to the insignificant one. The noise generated by workers' vehicles is almost always insignificant.

Noise during construction can mainly affect sensitive ecosystem areas which are close to "Blue 1" Photovoltaic Park Project in Topoja and settlements located near the project site and along roads.

During the operational phase of the project under study, the noise level will increase from the current one by:

- The noise generated by inverters, transformers and substation.

The Noise Level Guidelines (IFC, WHO) refer to noise originating from facilities as well as stationary noise sources, and are commonly applied as design standards for industrial and infrastructure facilities. The

Albanian Government also provides similar guidelines⁵⁷ and standards to ensure industrial activities are compatible with a clean and safe environment.

Table 53. IFC Noise Level Guidelines

Type of Receptor	IFC Standards ⁵⁸		National Standards		
	Daytime 07:00 – 22:00 1-hr LAeq (dBA)	Night-time 22:00 – 07:00 1-hr LAeq (dBA)	Critical 24-hours LAeq (dBA)	Critical 1-h LAeq (dBA)	Serious nuisance 16-h LAeq (dBA)
Residential institutional or educational	55	45	-	-	55
Industrial or commercial	70	70	70	-	-
Urban environment	-	-	-	85	-

In line with the approach of the IFC, if changes in background noise as a result of noise emissions from the plant are no greater than 3 dBA then noise impacts are not deemed to be significant.

Based on the best practice the following criteria have been used for the assessment/rating of constructional and operational noise impacts. The impact assessment methodology for residential receptors is done based on the following table:

Table 54. Impact Assessment Methodology for Residential Receptors

	Major	Moderate	Minor	Negligible	Not Significant
Construction and Decommissioning Noise	Noise level >15 dBA above criteria.	Noise level between 10 to 15 dBA above criteria.	Noise level up to 10 dBA above criteria.	Noise level up to 5 dBA above criteria.	Noise level below criteria.
Operational Noise	Noise level between >10 dBA above criteria.	Noise level between 5 to 10 dBA above criteria.	Noise level between 3 and 5 dBA above criteria and above baseline.	Noise level below criteria but above baseline < 3 dBA.	Noise level > 10 dBA below criteria and below baseline.

Note: Criteria for construction is 70 dBA; criteria for house receptors are 55 dBA (daytime); daytime is 07:00 to 22:00; night time is 22:00: 07:00.

These operational noise criteria showed in Table 54 above have been used on numerous international development projects and although they do not have a specific legal basis, they are considered as best practice with respect to significance impact rating of noise. Construction sites, however, have special characteristics compared with other major noise generators. Construction is generally undertaken in the open, is usually of a temporary duration, and varying levels of noise are produced by several different types

⁵⁷ Ministerial Guideline No. 8, dated 27.11.2007 “On the noise limit levels in certain environments”.

⁵⁸ <https://www.ifc.org/wps/wcm/connect/4a4db1c5-ee97-43ba-99dd-8b120b22ea32/1-7%2BNoise.pdf?MOD=AJPERES&CVID=Is4XYBw>



of noise sources. Noise levels created by construction machineries and equipment can vary greatly and depend on factors such as type of equipment, the specific model, the operation being performed, duration of the activity, and the condition of the equipment. There are no standardized criteria for assessing construction noise and associated impacts, and consequently such criteria must be determined on a project specific basis. The Project construction noise criteria should take into account the existing noise environment, the absolute noise levels during construction activities, and the receptor land use. The following reviews of recognised construction noise guidelines provide guidance to develop suitable construction noise criteria. For construction, noise criteria of 70 dB LAeq, 1-hr are set to take account of the fact that it is temporary, and to acknowledge that construction work by its very nature is noisy and a lower, strictly enforced criteria, can limit development.

8.2.4.1. Potential impacts during construction phase

Noise and vibration during construction phase may arise from different work activities. Typically, this includes construction activities, the preparation of footings for the PV solar plant and OHL, installation of the necessary structures, backfilling and reinstatement, movements of vehicles, equipment and personnel, etc. Moreover, potential daily construction hours may include 07:00 – 18:00, Monday to Friday. The construction of the Project is planned to commence with Plant Site early works in Quarter 3 of 2022, and be in full operations in second half of 2023. The expected duration of the PV construction period consists of 2 months early works, and 11 months construction. The final construction schedule will be specified during the detailed design phase.

Based on the available project information and typology of the project area, there are no anticipated blasting activities that will occur; therefore, no emissions of noise and vibration will be happening from blasting.

Mechanical equipment which is planned to be involved in the construction of the proposed PV solar plant and OHL includes, but is not limited to: track loader, excavator, hydraulic hammer and breaker, roller, mobile crane, air compressor, dump trucks, generators, concrete pump, etc. The level of noise from these items during construction is likely to change based on the use of industry standard and maintenance of equipment/ machineries. For the PV solar plant site there are no anticipated impacts from noise and vibration generation. The site is located in major distance from inhabited areas, approximately 345 m from the closest house. The impact on the PDA Acces Road will be permanent and will be more significant during the preconstruction and construction phase, due to the number of materials and panels to be transported. The impact on OHL access roads will be temporary only during construction. Please see more sensitive areas in the project zone the ones that cross with urban areas refer to the map shown Figure 61.

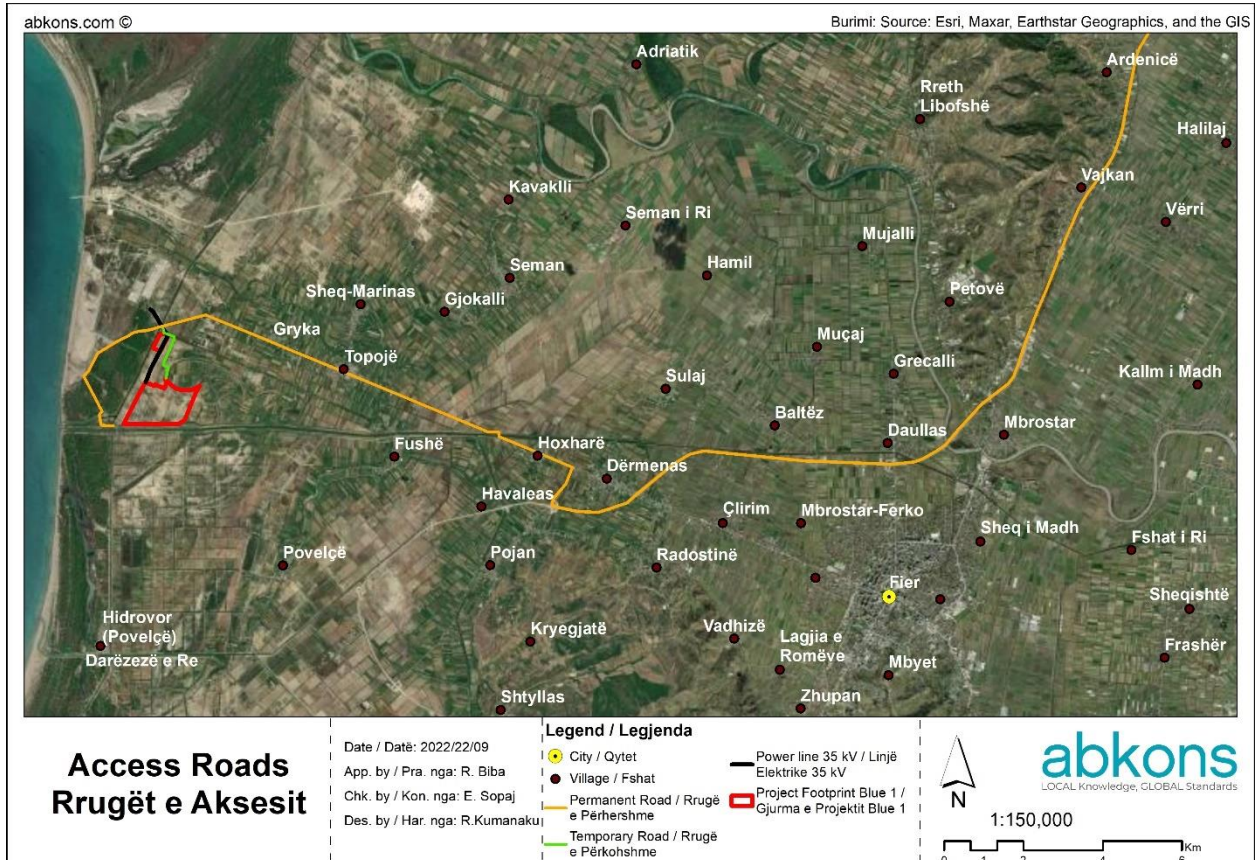


Figure 61 Access Roads

The main sources of construction noise and vibrations will be restricted to the OHL route, in particular for the installation of towers that are located in close range with human receptors (houses). As a consequence, some intermittent noise and vibration impacts are likely to be experienced by local residents, users of roads and rights of way in the vicinity of the construction locations of the electric towers and local farm workers, for a period of a few weeks, as each tower and associated infrastructure are installed. As construction will be limited to daytime hours during weekdays, there will be no noise disturbance during night-time or at weekends. On the other side, vibration emissions will be generated during the earth compaction after backfilling of the site around towers. Most probably will be used small hand roller compactors (hand-arm vibration), therefore vibration impacts will not be experienced at these locations and there will be no associated risks for houses nearby.

Project workers will be exposed to noise from construction machinery as well as, potentially, hand-arm vibration from hand-held power tools, or whole-body vibrations from surfaces on which the worker stands or sits. Occupational Noise and Vibration will be managed through the development of a construction Occupational Health and Safety Management Plan (OHSMP), which will ensure compliance of the Project with national and international standards/ guidelines (e.g., IFC General EHS Guideline) in relation to OHS noise and vibration.

Other potential noise emissions may arise from vehicle movements in the project area. The roads to be used during construction period pass in vicinity of inhabited areas, these increased traffic causes noise and vibration impacts. Project related traffic is limited to daytime, therefore impacts from noise and vibration are considered minimal; The impacts are characterized as short-term (6 months) since they will last until the end of the construction period and local (up to 1 km). During the initial stage of project mobilization there will be increased level of traffic while equipment and materials are transported to the main site of the PV solar. Vehicle movement will continue during the whole duration of the project, nevertheless it is expected that the movement will vary according to the planned works; sometimes it will decrease and other times it will increase. Noise and vibration emissions from vehicle movement are predicted to be less significant than other types of noise and vibration generation sources and short-term.



Aspect					
Construction activities, equipment and machinery and traffic					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary (weeks)	Local	Daily	Likely	Medium - PV Plant and OHL
Receptor					Sensitivity
Local residents within nearby the PV plant and OHL corridor. Project workers.					Medium - PV Plant and OHL
Overall Significance of Impact					
Moderate (noise and vibration) – PV Plant and OHL					

Management and Mitigation

Equipment maintenance, and noise/ vibration emissions and monitoring during construction will be managed through the development of a robust Construction Environmental Management Plan (CEMP) and CTMP. The mitigation measures for noise impacts will include the following:

- Development of the OHSMP for protection of workers and equipment with adequate PPE;
- Development of the CTMP (see mitigation measures propose for traffic management);
- Temporary acoustic screening if required;
- Avoid simultaneous work activities that generate high levels of noise/ vibration emissions;
- Prior notification of local residents in case of important work activities that generate noise and/or vibrations;
- Restriction of construction activities to daytime hours and weekdays.

Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

Minor (noise and vibration) – PV plant and OHL

8.2.4.2. Potential impacts during operation phase

During the Project's operational phase there will be no work activities besides any maintenance needed for the PV solar plant and transmission line. Maintenance works are however predicted to be minor and short-term, therefore there are almost no impacts associated with noise and vibration emissions.

It can be also anticipated that no impacts will be occurring due to the Corona effect that is usually associated with overhead transmission lines and noise emissions. Corona is a typical phenomenon associated with all transmission lines as they can generate small amounts of sound energy under certain weather conditions such as fog, high humidity, rain or snow. This adverse effect becomes more noticeable at higher voltages⁵⁹ above 345 kV where under these conditions, a crackling or humming sound may be heard in the immediate vicinity of the OHL route. Since the proposed OHL of the project will be 110 kV it can be concluded that there will be no impacts or noise emissions due to Corona effect. Overall impact significance for this phase is:

⁵⁹ <https://www.velco.com/library/document/download-migrated/Transmission%20Line%20Corona.pdf>



Negligible (noise and vibration) – PV Plant and OHL

8.2.4.3. Potential impacts during decommissioning phase

Decommissioning activities will generate noise and vibration emissions of a similar intensity and duration as during construction phase. As a result, impacts will be similar to those experienced during the construction phase (see section 8.2.4.1 above). Management and mitigation measures are similar to those during construction phase. Therefore, residual impact after management and mitigation measures is:

Minor (noise and vibration) – PV Plant and OHL

8.2.4.4. Cumulative impact

There will be a short-term cumulative impact as result of same time construction activities in the area. It is evaluated that momentary in the area is going to be constructed Hoxhara Station, OST 100kV line and TAP connecting line with Hoxhara Station. It is recommend that all this projects that are going to be constructed in the same time to have collaborate in Traffic Management. During the operational phase we expect to don't have noise cumulative impact.

Negligible (noise and vibration) – PV Plant and OHL

8.2.5. Landscape Impact

The sensitivity of visual receptors depends on the local situation. The potential landscape receptors in the region include locals, travellers and tourists. Being a very sensitive area, there is a need for a design that protects as much as possible the existing landscape⁶⁰. During the construction phase, the landscape along the project area will eventually be transformed into a landscape of a construction area.

The construction activities will be the following:

- movement of heavy vehicles for the transport of raw materials;
- movement and use of heavy work vehicles such as excavators, cranes, etc.;
- loading and unloading of materials to be used as raw material.

In addition, the visual environment created during the construction period will be temporary, with a short-term duration and limited only to the construction phase. Regarding the construction duration, the visual impacts will have a negative effect as well as will be visible within the Project area.

During the operational phase of the Photovoltaic Park, the impact on the landscape of the area shall be partially visible. The entire project will be fences in a suitable way for the safety of residents and fauna species in the surrounding areas. Where possible, there will be suitable planting, so the project will improve the landscape, compared to what it has been so far. However, considering the area with all its components such as road traffic, material used, the construction method, etc., the impact of the project on the landscape of the area is expected to be significant.

8.2.5.1. Potential impacts during construction phase

Landscape effects include direct and indirect effects on the landscape as well as effects on the general landscape character. During the pre-construction phase, in the project area will be performed the vegetation clearance process for the placement of working machineries, equipment and other associated facilities needed for the PV construction. This will undoubtedly change the landscape view in general, but considering the low value of vegetation cover in the area, the significance of potential impacts during this stage is considered to be very low.

⁶⁰ Referring to land cover



During the pre-construction phase of the OHL, the vegetation has to be cleaned out in the areas designated for the construction of the electric pylons. This will undoubtedly change the landscape visual, especially in the forest areas, where the vegetation has to be followed also by a cut-off of the trees in the RoW.

During construction works for opening of trenches, earth works, foundations and installations, the impacts on landscape are anticipated to be more visible. The use of pesticide for the management of alien invasive species will be under strict control and on as necessary. No agents identified as being prohibited will be used and wherever possible mechanical means will be the preferred method. Only in case vegetation control is necessary will be considered use of organic fertilizers. A lot of staff personnel will be involved and several work activities will be performed simultaneously at this stage. Although, it shall be emphasized that there is absence of human receptors in surrounding of the area, potential impacts may arise due to the presence of passers-by and potential visitors. In this context, the sensitivity of receptors is considered to be low-moderate and the magnitude is considered to be medium.

The following project actions will generate impact factors on the landscape and visual quality component during the construction phase:

- Vegetation clearance;
- Construction/improvement of internal and external access roads;
- Levelling off the ground;
- Pile driving for mounting structure;
- Construction of electrical substation and foundations;
- Marking out of foundation, earth works and excavations;
- Installation of foundations and grounding devices;
- Assembly, installation, alignment and fixing of pylons;
- Construction of deposit areas;
- Environmental reinstatement of the construction areas.

The potential impacts on landscape and visual quality deriving from the above actions are associated with the following impact factors:

- Landscape features alteration;
- Presence of new buildings/infrastructures.

Aspect					
Visual impact and landscape - landscape visual and landscape character					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short-term	Local	Permanent	Likely	Medium - PV Plant and OHL
Receptor					Sensitivity
Local Communities, Visitors, Tourists					Low to Medium - PV Plant and OHL
Overall Significance of Impact					



Minor to Moderate – PV Plant and OHL

Management and mitigation measures

Mitigation measures for overhead line developments are relatively limited and it is recognized that there is limited potential to relocate the infrastructure or screen these structures. However, there is potential to include integrated mitigation measures that would protect, and potentially enhance, the landscape features and character, and also maximize the screening capability of the landscape, thereby minimizing visual impacts. In relation to landscape and visual impacts, objectives of mitigation measures for the proposals during construction shall include, but are not be limited to:

- Sensible vegetation clearance to ensure only limited vegetation is cleared to facilitate construction access and operations;
- Where construction access is required in the vicinity of existing vegetation, suitable protection to existing tree canopies and root zones should be provided with protective fencing and ground protection surfacing, which should be removed immediately upon completion of construction works;

The PV plant, as previously explained, is located in a plain area with very low height from the sea level, and some areas are located even below the sea level. During construction, the following mitigation measures should be included:

- Limit and phase vegetation clearance and the footprint of construction activities to what is absolutely essential;
- Use of existing access roads as far as possible;
- Avoid excavation, handling and transport of materials which may generate dust under very windy conditions;
- Consolidate the footprint of the construction base camp to a functional minimum. Screen the yard with materials that blend into the surrounding area;
- Keep construction sites tidy and all activities, material and machinery contained within an area that is as small as possible;
- Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily waiting until completion of the construction phase;

Residual Impacts

Considering the application of the abovementioned mitigation measures, the impact on the infrastructures and utilities component is depicted in the following table and it is expected to be negative and minor both for the PV and OHL area.

Minor – PV Plant and OHL

8.2.5.2. Potential impacts during operation phase

Visual impacts will result from operations throughout construction phases, including construction operations and traffic movements, facility installation and operational phases. The prominence of the development proposals will be dependent upon a combination of land use, land cover and topographic factors relative to the position of the visual receptor and their sensitivity.

The sensitivity of visual receptors is an important issue in the assessment of the significance of an impact. This sensitivity is based on the type of receptor, as well as the special nature of the view. For example, residential properties are considered to have a high sensitivity.



The project site is located on plain terrain with slight undulation. There will be a significant change to the visual quality of the area resulting from development or change in land use that will alter the landscape. Changes in the visual landscape will range from the construction phase to the commissioning of the PV Modules and associated structures and further during operations. Blue 1 solar power Project is not the first and only solar power Project in the vicinity of the project area and the new development will have an impact on the surrounding area. The project area is primarily a rural area with agriculture as a primary activity. Although the PV modules, inverter, Transformers, and associated components would be manufactured off-site and the construction phase would be relatively short-term in duration (less than 10 months), it would still require a large number of equipment or infrastructure such as ground-mounted structures, PV Modules, Transformers, Inverter, Transmission line towers themselves when being erected as well as cranes, dumpers, transportation vehicles on site. Additionally, the presence of bare soil along the access roads would increase the potential visual impact. The significance of the visual impacts will reduce at increasing distance from the development.

In the Project area actually, there are other pylons and OHL, further more Blue 1 project OHL will replace an existing TAP OHL line, demolished recently so the impact will be minor from the OHL.

The line of electric towers would introduce additional modern and dominant elements to the landscape which would both dwarf the existing poles and contrast with the character of the rural landscape. Therefore, they would become the dominant feature and a key characteristic of the landscape within the local area. The impact of the sensitivity in this phase it is deemed to be moderate, while the magnitude is low, with an overall impact significance is assessed to be **Minor negative**.

The PV Plant area is located at sea level and the human receptors are located at nearly 1 km at the village of Grykë, although there are some single receptors in the proximity of the PV plant. The plant is situated in an area not visible by the main roads crossing the area. The sunlight reflection of the panels can be seen from long distance if the receptor is located in hilly areas.

There are some types of visibility factors that affect perception of large objects in the landscape like the view shed limiting factors, viewer characteristics, lighting factors, atmospheric conditions, distance and the objects visual characteristics. In real landscapes, interactions between these visibility factors are extremely important in determining the actual visibility of an object such as a solar facility (Benson 2005; BLM 2013a). For example, distance interacts strongly with atmospheric conditions as a determinant of visibility; a distant facility that is visible on clear days may be completely invisible on hazy days or appear greyer and less distinct. Some of these factors are highly variable and the effects may change due to even the slightest changes in one of the contributing factors, like for example as the viewer moves over or the angle of the sun changes over a few minutes.

The impact of the sensitivity in this phase it is deemed to be moderate, while the magnitude is low, with an overall impact significance is assessed to be **Minor negative**.

Aspect					
Visual impact and landscape - landscape visual and landscape character					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long-term	Local	Permanent	Likely	Low - PV Plant and OHL
Receptor					Sensitivity
Local Communities, Visitors, Tourists					Moderate - PV Plant and OHL
Overall Significance of Impact					

**Minor Negative – PV Plant and OHL****Management and mitigation measures**

In relation to landscape and visual impacts for the OHL, objectives of mitigation measures for the proposals during operation phase shall include, but are not be limited to:

- The application of a programme of advanced mitigation planting as well should be provided. Proposed replacement planting to replace areas removed during construction and decommissioning phases to facilitate machine access should also be included, all planting should comprise native plant species to reflect the local landscape character;
- All mitigation and replacement planting should be suitably protected, maintained and monitored during medium term establishment for a minimum of 5 years upon completion of the proposed development.

For what concerns the PV plant the following mitigation measures shall be included:

- Use consistent colour treatments: wherever possible, use uniform (and well-chosen) colour treatments on all structures and surfaces, which blends well with the surrounding landscape.
- Minimize vegetation clearing outside of the arrays: vegetation removal causes strong colour and texture contrasts by exposing light-coloured soils that lack the visual texture that vegetation provides.
- Carefully choose the exposed metal support structures or reflective surfaces in order to not reflect the sun. These elements might be coated or treated or replaced by materials that are less reflective.
- Plant vegetation outside the plant in strategic points that might be visible from the roads crossing the area so the PV remains not visible passing by.

Residual Impacts

Considering the application of the abovementioned mitigation measures, the impact on the infrastructures and utilities component is depicted in the following table and it is expected to be **negative** and **minor** for the PV and negative and minor for the OHL area.

Minor – PV Plant and OHL**8.2.5.3. Potential impacts during decommissioning phase**

Upon decommissioning the impacts will have a proportionally inverse impact that had in Pre-construction, given the nature of the Project. The area will return to its previous and natural conditions with the vegetation and trees populating again the mountainous areas and field visual free of these dominant elements. This impact is deemed to have a proportional negative impact, so it is assessed to be **minor negative after mitigation measures**.

Minor – PV Plant and OHL**8.2.5.4. Cumulative Impacts**

In the same area OST, TAP and Pumping Station is working on construction and reconstruction this will influence for sure the landscape during the short-term construction phase if they occur simultaneously. The impact on the visual amenities in all the permanent access road segment during construction (if occurring in the same time) and operational phases will increase to Minor Negative for the OHL and PV Plant.

Minor – PV Plant and OHL



8.2.6. Impacts on Geology and Soil

During the construction phase there will be no noticeable impacts in terms of geological and hydro-geological changes. Works that will be carried out in the Photovoltaic Park in Topoja will be insignificant ones that will be carried out mainly above the ground. The project does not involve the significant canal digging on hilly or mountainous terrain or the tunnel digging. The works to be carried out will be mainly above the ground and will affect the upper layer of non-irrigated arable land.

There will be no possible changes in the silt patterns as a result of construction activities. Construction works will not destabilize the soils which can most likely lead to soil erosion during heavy rainfall and sedimentation in the drainage canals and irrigation canals of the area. They will affect the water quality reduction due to sediment increase in the drainage canals. Other related impacts may include accidental events (spills, leaks and uncontrolled discharges) due to the presence of various materials in the site, including fuel. Furthermore, the storage and treatment of hazardous and non-hazardous waste within the site may pose risks for potential soil pollution, especially in cases of inappropriate waste management practices. In such event, the efficient area drainage and management will be solution to reduce potential impacts. Rain water and sewage will be collected through a drainage network. The contractor must ensure that there is no oil spill from their vehicles and machinery. In the event of accidental spills, the contractor must take all emergency measures to properly clear the accident location and the waste must be properly disposed of and transported to designated locations. In any case, specific measures must be taken in order to ensure unexpected pollution during construction. These measures shall be introduced in the next chapter of the study.

Impacts are predicted to be less significant during the operational phase. The Project Area will not be changed as a destination of use. Furthermore, the storage and treatment of non-hazardous waste within the site may pose risks for potential soil pollution, especially in cases of inappropriate waste management practices.

The Project activities that may pose impacts on geology and soils include clearance of the vegetation cover, topsoil removal, earthworks (excavation of soil), the storage and use of fuels, maintenance of equipment and waste generation.

In terms of potential impacts, flat terrains have high stability and thus are typically less sensitive to erosion, compaction and pollution, where any likely impact can be localized and controlled. The most likely adverse impacts on geology and soil in the project area may include:

- Degradation of soil quality due to excavation activities, improper disposal of spoil material, nutrient decline of soil quality and higher compaction, etc.;
- Degradation of soil quality due to potential contamination of soils and waters through such activities as effluent disposal (i.e., wastewaters), or through such processes as spillages and improper management of wastes;
- Soil erosion, especially in the absence of vegetation;
- Modification of hydrological regime impacting the processes such as flooding and waterlogging;
- Soil mass movement that could cause small landslides and blockages of the irrigation and drainage channels.

Typical receptors in this case are soil, agriculture land and vegetation.

8.2.6.1. Potential impacts during construction phase

The construction of the PV solar plant and OHL will include earthworks and site clearance, which will result in the removal of the vegetation and topsoil present in the project area, approximately 87 ha for the PV solar plant (permanent land) and transmission line (temporary land excluding electric towers). Mostly changes will occur at the PV site, on the contrary low changes in relief are expected during the construction of the OHL. Impacts to soil are most likely to occur at the PV site and locations of transmission towers installation and due to preparation works along the OHL corridor, as the soil structure may be disturbed during the clearance and excavation for the foundations and the backfilling. In addition, the construction of



temporary access roads to the PV plant site and places of towers installation, assembling and erection will require earth works that may also impact on geological structures.

Typically, the excavation process and removal of the topsoil and vegetation could result in alterations to the drainage and surface run-off regime on-site, particularly during the wet season (January-April). The volume to be excavated for OHL piles is estimated at $8 \times 2 \text{ m}^3 = 16 \text{ m}^3$. No new access road will be needed, company will improve the permanent existing one that is used also to axes the Pumping station.

Other related impacts may include accidental events (spills, leaks and uncontrolled releases) due to the presence of hazardous materials on site, including fuel. In addition, storage and handling of hazardous and non-hazardous wastes within the site may pose risks for possible contamination of soil, especially in cases of improper waste management practices.

Based on the above-mentioned discussions, impacts on soil are considered negative and both direct and indirect. However, the changes on soil will be temporary, only during the construction phase and the scale of the impacts will be at a local level. The magnitude of the impacts and the sensitivity of receptors is different for the PV solar plant site and OHL route. The overall impacts significance prior to mitigation is showed in table below.

Aspect					
Construction activities, excavations, use and storage of fuels and chemicals, improper management of wastes					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct and indirect	Temporary (weeks)	On-site	Daily	Possible	Medium - PV Plant and OHL
Receptor					Sensitivity
Local soil and geology.					Medium - PV Plant and OHL
Overall Significance of Impact					
Minor – PV Plant and OHL					

Management and Mitigation

In order to address potential impacts on soil and geology a series of mitigation and management measures will be undertaken. Mitigation of impacts relating to soil contamination will be managed through the development of the Project ESMP/CESMP for the construction phase, which will include provision for good working practices in relation to maintenance of vehicles and machinery, use, storage and handling of chemicals and management of wastes. In more details, the following measures are foreseen within the management plan:

- The top layer of fertile soil should be removed (where possible) during construction works and stored. Topsoil stripping is usually done through removal of the upper layer of the soil 30-50 cm.
- The topsoil will be stored and used for the rehabilitation of affected construction areas. Topsoil stockpiles height not to exceed 2 m;
- Effective site drainage to allow for the directed flow of surface water off site;
- Oil interceptors and silt traps shall be put in place to manage and retain sediments on site;
- Preparation of guidelines and procedures for immediate clean-up actions following any spillages of oil, fuel or chemicals;
- Development of a site-specific Emergency Response Plan for soil clean-up and decontamination;



- Implementation of a training program to familiarize staff with emergency procedures and practices related to contamination events;
- Development of an Erosion and Sediment Control procedure within the CEMP to prevent impacts in surrounding of working areas, drainage and irrigation system;
- Development and implementation of a waste management plan (as part of the ESMP) to ensure that waste is disposed of correctly such that soil contamination is minimized;
- Bunding of areas where hazardous substances are stored (e.g., fuel, waste areas);
- Ensure storage areas have impermeable floor and containment, of capacity to accommodate 110% of the volume of the largest waste container;
- Rehabilitation and re-vegetation of cleared areas adjacent to the PDA which shall include the re-vegetation of bare soils before the next wet season; Land re-cultivation and restoration will be carried out after works implementation. In addition, after completion of construction all the temporary roads and embankments will be reinstated, lands will be re-cultivated and the micro relief reproduced.
- Adequate sanitary facilities to be provided for the construction workforce; It is recommended one mini-toilet for every 7 workers according to best practices⁶¹.

Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

Negligible Minor – PV Plant and OHL

8.2.6.2. Potential impacts during operation phase

During the operation phase there are limited anticipated impacts on soil and geology as work activities will be completed during the construction phase. Any potential impacts may be related to accidental events (spills and uncontrolled releases) during operation or any maintenance activities. The PV modules will be cleaned monthly using dry cleaning techniques, with wet cleaning (using water) only planned on a quarterly or 6-month basis. However, it is not expected any use of harmful chemicals or detergents to clean solar panels.

Also, storage and handling of hazardous and non-hazardous wastes within the site may pose risks for possible contamination of soil, especially in cases of non-proper waste management practices. Oils / fuel spills from vehicles or machinery and the use of chemicals/paints used for maintenance work on OHL may occur, but the likely impacts are considered to be minimal.

Mitigation of impacts relating to soil contamination will be managed through the development of the Project ESMP for the operation phase, which will include provision for good working practices in relation to maintenance of vehicles and machinery, use, storage and handling of chemicals and management of wastes. In conclusion, the overall impact significance after mitigation measures and management plans is:

Negligible – PV Plant and OHL

8.2.6.3. Potential impacts during decommissioning phase

Impacts on soils and geology during the decommissioning phase are considered less than during Project construction as, although there will be some ground disturbance, the aim of decommissioning is to remove foundations, hardstanding and other Project infrastructure, rather than areas of top- and sub-soil. In the end of the decommissioning process all affected areas will be reinstated. Therefore, the impacts in this phase are predicted:

⁶¹ <https://www.hse.gov.uk/pubns/cis59.pdf>



Negligible – PV Plant and OHL

8.2.6.4. Cumulative impacts

There will be no cumulative impact as a result of construction activities or during the operation and decommissioning phases associated with the PV element of the project. However, in the event that the OST 100kV line is constructed at the same time as the projects overhead line the impacts along the OHL route in terms of soil pollution and geology are likely to increase and/or be extended. It is recommended that the Project liaises with OST to understand the scheduling of the 100kV line and discuss a collaborative approach to minimise potential impacts and disturbance to local communities along the OHL route during construction.

Negligible – PV Plant and OHL

8.2.7. Impacts on Water Resources

There are significant water resources and water bodies in this area that may be affected by this project construction. The project shall consider to improve the management of these waters, mainly groundwater.

Water resources will include both groundwater and surface water. The key potential impacts on surface and groundwater resources may include as follows:

- Earthworks in the project area may increase the erosion, especially during rainfall events, which may increase the suspended sediment concentrations and pollute water resources;
- Disruption of the irrigation and drainage patterns/ network scheme due to earthworks for the PV plant and OHL;
- Degradation of surface water and groundwater quality as a result of accidental leaks/spills or siltation due to earthworks;
- Sewage will generate from the construction workforce (toilets and washing facilities) and during the operation phase of the PV plant;
- Liquid effluents will also arise from washing of equipment (i.e., PV solar panels); and
- Inappropriate storage and management of wastes, material storage that may lead to water quality impacts from run-off entering, and improper drainage channels inside the PV plant site.
- The site facilities will ensure availability of water for staff use (washing hand, toilets etc) with water tanks to be filled with rotation trucks. Drinking water will be supplied from local companies each week.
- For sanitary and construction water SPV Blue 1 will take it with tanks from local suppliers.
- For construction use each subcontractor will provide their own water

According to the project, there will be no interruption of these water bodies. It is estimated that trucking water to the Project Site from the Local municipality for construction works, compaction and dust suppression would require 2 (4000 Gallon) trucks per day, over a 5-day working week for the length of the construction schedule. It is estimated that 1 truck trip averages a 15 km roundtrip.

8.2.7.1. Potential impacts during construction phase

During the construction there will be no expected impact on water quality, taking into account that the works will be superficial ones with natural, ecological materials of the surrounding area. The only expected impacts can be caused by Modification of irrigation and drainage patterns, Increased sediment content of surface waters and deterioration of water quality and Potential ground water contamination. These impacts are elaborated and evaluated further below.

The materials and architecture that will be used in this project will be environmentally friendly. The construction works for the Blue 1 Photovoltaic Park in Topoja do not affect the water resources of the entire project area.

Modification of irrigation and drainage patterns

Construction activities could affect natural irrigation and drainage patterns in the project footprint area, in particular within the PDA. Excavation works for the foundations opening, hard structures, levelling and reshaping of slopes and deepening of drainage channels in the project sites could modify, deteriorate, damage and/or cause blockages in the irrigation and drainage system. It should be noted that all existing drainage channels will remain and no additional drainage channels are proposed within the PDA. Any works on the existing drainage channels is only required due to the lack of historic maintenance of the channels and the only works proposed of the channels is to ensure that they function as originally designed; such works is envisaged to include the deepening and restoration of the slopes. The rehabilitation of drainage channels may increase sediment loading; no changes in overall performance of the drainage is foreseen during the construction phase, and once rehabilitation of the channels is complete the overall performance of the drainage system should improve and be more closely aligned to its original design. This improved performance may lead to increase flows within the channels which may improve overall water quality. All these processes could lead to adverse impacts such as increased erosion, sediment transport, and sediment deposition impacts.

No reductions to the connectivity of irrigation and drainage channels within or nearby the project footprint areas are envisaged as all channels will remain and their overall functioning improved due to cleaning and frequent maintenance during construction phase.

The majority of potential impacts on irrigation and drainage network scheme is anticipated within the PDA due to the presence of the extensive existing irrigation / drainage channels in the area, large construction work surface area and larger presence of water flows. For the OHL route impacts on irrigation and drainage scheme are deemed to be lower due to the proposed locations of the tower pylons which will typically be located a fair distance from the channels. And also, will be constructed in a demolished existing OHL route.

Based on the above discussions the impact significance prior to mitigation is rated as follows:

Aspect					
Construction activities, excavations, alterations in the irrigation and drainage patterns/ network					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short-term	Local	Daily	Unlikely	Medium - PV Plant and OHL
Receptor					Sensitivity
Irrigation and drainage patterns/ network, lands nearby					Medium - PV Plant and OHL
Overall Significance of Impact					
Moderate – PV Plant					
Negligible -OHL					

Management and Mitigation measures



The following mitigation measures are recommended to be implemented for the preservation and functionality of the irrigation and drainage network scheme:

- The irrigation and drainage pattern/network scheme around the PV plant site and areas of work for the OHL towers shall not be altered, but kept disciplined and functional to the maximum extent possible with the natural/ existing water flowing, channel depth and slope inclination to prevent blockages and/or flooding in surrounding lands;
- Develop an Irrigation and Drainage Preservation Procedure within the CEMP; This procedure should clearly define mitigation and management measures for temporal diversion of the channels when necessary or when construction works are being implemented in a particular section;
- Develop an Erosion and Sediment Control Procedure within the CEMP to define measures that prevent and/or reduce impacts and control the risk of erosion and sedimentation impacts on existing water bodies in the project area. This measure could include potential silt fencing in specific working locations, changes or improvements in the project design, erosion protection interventions, reshaping of slopes, hydro-seeding or planting of vegetation, etc.;

Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

Minor – PV Plant

Increased sediment content of surface waters and deterioration of water quality

Temporary contamination of surface waters with run-off from construction sites may take place during the construction phase. Site clearance and construction activities for the PV plant and OHL, including the removal of soil (and topsoil) could result in the acceleration of erosion, increased surface water run-off and sediment load in surface water bodies (drainage and irrigation channels). As a consequence, this may lead to the increase of soil particles in surface water bodies and notable (visual) deterioration of the water quality caused by higher turbidity.

Moreover, there will be heavy machineries, construction materials and other equipment on-site that will be used for the opening of the access roads, site preparation as well as foundations for the PV solar plant and OHL towers. If these machineries and equipment are not maintained in a good state of repair, hydrocarbon-related leaks from construction plant and equipment could be part of the surface water run-off leading to water pans thus adversely affecting surface water quality. The potential release of these contaminants and extra sediment loads in surface water bodies (including drainage/ irrigation channels) can also lead to an impact on the aquatic ecology.

Besides the above-mentioned sources of impact, there may be additional sources of pollution such as accidental spillages of fuel/hydrocarbon and hazardous materials, lubricants, cement and wet concrete; as well as potential pollution from inadequate or unsafe storage of wastes, handling and disposal of sanitary wastewater and domestic water from the contractors during the work activities.

Nevertheless, there are differences to the extent of impacts, magnitude and sensitivity of the areas between the PV solar plant and OHL route. Higher impacts are predicted for the PV solar plant due to the large surface area it covers. Instead, for the OHL route the requirements for vegetation clearance and work site surface area are much more limited and rated to the minimum of impacts in terms of increases in run-off flow and sediment load. Overall, the impacts for both project components are predicted to be short-term duration and localized. The impact assessment matrix is rated in more details below:

Aspect



Construction activities, excavations, alterations in the hydrological pattern/ scheme, wastes and wastewaters					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct and indirect	Temporary (weeks)	Local	Daily	Likely	Medium - PV Plant and OHL
Receptor					Sensitivity
Local surface waters (irrigation and drainage network)					Medium - PV Plant and OHL
Overall Significance of Impact					
Moderate – PV Plant and OHL					

Management and Mitigation measures

The following mitigation measures are recommended to be implemented for the protection of surface water bodies:

- The hydrological pattern and scheme around the PV plant site and areas of work for the OHL towers shall not be altered and kept disciplined to the maximum extent possible with the natural/ existing water flowing, channel depth and slope inclination;
- Develop an Erosion and Sediment Control Procedure within the CEMP to define measures that prevent and/or reduce impacts due to erosion and sediment creation;
- Flow of the drainage channels as passing through the PV plant site shall be maintained and adapted as per above scenario;
- Special attention needs to be taken during the access roads rehabilitation for the PV plant and OHL towers in order to maintain proper drainage and standard slope inclination as the soil cannot wash out in the water body. In addition, it may also be needed proper compaction and filling with construction material (e.g., crushed stone) of the access road structure;
- Adequate arrangement for storm water management during construction period shall be made to avoid sediment run-off from the construction site;
- Storm water flow must be directed to the existing drainage channels with appropriate mitigation measures such as use of silt traps/ fences to avoid sedimentation and/or blockages of the channels or contamination of the receiving water body.

Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

Minor – PV Plant and OHL

Potential groundwater contamination

As mentioned above, vegetation clearance, earthworks and soil compaction may increase the intensity and volume of surface water run-off as a result of a decrease in water infiltration recharging the groundwater. Improper handling and disposal of sewage, wastewaters and other solid wastes can eventually contaminate the groundwater resources in the area. The hydrogeology of the project area could potentially be affected if any leaked hydrocarbons permeate into the sub-surface and through cracks in the bedrock geology come



into contact with the groundwater. Groundwater contamination during the construction phase may occur from unplanned events such as leaks and spills of oil, lubricants, fuel from heavy equipment, improper handling of wastes and sewage.

Mitigation measures such as storage of oil, lubricants, fuel at concreted laydown areas are foreseen to be implemented to minimize contamination in the event of a spill. Proper sanitary facilities are anticipated to be provided on-site. While there is a potential for short-term direct impacts to groundwater quality from construction, proper handling of fuel, waste and liquid effluents, the impact to groundwater from spills and leaks is assessed to be low.

Aspect					
Construction activities, excavations, alterations in the hydrological pattern/ scheme, wastes and wastewaters					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct and indirect	Short-term	On-site	Daily	Possible	Medium - PV Plant and OHL
Receptor					Sensitivity
Groundwater resources.					Medium - PV Plant and OHL
Overall Significance of Impact					
Minor – PV Plant and OHL					

Management and Mitigation measures

The following mitigation measures are recommended to be implemented for the protection of groundwater resources:

- Fuel, oil and used oil storage areas shall be contained in bunds of 110 percent capacity of the stored material;
- Refuelling shall be carried out in designated areas using strict protocols;
- Spill containment and clean up kits will be available on-site and clean-up from any spill shall be appropriately contained and disposed of at a bound landfill site;
- Project staff shall not be permitted to utilize any water sources (stream, river, or other water bodies) for the purposes of bathing, washing of clothing;
- Construction vehicles/ machineries and equipment shall be serviced regularly at off-site location;
- Ensure that all construction plant and equipment is maintained in a good state of repair with minimal leaks;
- Oil leakage or spillage shall be contained and cleaned up immediately. Waste oil or hydrocarbons shall be collected and stored for recycling or disposal;
- Adequate sanitary facilities, i.e., toilets and waste bins shall be provided for the construction workforce;
- Workers shall be trained in the use of designated areas/bins for waste disposal and encouraged to use toilets;
- Licensed companies shall be contracted for management and disposal of wastes, wastewaters and sludge from the septic tank.



Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

Negligible – PV Plant and OHL

8.2.7.2. Potential impacts during operation phase

One of the key activities during the operation phase is the regular cleaning of PV modules to prevent dust build-up which could affect their performance. This has the potential to consume significant quantities of water. In order to reduce the water demand of the project it is planned that the PV modules will be cleaned monthly using dry cleaning techniques, with wet cleaning (using water) only planned on a quarterly basis, otherwise there will be a degradation in plant performance. For wet cleaning it is estimated that on average around 1 litre of water per PV module is required, which equates to around 110 m³ of water per wet clean, and up to a total of 450 m³ per year. The whole process is not expected to use any additives which might alter the water quality. Nevertheless, in case of usage, it must be biodegradable with low environmental impact and contain no volatile organic compounds (VOCs), phosphate and be chlorine free. This would be the maximum water quantity required for the wet cleaning process of Blue 1 solar plant; however, this does not mean that will be done 4 wet cleaning per year. Based on best practices the PV modules did not require any additional wet cleaning process besides dry cleaning with rainwater. Most probably for Blue 1 solar plant will be a similar situation, an assumption of 2 wet cleaning processes on average per year would surely be a more accurate estimation.

The water for cleaning, and potable use, will be sourced from local permitted resources / suppliers. No abstraction of groundwater or surface water resources, such as drainage/irrigation channels will be undertaken by the project. This will include agreements with local water supply companies (e.g., Kondi shpk) and/or local fire stations. Water will be supplied through water trucks at the moment when the wet cleaning process will be needed (preliminary assumption 2-4 times per year). The Developer and the Consultant discarded the initial option of creating a groundwater well or sourcing from a close surface water resource, as the need for water supply is considered limited and water treatment would have been necessary. From a permitting point of view, it also makes things easier and the developer will be looking forward to signing an agreement either with a private company or with the municipality (fire department) to supply water via water trucks. This new solution means that there will be no impacts on water resources (surface water and groundwater) during the operation phase. Therefore, the evaluation of the impact significance will result as follows:

Aspect					
Groundwater and surface water bodies					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long-term	Local	Daily	Likely	Low - PV Plant
Receptor					Sensitivity
Groundwater and surface water resources					Low - PV Plant
Overall Significance of Impact					
Minor – PV Plant					

Management and Mitigation measures



The following mitigation measures are recommended to minimize water consumption and enhance water reuse:

Periodical training is needed to be provided to workers for best utilization of water during operation;
Potential provision of rainwater harvesting and use during the wet cleaning process of PV modules;
Recycle/reuse of water to the extent possible.

PV Modules Cleaning Systems and Methodology

The water required during operational phase of the project will be mainly for washing the solar modules. From discussions with project team, it is understood that approx. 1 L of water will be required per month for cleaning of one module. To reduce the water demand of the project it is planned that the PV modules will be cleaned monthly using dry cleaning techniques, with wet cleaning (using water) only on a quarterly basis. Other proposed measures include installation and use of rainwater harvesting and steam cleaning equipment and prohibiting extraction of groundwater or surface water for both construction and operation activities of the project.

Below is a summary of the cleaning techniques that are used for large scale solar projects.

Manual dry cleaning of solar panels

Manual cleaning consists of using a nonconductive brush, sponge, or other mild agitating method, and is performed by brushing and rinsing the modules with brooms and water. Quality of cleaning varies depending on the workers professionalism and motivation and on the equipment, they use. When the module is wet it is hard to tell whether it was properly brushed and if all the dirt was removed. Stains or a heavy dirt coating may be only partially removed with remains left on the glass after the module dries. This method can be performed with a dry or wet brush cleaning, depending on the type of dirt.



Figure 62 Manual dry cleaning of solar panels



- *Cleaning Robot Cleaning*

Robotic cleaning is performed by a machine with an automatic or semi-automatic system mechanism of rotating brushes, combined with a blower, angled in such a way as to push dust down and away from the modules that assists in manual cleaning. Automatic cleaning allows absolute control over module brushing and complete removal of dirt takes place systematically. This process will be handled by an operator and this method can be performed with a dry or wet brush cleaning, depending on the type of dirt.



Figure 63 Robotic cleaning

- *Mechanical cleaning*

Mechanical cleaning consists of a synthetic fibre roller that, by means of a rotary system, rotates continuously on the module surface. The system is arm mounted on an all-wheel-drive vehicle, designed specifically to clean free field solar power plants, and can clean entire module rows in one pass. This method can be performed with a dry or wet brush cleaning, depending on the type of dirt.



Figure 64 Mechanical cleaning



It is considered that the project will use robotic and manual cleaning as the space between strings does not allow mechanical cleaning.

In conclusion, in the case of wet cleaning, the amount of water needed is insignificant. There would be no need of water if SPV Blue 1 manages to successfully implement dry cleaning of the modules. If wet cleaning will be necessary, water runoff / discharge from the panels is likely to get evaporate or absorbed into the arid ground below the panels, and no drainage canal is required. Proper equipment (steam equipment) is recommended to rationalize use of water tank trucks & storage tanks on site. SPV Blue 1 will install and use rainwater harvesting and steam cleaning equipment. Extraction of groundwater or surface water for both construction and operation activities of the project is prohibited.

Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

Negligible – PV Plant

8.2.7.3. Potential impacts during decommissioning phase

Impacts on water resources during the decommissioning phase are considered to be less significant than those during Project construction. As a result, the significance of impacts is rated:

Minor – PV Plant and OHL

8.2.7.4. Cumulative Impact

No cumulative impacts are foreseen in relation to water resources.

Negligible – PV Plant and OHL

8.2.8. Impacts from Wastes

During its life cycle, mainly during the construction phase, the proposed PV solar plant and OHL will include numerous work activities such as site clearance, removal of vegetation, excavation works, setting up of labour and staff working facilities (base camp), installation of modules/panels and temporary structures that will generate different types and amounts of wastes (solid and liquid wastes). The largest quantities of wastes are expected to be non-hazardous, however there may be certain hazardous wastes that may be generated in small quantities. Typically, the following types of wastes will be generated due to the development of the project:

- Excavated soil material (spoil/surplus material) due to earthworks and construction activities;
- Municipal and domestic solid waste from workforce;
- Sanitary waste and sewage from workforce;
- Waste oil from generator and other construction machinery;
- Packaging waste such as gunny bags, plastics, paper/cardboard, etc.;
- Empty paint containers, metal scrap, paints, varnishes, adhesives, anti-corrosive substances, etc.;
- Construction debris.

In regard of the management of broken solar panels, SPV Blue 1 confirms that until the end of work, the broken solar panels will be stored on site in containers. Up to now no acceptable recycling company has been identified, but SPV Blue 1 is continuing efforts to identify a recycling company.

Receptors



Potential receptors will be local communities and houses within and/or nearby the project area. Improper management of solid and liquid waste may lead to air, water, soil pollution and odour nuisances in and around the project site.

Potential Waste Streams Generation

The potential waste streams that may be generated during the project development phases (i.e., construction, operation and decommissioning) have been evaluated on the basis of similar projects and the ESIA team's experience. Reference has also been made to Albanian legislation, namely the DCM No. 99, dated 18.02.2005 "On the approval of the Albanian Waste Catalogue" amended, European Waste Catalogue⁶² and international guidelines⁶³ for PV solar plants and transmission lines.

Table 55. Potential Waste Streams and Classification Codes for the proposed project

List of wastes		Constructi on Phase	Operatio n Phase	Decommis sioning Phase	Quantity in the Constructio n phase	Quantity in the O&M phase	Potential quantity for a 140 MW PV Project
Type of wastes	Code of wastes				(ton / MW)	(ton / MW)	(ton)
Non - hazardous wastes							
Paper and cardboard packaging	15 01 01	Yes			4.52		632.8
Plastic packaging	15 02 01	Yes			0.03	0.004	4.76
Wooden packaging	15 03 01	Yes			0.18		25.2
Metallic packaging	15 04 01	Yes			0	0.029	4.06
Mixed packaging	15 06 01	Yes			0		0
Waste glass packaging	15 07 01	Yes			0		0
Absorbents, filter materials (including oil	15 02 02				0		0

⁶² https://www.sustainabilityexchange.ac.uk/the_european_waste_catalogue_ewc

⁶³ <https://www.gov.uk/how-to-classify-different-types-of-waste>



List of wastes		Constructi on Phase	Operatio n Phase	Decommis sioning Phase	Quantity in the Constructio n phase	Quantity in the O&M phase	Potential quantity for a 140 MW PV Project
Type of wastes	Code of wastes				(ton / MW)	(ton / MW)	(ton)
filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances							
Absorbents, filter materials, wiping cloths and protective clothing other than those mentioned in 15 02 02	15 03 02	Yes			0		0
Discarded equipment other than those mentioned in 16 02 09 to 16 02 13	16 14 02	Yes			0.23	0.023	35.42
Wastes not otherwise specified	16 99 07	Yes					
Concrete	17 01 01	Yes		Yes	1.45		203
Wood	17 01 02	Yes			1.97		275.8
Plastic	17 03 02	Yes			0.2		28
Iron and steel	17 05 04	Yes		Yes	0.72		100.8
Mixed metals	17 07 04	Yes		Yes	0		0
Cables other than those mentioned in 17 04 10	17 11 04	Yes	Yes	Yes	0.06		8.4
Soil and stones other than those mentioned in 17 05 03 (Surplus natural material)	17 04 05	Yes			1.4	0.004	196.56



List of wastes		Constructi on Phase	Operatio n Phase	Decommis sioning Phase	Quantity in the Constructio n phase	Quantity in the O&M phase	Potential quantity for a 140 MW PV Project
Type of wastes	Code of wastes				(ton / MW)	(ton / MW)	(ton)
Mixed construction and demolition waste other than those mentioned in 17 09 01, 17 09 02 and 17 09 03	17 09 04	Yes		Yes	0		0
Scalps, syringes, sharp instruments (except 18 01 03)	18 01 01	Yes					
Waste, collection, and disposal of which requires special treatment to prevent infections	18 03 01	Yes					
Medications other than those mentioned in 18 01 08	18 09 01	Yes					
Paper and cardboard	20 01 01	Yes					
Glass	20 02 01	Yes					
Biodegradable kitchen and canteen waste (organic wastes, i.e., food wastes)	20 08 01	Yes					
Cloths	20 10 01	Yes					
Paint, inks, adhesives, and resins other than those mentioned in 20 01 27	20 28 01	Yes					
Discarded electrical and electronic equipment other than those mentioned in 20	20 36 01	Yes	Yes	Yes			



List of wastes		Constructi on Phase	Operatio n Phase	Decommis sioning Phase	Quantity in the Constructio n phase	Quantity in the O&M phase	Potential quantity for a 140 MW PV Project
Type of wastes	Code of wastes				(ton / MW)	(ton / MW)	(ton)
01 21, 20 01 23 and 20 01 35							
Wood other than that mentioned in 20 01 37	20 01 38	Yes					
Plastics	20 01 39	Yes		Yes			
Metals	20 01 40	Yes		Yes	0	0.089	12.46
Other fractions not otherwise specified	20 01 99	Yes					
Biodegradable waste	20 02 01	Yes			0.26	0	36.4
Mixed urban waste	20 03 01	Yes	Yes	Yes			
Septic tank sludge	20 03 04	Yes	Yes			1.174	164.36
Hazards Wastes (*)							
Packaging containing residues of or contaminated by dangerous substances	15 01 10*	Yes					
Absorbents, filter materials (including oil filters not otherwise specified), wiping cloths, protective clothing contaminated by dangerous substances	15 02 02*	Yes					
Oil filters, diesel	16 01 07*	Yes					



List of wastes		Constructi on Phase	Operatio n Phase	Decommis sioning Phase	Quantity in the Constructio n phase	Quantity in the O&M phase	Potential quantity for a 140 MW PV Project
Type of wastes	Code of wastes				(ton / MW)	(ton / MW)	(ton)
Wastes containing oil	16 07 08*	Yes					
Wastes containing other dangerous substances	16 07 09*	Yes					
Soil and stones containing dangerous substances	17 05 03*	Yes					
Solvents	20 01 13*	Yes					
Paint, inks, adhesives and resins containing dangerous substances	20 01 27*	Yes					
Electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components	20 01 35*			Yes			

Potential impacts during construction phase

Waste streams generated during construction of the Project are likely to consist of the following:

- Excavated soils (spoil/surplus natural material);
- General urban wastes during construction phase;
- Hazardous wastes; and,
- Sanitation, wastewater and sludge.

During this phase, the main source of waste will be the construction activities themselves, waste from equipment and material packaging, and waste generated by the workforce. Some quantities of waste will be generated from earth and concrete works, electro-mechanical works, PV modules installations, tower and cable installations, etc. However, as a large element of the PV solar plant and OHL construction comprise the assembly of prefabricated structures, therefore the amount of construction waste will not be large.

Maintenance of construction machinery and vehicles will not be conducted within the construction areas, therefore the creation of associated wastes (used tyres, batteries, oils, etc. from vehicles) is not expected.



Fuel storage facilities will probably not be necessary on-site and therefore would not be provided within any construction areas or contractor's compound. Where fuels are taken to site, this would be restricted to the minimum amount required for the PV plant and OHL works and equipment on site. Dedicated fuel tanker vehicles/ trucks will be used for this purpose.

Vegetation along the proposed location for the PV solar plant is almost inexistent, thus vegetation clearance will not produce any significant quantities of these organic/biodegradable wastes. The OHL route encompasses a large area and it can be anticipated that the vegetation clearance will generate small amounts of organic wastes. These wastes will normally be composed of scrub and small trees unacceptable for timber processing. They will be retained and redistributed or composted on the site which would allow production of nutrient capital and facilitate natural regeneration.

Excavated soils

The largest amount of waste that is expected to result during the construction phase will be excavated soils (spoil/ surplus material) from the earthworks and construction activities needed for the installation of the PV solar modules and OHL towers foundations. Potential impacts may result in case of improper management of these wastes (natural excavated soils) by the Contractor. This includes depositing of excess/surplus material in areas not approved by government institutions/authorities (such as Fier and Divjaka Municipalities) and in non-compliance with the existing national legislation. The deposition of these soils directly in areas covered with vegetation would have direct adverse impacts in the biodiversity (flora and fauna) of the areas. Moreover, the deposition of excess/surplus material in the vicinity of water bodies/water resources (such as drainage and irrigation channels) would represent a permanent risk of contamination of these waters and damage to water ecology due to the increased organic matter and turbidity in water, in particular during rainfall periods. However, as the site is predominately flat the extent of soil waste from site grading will be minimal, with the main source of excavated material that will require management will be that excavated during works of canals to make them deeper. It is anticipated that all excavated material will remain on site, being used backfilling trenches or for use for layering on internal routes and pathways, with any excess material used for internal landscaping.

Other impacts may arise as a result of poor management of hazardous wastes or materials and/or accidental spills of fuel, lubricating oils, etc., in natural excavated soil. In case of contact of a hazardous substance with natural soil it should be handled and managed as a hazardous waste. Nevertheless, taking into account the baseline conditions of the PV plant location, as well as the hydrological/ hydrogeological studies, the project footprint area will most probably require backfilling to increase the level of the site and reinforce the stability and foundations of the plant area. In this context, the PV site area will mostly need levelling works instead of major excavation works. On the other side, the OHL will generate small quantities of excavated soils for the installation of towers. Instead of depositing these natural soil quantities in disposal areas, they could be preserved in a temporary disposal close to the PV solar plant and (partially) reused in the backfilling process and/or reused for the rehabilitation process in the end of construction works. This approach minimizes the risks from surplus/spoil material and fits properly with the purpose and objectives of a good waste management practice as required by the national legislation and international best practices.

General urban wastes

General urban waste may include a variety of non-hazardous materials, including wood, paper, cardboard, plastics, etc. Urban wastes may also include packaging materials such as plastics, paper and cardboard from the use of equipment, tools and machineries to be used within the scope of the Project. In addition, general urban wastes, similar to household wastes, will be generated by workforce activity during construction work in the project areas, including food residues (organic wastes), paper, bottles and cans and other packaging materials. These residues/wastes shall be collected on-site and further handled, deposited and/or recycled.

Several impacts may arise as a result of improper urban waste management. Primarily, there may be soil and surface water contamination in the event of illegal dumping of waste inside and/or outside the project area. These potential impacts besides contamination of environmental elements, also pose a hazard to the generation of unpleasant odours (such as organic wastes). Moreover, improper waste management would



result in an unsafe environment for the workforce and the local community in the area, which as a result may pose risks for human health-related issues. Another important aspect would be the indirect impact of additional costs that will be needed by the relevant authorities (i.e., municipalities) for handling, cleaning, collecting and transporting these wastes from the illegal dumping areas to the approved disposal/ landfill sites.

Hazardous wastes

Hazardous wastes can be generated during the construction activities for the PV solar plant and OHL. This may result due to the presence of different substances / materials on-site such as paints, solvents, fuel, oil, additives, etc., which may have to be used during the various work activities. Among the types of hazardous waste that might be generated are: excess concrete quantities (with additives), various paints, solvents and contaminated containers (e.g., used containers of paints, solvents and additives). In comparison with urban/municipal wastes, hazardous wastes pose higher environmental and human-related health risks, in particular if handled, collected and/or deposited improperly. The effects of hazardous waste are immediate and can cause massive contamination, especially if they get in contact with agricultural lands or even worse in contact with water bodies, which due to free flow may have a direct impact on biodiversity (flora and fauna) and indirect pollution of other habitats in the downstream (water bodies or ground surface).

Nevertheless, the proposed project will generate limited amounts of hazardous wastes during construction.

Sanitation and wastewaters

Urban wastewaters will be generated during the construction process as a result of workforce activity on-site. Urban wastewater generation can have significant impacts on the environment if no precautionary measures are taken to manage, collect and treat them accordingly. Direct discharge into the environment would lead to direct impacts on agricultural lands, contamination of groundwater resources and contamination of surface waters (irrigation canals and drainage channels).

The project considers that the management of sanitary wastewaters will be done through the construction of a septic tank within the PDA and placement of portable mini-toilets in various working site areas during construction activities. The capacity of the septic tank will be calculated and specified by the Contractor prior to the commencement of works. The septic tank will be regularly monitored by the site management team. This will include checking of the wastewater level, periodic emptying, cleaning, collection (usually on weekly basis) and transferring of wastewaters by a private company that offers these types of services. A similar monitoring will also be performed for portable mini-toilets. The Contractor should undertake adequate measures to put in place the appropriate number of chemical/mini-toilet facilities and perform adequate management. According to the BSI standard⁶⁴ (BS6465-1-2006), it is recommended that one mini-toilet should be available to seven persons working on-site during 40-hour week.

64 <https://www.hse.gov.uk/construction/healthrisks/welfare/toilets-and-washing.htm>

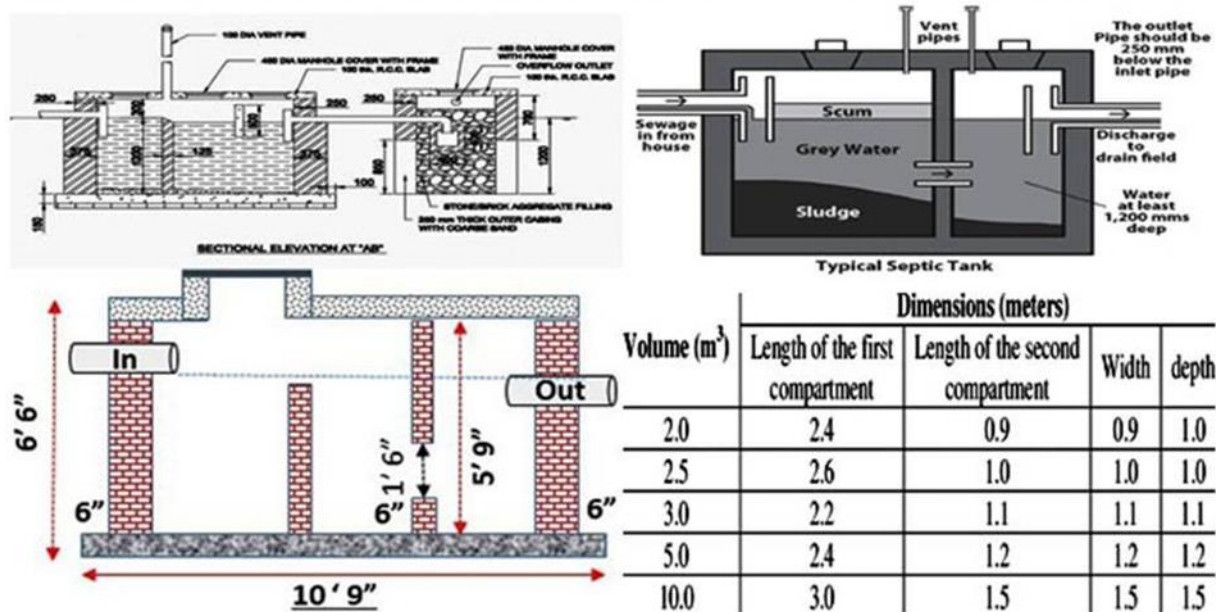


Figure 65 Typical sketch of a septic tank

Estimated useful volume of the septic tank – the estimated useful volume, or total volume required for the septic tank, is calculated from the equation below:

$$V_e = ((1000 + N * (C * T * K * L_f)) * (1/1000))$$

V_e : estimated useful volume of the septic tank, in m³;

N : number of people / contribution units;

C : sewage contribution, in litre / person. day or in Litre / unit. day;

T : sewage retention period, in days;

K : rate of accumulation of digested sludge, or time of accumulation of fresh sludge, in days;

L_f : contribution of fresh sludge, in Litre / person. day or in Litre / unit. day;

1/1000: conversion of a litre unit to m³.

Impact significance

As mentioned above, generation of various types of waste (solid and liquid) during the construction phase can result in potential impacts. Inadequate management and disposal of these wastes may result in infiltrations, soil contamination and contamination of water resources in the area, which may lead to direct and indirect impacts on biodiversity and also to the health of the local community. Poor general housekeeping at construction sites and base camp can result in visual impacts to local communities during the construction phase, especially if uncontained solid wastes such as paper, cardboard and plastic packaging is blown off the site. Poor management of waste foods at base camps can attract vermin and may cause impacts to the health of workers. In addition, the scale of the potential impacts prior to mitigation and impact significance of waste-related risks during the construction phase of the project can be summarized as follows.

Aspect					
Earth and concrete works, electro-mechanical works, PV modules installations, tower and cable installations of the OHL					
Type	Duration	Extent	Frequency	Likelihood	Magnitude



Direct	Short-term	Local	Daily	Likely	Medium - PV Plant and OHL
Receptor					Sensitivity
Local communities (visual and health), workforce (health), groundwater and surface water resources, soils.					Medium - PV Plant and OHL
Overall Significance of Impact					
Moderate – PV Plant and OHL					

Management and Mitigation measures

The contractor will develop a Waste Management Plan (WMP) in compliance with Albanian legislation, IFI Requirements and GIIP (Good international industry practice) that will include arrangements for the disposal of hazardous and non-hazardous waste through licensed waste disposal subcontractors/ companies. The plan will also include measures to ensure:

The construction contractor must ensure that the base camp offices have adequate waste handling and disposal facilities. Arrangements for collection of non-hazardous and hazardous wastes must include provisions of waste bins equipment on-site. It is recommended that waste bins are segregated according to the stream of waste e.g., organic wastes, hazardous wastes, paper/cardboard wastes, plastic wastes and metallic wastes. Their disposal and recycling must be made in close collaboration with the local government authorities (i.e., municipalities) and licensed waste recycling companies. Provision of chemical/ mini toilets for workers at the base camp must be in the ratio of 1:765, maximum 1:10 (toilet to workers) respectively in order to maintain hygienic and clean surroundings; The septic tank shall be built according to the standard construction and isolation standards to avoid any accidental leakage and/or discharge of wastewaters. Monitoring of wastewater in the septic tank must be performed periodically by the Contractor, namely by E&S and H&S experts.

- Segregation, reuse and, where feasible, recycling of wastes by registered operator; construction contractor must follow the 3R policy to manage the solid wastes;
- Waste storage/collection areas shall be fenced, laid at the bottom with an impermeable cover and equipped with relevant signage (e.g., urban waste collection area); any waste fuels/oils or chemicals that may need to be temporarily stored on site will be contained within solid impermeable bunding with 110% capacity of storage containers, to avoid contamination of soils, surface and groundwater in the event of spillage / leakage.
- Nearby municipalities may also be contracted for regular disposal of the base camp waste;
- Avoidance of refuelling on site to prevent oil spills. If this is not possible procedures will be developed to avoid accidental spillage, like the provision of drip trays and bunding for stores of fuel and waste chemicals/ substances;
- Responsible storage and disposal of liquid effluents such as sewage from temporary accommodation;
- Good general housekeeping;
- Covering of solid waste containers to prevent windblown litter across and outside site;
- Composting of organic wastes;

65 <https://www.hse.gov.uk/construction/healthrisks/welfare/toilets-and-washing.htm>



- Appropriate handling and storage of hazardous and non-hazardous waste for licensed collection for responsible disposal by registered operator; In each case, the entity/company that will transport or transfer the waste shall be equipped with a license of type III.2.B, as an obligation under Article 57 of Law no. 10463, dated 22.09.2011 "On Integrated Waste Management" as amended;
- Generated waste quantities - must be recorded in a separate/dedicated register according to the type of waste and the quantities generated. During the waste transfer process, a waste transfer format (Waste Transfer Format) shall be filled out to determine the respective quantities according to the type of waste leaving the site and the name of the company/entity that will handle these wastes. These data shall be regularly kept by the Contractor during the construction activity, and presented/reported to the government authorities if required;

Conduct continuous training and education awareness of all employees of the project in regard to waste management practices in order to avoid, reduce the risks of waste generation and potential impact during the construction phase.

Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

Minor – PV Plant and OHL

8.2.8.1. Potential impacts during operation phase

During its operation, the PV solar plant and OHL will create minimal quantities of waste that will result from the activities of working staff and in case of any maintenance and control activities of the installations. Common types of waste that will be created in the operational phase of the project may include electrical waste (consumables, spare parts and obsolete equipment) and broken/ damaged solar panels, as well as packaging waste and waste paint from coating towers. These items will be removed outside of the project area. Nevertheless, it can be anticipated that there will not be any substantial generation of solid wastes; mostly these wastes will be of domestic types and wastes deriving from any maintenance activity. Wastewaters will continue to be handled and managed through the septic tank that will be installed during construction phase within the PDA.

A proper ESMS and waste management system shall be established during the operational stage. This system will be in compliance with the national legal waste management requirements and will consider possibilities for re-use of wastes. Another option includes the possibility that waste elements such as any electric waste, broken PV panels/modules, packaging waste, etc., are offered as recyclable waste streams to the authorized/ licensed waste management companies. Considering the limited distribution of impact (within the site), long duration of activities and low magnitude and intensity, the significance of impacts from wastes prior to mitigation is assessed as negligible-minor.

Minor – PV Plant and OHL

Management and Mitigation measures

The developer will prepare and maintain a Waste Management Plan (WMP) in compliance with Albanian legislation that will include arrangements for the disposal of hazardous and non-hazardous waste through licensed waste disposal subcontractors/ companies. The plan will also include measures to ensure:

- Food/organic waste and recyclables such as. paper, plastic, scrap metal waste, etc. must be properly segregated and stored in designated waste bins/containers and periodically deposited in approved disposal areas or either sold to licensed recycling companies.
- Ensure electrical waste (consumables, spare parts and obsolete equipment) and broken solar panels are properly packed and sent back to manufacturer and/or reused in other forms and locations;



- Generated waste quantities - must be recorded in a separate/dedicated register according to the type of waste and the quantities generated. During the waste transfer process, a waste transfer format (Waste Transfer Format) shall be filled out to determine the respective quantities according to the type of waste leaving the site and the name of the company/entity that will handle these wastes. These data shall be regularly kept by the Developer during the operation activity, and presented/reported to the government authorities if required;
- Conduct continuous training and education awareness of all employees of the project in regard to waste management practices in order to avoid, reduce the risks of waste generation and potential impact during the operation phase.

Recycling practices of the PV modules – This type of “electronic equipment” is intended to have a useful lifespan of approximately 25-30 years. SPV Blue 1 confirmed that until the end of works broken solar panels will be stored on site in containers. The beginning of the implementation of large PV parks in Europe, and also in the rest of the world, started around 2007, and therefore limited experience or industrial recycling practices have been developed at a large scale until very recently. Nevertheless, there is always a fraction of supplied PV modules that are damaged or need to be replaced, becoming waste, and therefore require recycling. SPV Blue 1 also has extensive experience in O&M sites and PV modules waste management, since these early times.

In most European countries there is a monetary contribution from the manufacturer to a system that deals with these “electronic waste”, which define the methodologies and targets for them. targets – that since 2019 is the recycling of 65% of the average of the produced WEEE. In the meantime, some experimental electronic waste treatment companies have been created, but the numbers concerning the recycling of the more complex and dangerous part of the panels: glass and photovoltaic elements are very low. On the other hand, the frame in aluminium, plastics and cables can be recycled without problems. Silicon-based photovoltaic panels require normal treatment of flat glass and no specific removal of the semiconductor layer. Photovoltaic panels not based on silicon require special technology to remove semiconductors and isolate toxic heavy metals.

A European entity called the “European Recycling Platform” is responsible for the management of the discarded/damaged PV panels, sending them for recycling units that separate the aluminium frame, metal conductors, plastics and the glass and photovoltaic elements. The first ones are completely recycled. The destination of the major part of plastics and the glass and photovoltaic elements is a controlled specific landfill indicated by European Recycling Centre (ERC).

As an example, in Portugal, from 2017 to 2020 were collected and sent for treatment 7.5 ton of photovoltaic panels. As each panel weighs approximately 20 kg, about 375 PV panels were processed.

In conclusion, waste during normal operations will be minimal and will largely consist of municipal waste (e.g., food; packaging) and over time potentially defunct panels, cabling and control equipment etc. Waste management arrangements for the construction phase should be continued (proper control of collection, storage and final disposal via licensed contractors).

Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be:

Negligible – PV Plant and OHL

8.2.8.2. Potential impacts during decommissioning phase

Impacts from waste generation during the decommissioning phase are considered to be less significant than those during Project construction. This phase will include the dismantling and removal of all project structures and facilities. As a consequence, potential amounts of wastes may be generated during this process. The most common types of waste that will be created in the decommissioning phase of the project may include domestic wastes, packaging wastes, electrical waste and solar panels. Solar panels/modules will be removed and transferred to another location such as the European Recycling Centre (ERC) or either sent to the manufacturer for recycling. At the end of the phase, all these wastes and items will be removed



outside of the project area. As a result of the aforementioned discussions, the significance of impacts is rated:

Minor – PV Plant and OHL

8.2.8.3. Cumulative Impact

No cumulative impacts are foreseen in relation to waste generation.

Negligible – PV Plant and OHL

8.3. Impacts on Local Ecology/ Biological components

8.3.1. Impact Assessment Methodology

In addition to characterising the magnitude of impact, the other principal step necessary to assign significance for a given impact is to define the sensitivity of the receptor. For ecological impacts, the sensitivity is assigned as low, medium or high based on the conservation importance of habitats and species. Criteria for deciding on the value or sensitivity of biological receptors are presented as follows:

- **High:** For ecological receptors, specifically protected under the Albanian legislation and/or international conventions e.g., species listed as rare, threatened or endangered e.g., IUCN.
- **Medium:** For ecological receptors, not protected or listed, but may be a species common globally but rare in Albania with little resilience to ecosystem changes, important to ecosystem functions, or one under threat or population decline.
- **Low:** For ecological receptors, not protected or listed as common / abundant; or not critical to other ecosystem functions (e.g., key prey species to other species).

Table 56. Assessment Criteria and impact Assessment Methodology for Habitats

Habitat Sensitivity/ Value		Magnitude of Effect on Baseline Habitats			
Note: Assessment Criteria for the Impacts Significance takes into account the location of the habitat, whether it is located within the project area or within the area of influence or outside both of them.		Negligible	Low	Medium	High
		Effect is within the normal range of variation.	Affects only a small area of habitat, such that there is no loss of viability/ function of the habitat.	Affects part of the habitat, but does not threaten the long-term viability/ function of the habitat.	Affects the entire habitat, or a significant portion of it, and the long-term viability/ function of the habitat is threatened.
Negligible	Habitats with negligible interest for biodiversity.	Negligible	Negligible	Negligible	Negligible
Low	Habitats with no, or only a local designation/ recognition, habitats of significance for species listed as of LC on the IUCN Red List of Threatened Species, habitats which are common and widespread	Negligible	Negligible	Minor	Moderate



	within the region, or with low conservation interest based on expert opinion.				
Medium	Habitats with nationally designated or recognised areas (IBAs, KBAs, Emerald sites, IPAs), habitats of significant importance to globally VU, NT or DD species, priority habitat of Annex 1 of Habitats Directive, habitats of significant importance for nationally restricted range species, habitats supporting nationally significant concentrations of migratory species and/or congregator species, and low value habitats used by species of medium value.	Negligible	Minor	Moderate	Major
High	Habitats within internationally designated or recognized areas; habitats of significant importance to globally CR or EN species, habitats of significant importance to endemic and/or globally restricted-range species, habitats supporting globally significant concentrations of migratory species and/or congregator species, highly threatened and/or unique ecosystems, sites of international importance (Ramsar Sites), areas associated with key evolutionary species, and low or medium value habitats used by high values species.	Negligible	Moderate	Major	Critical

Table 57 Assessment Criteria and impact Assessment Methodology for Biological Species



Baseline Species Sensitivity/ Value		Magnitude of Effect on Baseline Species			
Note: Assessment Criteria for the Impacts Significance takes into account the location of the habitat, whether it is located within the project area or within the area of influence or outside both of them.		Negligible	Low	Medium	High
		Effect is within the normal range of variation for the population of the species.	Effect does not cause a substantial change in the population of the species or other species dependent on it.	Effect causes a substantial change in abundance and/or reduction in distribution of a population over one, or more generations, but does not threaten the long viability/ function of that population dependent on it.	Affects entire population, or a significant part of it causing a substantial decline in abundance and/or change in and recovery of the population (or another dependent on it) is not possible either at all, or within several generations due to natural recruitment (reproduction, immigration from unaffected areas).
Negligible	Species with no specific value or importance attached them.	Negligible	Negligible	Negligible	Negligible
Low	Species and sub-species of LC on the IUCN Red list, or not meeting criteria for medium or high value.	Negligible	Negligible	Minor	Moderate
Medium	Species on IUCN Red List as VU, NT, or DD, species protected under national legislation, nationally restricted range species, nationally important numbers of migratory, or congregator species, species not meeting criteria for high value, and species vital to the survival of a medium value species.	Negligible	Minor	Moderate	Major
High	Species on IUCN Red List as CR, or EN. Species having a globally restricted range (i.e., plants endemic to a site, or globally breeding range for bird species), internationally	Negligible	Moderate	Major	Critical



	important numbers of migratory, or congregator species, key evolutionary species, and species vital to the survival of a high value species.				
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Source: ERM (2017)⁶⁶

The whole Project and study area have been affected by various interventions and human activity. It is also noted the presence of ecologically sensitive species at a distance determined from the proposed site.

The main impacts on biodiversity include the following:

- Impact due to vegetation clearing;
- Impacts from excavation and construction activities on habitats and species, specifically impacts on nest-building species, and the effect of sediment and pollutant deposition on surrounding water bodies;
- Installation of project access and internal roads and installation of transmission lines;
- Impacts on birds that use transmission towers for nests by building them all over wires or using tower holes;
- Impacts on water birds by possibly colliding with solar panels.

The construction period will be a short-term one and site-specific.

8.3.2. Impact assessment on Terrestrial Habitats

The most significant impact of the land preparation and construction phase of the Project would be habitat loss or degradation for terrestrial flora and fauna species, which would result in loss of species' populations for flora, and for fauna it would be losing areas important for their ecological functions. Given the construction activities will be limited to the footprint of the internal roads and buildings, the extent of the impact would be restricted.

Field surveys identified three habitat types in the AOI of the Project. An Area of Influence of 2 km radius was considered for the PV solar plant and 0.5 km for the OHL route. Referring to the additional Biodiversity baseline studies, the proposed project and associated infrastructures facilities encompass a diverse ecosystem and habitats. Six confirmed species that meet the CH thresholds for Criteria 1-3 / Criteria ii-iv: wetland habitats within the Karavasta KBA are CH for Dalmatian Pelican and Pygmy Cormorant; and wetland and aquatic habitats within the PV plant and along the transmission line route are CH for the Albanian Water Frog; wetland habitats within the Karavasta KBA are CH for four species of fish.

For this is required that BMP and BAP will be completed before construction work start.

The PV plant area is represented by abandoned agricultural lands, salt meadows, marshes and reeds, typical for drainage and irrigation channels in the area. The potential area of influence around the PV solar plant is represented by more significant habitats, including wetlands, lagoons, sand dunes and coastal coniferous forest in the north-western part which are typically populated by Mediterranean association species. Along the OHL route, including the buffer area, encompasses abandoned, agricultural lands and semi-natural lands used for hay production, as well as pasture lands. The habitats are represented by salty marshes and meadows, reeds in drainage and irrigation channels, coniferous forest in surroundings or riparian habitat of the river Seman, olive trees parcels and with the majority comprising of mixed mosaic agricultural lands.

There are a few habitats that are of special interest in terms of protected status which lie within and/or adjacent the defined Aol, but not classified as priority or critical habitats by the EU Habitats Directive (Annex I). Based on the baseline surveys there are no classified habitats within the project footprint that have a

⁶⁶ ESIA Report for 100 MW Veltor Solar Plant, Telengana, March 2017



protected status of less or more than 5% of the global extent of an ecosystem type with IUCN status of CR or EN.

Within the PDA area have been observed (i) Mediterranean salt marshes (mostly on the secondary drain canals) where the water stays for a longer time (Code 1310), (ii) salt meadows in drier places, and saline soils (code 1410) and (iii) drainage channels/reedbeds (code 72A0). The first is dominated by *Salicornia europaea*, the second by *Juncus maritima* and *Tamarix dalmatica*, and the third by the aquatic plants *Phragmites australis*, *Typha angustifolia*, *Scirpus lacustris*, etc.

The 1410 Mediterranean salt meadows and 1310 *Salicornia* and other annuals colonizing mud and sand, are not classified as priority type habitats, are listed on Annex I of the EU Habitats Directive. 'Small areas of the former saltmarsh habitat are naturally modified within the PV plant, following abandonment of agricultural cultivation.

8.3.2.1. Potential impacts during construction phase

The key impacts on habitats during construction are mainly limited to the project footprint, including the PV solar plant and OHL route. The estimated project area will be affected by various construction works and activities during this phase. The area of influence or buffer area is created with the only scope of avoiding any associated risks due to the project development and increase the attention of workers, staff and contractors during work activities. The project goal during the ESIA phase was to avoid to the highest extent possible direct interaction with any protected area and/or high priority habitat. As mentioned above, the PV plant area includes mainly habitats with no or very low interest in terms of biodiversity diversity and ecological protected status. Five habitats are identified as PBFs, as defined by IFC PS6.

The PV plant is located in an area with a mixture of Natural and Modified Habitat and therefore PS6 paragraphs 12 and 17-19 are applicable (IFC 2012).

Based on the baseline studies, the OHL route does not encompass any high priority or critical habitat type and due to the typology of construction works to be conducted there are no anticipated risks. The construction of each OHL tower pylons will necessitate the removal of soil and surface vegetation from comparatively small areas of land for laying tower foundations. For the OHL the construction works will be minimal in this area and easily managed through various mitigation measures.

Introduction or spread of non-native invasive species accidentally is also a risk that can occur during construction activities which may cause impact with minor to moderate magnitude.

The improper disposal of excavation material is a potential factor that may impact on habitats during construction activities in case of improper management of solid wastes. The relatively small amounts of excavation and waste material that will be generated by the Project during construction activities, in relation to the expanse of largely uniform habitat along the majority of the project footprint means that related impacts are not significant.

Based on the aforementioned discussions, the significance of impacts on habitats for the PV solar plant and OHL route is rated as below.

Aspect					
Earthworks, vehicle movement, PV modules installations, tower and cable installations for the OHL					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long-term	Local	One-off	Likely	Moderate - PV Plant and OHL
Receptor					Sensitivity



Local habitats, biodiversity species, habitats listed in Annex I of the EU Habitat Directive	Moderate - PV Plant and OHL
Overall Significance of Impact	
Moderate – PV Plant and OHL	

Management and Mitigation

Mitigation of impacts in relation to habitats will be managed through the development of the ESMP and BMP, which will specify appropriate measures for the management of site clearance and excavation activities, training of staff for the preservation of biodiversity values, and soil and waste management both along the PV solar plant and OHL, as well as for associated infrastructure, such as base camp and any small length access/entrance roads, etc.

In areas of Modified Habitat, the project should minimize impacts to biodiversity and implement mitigation measures as appropriate. In areas of Critical Habitat, projects are required to demonstrate:

- No other viable alternatives within the region exist for development of the project on Modified or Natural Habitats that are not critical;
- The project does not lead to measurable adverse impacts on those biodiversity values for which the Critical Habitat was designated, and on the ecological processes supporting those biodiversity values;
- The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and,

Where the Project will have significant, adverse and irreversible impacts to PBFs, the Project should not implement any project-related activities unless appropriate mitigation measures are put in place, in accordance with the mitigation hierarchy, to ensure no net loss and preferably a net gain of priority biodiversity features over the long term, to achieve measurable conservation outcomes.

While this CHA has identified CH-qualifying species and PBFs, available information suggests that the Dalmatian Pelican, the Pygmy Cormorant, and four species of fish occupy coastal lagoons and water surfaces that do not overlap with the Project footprint (PDA, OHL and access roads). Available data suggests that drainage ditches in the Project area have suitable habitat for the Albanian Water Frog.

As the Project must also comply with PS6 (IFC 2012), and Guidance Note 6 paragraph GN93 to GN98 (IFC 2019) by:

- Demonstrating that Project's operations within the protected area are in line with national law;
- Developing the Project in a manner which is consistent with any management plans that exist for the area;
- Consulting with protected area staff, or officials responsible for management of the area; and
- Developing, and implementing, additional programmes to 'promote and enhance the conservation aims of the area'.
- All mitigation measures will also be included in Biodiversity Action Plan (BAP) for Construction Phase.
- Establishment of working strip to restrict area (If any) of impacts to within OHL working corridor;
- Road construction works will be confined to the road working strip where practically possible;
- Road construction/ upgrading will follow existing tracks and trails where possible;
- Permanent infrastructure to be sited on unused land of no particular ecological value;



- No construction materials will be taken from the surrounding environment unless approved by the responsible authority;
- Avoidance of forested areas and any other valuable environmental resource identified during route refinement;
- Restoration of sites to their original condition where possible upon completion of construction; and
- Retain original vegetation where possible for reinstatement.
- Establish a pre-post construction biodiversity baseline from which all mitigation, restoration, and loss / degradation can be measured. Project Developer need to develop a Biodiversity Management Plan (BMP) that details the mitigation and monitoring measures that will be implemented during construction and operation phases of the Project to avoid and minimise impacts to CH-qualifying features and PBFs, and restore habitat for these features on-site and verify the levels of impacts occurring; and,
- A Biodiversity Action Plan (BAP) that quantifies the residual impacts to CH-qualifying features and PBFs, and proposes conservation actions that would support the Project meet its commitments to these features as required by PS6 and PR6, and promotes the conservation aims and effective management of the Karavasta KBA.
- An ecologist/biologist or environmental expert will be required to supervise the habitat clearance works and provide advice to the workforce when required.
- Avoid disturbance or works within the drainage and irrigation channels within the PDA, and where works are required to safeguard the project as part of drainage scheme, ensure works are undertaken sensitively and rehabilitation the channels to ensure no net loss in habitat.
- Environmentally sensitive areas and critical habitats in surroundings of the project areas will be clearly marked and mapped as 'No-Go Areas' and access by staff and contractors will be strictly forbidden, until the relocation of habitat out of PDA is completed.
- Limit site clearance activities to only those areas where this is required and avoid where possible the removal of vegetation or disturbance of habitats.
- Vegetation clearance within the project footprint will be undertaken by the EPC Contractor in a progressive manner, working from the center towards the edge of the construction site. This should enable fauna to move away from the area of works, disperse into surrounding habitats and should prevent the possibility of fauna being isolated in fragmented areas of habitat.
- Routine checks will be undertaken to ensure vegetation clearance is confined to defined areas of disturbance and periodic checks will also be undertaken supervising engineers.
- The Biodiversity Expert will be on site during vegetation clearing and to assist the workforce where required.
- If working sites are open in the period 1st March – 31st July (bird breeding season) pre-vegetation clearance surveys will be undertaken by qualified ornithologists. Should nests of species of conservation concern (species listed in Bern Convention, EU Birds Directive or Albanian national law) be located in the working strip, the strip shall be optimized so that no works are carried out within a 15 m buffer of the nest site until chicks have fledged from the nest or it is abandoned.
- Any construction work within drainage channels will be prohibited. Signage will be erected to communicate awareness.
- Burning of waste or vegetation on-site will be prohibited.
- All employees, contractors and staff working on site will undergo induction training covering the key procedures and protocols relevant to an individual's area of work that are included within this BMP.
- Driver induction should include awareness of fauna on site and the sensitivities thereof.
- Any topsoil cleared will be conserved in designated stockpiles. Stockpile locations should be selected to avoid vegetated areas and be at least 20 metres from any water body.



- All open excavations should be routinely checked each morning to see whether any animals have become trapped in the excavations.
- Should any protected fauna species be identified during construction activities the areas where these species are observed will be demarcated and warning signs for workers/drivers will be erected
- A gap of at least 5-10 cm should be retained at the base of fences on site to allow for small animals to move freely across the site.
- No trees shall be cut/trimmed during the nesting/maternity period for birds and bats (between April and July).
- Avoid the accumulation of stagnant water and organic waste within the construction site and on the roads, that could attract wildlife, especially amphibians. This is especially important of the potential occurrence of the Red listed Albanian Water Frog.
- No wastewater shall be directly discharged to the environment. Chemical toilets shall be provided to workers and regularly emptied and cleaned under a safe protocol.
- Project construction will not be undertaken at dusk, dawn and at night to avoid disturbance to nocturnal and crepuscular fauna (i.e., protected status fauna species, bats, etc.) from increased noise and vibration.
- Poaching, hunting and fishing will be strictly forbidden. This will be communicated in both the induction and training of on-site workers.
- The speed limit of 30 km/hr should be adhered to on-site. Adequate signage and awareness through induction should enforce this.
- Fishing and the collection of aquatic natural resources within or in the vicinity of the project will be prohibited to minimize impacts to aquatic habitats and species.
- Signage will be erected for general awareness.
- This rule will be included in site induction and worker training.
- Implement measures to prevent the transport of excess sediment to the downstream environment due to erosion where required on a site-by-site basis. This will include the erection of silt barriers within the riparian areas and wetlands, or the use of any other appropriate methods such as hay bales, spoil berms, geotextile and dewatering and bypass methods.
- Refuelling of vehicles and machinery will be restricted to designated refuelling locations, which will be located at least 50 meters from any waterbody.
- Aquatic Natural Habitat that is impacted by temporary construction activities (temporary roads, wetland and river crossings, structures) will be fully reinstated to pre-construction conditions on completion of construction works.
- On PDA and OHL route sections through open land habitats (meadows etc..) important for breeding birds, birds will be discouraged from these areas by installing plastic bands (e.g., warning tape) or flags that flutter in the wind, before bird breeding season starts i.e., before March 1st.
- In sensitive habitat areas, measures to discourage nesting activity should be employed like flags or use of tape. Where this does discourage breeding, vegetation removal can occur (following a pre-vegetation removal check) at any time of the year unless wider disturbance is identified as a key issue;
- Translocate important flora species to other suitable areas;
- Micro-siting of the route to be done, where possible, for best position available for biodiversity (Particularly important where areas of European Priority Habitats and designated sites are affected);
- Habitat compensation measures should be considered where required to replace permanently lost and damaged habitats. This may include new habitat creation, restoration of damaged habitats and habitat enhancement; and
- Ecological awareness training should be provided to all personnel.
- Establish BAP or if necessary, a Forest Fire Risk Prevention Plan;
- Avoid where possible works during winter months when mudflat habitat is likely to be flooded and where impacts will be greater.



Residual Impact

Following implementation of mitigation and management measures, the residual impact will be:

Minor – PV Plant and OHL

8.3.2.2. Potential impacts during operation phase

During the operation phase both the PV facility and associated transmission line can be considered as passive in nature, and there will be no construction works or any other heavy work activities, therefore no impacts are anticipated. The PV solar plant and OHL will only require periodic maintenance which will mostly be associated with minor interventions and repairs of the PV modules or electric cables and associated facilities. Once the PDA and transmission line has been constructed, the only impacts relate to operations and maintenance activities, which principally relates to vegetation and erosion/sedimentation controls to manage wetland habitat under the solar panels.

Minor – PV Plant and OHL

Management and Mitigation

Potential damage to local habitats will be managed by ensuring that only designated access tracks will be used for maintenance of the traffic and the appropriate handling and use of paints and chemicals.

Mitigation of impacts in relation to habitats will be managed through the development of the ESMP, BMP and BAP, which will specify appropriate measures for the management of maintenance activities, training of staff for the preservation of biodiversity values, and soil and waste management both along the PV solar plant and OHL, as well as for associated infrastructure, such as small length access / entrance roads, etc.

As a result, impacts on habitats during this phase are considered to be negligible.

Negligible – PV Plant and OHL

8.3.2.3. Potential impacts during decommissioning phase

During this phase the project facilities and structures will be removed. The affected project footprint will be restored and rehabilitated. The areas will be relieved from the project facilities, restored to their natural state and no other development will be performed. The impacts during this phase are rated:

Negligible to Minor – PV Plant and OHL

8.3.2.4. Cumulative impacts

No cumulative impacts on habitats are foreseen in relation to the proposed project.

Negligible – PV Plant and OHL

8.3.3. Impacts on Flora

The project, including the PV solar plant and OHL route passes through mixed Mediterranean landscape of agricultural, abandoned, meadows and pasture lands. Vegetation in the PV solar plant area is dominated by salty marshes and meadow lands with low biodiversity values. The OHL route encompasses a larger area and a more diverse environment in terms of habitat diversity and biological species.

The field surveys have identified several habitats and biodiversity species within the project footprint area and area of influence. Each of the habitats has their own specifics and biodiversity species. In overall were observed 120 species under IUCN threatened status, from which 117 species are under LC Category, 5



species under DD category, and one species under the NT category (IUCN, 2021). Based on the Albanian Red List, within the zone of interest, there are 3 species are under the EN category and 8 species under the VU category. However, there are no species that under Annex II & IV of EU Directive EEA meet the criteria for Priority Biodiversity Features present within the PDA and along the OHL route.

8.3.3.1. Important is to be analysed are the impacts of the main invasive species, which were observed during the field surveys. Potential impacts during construction phase

The key impact during construction includes the loss of vegetation cover over the 87 ha PV solar plant area. Vegetation clearance will be also required for the transmission line. This will be necessary during the excavation process at tower pylon construction sites and laying of access routes, however the numbers of plants and vegetation removed will be minor. The PV plant area possess no particularly important flora species within the direct project footprint to be affected by work activities. Vegetation in this area is represented by grass, bushes, shrubs and reeds, the latter ones observed in the drainage channels. The OHL route includes a limited variety of habitats and vegetation cover areas, mostly in agricultural and abandoned lands.

The baseline surveys identified no flora species with a priority or protected status.. The other flora species are classified as species with national protected status and rated as EN category and VU category. It is noteworthy to highlight that all these species area located outside of the project footprint area and area of influence (both PV plant and OHL). In this context there are no risks associated or impacts on flora species with protected status due to the project activities.

Construction works for the installation of the PV solar panels and foundations of the tower pylons will include earth movement (soil) and disturbance of the natural soil configuration in the project footprint areas. The removal of vegetation and soil in the site clearance footprint could result in alterations of hydrology of the areas and the surface water run-off regime, in particular for the PV plant. The loss of vegetation can also have an adverse effect on soil quality and hamper survival of neighbouring flora species, fauna species and foraging for herbivores in the area. However, considering the baseline conditions these risks are anticipated to be minimal.

Aspect					
Construction works, such as site clearance and excavation processes for the installation of PV solar modules and tower pylon installations for the OHL					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary (weeks)	On-site	Daily	Possible	Moderate - PV Plant and OHL
Receptor					Sensitivity
Local flora species					Low - PV Plant and OHL
Overall Significance of Impact					
Minor – PV Plant and OHL					

Management and Mitigation

Specific mitigations of potential impacts on flora are required during the construction phase, although the ESMP will provide for worker awareness and training sessions in relation to protection of local flora. This



may include procedure for the identification of rare and protected species for removal under license if necessary. Furthermore, mitigation of impacts in relation to fauna will be also managed through the development of the ESMP which will specify appropriate measures for the management of site clearance and excavation activities, and soil and waste management both along the OHL, as well as for associated infrastructure, such as worker base camp, access roads, etc.

A number of measures will be incorporated into the Project ESMP to prevent and/or minimize impacts on flora. These measures will include (but not limited to):

- Perform a pre-construction survey in specific key locations of the project prior to the commencement of construction works;
- Vegetation clearing shall be limited within the boundaries of the project footprint areas where it is absolutely necessary;
- Demarcate work areas clearly for construction workers to ensure that the disruption of vegetation does not occur outside of designated areas;
- A Biodiversity Management Plan (BMP) which will include demarcation of the flora species on-site by a botanist, identifying measures to protect them from any accidental damage during construction is developed;
- To the extent possible the site design will consider retaining as many flora species as possible, and the relocation (if necessary) of those that cannot be retained and protected;
- Provide training to staff to enable the identification of flora species with protection status; Rehabilitation of the site, and areas cleared during construction, encouraging the establishment of native flora species; details of this will be defined within the BMP.
- In general, compensation measures with native vegetation species would be a good example for the minimisation of environmental impacts.

Residual Impact

Following implementation of mitigation and management measures, the residual impact will be:

Negligible – PV Plant and OHL

8.3.3.2. Potential impacts during operation phase

During this phase there will be no impacts on flora as no work activities will be performed. There might be only localized maintenance activities within the PV plant area and along the OHL route, but these activities will not pose any effects on flora species. Some recent studies have found that rooftop PV panels can reduce daytime air temperature by 0.2–0.8°C during the summer time, causing a cooling effect⁶⁷. Precipitation and vegetation conditions are the key factors in determining local evapotranspiration (ET). In many ecosystems ET is dominated by plant transpiration even in the areas with low vegetation cover, similarly to the solar plant PDA. The PV plant will have little impact on vegetation after the construction of the PV plant, giving priority species more shade tolerant. The precipitation and ET over the PV plant and their surrounding area will not change following the construction of PV plant.

Natural vegetation growth will be allowed within the PV project area. The BMP will also cover management and monitoring of flora during the operation phase with the overall aim of no net loss of flora species within the project area when compared to the before project scenario.

After installation of the solar panels, the vegetation under the PV modules will periodically be cut to prevent shading of the panels, which in principle will limit their height to below 1 m. On the other hand, the installation of the PV plants will increase the surface roughness and slightly change the wind profile in the area. It can

⁶⁷ Zhang, X. and Xu, M., (2020). Assessing the Effects of Photovoltaic Power plants on Surface Temperature Using Remote Sensing Techniques. *Remote Sensing*, 12(11), p.1825.



be anticipated that the PV plant will have little effect on the vegetation growth due to maintaining a balanced effect between the temperature, soil moisture, and ET within the PV plant.

Management and Mitigation

The installation of PV plant modules will lead to keeping similar land conditions, barren land, which as a consequence may lead to soil erosion during rainy periods and/or in highly windy weather. So, to avoid such phenomenon it is recommended the cultivation of the specific plant species which provide good cooling effect by extracting heat from PV panels and that can be use in the barren land. Cultivating specific plants of certain economics benefit can be easily achieved as well (e.g., medicinal plants).

Negligible – PV Plant and OHL

8.3.3.3. Potential impacts during decommissioning phase

During the decommissioning phase there will be no impacts on flora species. All project structures and facilities will be removed and work activities will be conducted within the project areas of the PV solar plant and OHL. The affected areas will be restored and re-vegetated.

Negligible to Minor Positive – PV Plant and OHL

8.3.3.4. Cumulative impacts

No cumulative impacts are foreseen in relation to flora species.

Negligible – PV Plant and OHL

8.3.4. Impacts on Fauna and Terrestrial Ecology

8.3.4.1. Pre-construction and Construction Phase

During construction phase the changes in the natural habitats within the project footprint will pose effects on local fauna species. The potential fragmentation of habitats may also occur in the project area although the impact is anticipated to be of low significance. Beside the earthworks, the increased presence of traffic and people on site will also contribute to the disturbance of fauna species that are normally mobile in the area. Other activities which may contribute to impacts on fauna species include dust and noise emissions during the excavation processes and vehicle movement. Overall, the impacts on fauna will be negative during construction phase; however, they will be restricted to the project footprint boundaries of the PV solar plant and OHL. Most of the impacts are considered reversible over the long-term, except for the loss of the habitat in the PV plant site and OHL tower pylons which will be permanent for the whole project duration.

The baseline studies revealed that few fauna species with protected status were observed within the wider study area. This includes 13 species of mammals, including 8 bats, one rodent (*Muscardinus avellanarius*) and 4 carnivores (*Lutra lutra*, *Meles meles*, *Mustela putorius*, *Canis aureus*) are fulfilling the criteria of the Priority Biodiversity Features, being either Annex II and /or Annex IV EU Habitat Directive or species listed in the National Red List.

There are no important roosting sites for Bats in the PDA and areas intersected by the OHL routes, where Bats use both Blue 1 PV and OHL routes as foraging area for dozens of individuals of bats belonging to Pipistrelle species. Drainage channels of primary and second grade provide feeding grounds and commuting corridors for otter (*Lutra lutra*), Annex II species, and vulnerable species in the National Red list of Albania (2013). The PDA and most of OHL routes are part of the foraging area for European badger (*Meles meles*) and golden Jackal (*Canis aureus*), both red-listed in the National Red list of Albania (2013). Temporary ponds artificially created by sand extractions as well as rain-fed ponds behind the wooded sand dunes inside the Blue 1 PDA and along the OHL routes are important breeding sites during spring and early



summer for toads and frogs. The presence of the Albanian water frog (*Pelophylax shqipericus*) has been confirmed during April, 2022. This species is globally threatened and it has a limited distribution range. The principle of "Avoidance" should be applied to maintain and preserve these types of biotopes that are critical habitats for this endemic frog species.

Drainage channels in the Blue 1 PDA area and those intersected by the OHLs are important and sensitive habitats for aquatic life, including frogs, toads, terrapin and pond turtles as they provide freshwater breeding and feeding grounds for a number of species, including otter. Banks of the drainage channels provide shelter, breeding and feeding grounds for a number of reptiles, including *Testudo hermanni*, *Emys orbicularis*, *Podarcis tauricus/ionicus*, *Podarcis muralis*.

PDA ground preparation, cleaning of the vegetation along the drainage channels, upgrade of the access roads, fencing and lightning during night may interrupt the existing corridors for badger, otter and jackal during their daily commuting for forage and dispersal. However, the number of animals impacted is limited (two or three otters, badgers and a few jackals are using the PDA of Blue 1 as part of their hunting grounds and commuting corridors) and overall, the impact on these species is assessed as minor. These animals, nevertheless, are highly adaptive and will find other safer commuting corridors during night in the adjacent areas.

PDA ground preparation, cleaning of the vegetation along the drainage channels, upgrade of the access roads, especially the road passing through wooded sand dunes with Mediterranean pines, will also impact the population of the endemic Albanian frog, *Pelophylax shqipericus*, whose presence, was confirmed in the small ponds situated in depressions behind the wooded old dunes with *Pinus pinea* and *Pinus pinaster*. The upgrade of the access road passing through Pine forest is going to impact the remnant small populations of the species in the project area. It is vital that conservation measures are taken into consideration while design and implement the upgrade work of this access road.

Cleaning of drainage channels during breeding season (March-July), and upgrade of the access road to PDA for Blue 1, as it was the case with cleaning operation in drainage channels of Blue 1 PDA during May-June 2022, may have caused severe damage in amphibians' populations and pond turtles (especially tadpoles and juveniles). This operation should not have happened if the company would establish communication with drainage board of Fieri, who is in charge of maintaining the drainage scheme operational.

As already noted during 02 July, 2022, the upgrade of the existing access road from Semani beech to Hoxhara Sub-station would impact the habitats and species on both sides of the road, increase road-kills for slowly moving animals and further fragmentate habitats and species population. The upgrade of the road would increase the traffic and speed and these would result in enormous impacts on amphibians (juveniles) and reptiles trying to cross the road while commuting. Maintain connectivity and create safe corridors for animals to move from one side to the other is strongly recommended. Fresh tracks of otter (*Lutra lutra*) were observed today (02 July, 2022) on a small pond, divided by the access road into two separated water bodies. During breeding season, after the metamorphosis (April-May), thousands of tadpoles and juveniles leave these ponds and during this very moment high rate of road killing may happen.

The Pipistrelle bats are present in the project footprint area, while *Rhinolophus ferrumequinum* and *Myotis myotis* were observed inside the military bunkers at the top of the hill, west of Fieri city. The drainage channels and open terrains of salty marshes provide foraging grounds for pipistrelle bats. June and October 2021 and April 2022 site visit confirmed that none of the bats are using the existing bunkers inside the Blue 1 PDA for roosting, and thus the removal of these bunkers will not have any significant impacts on bats

The selected OHL routes are not intersected with the military bunkers, and therefore, no direct impact on this bat roosting site is anticipated.

These data show that besides the variety of the fauna species within the wider study area, their presence is limited within the project footprint area. A key factor influencing this evaluation is the fact that there are no protected areas within the project footprint or priority type habitats. Thus, the impact assessment rating is concluded as below.

Aspect



Construction works, vehicle movement, site clearance, excavation processes for the installation of PV solar modules and tower pylon installations for the OHL					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short-term	On-site	Daily	Possible	Medium - PV Plant and OHL
Receptor					Sensitivity
Local fauna species					Medium - PV Plant Low - OHL
Overall Significance of Impact					
Moderate – Blue 1 and 2 PV Plants					
Minor - OHL					

Avoidance, Minimisation / Mitigation and Restoration Measures

Mitigation of potential impacts on fauna will be managed through the development and implementation of the EHSSMP, which will provide for worker awareness and training sessions in relation to protection of local fauna, and a code of conduct that forbids poaching or deliberate killing of animals listed in baseline studies.

Specific mitigation measures for the protection of biodiversity are listed in the ESMP section; these measures are applicable to the management and mitigation of impacts of construction to terrestrial fauna as well as avifauna. Mitigation of potential impacts on fauna will be managed through the development and implementation of the Biodiversity and Restoration Management Plan (BRMP), which should include but not be limited to the following:

- Require the presence of a qualified ecologist during major earthworks in particular for works on drainage channels and upgrade of the access roads;
- Demarcate work areas clearly for construction workers to ensure that work activities do not occur outside of designated areas of the project;
- Maintain a distance of at least 30 m “no-go area” from the primary and second grade drainage channels as they are important breeding habitats for frogs, including the Albanian water frog (*Pelophylax shqipericus*), and other species of conservation concern that use this channel's network;
- Maintain the connectivity among the drainage channels (1st, 2nd and 3rd grade drainage channels) during the pre-construction, contraction and operation phase of the project, as they are of critical importance for wildlife conservation, including species of conservation concern (Albanian frog, other frogs, otter, pond turtles, golden jackal, badger)
- Incorporation of protection measures for the protected fauna species as some of them hold a protection status according to the Albanian and IUCN Red Lists;
- Ensure that all drivers receive training on the ecological sensitivities and driving techniques required to minimize disturbance to fauna which may be nocturnal or have specific migratory routes during the day;
- Speed limits of vehicles shall be established and enforced.
- Identify post construction rehabilitation measures that seek to enhance the local biodiversity and create habitats that support the local population of the identified key species



- provide for worker awareness and training sessions in relation to protection of local fauna, and a code of conduct that forbids poaching or deliberate killing of animals listed in baseline studies.
- Ensure a gap (around 15-20 cm) is provided under the fence around the whole site to ensure that small faunal species can continue to move through the site.
- Apply the restriction period “No drainage channel cleaning operations performed during breeding seasons (March-July)”, as this period is of critical importance for amphibians, including the endemic Albanian frog, and semiaquatic reptiles (water snakes, terrapins and pond turtles).
- No tree cutting will be performed during the nesting/maternity period for birds and bats (between April and July), during the same period new ground disturbance activities will also be limited in order to avoid disturbing ground nesting species;
- Night works will be avoided to reduce impacts to nocturnal fauna species, especially bats. This measure is also important to minimize the impact on juveniles (amphibians, reptiles) with limited dispersal ability. Most of juveniles after the completion of the metamorphosis (frogs, toads) leave the ponds and disperse, and this is a critical time of high mortality rate.
- Establish on-site conservation areas for natural habitats adjacent or within the Project sites that need to be protected from accidental disturbance during construction.
- Define temporary demarcation by highly visible wooden sticks (50 cm high) planted into the ground and /or flagging tape, while a more permanent fencing could be provided in areas of particular sensitivity (e.g., channels and wetlands);
- Avoid the accumulation of stagnant water and organic waste within the construction site and on the roads, that could attract wildlife, especially amphibians;
- Avoid spreading of invasive species by implementing an appropriate eradication activity;
- Restrict vehicle movement to the existing roads that connect the Project site with the surrounding areas. Off road driving shall be prohibited in order to avoid any unnecessary disturbance of natural vegetation and fauna.
- Install speed limits and animal crossing signs on the access road and enforce speed limit along the site access road;
- Domestic wastewater will be treated in package wastewater treatment plant. No water will be discharged. Chemical toilets will be provided to workers and periodically emptied under a safe protocol.
- Use of culverts/channels as appropriate to avoid impact on the stagnant water within and around the construction areas.
- Awareness among employees and contractor working on site about the protected species/habitats potentially present in the area will be developed, in order to ensure constant monitoring and promote actions to be taken if wildlife is encountered.

Residual Impact

Following implementation of mitigation and management measures, the residual impact will be:

Minor – PV Plant and OHL

8.3.4.2. Potential impacts during operation phase

During this phase there will be some impacts on terrestrial fauna. They are related with systematic maintenance works of the drainage channels and maintenance of the access roads. Although there might be only localized maintenance activities within the Blue 1 PV plant area, along the OHL routes and access roads, these activities may pose significant local effects on fauna species if not implemented as designed.

Potential damage to local fauna will be managed by ensuring that “No drainage channel cleaning operations and access road improvements and maintenance are performed during breeding seasons (March-July)”. Other impacts can be managed through traffic management and the appropriate handling and use of paints



and chemicals. These will be managed through the operational BMP and ESMP, which will also provide for worker awareness and training sessions in relation to protection of local fauna, and a code of conduct that forbids poaching or deliberate killing of animals listed in baseline studies.

The use of pesticide for the management of alien invasive species will be under strict control and on as necessary. No agents identified as being prohibited will be used and wherever possible mechanical means will be the preferred method. Use of any toxic/non-biodegradable pesticides will be prohibited in accordance with the Stockholm Convention on banned chemicals. Only organic, chloride-free, and environmentally friendly fertilizers will be allowed to apply.

Specific mitigation measures for the protection of biodiversity for operation period should include the following measures:

- The Project should develop the BMP to cover the operational phase of the Project (see Construction Phase mitigation measures above), and includes the identification and implementation of biodiversity enhancement measures and provide the scope for ongoing biodiversity monitoring.
- Apply the restriction period “No drainage channel cleaning operations performed during breeding seasons (March-July)”, as this period is of critical importance for amphibians, including the endemic Albanian frog, and semiaquatic reptiles (water snakes, terrapins and pond turtles).
- Ensure a gap (around 15-20 cm) is provided under the fence to ensure that small faunal species can continue to move freely through the site.

Negligible – PV Plant and OHL

8.3.4.3. Potential impacts during decommissioning phase

During the decommissioning phase there will be no impacts on flora species. All project structures and facilities will be removed and work activities will be conducted within the project areas of the Blue 1 PV solar plant and OHL. The affected areas will be restored and re-vegetated.

Minor – PV Plant and OHL

8.3.4.4. Cumulative impacts

Near the proposed project area, there are other construction works occurring in the vicinity, like the new Hoxhara Substation and the construction of a short OHL by TAP project connecting to the substation. These construction works occurring in the vicinity and simultaneously may create cumulative negative impacts on fauna. During the operation phase, maintenance of drainage channels from third-parties like drainage board and municipality of Fier may create disturbance in combination to the sensitive habitats and species along the channels and extended to the surrounding areas near the solar PV project. For both phases, the Project management team should apply strictly monitoring and the mitigation measures in coordination with third parties' activities.

The final assessment for cumulative impacts is as follows:

Minor – PV Plant and OHL (after mitigation)

8.3.5. Impact Assessment on Aquatic Habitats and Species

Due to the fact that installation of solar power equipment requires occupation of land, removing vegetation, use of a large quantity of water, etc, the possible impacts to water resources and associated aquatic livings



include the erosion of topsoil, increase of sediment load or turbidity in drainage and irrigation channels affecting thus aquatic species, reduction in the filtration of pollutants from air and rainwater, the reduction of groundwater recharge, etc.

8.3.5.1. Potential impacts during construction phase

Construction works for the installation of the PV solar panels and foundations of the tower pylons will include earth movement (soil) and disturbance of the natural soil configuration in the project footprint areas. These activities could result in alterations of hydrology of the affected areas by the project and alterations of the surface water run-off regime, in particular for the PV plant. This could further result in sedimentation of surface drainage channels, which may impact upon the quality of natural water systems and ultimately the biological aquatic systems that use these water bodies. Although it is noted that all drainage channels will remain within the PDA and there will only be rehabilitation works on some selected tertiary channels to reinstate them to their original design and functioning. The baseline survey revealed that there are no aquatic plant species with protected status within the PV plant area.

There are no Critically Endangered (CR) or Endangered (EN) aquatic species identified inside Project footprint through surveys.

Potential Impacts during Construction are listed below showing in which case the impact is direct and Indirect:

- Loss of aquatic habitats (direct impact)
- Changes to aquatic habitat functionality (Indirect impact)
- Barrier creation, fragmentation and edge effects (direct impact)
- Mortality, equipment movement (Indirect impact)
- Ecosystem services (Indirect impact).

This means that construction works in these sites have to be conducted on adequate mitigation and management measures.

Further on the supporting infrastructure (e.g., access roads rehabilitation and electrical facilities/ equipment) and the spacing requirement of the panels can result in an increased impact in terms of actual space (PDA) of the panels themselves. In summary the following impacts on aquatic ecology may be associated with construction work activities:

- The habitat changes, infrastructure and land preparation activities (e.g., vegetation clearing, removal of upper soil layers) can fragment aquatic habitats (ones the removed upper soil is disposed in non-proper locations) and become a barrier to the movement of species, affect hiding places, preying strategies and the availability of food.
- Discharge of used water in non-proper locations might affect the water bodies/pools and connectivity (through increased water temperature and decrease of salinity), pursuing thus the appearance of alien species and the spread of mosquitofish (*Gambusia holbrooki*), replacing the killifish (*Aphanius fasciatus*) that lives in brackish and salty coastal waters.
- The aquatic habitats might be affected by pollution due to the fact that in order to keep panel access to the sun, the cleared land is often maintained with dust suppressants and herbicides (in addition to other toxins used in panel operation). The use of dust avoidance components can both increase runoff and alter key chemical and physical properties of adjacent water connections when washed out.

Aspect



Construction works, such as site clearance and excavation processes for the installation of PV solar modules and tower pylon installations for the OHL

Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Temporary	On-site	Daily	Possible	Medium - PV Plant Low - OHL
Receptor					Sensitivity
Local aquatic ecology species.					Low - PV Plant Medium - OHL
Overall Significance of Impact					
Moderate – PV Plant					
Minor – OHL					

Management and Mitigation

Mitigation of impacts in relation to aquatic ecology will be managed through the development of the ESMP and BMP, which will specify appropriate measures for the management of site clearance and excavation activities, aquatic ecology protection, soil and waste management both within the PV solar plant footprint and along OHL route, as well as for associated infrastructure. Some of these mitigation measures are as follows:

- Staff and contractors will develop an Erosion and Sediment Control Procedure within the CEMP to minimise the risk of adverse impacts to waterbodies near the PDA arising from construction activities, erosion and suspended sediments on aquatic ecology and their habitats. These include surface water management infrastructure (e.g., cut-off / diversion drains, velocity dissipation devices, culverts) to be installed in appropriate locations to minimise and control surface water
- Maintenance of the pools along the drainage system (or establishment of new ones during both construction and operational phase of the project) will enable the survival of macro-invertebrates and specific water-related species, particularly during the low level of water seasons.
- Vegetation clearance and topsoil removal are one of the activities that will impact the aquatic ecosystems due to accelerated erosion.
- Moving of machineries during the construction phase on both intermittent and perennial surface waters, their channel connections, and associated wetlands are unlikely to be permitted because of the type of intervention. However, intermittent and ephemeral flows need to be avoided as much as possible.
- Direct disturbance to intermittent and ephemeral waters would result from site grading and from modifying flow pathways to avoid the runoffs to PV facility infrastructure. Consequently, changes in surface water flow could affect the transport of sediment, nutrients, minerals, and organic matter that maintains habitat and other processes in downstream reaches.
- Apply the restriction period “No drainage channel cleaning operations performed during breeding seasons (March-July)”, as this period is of critical importance for amphibians, including the endemic Albanian frog, and semiaquatic reptiles.



- Emergency spill management procedures will be in place to minimise the risk of impacts to receiving aquatic habitats and species. This will be communicated to all relevant staff and contractors during their induction.
- Project staff and contractors will be banned from fishing and the collection of aquatic natural resources within or in the vicinity of the project to minimise impacts to aquatic habitats and species.
- If trees are cut, they should be replaced with mostly indigenous species. Provision should be made for an irrigation network and maintenance of greenery.
- The use of pesticides and herbicides for management of vegetation will be banned. If vegetation control is required mechanical methods will be considered, along with the use of organic fertilisers.
- Environmental education and awareness programmes will be conducted for project staff and contractors (e.g., through staff inductions) to emphasise the importance of conserving biodiversity for wildlife and communities.
- Establish buffer zones around perennial and larger temporary surface waters/Maintain a distance/buffer zone of at least 30 m “no-go area” from the primary and second grade drainage channels as they are important fish spawning and migration ways that use this channel's network.
- Avoid high-value aquatic habitats, including ponds, waterways (temporary and perennial), riparian habitat, and habitats supporting protected species.
- Avoid surface water or groundwater withdrawals that affect sensitive habitats (e.g., aquatic, wetland, and riparian habitats).
- Maintain small ponds or create new ones inside the project area.
- Follow recommended dust abatement practices.
- Limit chemical used during regular site maintenance to non-persistent chemicals.
- Decontaminate equipment used in surface water.
- Monitor disturbed areas for invasive alien species and eradicate these species when found.
- Design waterways crossings to allow for and maintain uninterrupted movement and safe passage of fish during all project periods.

Residual Impact

Following implementation of mitigation and management measures, the residual impact will be:

Minor – PV Plant
Negligible – OHL

8.3.5.2. Potential impacts during operation phase

During this phase there will be no impacts on aquatic ecology as no work activities will be performed.

Regarding the flooding in this area, there is a small risk that may result in cases of flooding in the area, but this risk is manageable as:

- There is a pump storage system pre-existing located not far from the PV plant and managed and will be managed by the local authorities, independently of Project developer.
- Developer responsibility is limited to the maintenance of drainage ditches and canals inside the PV plant.



There might be only localized maintenance activities within the PV plant area and along the OHL route, but these activities will not pose any effects on the aquatic biodiversity species. Pollution of waters of streams should be avoided with the uncontrolled use of pesticides and fertilizers in the plantation areas and during maintenance operations. The Project will also undertake periodic maintenance works on the drainage channels inside the PV plant to ensure they are functioning as required as well as Developer will insist that Local Authorities will maintain periodically the cleaning of channels outside of PV Plant till to the pump Station, and this could bring benefit to aquatic species by ensure good flow regimes are maintained which should improve overall water quality.

The Project will also undertake periodic maintenance works on the drainage channels to ensure they are functioning as required, and this could bring benefit to aquatic species by ensure good flow regimes are maintained which should improve overall water quality. The BMP for the operation phase of the project should consider the protection and potential enhancement of biodiversity features present within the drainage channels, and in particular during maintenance of the channels. Furthermore, the BMP will include scope of on-going monitoring of aquatic habitats within the PDA.

Negligible – PV Plant and OHL

Management and Mitigation

Following the PDA Blue 1 location of solar panel investment is in a considerable distance from the Lagoon of Darezeza/Petriti, and River Semani as well.

The application of dust suppressants will occur throughout the operational period, where they could enter aquatic habitats following rainfall. Dust suppressants are used to reduce the deposition of dust on mirrors and panels and consist primarily of chloride salts and brines. Dust suppressants have been found to increase runoff into streams potentially resulting in scour impacts on aquatic communities.

Soil and Water Intervention/Conservation related to drainage system infrastructure works should preferably be conducted start during the months July-August ones the period of active biological live is completed. Improved Drainage channels management practices in the lower catchment such as diggings and soil and water control, reeds cuttings etc., during the species reproduction time might directly affect sub-populations and survival.

The first step in designing erosion mitigation measures is to identify erosion prone areas such as drainage channels of different grade, areas with unstable slopes, deforested areas and areas with easily erodible soil types. This is followed by an in-depth assessment of the land servitude and the upper and lower catchment areas for real or potential soil erosion problems due to runoff from the channel side intervention.

8.3.5.3. Potential impacts during decommissioning phase

During the decommissioning phase impacts on aquatic ecology will be similar to those during construction. All project structures and facilities will be removed and work activities will be conducted within the project areas of the PV solar plant and OHL. The affected areas will be restored and re-vegetated.

Minor – PV Plant

Negligible - OHL

8.3.5.4. Cumulative impacts

Cumulatively, these changes in hydrology, geomorphology, nutrient cycling, and sediment dynamics have some minor implications for aquatic ecosystems and biodiversity.

Similar to cumulative impacts on fauna, these construction works occurring in the vicinity and simultaneously may create cumulative negative impacts on aquatic species. During the operation phase, maintenance of drainage channels from third-parties like the regional drainage board and municipality of Fier may create additional disturbance in combination to the sensitive aquatic habitats and species along



the channels and extended to the surrounding areas near the solar PV project. For both phases, the Project management team should apply strictly monitoring and the mitigation measures in coordination with third parties' activities.

Minor – PV Plant and OHL

8.3.6. Impacts on Avifauna

25 species of birds were recorded in the PDA corresponding with the autumn migration season. The majority of birds belonged to the group of passerine species such as Cetti's Warbler (*Cettia cetti*), Crested Lark (*Galerida cristata*), Eurasian Magpie (*Pica pica*), Hooded Crow (*Corvus cornix*), European Goldfinch (*Carduelis carduelis*) etc. Most of the species present in the area are indeed resident species while a few others represent typical wintering species such as Meadow Pipit (*Anthus pratensis*), and Water Pipit (*Anthus spinoletta*). The presence of the above birds in flocs in the open grounds of the PDA demonstrates that the area serves as a foraging ground for at least 25 species. Again, the drainage ditches were important for waterbirds, Common Moorhen (*Gallinula chloropus*) and Little Grebe (*Tachybaptus ruficollis*) as well as for a number of passerines. Furthermore, the visits registered the presence of one specie part of Annex 1 of the Birds Directive and two species considered as Vulnerable both in the National Red list of Bird species.

The proposed OHL route is similar with regard to habitat characteristics as they occur within the PDA of Blue 1 and Buffer zone of Blue 1. The transmission line crosses through two types of habitats including (i) the abandoned arable land, and (ii) the drainage ditches and channels. Around 24 bird species were observed in the OHL route, composed of 1 non-breeding species, 1 possible breeding and 22 confirmed breeding. The breeding bird's community is composed of species typical to agricultural land. The vegetation along the drainage channels is inhabited by breeding Great Reed Warbler (*Acrocephalus arundinaceus*), Eastern Olivaceous Warbler (*Iduna pallida*), Cetti's Warbler (*Cettia cetti*) etc. Adjacent pine forest habitats are a breeding ground for European Goldfinch (*Carduelis carduelis*), Greenfinch (*Chloris chloris*), Cuckoo (*Cuculus canorus*), Icterine Warbler (*Cuculus canorus*), Golden oriol (*Oriolus oriolus*) etc.

The majority of birds belonged to the group of passerine species. Again, the drainage ditches were important for waterbirds as well as for a number of passerines.

8.3.6.1. Potential impacts during construction phase

Bird species are likely to be affected by loss/degradation of breeding/feeding habitat and disturbance (presence of people, artificial lighting, dust and noise). Construction impacts will be confined to Project Site and OHL routes with 500m corridor. The habitats affected by the construction are common at the national and local level and the areas affected directly are relatively small. The impact is expected to be more significant for birds occurring within the PDA while for other birds it is likely to be not significant as they are highly mobile.

Among the bird species that are present or likely to occur within the Aol, Thirty-five species of birds are classified as Priority Biodiversity features, but none of them trigger a CH.

Based on the above as well as information provided in the baseline section Avifauna and on the characteristic of the avifauna community for each project area, the Consultant considers that the potential adverse effects during construction phase will likely be of variable significance. It is worth noting that the impact would be higher if construction works are undertaken during the breeding season, i.e., March-August. Overall, the impact assessment rating will be as follows.

Aspect
Construction activities, vehicle movement, equipment and machinery working, traffic and presence of humans on site



Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short-term	On-site (local)	Daily	Possible	Medium - PV Plant and OHL
Receptor					Sensitivity
Local and migratory avifauna species.					Medium - PV Plant Medium - OHL
Overall Significance of Impact					
Moderate – PV Plant and OHL					

Management and Mitigation

Mitigation of potential impacts on fauna and avifauna will be managed through the development and implementation of the ESMP and associated Biodiversity Management Plan (BMP), which will provide for worker awareness and training sessions in relation to protection of local avifauna, and a code of conduct that forbids disturbance, poaching or deliberate killing of animals listed in baseline studies and present in the project site. Specific mitigation measures for the protection of biodiversity during construction should include the following measures:

- The Consultant undertook additional breeding birds' surveys in Spring and Autumn 2021 to confirm whether breeding and nesting birds were present in the PDA. Further recommendations are suggested for the EPC Contractor to perform additional preconstruction and during construction surveys on fauna species and birds.
- The Project should develop the BMP to cover the construction phase of the Project (see above) and includes the identification and implementation of biodiversity enhancement measures.
- Avoid construction works during breeding season, i.e., between late March-mid-August or require the presence of a qualified ornithologist during major earthworks in particular for works on soil levelling and work in drainage channels;
- During the construction activities, identify places where fauna species with protected status are most often observed, demarcate the area and install warning signs for workers/drivers.
- Maintain a distance of at least 30 m "no-go area" from the primary and second grade drainage channels as they are important breeding and migratory habitats for several bird species;
- No tree cutting and vegetation clean shall be-up should be performed during the breeding season. During the same period new ground disturbance activities shall also be limited in order to avoid disturbing the ground nesting species;
- Pre-clearance checks will be undertaken by an experienced ornithologist for ground and tree nesting birds within the working width prior to the commencement of the habitat clearance works to avoid causing disturbance or harm to nesting birds and their young from collisions with machinery. A 'no-go area' comprising a 5 m radius will be demarcated around each active nest by the Project contractors with guidance from the ornithologist. And the habitat clearance will be prohibited within these 'no-go areas' until the birds have fledged.
- Monitoring of bat collision fatalities following a standardized methodology potentially using trained dogs. Monitoring to be completed monthly and concurrently with bird collision monitoring.



- THE CH study has not identified a need to take additional measures on site during the bird migration seasons. However, if it were identified to be necessary based on the results of collision fatality monitoring additional measures will be need to be implemented.
- Night works shall be avoided (from 8 pm to 6 am at least) to reduce impacts to nocturnal birds;
- Restrict vehicle movement to the existing roads that connect the Project site with the surrounding areas. Off-road driving shall be prohibited in order to avoid any unnecessary disturbance of natural vegetation and fauna. Speed limits of vehicles shall be established and enforced in order to avoid any accident with birds;
- Conduct regular awareness-building and environmental education campaigns for workers:
- Ensure construction site areas and base camp are kept clean, and that good practice with respect to waste management is applied, to ensure food attraction sources are eliminated;
- Engage suitably qualified biodiversity expert(s) to undertake the necessary training, awareness raising, and necessary survey work.

Residual Impact

The residual impact is susceptible for species of conservation concern such as the Dalmatian Pelican (*Pelecanus crispus*), Pygmy Cormorant (*Microcarbo pygmaeus*) and Collared Pratincole (*Glareola pratincola*).

The project will have no residual impacts upon the Dalmatian Pelican and the Pygmy Cormorant as those waterbird species are strictly related to water surfaces. Even during their movements from one wetland site to the other, they do follow the water surfaces with very rare passages above the PDA and the OHL Karasvasta-Fier. The OHL does not interfere with the migratory routes for waterbirds which compose the majority of the migratory birds using the Eastern Adriatic Flyway.

Meanwhile, the Collared Pratincole will be affected only by the loss of a potential foraging habitats. Nevertheless, the surrounding areas are occupied by the similar habitat and it is very likely that the Collared Pratincole will forage in the adjacent habitats.

Following implementation of mitigation and management measures, the residual impact will be:

Minor – PV Plant and OHL

8.3.6.2. Potential impacts during operation phase

There are several risks to birds associated with operation and presence of the Project, but these principally relate to the power transmission line component and include:

- Collision with power lines;
- Electrocution with electric pylons during perching.

Once the PV Panels are installed, the site appearance from the air will be altered significantly which may cause potential disorientation of birds from dense arrays of panels resembling water bodies and therefore potential for collision mortality.

There is limited evidence of birds getting confused by the presence of PV panels mistaking them for a water body or resource; however, should this phenomenon occur, it will be quickly identified through biodiversity monitoring programme to be developed within the BMP during the operation phase of the project. Birds may use power line towers as a perch during hunting, nesting and rest, where they can be exposed to electrocution depending on the design and insulation of the electric pylons. Large birds can also die through collision with powerlines. The risk of collision is higher in areas of large bird concentrations such as migratory routes or sites connecting important bird areas. Such areas include water bodies or wetlands used as stop-over sites, feeding or nesting sites, or where the peculiarities of the terrain narrow the migration routes.



The rest of the bird species is composed by terrestrial birds or those closely related to terrestrial habitats. The most common terrestrial birds are birds of prey (buzzards, falcons, eagles etc.) and passerines such as wagtails, swallows, larks, buntings, sparrows etc

Waterbirds tend to migrate through corridors over the water bodies. This was observed also during our surveys in both the PDA and OHL where a very limited number of waterbirds have been recorded in the terrestrial habitats of PDA and OHL. Furthermore, the OHL does not cross the large open water bodies. As such the impact of the OHL, construction and operation phase, on waterbirds is very likely to be of minor importance.

Furthermore, the installation of bird diverters would reduce the chances for collision.

Terrestrial waterbirds will certainly use and migrate through the PDA and the areas crossed by OHL. The more relevant impact in such a case could be the collision with powerlines. Nevertheless, this impact will be only of minor importance if mitigation measures such as the placement of bird diverters are undertaken before the project operation phase.

During this phase, consideration has to be paid to bird species with protection status and migratory birds that may be damaged due to the presence of the PV panels on site and/or cross the proposed OHL route during the spring and autumn migrations.

Minor – PV Plant and OHL

Management and Mitigation

The following management and mitigation measures are recommended to further understand and reduce the potential impact associated with the operation of the PV solar plant and OHL:

- The BMP and BAP to cover the operational phase of the Project and includes the identification and implementation of biodiversity enhancement measures and restoration/rehabilitation measures.
- Install bird markers / diverters on OHL towers and powerlines;
- Bird friendly design of towers to reduce risk of electrocution;
- Additional biodiversity surveys (especially for birds), and monitoring of impact of existing line on bird mortality in the area.

The above key aspects are discussed further below.

Details of final and additional mitigation measures, including any required for specific species, will be detailed within the BMP and BAP and further enriched/ improved by the ornithological expert of the, following completion of the pre-construction surveys.

Bird Markers / Diverters

One of the key mitigation measures used to protect birds from collision with transmission lines is to use line markers (diverters) to increase their visibility. Bird markers will significantly reduce the risk of collisions of birds with wires. Bird markers on the line will improve the visibility of the lines and should provide sufficient mitigation. However, as part of the further avian monitoring specific attention should be paid to the presence of bird species with protected status and areas where they stopover within the project area, so that the levels of risks and any additional specific mitigation measures can be identified. Therefore, it is necessary to organize regular observations of possible spring (March) and autumn (September-October) flyover of the project area prior and during construction phases.

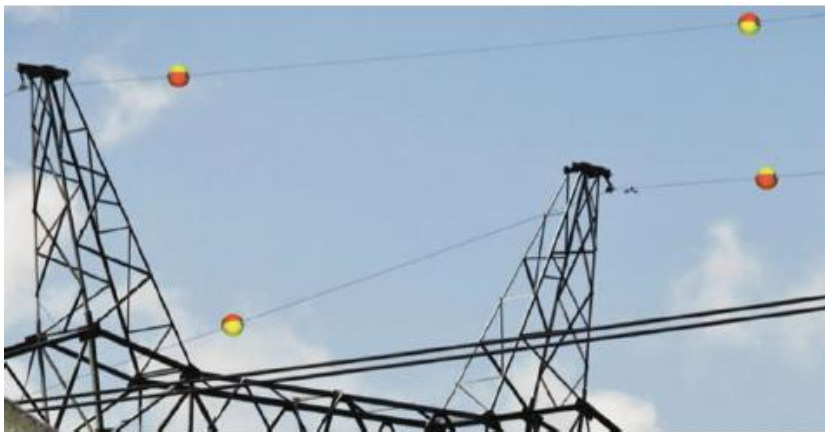


Figure 66 Examples of bird markers⁶⁸

Tower Design

Using bird-friendly power line designs is the most effective way of preventing electrocution on distribution lines; good designs protect birds by deterring perching and nesting, and by using insulated components and/or large air gaps. Proved successful examples of bird protective devices are often installed on the top of pylons to inhibit birds from landing on pylons, however, there is a risk that such measures are not bird friendly since may lead to collision with parts of the pylons due to difficulty in landing. Thus, such measures are recommended to be provided by relevant experts of the field.

Residual Impact

The project will have no residual impacts upon the Dalmatian Pelican and the Pygmy Cormorant as these waterbird species are strictly related to water surfaces and they rarely pass over the PDA and the OHL Karasvasta-Fier. Moreover, the OHL does not interfere with the migratory routed for waterbirds which compose the majority of the migratory birds using the Eastern Adriatic Flyway.

Following implementation of mitigation and management measures, the residual impact will be:

Negligible – PV Plant
Minor –OHL

⁶⁸ https://www.researchgate.net/figure/Two-types-of-line-markers-were-present-on-the-power-line-we-studied-at-the-Iain-Nicolson_fig1_333903783



8.3.6.3. Potential impacts during decommissioning phase

The project is not expected to be decommissioned at least for 30 years. Impacts during decommissioning are expected to be temporary and the magnitude of the impact will depend on how much of the infrastructure is removed. Decommissioning is expected to have a moderate adverse impact significance on the ecological features within the Project AOI, given similar factors highlighted during construction. Once fully decommissioned and the habitats recovered from disturbance, the long-term impact significance is likely to be moderate positive following the reinstatement of native vegetation and colonisation by animal species.

Negligible – PV Plant and OHL

8.3.6.4. Cumulative impacts

The broader area has seen a notable interest from developers of various renewable energy projects, which could be associated with the solar energy resource potential found in the region, proximity to the existing sub-station and its evacuation capacity, as well as other factors. Such developments, whether already approved or only proposed, are considered as they have the potential to create numerous cumulative impacts, whether positive or negative, if implemented.

The following impacts on avifauna can reasonably be assumed in the 2 km radius around the development:

- Overgrazing results in degradation of habitat, potentially reducing populations of wide-ranging species such as bustards, which depend on large foraging areas.
- Extensive agricultural operations have led to large areas of grassland having been converted into agricultural crops, which is relatively sterile environments for most priority species.
- Invasive alien plants are a continuing threat, especially along drainage lines.

The cumulative impacts from the proposed Projects are listed below:

- Displacement of priority species due to habitat transformation and disturbance: Solar developments are a new threat. Possible impacts on birds are loss of habitat, breeding disturbance during construction, collisions with the reflective solar panels. Existing and new power lines from substations to renewable energy facilities are also threats to priority species.
- Potential mortality due to collisions with the proposed photovoltaic panels: Collisions with the solar PV panels are a possible threat to priority species known to potentially occur at the development area. As far as potential future impacts are concerned, the cumulative impact of PV collision mortality due to the combined effect of all the proposed solar facilities in the area is currently low, due to the small number and small size of proposed developments.
- Potential mortality due to entrapment in the double perimeter fence: Entrapment in the double perimeter fence is a possible threat to large-bodied priority species known to potentially occur at the development area. As far as potential future impacts are concerned, the cumulative impact of entrapment due to the combined effect of all the proposed solar facilities in the area is currently low, due to the small number and small size of proposed developments.

Overall, the cumulative significance of this impact is rated at Low, due to the small size of the proposed development.

Minor – PV Plant and OHL (after mitigation measures)



8.3.7. Impacts on Economy and Employment

8.3.7.1. Potential impacts during pre-construction and construction phase

The following project actions will generate impact factors on the economy and, employment component during the pre-construction and construction phase:

- Mobilization of vehicles, workers and equipment, transport of materials and waste;
- Surface levelling and grading;
- Pile driving for mounting structure;
- Excavation, trenching and cable laying;
- Marking out of foundation, earth works and excavations;
- Installation of foundations and grounding devices;
- Assembly, installation, alignment and fixing of pylons;

The potential impacts on economy and, employment deriving from the above actions are associated with the following impact factors:

- Demand for workforce;
- Demand for goods, materials and services.
- In the pre-construction phase, SPV Blue 1 will hire staff locally, nationally or internationally, according to the skills required and the availability of workforce.

The Project, to the extent possible, will supply its workforce from local communities (i.e., communities within the Administrative Unit of Topojë, where the Project is located), reducing also in such way the presence of external workforce. It is the project intention to rely on local contractors that will employ workers mainly from local communities, therefore reducing the need for workers from outside the area.

It is expected that at peak of construction activities, approx. 40 workers⁶⁹ will be needed for the construction of the PV and OHL. At a local level, employment opportunities will mainly be for semi-skilled and unskilled workers and SPV Blue 1 will maximize the efforts to employ local workforce, but the real percentage to be confirmed when subcontractors are contracted. The number of workers on site will build up over time until peak construction activity is reached and then will start to tail-off as construction nears completion and the Project enters the commissioning phase. It is anticipated that there will be no need for a workers' camp related to the implementation of the Project. This will avoid creating the typical tensions between workers in camps and the local communities.

Also, the indirect employment has to be taken into consideration in this phase that might be associated with:

- The project's supply chain (goods and services);
- Spending of project employees in local communities.

The Project will generate economic opportunities linked to the demand of goods, materials and services. The Pylons and Panels will be imported and will be transported using the existing infrastructure, but it is highly likely that materials needed for civil works (i.e., cement, clay), as well as the materials needed for infrastructure improvements (i.e., for the upgrading of access tracks) will be procured locally in the pre-construction phase of the Project.

Additional employment opportunities will rise for the security safeguard of the PV plant area and to prevent H&S risks to the local population. The security personnel will be hired from local residents, although the number of employees required is still unknown.

⁶⁹ The on-site workforce is expected to reach its peak of approximately 100 individuals with an average construction-related on-site workforce of 40 individuals



There is no available data from which to estimate levels of indirect employment and indirect economic opportunities generated by the Project and the impacts will depend on the nature of the local economy, the availability of required goods and services in the Project Area and ways in which employees choose to spend their earnings.

Construction activities may create employment related expectations among the local population, which are unrealistic. If this is not managed appropriately, it could lead to worsened relationships between the Project and the local population once these expectations do not materialise.

The impact for this phase is considered to be **Negligible to Minor Positive**.

Aspect					
Economy and Employment - Request for workforce, goods, materials, and services					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short-term	Local and Regional	Daily	Likely	Low - PV Plant and OHL
Receptor					Sensitivity
Eligible and able people in the local communities and in the region					Medium - PV Plant and OHL
Overall Significance of Impact					
Minor Positive – PV Plant and OHL					

Management and Mitigation

The following measures required by IFC PS 2 will be implemented during the pre-construction and construction phase for the economy, employment and livelihood component:

- Collaborate with the State Employment Offices;
- Collaborate with local institutions (Municipality and Administrative Units)
- Put in place transparent and fair recruitment procedures by:
 - Strictly following the Albanian Code of Work requirements;
 - ILO conventions ratified by Albania;
 - IFC PS 2 Labour and Working Conditions;
- Adopt and maintain human resources policies and management systems or procedures with the requirements of PS 2 and national law. These policies and procedures will be understandable and accessible to workers, and in the main language(s) spoken by the workforce. HR policies and management will ensure:
 - Non-discrimination and equal opportunities to all workers;
 - Compliance with national laws and international standards regarding employment of minors;
 - Avoidance of any form of forced labour and child labour;
- Provide clear and transparent information on wages, benefits and working conditions; Provide workers with a safe and healthy work environment;



- Use an international workforce for a term-limited period for compliance and training purposes, where national personnel cannot be sourced.
 - The Project will develop a Labour and Recruitment Management Plan (LRMP) that details the strategy for maximising local employment and specifies worker employment conditions and welfare requirements.
 - Implement a grievance mechanism open to employee and non-employee workers. Ensure that all workers directly and indirectly employed are informed on how to submit grievances.

In addition, the following enhancement measures will be implemented to increase Project benefits on the economy and employment component:

- Maximise use of local workforce in the Project;
- Prioritize employment of members of vulnerable groups and individuals
- The presence of the CLO through the construction phase should allow any future issues to be identified and addressed referring to women and vulnerable groups and individuals;
- In order to increase the project's local contents, the Company will aim to procure goods, services and materials from local businesses to the extent possible;
- Information on procurement opportunities will be given to local businesses, through tailored communication with local authorities and other appropriate parties;
- Local companies identified as able to provide goods, materials and services during the strategical analysis will be contacted directly providing information on tendering opportunities;
- Local authorities and local communities will be informed and consulted on impacts due to project activities and planned mitigation measures during the pre-construction meetings and throughout the project life cycle as planned in the Stakeholder Engagement Plan;

In order to increase women employment opportunities, the following measures should be taken by SPV Blue 1:

- Provide equal trainings for men and women;
- In field training during the development of implementation phase, also through Contractor/s and Sub-Contractors;
- Establish training and re-training program that specifically target women, to increase their opportunities;
- Define number of persons to be interviewed for a new position which need to be women;
- Clearly indicate that the position opportunity is for both men and women;
- Provide a women friendly working environment.

Residual Impact

Considering the application of the enhancement measures, the impact on the economy, employment and livelihood components is expected to be **Minor positive**.

Minor Positive – PV Plant and OHL

8.3.7.2. Potential impacts during operation phase

The following project actions will generate impact factors on the economy and, employment component during the operation phase:



- Operation and maintenance of the PV;
- The operation and maintenance of the OHL will be managed by the Transmission Line Operator (OST), to whom will be handed over after the line will be completed and commissioned.
- The potential impacts on economy, employment and livelihood deriving from the above actions are associated with the following impact factors:
 - Demand for workforce;
 - Production of energy.

Employment during this period on both direct and indirect directions, will be limited and will consist essentially in a few workers dedicated to the operation of the PV and workers periodically contracted for maintenance activities. It is anticipated that the number of a total of around 10 to 15 job opportunities will arise during the operation phase, including skilled and semi-skilled labour (such as electrical and mechanical technicians) and unskilled labour (such as module cleaners and security personnel) for a duration of 30 years. Workers in this phase will be, to the extent possible, hired from local communities.

Likewise, the need for goods, materials and services will be limited, and will essentially consists in products necessary for the periodic maintenance of the PV. The Company will prepare a strategy and implement activities to increase local procurement and to support the creation of a local supply chain that can provide products and services needed for the periodic maintenance of the PV.

Production of energy during the operation phase will lead to general benefits on Albania's energy market, increasing the amount of energy available to businesses, industries and families, and decreasing the dependence on water sources. Works on the OHL and the substation will introduce new infrastructures and will overall improve the power transmission network.

Aspect					
Economy, Employment and Livelihood - Request for workforce, goods, materials, services and production of energy					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long-term	Local, Regional, and National	Continuous	Likely	Low - PV Plant and OHL
Receptor					Sensitivity
Local communities, regional and national receptors					Medium - PV Plant and OHL
Overall Significance of Impact					
Negligible					

Management and Mitigation

The following measures required by IFC PS 2 will be implemented during the operation phase for the economy, employment and livelihood component:

- Put in place transparent and fair recruitment procedures;
- Adopt and maintain human resources policies and management systems or procedures with the requirements of PS 2 and national law. These policies and procedures will be understandable and



accessible to workers, and in the main language(s) spoken by the workforce. HR policies and management will ensure:

- Non-discrimination and equal opportunities to all workers;
- Compliance with national laws and international standards regarding employment of minors;
- Avoidance of any form of forced and child labour;
- Ensure that workers are not discouraged from forming or joining workers' organisations;
- Provide clear and transparent information on wages, benefits and working conditions;
- Provide workers with a safe and healthy work environment;
- Provide training opportunities for local workforce to be employed during the operational phase;
- Provide equal employment opportunities for men and women;
- Implement a grievance mechanism open to employee and non-employee workers. Ensure that all workers directly and indirectly employed are informed on how to submit grievances. Ensure that the grievance mechanism is managed in line with indications of the SEP.

These same measures will be applicable to non-employee workers. The company will monitor employee standards of its contractors throughout the lifetime of the Project through regular labour and OHS audits.

In addition, the following enhancement measures will be implemented to increase Project benefits on the economy, employment and livelihood component:

- Contractors will be contractually required to maximise use of local workforce in the Project;
- In order to increase the project's local contents, the Company will aim to procure goods, services and materials from local businesses to the extent possible;
- The Company will provide information on procurement, tendering, and contracting processes with a transparent and clear approach, to ensure that equal access to opportunities is guaranteed;
- Information on procurement opportunities will be given to local businesses, through tailored communication with local authorities and other appropriate parties;
- Local companies identified as able to provide goods, materials and services in the during the strategical analysis will be contacted directly providing information on tendering opportunities;
- Local authorities and local communities will be informed and consulted on impacts due to project activities and planned mitigation measures during the pre-construction meetings and throughout the Project life cycle as planned in the Stakeholder Engagement Plan;

The Company will control and monitoring activities regarding Contractor constructors' actions and has overall responsibility for employment, social, health and safety, and cultural heritage aspects of the Project.

Residual Impacts

Considering the application of the enhancement measures, the impact on the economy and employment components and it is expected to be Minor to Moderate positive both for the PV and OHL area.

Negligible Positive

8.3.7.3. Potential impacts during decommissioning phase

Potential impacts to employment associated with decommissioning of the OHL will entail temporary to short-term work. Overall, during decommissioning, the impact will be similar to the construction phase, **Minor Positive**.



Minor Positive

8.3.7.4. Cumulative Impacts

Synergy with other projects can maximize the benefits of the local communities on employment and local economy. If better coordinated and apply the mitigation measures to enhance the opportunities from the local communities, the positive impacts could be a bit higher.

Minor Positive

8.3.8. Impacts on Land Use and Livelihood

8.3.8.1. Potential impacts during preconstruction and construction phase

The following project actions will generate impact factors on the land use and livelihood component during the preconstruction phase:

- Land acquisition;
- Surface levelling and grading.
- The potential impacts on land use and livelihood deriving from the above actions are associated with the following impact factor:
- Change in land use and ownership.
- Loss of land available for farming and grazing activities
- Loss of incomes from farm activities due to loss of land
- For the preconstruction, construction and operation of the Project, the following land requirements are planned:
- Land Acquisition: land required by the Project for installing of permanent facilities.
- Lease: land required by the Project during construction activities will be temporary leased.
- Easement: a right by which a piece of land, owned by one person is subject to a specified use or enjoyment by another. The easement may imply the restriction to use the land, such as building, planting trees, maintenance etc.

It should be noted that no displacement of houses is necessary for this Project.

The following type of impacts will occur during the preconstruction and construction phase in terms of land use.

Land necessary for permanent facilities: these plots of land have been acquired from current land owners and will permanently change their status, hence it will not be possible to conduct current activities, such as farming or animal grazing; land owners and land users have been compensated for the losses, as further explained below. The land needed for the construction of the PV has already been acquired, so land acquisition is limited for the land required for the OHL pylons, which will limit the impact on the private owners and their activities.

Land necessary for temporary facilities: these plots of land will be leased from current land owners and will be used during the construction phase. Hence it will not be possible to conduct current activities, such as farming or animal grazing, for a certain period of time, which may be equal to the entire construction



period or shorter. The land leased is limited to the activities for the construction of the OHL. Construction is expected to last 12 months, but certain activities may require a shorter time. This means that either one season's crops or no crops will be affected (depending on the season in which construction is carried out on a particular plot). Land owners and land users will be compensated for the temporary occupation of land and for the loss of crops, as further explained below. The leased land will then be handed back to owners after the end of construction and reinstatement, in its original conditions, to the extent possible.

These two impacts will occur during the preconstruction phase of the project where the land necessary for the permanent and temporary facilities will be acquired or leased prior to the commencement of works and of the construction phase.

Easement: along the OHL right of way land will be subject to easement, which will imply restrictions on the activities that can be performed. This means that generally current land use will not be affected, however some potential future uses may be limited. Easement will be valid for the entire operation phase of the Project. Land owners and land users will be compensated, as further explained below. It should be noted that the land needed for the construction of the OHL is limited since the number of towers required is only 8, and three of them will be located in the same location of the OHL towers used by the TAP project in the area. The other 5 towers are located in state land and no private is affected by this facility.

The Project has already acquired the land necessary for the development of the PV Plant through negotiated settlements with the rightful owners and users of land.

The following groups will be affected by changes in land use:

- Informal land users whose activities have benefited from the land use and whose crops might be affected by the project implementation.

The Land Acquisition and Livelihood Restoration Plan (LALRP) has been developed for the Project, and has ensured that land users that are not land owners will be compensated for losses of crops, pasture or forest. The state land users will be compensated for the loss of crops and/or pasture.

Land that will be permanently acquired, temporarily leased or subject to easement, has been compensated to land owners and land users in line with the indications of LALRP, prepared in line with National Legislation and IFC Standards. In addition, compensations have been provided when project impacts have occurred on crops, trees, pastures and other assets present within the Project footprint, both for permanently acquired and leased land. The application of the LALRP will reduce to the extent possible impacts on the livelihood of current land owners and users.

During the upgrading of access tracks, as well as a result of increased traffic, particularly the presence of heavy vehicles, some of the local farmers may have temporary difficulties accessing their plots of land. This impact it may occur only occasionally and under certain circumstances, but nevertheless it will be managed to prevent impacts on livelihoods and preserve good community relations.

The following ecosystem services were identified and assessed in detail. All impacts were determined as minor or negligible and no significant / priority ecosystems services were identified.

None of the Type I ecosystem services value or functionality are at risk from the construction or operation of the SPV Blue 1 Project and associated impacts are not considered as significant. No Type 1 ecosystem services qualify as priority as per the IFC Guidance Note 6 (Ref. 3).

Table 58 Ecosystem services impact assessment

Ecosystem Category	Identified Activity	Ecosystem services benefits/beneficiaries	Impact	Justification
Food – Supply Service	Small-scale artisanal fishing in	Additional Activity	Impacts on such services may	In the western boundary of the Project Location, there are some small



	rivers and along the seashore		adversely affect communities	wood platforms that are used by local residents for fishing for the entertainment purpose. Fishing observed in the proximity of the pumping station. PV Plant construction and operation will improve drainage channel function and supply of water downstream.
Raw materials – Supply Service	Cleaning and packaging of canes collected in the area Use of clay for the production of solid bricks	Primary Activity	Impacts on these services do not adversely affect communities	Collection of raw materials are defined in limited areas around this identified business. No collection of such materials observed or reported in the PV plant area
Protection from erosion and preservation of soil fertility – Regulator Service	Forest belt	Protective character	Impacts on such services may adversely affect communities	Forest degraded because of the lack of maintenance Forest does not offer any tourist attractions
Tourism – Cultural Service	8 km coastline	Seasonal Activity	Impacts on such services may adversely affect communities	Daily tourism activities from local areas and Fier city Tourism activities based on sea and sunbathing.

The overall impact for land use and livelihood in this phase is considered to be **Minor Negative**.

Aspect					
Reduced access to land and ecosystem services, permanent acquisition and temporary lease					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Permanent and temporary	Project footprint	Continuous	Likely	Minor - PV Plant and OHL
Receptor					Sensitivity
Land owners and Land users including ecosystem services affected					Low - PV Plant Low - OHL

**Overall Significance of Impact****Minor Negative****Management and Mitigation**

The mitigation measures listed below follow the mitigation hierarchy and will be performed for the preconstruction phase for land use and ownership component:

Avoidance:

- When selecting the site of the project elements, construction sites and access roads, avoid to the extent possible locating them on farmed land or land with the presence of fruit trees or other assets;
- Minimize the amount of land occupied during construction;

Minimization:

- Ensure all compensations prior to the commencement of the construction activities;
- All land users, formal and informal ones will be compensated at full replacement value as defined in the LALRP.

Implement a grievance mechanism and ensure that all PAPs (project affected people) are informed on how to submit grievances. Ensure that the grievance mechanism is managed in line with indications of the LALRP.

Rehabilitation:

- Upon the completion of construction activities, fully reinstate leased land and ensure it is handed over in its original conditions, to the extent possible.

The following recommendations are made to support the minimization of impacts for the ecosystem services:

- Judicious clearance of vegetation in the working strip area to minimize impacts on local habitats;
- A Traffic Management Plan will be implemented to reduce traffic disturbance to touristic facilities and sites in the area;
- Reinstatement of temporary disturbed areas during construction will include reprofiling and re-vegetation;
- Use of pesticides for vegetation clearance during construction and operation will be prohibited;

Residual Impacts

Considering the application of the mitigation measures, the negative impact on the land use and ownership component is expected to be:

Negligible**8.3.8.2. Potential impacts during operation phase**

The following project actions will generate impact factors on the land use and ownership component during the operation phase:

- Operation and maintenance of the PV;
- Operation and maintenance of the OHL;



The potential impacts on land use and ownership deriving from the above actions are associated with the following impact factor:

- Change in land use and ownership.
- Loss of land available for farming and grazing activities.
- Loss of incomes from farm activities due to loss of land.

During the operation phase, easement will have to be placed along the OHL right of way, as indicated in the previous section. The indication of activities that can and cannot be performed within the right of way during the operation phase has been provided in the LALRP. Compensation will be provided for land subject to easement, based on the indications of the LALRP if informal users will be identified. SPV Blue 1 confirms that compensation will be monetary and driven by LALRP process. Although the OHL will be handled to the OST, the compensation for the easement to the landowners will be subject of SPV Blue 1.

No direct impacts are expected on ecosystem services during the operation phase as there is no direct ecosystem services occurring in the PDA footprint.

Aspect					
Reduced access to land, easement					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Permanent and temporary	Project footprint	Continuous	Likely	Low - PV Plant and OHL
Receptor					Sensitivity
Land owners and Land users affected					Low - PV Plant and OHL
Overall Significance of Impact					
Minor Negative					

Mitigation Measures

Once the project is operational, there will be a minor impact for those with permanent loss of land from the towers/ pylons, while the agricultural activities on the remainder of the land will resume as usual.

The mitigation measures listed below follow the mitigation hierarchy and will be implemented for the construction phase for land use and ownership component:

- **Avoidance:**
 - When selecting the siting of the OHL right of way, avoid to the extent possible locating it on farmed land or land with the presence of fruit trees or other assets;
- **Minimization:**
 - Ensure that land users and owners are fully clear on the meaning of the easement and fully clear of the restrictions applied throughout the easement area;
 - Implement a grievance mechanism and ensure that all PAPs are informed on how to submit grievances. Ensure that the grievance mechanism is managed in line with indications of the LALRP.



Residual Impacts

Considering the application of the mitigation measures, the negative impact on the land use and ownership component is expected to be:

Negligible

8.3.8.3. Potential Impacts during Decommissioning

The impacts associated with land use and livelihood during decommissioning are neutral. The land for the PV Plant has already been acquired by the Project and will remain property of the company upon decommissioning.

8.3.8.4. Cumulative impacts

The new Eolic plant will require new land acquisition during construction phase. This will not impact the PDA or the OHL. The other projects in the area have already been developed and do not require additional land acquisition for their operation.

Negligible – PV Plant and OHL

8.3.9. Impacts on Transport and Traffic

8.3.9.1. Potential Impacts during Construction Phase

The following project actions will generate impact factors on the transportation and traffic component during the construction phase:

- Mobilization of vehicles, workers and equipment, transport of materials and waste;
- Construction/improvement of internal and external access roads;
- Levelling off the ground;
- Pile driving for mounting structure;
- Construction of electrical substation and foundations;
- Excavation, trenching and cable laying;
- Marking out of foundation, earth works and excavations;
- Installation of foundations and grounding devices;
- Assembly, installation, alignment and fixing of pylons;
- Waste management.

The potential impacts on transportation and traffic deriving from the above actions are associated with the following impact factors:

- Increase of traffic;
- Increased risk of road accidents;
- Interruption/limitation of infrastructures/services.
- Vibration and traffic increase in areas near the access roads.

The components of the PV and OHL will be transported from Port of Durrës, situated 124.3 km from the construction site, by trucks through the National Highway then directed to the site through secondary roads.



Figure 67 Transport route and distance from the Port of Durrës to the site

The company has performed the assessment of the road and of the villages crossed and photo logs are kept. The road pavement assessment and village assessment reports will be attached to this document. The aim is to minimize and mitigate all the potential risks for the local communities by identifying the potential hotspots while passing through the transport route and taking possible mitigation measures to avoid such potential risks. These hot spots are considered to be sensitive receptors such as densely populated areas, centres of communities, schools, hospitals or clinics.

The materials from the Port of Durrës to the site will be limited in two days a week in the period in which the solar panels will be transported in the construction site.

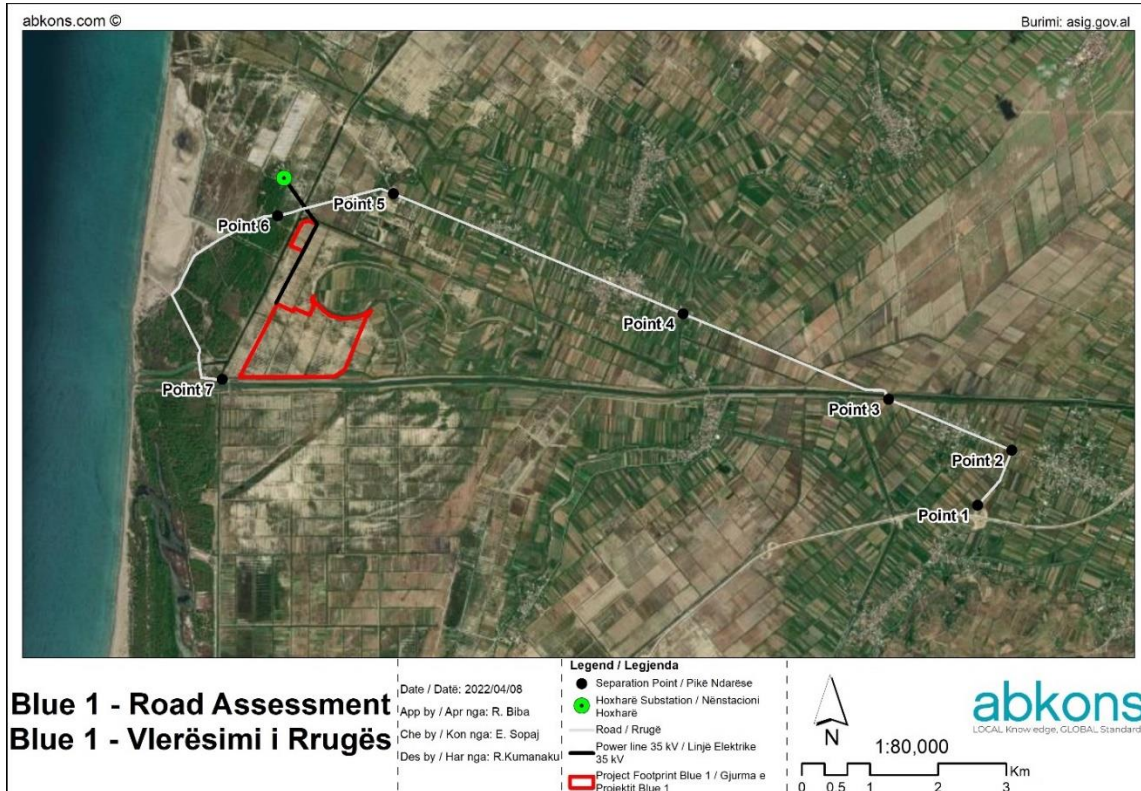


Figure 68 Transport route to the construction site

The access road Grykë – Beach that leads to the site of 3,68 km long, which is in very poor conditions, will be upgraded and maintained by the Company. Impacts will also be generated due to the need to transport materials and workers to and from the sites.

However, these traffic flows will be limited and will not have significant impacts.

The access roads will be upgraded, but no additional land will be required for this activity leading to no additional impact on land-take for the local landowners.

At the end of construction activities, improvements of existing roads will actually leave a positive legacy on the local road conditions, resulting in benefits for the local communities.

Overall significance of the impact is considered **Minor negative**.

Aspect					
Risk of accidents due to traffic increase, interruption/limitation of services.					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short-term	Local and Regional	Continuous	Possible	Low – PV Plant and OHL
Receptor					Sensitivity
Local Communities and workforce					Medium - PV Plant Minor - OHL
Overall Significance of Impact					



Moderate Negative

Management and Mitigation

Avoidance:

- Plan transportation routes in consultation with Municipality, road department and Police;
- Avoid transport activities, particularly those involving heavy goods vehicles during peak hours (7:30-8:30 AM and 12:00-13:00 pm);

Minimization:

- Ensure that local communities are timely informed about road closures, works on roads or use of heavy good vehicles;
- Develop and implement a Traffic Management Plan (TMP);
- Ensure that all Contractors and Subcontractors follow the TMP;
- Assessment of buildings and houses during preconstruction surveys to present in the proximity of the roads and access roads to be performed before the starting of the works and continuous monitoring of the buildings conditions is required and included in the TMP.
- Notify through local government all the habitants on the affected areas to coordinate the traffic flow for the local users;
- Plan and implement awareness campaigns on risks related to the traffic increase, especially in the schools present in the area;
- Ensure that all drivers (both of Contractors and Subcontractors) receive induction and training on road safety rules;
- Frequent testing of drivers to eliminate drink driving, also check for use of seatbelts and identify speed limits that are monitored during the construction phase.

Rehabilitation:

- Undertake route and access surveys on road conditions and ensure that possible damages to existing roads are repaired promptly and that at the end of construction activities roads are left in original or better conditions.
- The segment Grykë-Beach to the site, is in very bad conditions and inappropriate for such transport. It must be rehabilitated with the granular layer and asphalt layer in top of it;

Additional mitigation measures

- Possible “dry runs” by the drivers to get familiar with the area before actual transportation begins.
- Possible signage improvement where it is missing.
- Possible use of flagmen or other means of traffic control at key points on roads, especially during school hours in the hotspot areas.
- Drivers must use designated routes only;
- No persons are to be transported on the back of the vehicle;
- Safety belts are to be worn by the driver and all passengers in the vehicle;



- The use of cell-phones while driving is prohibited;
- Reckless driving is prohibited, including overtaking in oncoming lane;
- All accidents, incidents and traffic violations must be reported by drivers to the Project Management Team;
- Drivers must adhere to rules on driving and rest hours and must not drive when insufficient rest has been taken;

Residual Impacts

Considering the application of the mitigation measures, the impact on transportation and traffic component is expected to be negative and minor for both the PV and OHL area.

Minor Negative – PV Plant and OHL

8.3.9.2. Potential Impacts during Operation Phase

No project actions will generate impact factors on the transportation and traffic component during the operation phase, therefore the impact assessment is not performed in this phase. Limited traffic will be generated in this phase during periodic maintenance activities that will be conducted on the PV and OHL. The Company will consider semi-annual regular maintenance schedule during operations phase. Improvements to the roads performed during the construction phase can be considered a positive legacy on the local road conditions, resulting in benefits for the local communities.

Aspect					
Risk of accidents due to traffic increase					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long-term	Local and Regional	Continuous	Possible	Negligible - PV Plant and OHL
Receptor					Sensitivity
Local Communities and workforce					Negligible - PV Plant and OHL
Overall Significance of Impact					
Negligible – PV Plant and OHL					

8.3.9.3. Potential Impacts during Decommissioning Phase

The impact on traffic and transportation during this phase will be similar to that of the construction phase with the majority of risks related to that of road accidents and increase of traffic in the area.

The overall impact in this phase is considered **minor negative**.

Minor – PV Plant and OHL



8.3.9.4. Cumulative Impacts

The impacts on traffic are related to the construction and operation of the other developed projects in the area, namely the OHL of the TAP project and associated facilities and the Seman1 Solar Plant, new substation under construction by OST. During construction will be additional impacts on the local road used by the local communities, like increased traffic, increased risk of road accidents, interruption/limitation of infrastructures/services and additional vibration and traffic increase in areas near the access roads if construction works of other projects occur simultaneously with Blue 1 Project.

The main activities in the field relates to the maintenance of the facilities for these projects with little or no impact added to the existing one. For the new Eolic plant foreseen in the area, it is assumed that developers of these projects will use the same transport roads, but there are no foreseen periods of construction works for this project.

Minor during construction and Negligible during operation – PV Plant and OHL

8.3.10. Impacts on Health and Safety

8.3.10.1. Potential impacts during construction phase

The following project actions will generate impact factors on the health, safety and security component during the construction phase:

- Mobilization of vehicles, workers and equipment, transport of materials and waste;
- Vegetation clearance;
- Construction/improvement of internal and external access roads;
- Levelling off the ground;
- Pile driving for mounting structure;
- Construction of electrical substation and foundations;
- Excavation, trenching and cable laying;
- Marking out of foundation, earth works and excavations;
- Installation of foundations and grounding devices;
- Assembly, installation, alignment and fixing of pylons;

The potential impacts on community health, safety and security deriving from the above actions are associated with the following impact factors:

- Emission of dust and particulate matter;
- Emission of noise and vibrations;
- Increase of traffic;
- Increased risk of traffic hazards and incidents associated with the use of the highway for freight and local roads for workers;
- Influx of workers, increased incidence of communicable disease;
- Risks associated with the presence of personnel on site (within the project area) and at offsite operations and activities (within the community);
- Risk of unauthorized access to the site.



The construction of the PV and of the OHL, like all industrial and infrastructure construction projects, carries with it several key health and safety risks to the workers employed on the project as well as members of the surrounding communities. Key issues for consideration associated with the proposed project are as follows:

- Working at height and in confined spaces;
- Working with large scale structures;
- Ground excavation hazards;
- Potential for electrocution;
- Traffic;
- Issues associated with unauthorised access and vandalism.

Impacts to surrounding communities will mainly have to do with risk of accidents with vehicles and people due to transport and traffic along the road. Specific mitigation measures have been implemented also in this case to reduce risks to the extent possible.

The influx of workers in the Project Area can lead to an increase of communicable diseases among the population. This value impact however is considered to be very low, considering that no workers' camp is foreseen in the area and similarly the interactions between workers and local population will be limited. The presence of workers can also lead to tensions and conflicts with the local population, in case of inappropriate behaviours and frictions. Once again interactions between workers and the local population will be limited during the construction phase, hence the potential impact is expected to be low and manageable through appropriate measures.

The Company will have a limited number of employees, as the works will be performed through subcontractors.

Given the low number of the external workforce in the area and the decision of the Company not to implement a workers' camp in the area, the impact of the workforce on the local population and on the GBVH is deemed to be negligible. Nonetheless, mitigation measures should be taken to avoid or reduce impacts related to GBVH.

There is also a risk of GBVH within the workforce, given the fact that in construction projects like this one, the majority of workers is likely male.

Another risk is presented by unauthorized access to work sites from residents or passers-by, which might lead to incidents. This risk is particularly relevant for children who out of curiosity might be willing to access the work site and risk falling into open trenches or because of other incidents related to construction works.

Additional workforce might be needed to implement the security of the construction area to prevent risks related from unauthorized access for open trenches, risks of heavy trucks and other machineries moving in the construction area and other risks related to the construction works.

Finally, construction activities, particularly those related to transport, can lead to disruptions in roads and hence limit accessibility to health centres for the local population. This potential impact will have to be properly managed in collaboration with local authorities, to ensure that impacts are reduced to the extent possible.

The overall impact on health and safety risk of the project during construction is deemed to be medium negative.

Aspect

**Risks on health, safety and security - Influx of workers, construction works and excavations, influx of workers, increased traffic and movement of vehicles, noise and air emissions during construction**

Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short-term	Local	Continuous	Possible	Medium - PV Plant and OHL
Receptor					Sensitivity
Local Communities and workforce					Medium - PV Plant and OHL
Overall Significance of Impact					
Moderate – PV Plant and OHL					

Management and Mitigation

For the mitigation of impacts on the community health, safety and security component all measures indicated for the air quality, noise and vibration and transportation, traffic, security components have to be applied. Potential impacts on workers' health and security can be managed through specific Management Plans, in order to reduce risks to the extent possible. Safety and security measures will have to be applied by all workers, both of Contractors and Subcontractors.

In line with the European guidelines and Health and Safety suggestions, the Company will follow the national Albanian safety procedures, IFC, WB and WHO guidelines regarding Covid-19. The safety measures will be acknowledged by staff and any visitors prior to entering the working site and to interaction with local communities. The mentioned Albanian regulations, IFC, WB guidelines and safety measures in regard to Covid-19, issued by the Ministry of Health and Social Protection, Institute of Public Health and by e-Albania (the official governmental website of Albania) will be observed by all employees.

The Contractor will develop a OHSMP in which will identify and propose measures that shall be observed by all employees in matter of social distancing and H&S guidance.

Some of the mitigation measures to comply with the risk associated with GBVH are as follows:

- Mandatory and repeated training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women;
- Provide training and regular communications to human resources and/or other relevant persons (employees, supervisors, managers and contractors) on understanding sexual harassment in the workplace, and on how to respond to allegations of sexual harassment in the workplace;
- Provide training to community liaison officers and/or other relevant persons on how to respond to allegations of GBVH perpetrated by employees and contractors in affected communities;
- Implement a code of conduct for employees and contractors that includes the prohibition of GBVH in local communities; Provide induction training on the code of conduct for all employees and contractors;

In addition, the mitigation measures listed below will be implemented for the construction phase for the community health, safety and security component according to the mitigation hierarchy:

Minimization:

- Workers' health and safety should be managed in line with national regulations and IFC standards



- Enforce workers code of conduct;
- Cooperate and coordinate with local health and safety facilities to minimize impacts on health centres and access for the local population.
- Use security personnel in working site;
- Ensure that local communities are timely informed about road closures, works on roads or use of heavy good vehicles;
- Plan and implement awareness campaigns on risks related to the traffic increase, especially in the schools present in the area;
- Notify through local government all the habitants on the affected areas to coordinate the traffic flow for the local users;
- Secure / make safe all plant and machinery at the end of each working day;
- Provide regular updates to farmers, vulnerable groups and other residents about potential Project hazards and changes to Project activities that may have community safety impacts;
- Assure presence of ambulance and site doctor during the implementation of the works;
- Prepare and put in place the Emergency Response Plan.

Residual Impacts

Considering the application of the abovementioned mitigation measures, the impact on the occupational and community health, safety and security component is it is expected to be negative and minor both for the PV and OHL area.

Minor – PV Plant and OHL

8.3.10.2. Potential impacts during operation phase

The following project actions will generate impact factors on health, safety and security component during the operation phase:

- Operation and maintenance of the PV;
- Operation and maintenance of the OHL;

The potential impacts on community health, safety and security deriving from the above actions are associated with the following impact factors:

- Generation of electromagnetic fields;
- Potential for electrocution;
- Lightning strike and fire; and
- Issues associated unauthorised access and vandalism.

A direct lightning strike on a conductor of a power line causes extremely high voltage pulses at the strike point, which are propagated as traveling waves in either direction from the point of strike. Lightning strikes on electrical lines or substations are those that cause problems in the distribution network. The Power Lines are always protected in case of lightning strikes, but sometimes lightning does happen to strike the line or the earthing of the wires.

There is a risk associated whether there are trees nearby that might be caught on fire or, in the worst-case scenarios, people staying under the trees and, in this case, the strike might involve even them. These are



extremely rare cases, but this can be prevented by keeping clean the Right of Way (RoW) near the towers and wires. This can happen also to the workers trying to keep clean the RoW.

Hazardous situations may occur, these include downed power lines that may still be energized, associated fires, unstable structures, and wet/damaged electrical panels.

The power transmission towers, are not located near any national or local airport or known flight paths, therefore no direct risks through collision or indirectly through radar interference are expected.

The unauthorized access in electric towers or Power Lines can lead to fatalities for the perpetrator. Although these are extremely rare cases, it might happen that unauthorized people or children playing might access the electric towers.

Another impact during operation might be related with attempts to climb the towers by children or unskilled personnel, although this possibility is extremely remote and the impact as negligible, but has to be taken into consideration and mitigate as possible risk.

With regards to the impact linked to the generation of electromagnetic fields, this will occur only along the OHL.

There has been considerable research over the last 30 years associated with the potential impacts on human health associated with EMF. A detailed review and discussion of the scientific literature associated with this area of research is outside of the scope of this project, however, the IFC health and safety guidance for overhead power lines (IFC, 2007c) states the following in regard to the available scientific information:

Although there is public and scientific concern over the potential health effects associated with exposure to EMF (not only high voltage power lines and substations, but also from everyday household uses of electricity), there is no empirical data demonstrating adverse health effects from exposure to typical EMF levels from power transmissions lines and equipment. However, while the evidence of adverse health risks is weak, it is still sufficient to warrant limited concern.

The National Grid (an international electricity and gas company based in the UK and north-eastern US) provides typical electric and magnetic field limits for various voltage lines (132kV, 275kV, and other). The values indicate that electric and magnetic fields are within the ICNIRP⁷⁰ limits and even reach negligible amounts at around 50m – 100m⁷¹ from the OHL.

Same, the IFC EHS guideline also state that transmission lines require RoW to protect the system and also protection from potential hazards and in which RoW for transmission lines are generally from 15m to 100m.

Assuming the worst-case scenario that there is a link between EMFs and impacts on human health, it is evident that EMFs have the highest intensity in close proximity to their source, with intensity declining in relation to distance from the source. Therefore, it is logical that only receptors that have long term close contact with high exposure rates to EMF may potentially be affected. Such a receptor can be categorized as residential situated in close proximity to a high voltage source.

No building construction is allowed on the wayleave, which is 25 meters on each side from the centreline of the OHL. There are no residential settlements or public facilities (including educational or health facilities) located close to 25m from the edge of the OHL. There are no businesses or other receptors near the OHL, which is located in agriculture areas.

The unauthorised access as the probability may be low, but the consequence could be severe. There is also the risk of illegal connection and of landowners not complying with restrictions.

Another risk at this stage is related to the outbreak of the Covid-19 and the health issues with it associated. The risk is related with both the local populations and all the personnel working for the PV Plant.

Overall, the impact in this phase is considered to be **minor negative** for PV plant and OHL.

⁷⁰ <https://www.icnirp.org/en/applications/power-lines/index.html>

⁷¹ <https://www.emfs.info/sources/overhead/specific/275-kv/>



Aspect					
Risks on health, safety and security - electromagnetic field from the OHL, risk of electrocution, lightning strike, maintenance activities for the PV Plant and OHL					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long-term, Permanent	Local	Continuous	Possible	Low - PV Plant and OHL
Receptor					Sensitivity
Local Communities and workforce					Minor - PV Plant and OHL
Overall Significance of Impact					
Minor – PV Plant and moderate for OHL					

Management and Mitigation Measures

The major risks are associated with lightning strikes and fires. The measures to be taken are the following:

- Design of the route of the OHL has avoided health risk for the public and ensured that the OHL does not pass over any residential property or other sensible receptor;
- Preventative maintenance to ensure the robust connection of the lighting protection (earthing) system;
- Recommended techniques to prevent the electrocution hazards include: use of signs, barriers (e.g., locks on doors, use of gates, use of steel posts surrounding transmission towers, and education signs/ public outreach to prevent public contact with potentially dangerous equipment, b) Grounding conducting objects (e.g., fences or other metallic structures) installed near power lines, to prevent shock;
- After any damage has been assessed and documented in case of storm damage / wind damage - downed power lines, associated fires (similarly relevant to PV Plant), electrocution etc., the appropriate utility companies will be notified.
- Regular monitoring will be conducted by OST to verify illegal connections and of landowners or land users not complying with restrictions, etc. Monitoring shall be designed and implemented by accredited professionals as part of an occupational health and safety monitoring program.

The overhead lines request low maintenance. The risks are usually related to extraordinary events, such as lightning strikes or fires that might disrupt the service or pose risk to people living nearby. There is also a risk on safety related to acts of vandalism or climbing of the towers. The mitigations are such:

- Installation of anti – climbing devices in order to avoid accidental or intentional attempts;
- Painting with fluorescent colours of towers near the crossroads or near the borders of the road to make them visible to cars passing nearby.

In addition, the mitigation measures listed below will be implemented relatively to the generation of electromagnetic fields for the operation phase for the community health, safety and security component according to the mitigation hierarchy:

Minimization:



- Frequent controls to check the construction of buildings or illegal buildings near the area of risk (50 Meters);
- Frequent control to check if any animal shelter, residential or industrial building is being built in the same safety zone;

The mitigation of impacts related to the Covid-19 pandemic; it will depend on the course of the virus at period of entering into the operation of the Project. The Company shall follow the IFI guidelines and safety measures in regard to Covid-19, issued by the Ministry of Health and Social Protection, Institute of Public Health and by e-Albania (the official governmental website of Albania) that will be in force at the period.

Residual Impacts

Considering the application of the abovementioned mitigation measures, the negative impact on the community health, safety and security component is depicted in the following tables and it is expected to be:

Negligible – PV Plant and OHL

8.3.10.3. Potential impacts during decommissioning phase

In general, the health and safety risks from decommissioning activities will be similar to those during the construction phase. The project will be designed to reduce potential risks during its decommissioning. This is typically done by ensuring that a design risk register is kept and maintained through the design process, allowing potential risks that can arise during decommissioning to be identified and addressed in the design process.

It will be important that documentation is maintained during the operational phase that shows that any incidents or accidents have been managed and that no significant contamination has been caused that could lead to health and safety risks during decommissioning.

The Impact on health, safety and security is considered to be minor negative during this phase.

Minor – PV Plant and OHL

8.3.10.4. Cumulative impacts

The projects developed or being developed in the area do not create a cumulative impact with the construction and operation of SPV Blue 1 in relation to the health and safety component.

Negligible – OHL

8.3.11. Impacts on Infrastructure and Community Services

8.3.11.1. Potential impacts during construction phase

The following project activities will pose impacts on the infrastructure components and community services during the construction phase:

- Mobilization of vehicles, workers and equipment, transport of materials and waste;
- Construction/improvement of internal and external access roads;
- Levelling off the ground;
- Pile driving for mounting structure;
- Construction of electrical (step-up) substation and foundations;
- Excavation, trenching and cable laying;



- Marking out of foundation, earth works and excavations;
- Installation of foundations and grounding devices;
- Assembly, installation, alignment and fixing of tower pylons;
- Temporary deposit and disposal areas;
- Waste management.

The potential impacts on housing/dwellings and infrastructures deriving from the above actions may be associated with the following impact factors:

- Demand for waste disposal services;
- Deterioration of road infrastructure services;
- Interruption/limitation of community infrastructure and services.

The construction of the PV solar plant will not directly affect any dwellings or other buildings within the project footprint. The designed OHL route has avoided crossing near residential areas. There are a total of 8 towers needed for the transmission line with a total length of 1.560 meters. The OHL does not cross any sensitive receptors, while it crosses only agriculture areas. The OHL crosses one time the road SH 94 that from the village of Grykë leads to the Project site.

Other impacts will potentially occur on road infrastructure due to vehicle movement and traffic, as indicated in section 4.5. Construction activities are unlikely to have impacts on water distribution networks, considering that their extent is limited in the project footprint area or can be easily avoided.

The irrigation and drainage systems, although present, are not functioning properly, and only a small portion of the agricultural land in the area benefits from proper functioning of these services. This mostly arises due to lack of maintenance over the years which has not been performed periodically, and the channels are continuously filled with sediment materials that create blockages and do not allow proper functioning.

Based on the aforementioned discussions the impact significance can be rated as follows:

Aspect					
Infrastructure and community services – construction works for the PV solar plant and OHL route, interruption of infrastructure					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short-term	Local	Continuous	Possible	Medium - PV Plant Low - OHL
Receptor					Sensitivity
Local Communities, residential houses/ properties, and other community facilities or buildings					Low - PV Plant and OHL
Overall Significance of Impact					
Minor negative– PV Plant and OHL					

Management and Mitigation



The mitigation measures listed below follow the mitigation hierarchy and will be implemented for the construction phase for the infrastructures and utilities component:

Avoidance:

- When selecting the siting of project elements, construction sites and access roads, avoid to the extent possible creating interferences with existing infrastructure (e.g., residential houses, properties, greenhouses, power lines, commercial activities and community services);
- The OHL route should have at least a safety distance of 21 m on each side (or 25 m on each side from the axis of the transmission line)⁷² from sensitive receptors such as residential houses/properties, wherever practicable to the greatest extent possible that will be allowed by the project design.
- Apply best practices for the reduction of waste produced to the extent possible.

Minimization:

- Ensure that local communities are timely informed about road closures, works on roads or use of heavy good vehicles;
- Ensure that local communities are timely informed about any disruptions on infrastructures (water distribution, energy distribution) that might be caused by construction activities;
- Identify and use waste disposal facilities as close as possible to the Project location, so to reduce the need of transport.

Rehabilitation:

- Ensure that possible damages to existing infrastructures are repaired promptly and that at the end of construction activities roads are left in original or better conditions.

Residual impacts

Considering the application of the abovementioned mitigation measures, the impact on the infrastructures and utilities component is depicted in the following table and it is expected to be negative and negligible both for the PV and OHL area.

Negligible – PV Plant and OHL

8.3.11.2. Potential impacts during operation phase

The following project actions will generate impact factors on the infrastructure components during the operation phase:

- Operation and maintenance of the PV;

The potential impacts on infrastructures deriving from the above actions are associated with the following impact factors:

- Potential community investments
- Production of energy.

⁷² The Albanian standards KTP and KTZ have been updated and are in line with the European Standard EN-50351 2012 "Overhead electrical lines exceeding AC 1kV".



During this phase, the production of energy will lead to general benefits on Albania's energy market, increasing the amount of energy available to businesses, industries and families. Works on the OHL and the substation will introduce new infrastructures and will overall improve the power transmission network. This investment will probably have positive effects also at the local level, improving the overall quality of the energy distribution system and other community services (e.g., roads or other investments in the project area). In addition, the maintenance of the irrigation and drainage channels in the area, will improve the quality of the agriculture activities of the farmers and reduce the risk of possible floodings.

Aspect					
Infrastructure and community services					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long-term	Local	Continuous	Likely	Negligible - PV Plant and OHL
Receptor					Sensitivity
Local Communities					Low to Moderate - PV Plant Low - OHL
Overall Significance of Impact					
Negligible to Minor Positive – PV Plant					
Negligible – OHL					

Management and Mitigation Measures

The Developer will maintain community engagement and provide support to them in the most practicable manners possible through potential improvements in the infrastructure and community services close to the project area.

Residual Impacts

Considering the application of the abovementioned mitigation measures, the impact on the infrastructures and community services component is expected to be as follows:

Negligible to Minor Positive – PV Plant and OHL

8.3.11.3. Potential impacts during decommissioning phase

In the decommissioning phase the impacts will be similar to those during the construction phase, considering that interruptions on the local infrastructure will be minor. The impact at this phase is considered to be negligible.

Negligible – PV Plant and OHL



8.3.11.4. Cumulative Impacts

Cumulative impacts are foreseen in relation with the water pumping station and maintenance of drainage canals present in the area. The foreseen impact with the project will not create additional negative impact since SPV Blue 1 will contribute in the maintenance of the drainage canals inside the PDA thus improving the functionalities of the pumping station and the power plant of the pumping station has an independent transmission line not related to the development of the project.

Negligible or positive impacts – PV Plant and OHL

8.3.12. Impacts on Landscape and Visual Amenities

8.3.12.1. Potential impacts during construction phase

Landscape effects include direct and indirect effects on the landscape as well as effects on the general landscape character. During the pre-construction phase, in the project area will be performed the vegetation clearance process for the placement of working machineries, equipment and other associated facilities needed for the PV construction. This will undoubtedly change the landscape view in general, but considering the low value of vegetation cover in the area, the significance of potential impacts during this stage is considered to be very low.

During the pre-construction phase of the OHL, the vegetation has to be cleaned out in the areas designated for the construction of the electric pylons.

During construction works for opening of trenches, earth works, foundations and installations, the impacts on landscape are anticipated to be more visible. A lot of staff personnel will be involved and several work activities will be performed simultaneously at this stage. Although, it shall be emphasized that there is absence of human receptors in surrounding of the area, potential impacts may arise due to the presence of passers-by and potential visitors and tourists. In this context, the sensitivity of receptors is considered to be low-moderate and the magnitude is considered to be minor.

The following project actions will generate impact factors on the landscape and visual quality component during the construction phase:

- Vegetation clearance;
- Construction/improvement of internal and external access roads;
- Levelling off the ground;
- Pile driving for mounting structure;
- Construction of electrical substation and foundations;
- Marking out of foundation, earth works and excavations;
- Installation of foundations and grounding devices;
- Assembly, installation, alignment and fixing of pylons;
- Environmental reinstatement of the construction areas.

The potential impacts on landscape and visual quality deriving from the above actions are associated with the following impact factors:

- Landscape features alteration;
- Presence of new buildings/infrastructures.



Aspect					
Visual impact and landscape - landscape visual and landscape character					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short-term	Local	Permanent	Likely	Medium - PV Plant and OHL
Receptor					Sensitivity
Local Communities, Visitors, Tourists					Low to Medium - PV Plant and OHL
Overall Significance of Impact					
Minor to Moderate – PV Plant and OHL					

Management and mitigation measures

Mitigation measures for overhead line developments are relatively limited and it is recognized that there is limited potential to relocate the infrastructure or screen these structures. However, there is potential to include integrated mitigation measures that would protect, and potentially enhance, the landscape features and character, and also maximize the screening capability of the landscape, thereby minimizing visual impacts. In relation to landscape and visual impacts, objectives of mitigation measures for the proposals during construction shall include, but are not be limited to:

- Judicious vegetation clearance to ensure only limited vegetation is cleared to facilitate construction access and operations;

The PV plant, as previously explained, is located in a plain area with very low height from the sea level. During construction, the following mitigation measures should be included:

- Limit and phase vegetation clearance and the footprint of construction activities to what is absolutely essential;
- Use of existing access roads as far as possible;
- Consolidate the footprint of the construction camp to a functional minimum. Screen the yard with materials that blend into the surrounding area;
- Keep construction sites tidy and all activities, material and machinery contained within an area that is as small as possible;
- Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily waiting until completion of the construction phase.

Residual Impacts

Considering the application of the abovementioned mitigation measures, the impact on the infrastructures and utilities component is depicted in the following table and it is expected to be negative and minor both for the PV and OHL area.

Minor – PV Plant and OHL



8.3.12.2. Potential impacts during operation phase

The sensitivity of visual receptors is an important issue in the assessment of the significance of an impact. This sensitivity is based on the type of receptor, as well as the special nature of the view. For example, residential properties are considered to have a high sensitivity.

Impacts on the landscape caused by a Project are generally of two types: visual obstruction and visual intrusion. Visual obstruction occurs when new element constitutes a total or partial barrier to the perception of elements and landscapes behind. In the specific case of a power line or of a PV Plant, this can occur in a very limited way. Visual intrusion, on the other hand, occurs when new element causes a visual disturbance due to its aesthetic perceptive characteristics, regardless of the size of the field of vision it occupies. In the case in question, as the Project is configured, the impact will mainly concern the second aspect. Due to their shape, in the case of the OHL the main impact generated is due to the visual intrusion of the pylons, rather than the visual obstruction.

As far as the impact on the typology of landscape is concerned, the presence of power lines is nowadays a common trait of landscape. This is the reason why, in normal conditions of territories without very accentuated peculiarities, the presence of power lines does not constitute a particularly significant disturbance element. More significant impacts can occur when a power line is placed near cultural heritage or structural elements of particular landscape significance. In this case, when identifying the impact, the relationship of scale is fundamental, as well as the effect on possible visitors of these sites. However, in the present case, no cultural heritage elements are present within the Project footprint, and cultural sites with limited significance are present within the overall Project Area, therefore not specific interferences are expected. In addition, as stated previously, the number of pylons of OHL is limited and thus the impacts are located in a relatively limited area.

The Project area is actually free of tall industrial building or structures and the placement of electric pylons might result in negative change to the landscape character. The line of electric towers would introduce additional modern and dominant elements to the landscape which would both dwarf the existing poles and contrast with the character of the rural landscape. The impact of the sensitivity in this phase it is deemed to be moderate, while the magnitude is low, with an overall impact significance is assessed to be **Minor negative**.

The PV Plant area is located at sea level and the human receptors are located at nearly 800 meters at the village of Grykë, although there is one barn situated in the proximity of the PV plant. The plant is situated in an area not visible by the main roads crossing the area. The sunlight reflection of the panels can be seen from long distance if the receptor is located in hilly areas.

There are some types of visibility factors that affect perception of large objects in the landscape like the view shed limiting factors, viewer characteristics, lighting factors, atmospheric conditions, distance and the objects visual characteristics. In real landscapes, interactions between these visibility factors are extremely important in determining the actual visibility of an object such as a solar facility (Benson 2005; BLM 2013a). For example, distance interacts strongly with atmospheric conditions as a determinant of visibility; a distant facility that is visible on clear days may be completely invisible on hazy days or appear greyer and less distinct. Some of these factors are highly variable and the effects may change due to even the slightest changes in one of the contributing factors, like for example as the viewer moves over or the angle of the sun changes over a few minutes.

The impact of the sensitivity in this phase it is deemed to be moderate, while the magnitude is low, with an overall impact significance is assessed to be **Minor negative**.

Aspect

Visual impact and landscape - landscape visual and landscape character



Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Long-term	Local	Permanent	Likely	Low - PV Plant and OHL
Receptor					Sensitivity
Local Communities, Visitors, Tourists					Moderate - PV Plant and OHL
Overall Significance of Impact					
Minor Negative – PV Plant and OHL					

Management and mitigation measures

In relation to landscape and visual impacts for the OHL, objectives of mitigation measures for the proposals during operation phase shall include, but are not be limited to:

- Proposed replacement planting to replace areas removed during construction and decommissioning phases to facilitate machine access should also be included, all planting should comprise native plant species to reflect the local landscape character;
- All mitigation and replacement planting should be suitably protected, maintained and monitored during medium term establishment for a minimum of 5 years upon completion of the proposed development.

For what concerns the PV plant the following mitigation measures shall be included:

- Use consistent colour treatments: wherever possible, use uniform (and well-chosen) colour treatments on all structures and surfaces, which blends well with the surrounding landscape.
- Minimize vegetation clearing outside of the arrays: vegetation removal causes strong colour and texture contrasts by exposing light-coloured soils that lack the visual texture that vegetation provides.
- Carefully choose the exposed metal support structures or reflective surfaces in order to not reflect the sun.
- Plant vegetation outside the plant in strategic points that might be visible from the roads crossing the area so the PV remains not visible passing by.

Residual Impacts

Considering the application of the abovementioned mitigation measures, the impact on the infrastructures and utilities component is depicted in the following table and it is expected to be **negative** and **minor** for the PV and negative and minor for the OHL area.

Negligible – PV Plant and OHL

8.3.12.3. Potential impacts during decommissioning phase

Upon decommissioning the impacts will have a proportionally inverse impact that had in Pre-construction, given the nature of the Project. The area will return to its previous and natural conditions with the vegetation populating again these areas and field visual free of these dominant elements. This impact is deemed to have a proportional positive impact, so it is assessed to be **minor positive**.

**Minor Positive – PV Plant and OHL****8.3.12.4. Cumulative Impacts**

The development of the SPV Blue 1 will create visual cumulative impact with the Seman 1 Power Plant near the Hoxharë substation. Although situated 1.5 km from the PDA, the visual impact in a plain area where the projects are located might cause some minor cumulative impact.

Negligible to Minor Negative – PV Plant**8.4. Impacts on Cultural Heritage****8.4.1. Potential impacts during construction phase**

Based on the existing evidence of archaeological literature, there are no cultural heritage assets in the proposed footprints of the "Blue 1" Photovoltaic Park project in Topoja. Referring to the data, the Description of the Existing Social Status does not seem to interfere in any archaeological area or assets, as set out and observed in the map of cultural heritage as well.

The construction of the proposed project should not pose any threat to existing cultural assets. In this context, the size of the impact is considered small and the sensitivity of the area is considered small due to the archaeological heritage in the project area. In general, the significance of the impact is considered small. A separate Cultural Heritage investigation report is finalized in February 2021 on the project area and Cultural Heritage permit is issued in March 2021 from the National Cultural Heritage Council (NCHC).

The field reconnaissance conducted by the Cultural Heritage expert also revealed no Cultural Heritage assets or archaeological remains in the project development area.

Nevertheless, there is always a possibility that earthworks can potentially uncover any cultural heritage material or archaeological findings. Because of this the impact significance will be deemed as *minor*.

Aspect					
Cultural Heritage					
Type	Duration	Extent	Frequency	Likelihood	Magnitude
Direct	Short-term	On-site	Daily	Possible	Medium - PV Plant and OHL
Receptor					Sensitivity
Cultural Heritage Monuments					Low - PV Plant and OHL
Overall Significance of Impact					
Minor– PV Plant and OHL					

Management and mitigation measures

The project area is poor in classified and unclassified CH assets, historical monuments, and archaeological remains, historical towns, mosques, tekkes, graves, graveyards, and some natural landscapes. Special attention must be given to those located within and in proximity of the project's area.

During the site visit, are not identified CH assets, representing periods and typologies as shown Baseline.

There are still archaeological potential sites that have not been ground-truthed and there has been no pedestrian survey by archaeologists. There is still a minor potential that ground-truthed archaeological sites



exist within the footprint of any of the project components, even if pedestrian survey by archaeologists has been done.

Therefore, the following mitigation measures will be taken into account during construction works in proximity to observed and potential CH assets:

- Following national requirement, a tri-partite agreement should be developed with a licensed entity and the National Institute of Cultural Heritage, detailing the specific requirements, which will be periodically followed the excavation works;
- During the implementation, as prescribed in the Cultural Heritage legislation, the earth works will be supervised as per Law no.27, dated 17.05.2018, " On Cultural Heritage and Museums", article 144-147;
- The project activities are to be scheduled in such way to avoid/reduce impacts to the environment during significant events such as visits to the Tekkes, during religious days according to the community's calendar or funerary ceremonies
- Consultation with the site users shall occur through the CLO to understand site use, site boundaries, and timing of religious and cultural activities that could interfere with construction, operation or decommissioning activities.
- Disruption of user access, particularly to sites with ICH value, is likely to cause community issues, and so, where feasible, the construction programme shall ensure that Project equipment and activities are be planned and placed to avoid restricting any site access and potential noise during any religious and cultural activity.
- Regularly monitor for cultural heritage findings during earthworks and other related construction works
- Develop a Chance Find Procedure within the CEMP for managing cultural heritage and implement this procedure if any cultural heritage is discovered during construction; a confidentiality provision will be included.
- Avoid/minimise disturbance of sensitive areas within a buffer of 100 m. Whenever possible, disturbance of sensitive areas, as identified during the walkover by the qualified archaeologist
- Restoration actions. If impacts on sensitive/important sites are found to be impossible to be entirely avoided within the bounds of acceptable impact levels, then specific restoration and documentation activities will be developed.

Residual Impacts

Considering the application of the abovementioned mitigation measures, the impact on the cultural heritage component is depicted in the following table and it is expected to be Negligible both for the PV and OHL area.

Negligible – PV Plant and OHL

8.4.1.1. Potential impacts during operation phase

Historical and literature data show that the project area is not represented by archaeological monuments, artefacts and/or other related material. In addition, there are no risks anticipated during the operation phase.

Negligible – PV Plant and OHL



8.4.1.2. Potential impacts during decommissioning phase

Impacts during decommissioning will therefore be of the same nature as for construction, therefore, the impacts and mitigation measures of the construction phase are also needed during the decommissioning phase. So, it is assessed to be Negligible.

Negligible – PV Plant and OHL

8.4.1.3. Cumulative Impacts

No cumulative impacts are foreseen in relation to Cultural heritage.

Negligible – PV Plant and OHL



9. THE POSSIBILITY OF REHABILITATION OF THE IMPACTED ENVIRONMENT

The rehabilitation plan aims to rehabilitate the areas which have been impacted by the activity for the construction of the photovoltaic park. Based on the character of the construction works, it is estimated that the rehabilitation works will be easily applicable works. We will classify these works in two important categories:

- Engineering works;
- Biological rehabilitation/ restoration works.

9.1. Engineering works

Engineering works in order to rehabilitate the terrain impacted by construction works and the circulation of heavy vehicles. These works will be implemented simultaneously with the implementation of construction works, being finalized with the final rehabilitation after the construction works have been completed and before the commissioning of the work. These works will mainly consist of the following items:

- When required, the entity will intervene in the main road by enabling its filling and systematization, opening of drainage channels so that the existing infrastructure is not impacted by this project.
- The construction site area will be positioned away from the residential area, at the end of the works this area will be returned to its original condition.

9.2. Biological restoration works

Biological works refer to works which aim at revitalizing the affected areas by contributing to planting the characteristic trees and shrubs of the area, such as creating favourable conditions for the rapid development of vegetation.

The rehabilitation process will start at the end of the construction works and will continue during the testing and operational phase of the Photovoltaic Park. The period required for the accomplishment of full rehabilitation and restoration of the environment to the state prior to the start of works is set out 1 to 3 years.

The rehabilitation plan for the project includes:

- Use of surface soil for surface cover of affected land of the work area and surrounding areas;
- Cleaning all areas that were temporarily used by the project and various wastes (as well as temporarily deposited natural soils), rehabilitation, as well as their return to the previous condition;
- Maintenance of planted areas.

The estimate of rehabilitation works and the costs will be presented in detail in the ESIA study.



10. MEASURES TO MITIGATE ENVIRONMENTAL AND SOCIAL IMPACTS

Based on the Environmental Impact Assessment study for the "Blue 1" Photovoltaic Park in Topoja, this chapter summarizes the mitigation measures/action plan and project development.

The mitigation measures will be included in the detailed Environmental Plan and other project documents, to be implemented by the design company, Contractors and supervisors of the Project Management Office and local government for environmental protection. The effectiveness of these measures will be evaluated based on the environmental inspection and monitoring results, in order to determine whether these measures will be implemented continuously or need to be improved/adjusted.

10.1. Mitigation Measures During the Construction Phase

10.1.1. Waste Management

- A Waste Management Plan shall be developed. This will ensure that no solid waste is dumped on the ground. Bins and containers with appropriate labels should be placed in the premises of the company in designated areas.
- Waste dumping should be prevented, especially in natural areas. Garbage bins will be placed. These bins should be emptied regularly and the contents should be sent to a convenient and licensed landfill.
- The Contractor shall establish a control manual for the solid waste and their disposal.
- Bins will be emptied on a daily basis.
- It is necessary to include in the Waste Management Plan a training for all internal staff of the project on how to treat urban waste and mainly regarding the hazardous waste management (dumping of hydrocarbons, oils, etc.). The company must have executed contracts with companies licensed to transport and treat waste.
- Hazardous materials should be stored in suitable areas and care should be taken to ensure that they do not come into contact with the ground in the event of spills. (The area must be impenetrable and accessible only by authorized personnel, etc.)

Urban waste

- Construction sites and contractor camps should be clean at all times, especially the areas near the water sources.
- No type of waste will be allowed to be discharged into surface water sources such as rivers or drainage and irrigation canals in the area.
- Waste will be disposed in storage equipment. The contractor will then also remove the sweepings collected from the work areas, at least once a week.
- Waste should be disposed at a designated landfill.
- The contractor must take measures for workers to clean work areas at least once a week.
- Appropriate handling and storage of hazardous and non-hazardous waste for licensed collection for responsible disposal by registered operator; In each case, the entity/company that will transport or transfer the waste shall be equipped with a license of type III.2.B, as an obligation under Article 57 of Law no. 10463, dated 22.09.2011 "On Integrated Waste Management" as amended;
- Generated waste quantities - must be recorded in a separate/dedicated register according to the type of waste and the quantities generated. During the waste transfer process, a waste transfer format (Waste Transfer Format) shall be filled out to determine the respective quantities according



to the type of waste leaving the site and the name of the company/entity that will handle these wastes. These data shall be regularly kept by the Contractor during the construction activity, and presented/reported to the government authorities if required;

Recycling

Wherever possible, materials used or created from construction will be recycled.

Containers for glass, paper, metals and plastics should not leak. The office and work camp areas are particularly suitable for this form of the recycling process.

Where possible and practical, such as in shops and offices, waste will be separated for recycling purposes. Recycling protocols include materials in the following categories:

- Paper/cardboard;
- Aluminium;
- Metals (except aluminium);
- Organic waste;
- Glass; and
- Plastic.

10.1.1.1. Usage and removal of hazardous materials

Relatively small amounts of hazardous materials will be used during the construction and operation phase of the project. Disturbing materials to be used during construction and operation include gasoline, petroleum, transformer cooling oil, and sulphur hexafluoride.

Hazardous and non-hazardous waste that may be generated by the construction and operation of the project in the area include used transformer motor oils, hydraulic fluids, solvents and adhesives. Small spills and leaks of hazardous materials from vehicles or equipment may also occur. All waste will be treated, stored, transported and deposited in compliance with relevant Albanian and international laws, regulations and standards.

10.1.2. Air Emissions Management

Mitigation of impacts in relation to generation of dust and vehicle / machinery emissions will be managed through the development of the ESMP/CEMP and CTMP for the construction phase which will specify appropriate measures for the management of site clearance, excavation and construction activities, such as those listed below.

- Develop a Construction Traffic Management Plan (CTMP) to incorporate all relevant mitigation measures for vehicle movement nearby and within the project areas (PV plant and OHL);
- Removal of vegetation will be avoided as long as it is not necessary.
- Excavation, handling and transport of particulate materials must be avoided in the presence of wind or when a visible plume of dust is present.
- Soil reserves will be located in protected areas, where they are not exposed to the erosive effects of the wind, when it is possible to do so.
- Vehicle speeds should not exceed 40 km / h along dusty roads or 20 km / h when passing in unconsolidated and vegetation-free areas.
- The Contractor shall ensure that appropriate dust reduction techniques are applied when dust remover is unavoidable. Such measures will include pressing, damping, chemical stabilization, covering surfaces with less transportable wind material (straw, brush packs, chipping) and vegetation in open areas. There should be applied strict measures for the treatment of building



materials in powder form such as cement, lime, concrete additives, etc. and for the disposal of packaging.

- All exposed surfaces will be replanted or stabilized as soon as practicable.
- Minimise open excavation areas;
- Minimise stockpiling of soil and earthen material through coordination of earthworks and excavation activities (excavation, grading, compacting, etc.);
- When there is visible dust being generated by vehicles and other activities, implement dust suppression techniques, such as applying water to dusty areas (e.g., site, access road, etc.) through water spraying tanks;
- Minimise vegetation clearance (when is possible) to reduce exposure of bare soil, and revegetate cleared areas as soon as possible;
- For stockpiles left for long periods, apply grass seed or other covers;
- All construction machinery and equipment to be maintained in good working order and not left running when not in use;
- Burning of any material anywhere on construction sites is banned;
- Restrict vehicle speeds on construction sites and all access roads to minimize potential generation of dust;
- If any complaints or grievances are received from local community, investigate complaint and take action to remediate or clean up impacted receptor and take measures to reduce dust generation.

10.1.3. Water Emissions Management

During the construction phase, mitigation measures to be taken to avoid impact on the waters are:

- Avoid spillage of inert material during operation near drainage channels.
- Raw materials and soil deposits should not be deposited next to canals as they may be subject to rainwater erosion and suspend the water bodies.
- Periodically inspect work areas for hydrocarbon stains from accidental leakage from vehicles and work.
- Periodically check the technical condition of work vehicles and transport.
- Washing machinery and work tools at a distance of less than 50 m from the nearest river will not be allowed.
- Washing truck tires and clearing them of mud will be done before the latter leaves the work area, and a proper way of collecting waste will be implemented (installation of an Irish canal at the entrance-exit of the area of work for the collection of the produced sludge).
- Surface and groundwater pollution should not be allowed to occur from any kind of defect that may occur during the construction phase. Appropriate technical work must be implemented so that the streams of these waters are free of debris or non-degradable substances (such as lubricants or liquid hydrocarbons). Non-bio-degradable substances should not be dumped on the ground. In cases where there is an oil spill it is best to use absorbents such as sand and filaments immediately after the accidental spill.
- Used machine and equipment oils must be collected and disposed of at designated locations in accordance with the legislation in force.
- Disposal of toxic waste must also be done in accordance with the legislation in force.
- Waste piles should not be near rivers, in order to avoid their transport during rainfall and then their passage into rivers. Ground work during heavy rains should be avoided.
- During the construction (operation) of the project, the smooth flow of water (rivers, drainage canals, etc.) must be ensured.
- The design of the drainage system should be done in such a way as to ensure a complete drainage and to avoid the phenomenon of water deposition through the canals. Rainfall should be sent to



the receiving facilities without creating a significant increase in the water level of the existing water system. The irrigation and drainage pattern/network scheme around the PV plant site and areas of work for the OHL towers shall not be altered, but kept disciplined and functional to the maximum extent possible with the natural/ existing water flowing, channel depth and slope inclination to prevent blockages and/or flooding in surrounding lands;

10.1.4. Mitigation measures for land impacts

Proper waste management practices including hazardous materials and pollution prevention measures will avoid and minimize soil pollution.

For the construction phase, the following mitigation measures should be taken:

- Implementation of best environmental working practices;
- Follow the appropriate international guidelines and requirements, develop and follow a specific Emergency Response Plan, which includes procedures for clearing the land and pollution from any spills of oil, fuel or chemicals, etc.;
- Implementation of a waste management plan to ensure that waste is properly treated and disposed of, so that soil pollution is minimized;
- Surface water of workplaces should be collected in drainage channels;
- Attention must be paid for drainage channels in parking lots;
- Rehabilitation and re-vegetation of clean areas close to the Project site, which includes regeneration of bare soil before the next wet season;

10.1.5. Noise Management

The Contractor shall prepare a Noise and Vibration Mitigation Plan. The Noise and Vibration Mitigation Plan must include the following requirements:

- The construction site and other fixed noise-emitting facilities must be located away from noise-sensitive areas.
- All construction machinery and equipment must remain in good condition.
- Trucks should stay far enough away from noise-sensitive areas.
- Noise-emitting operations must be done all together. The total noise level will not be really loud if these operations were carried out individually.
- Construction activity must be avoided during night hours. Construction activities should be conducted in the daytime or in the morning.
- A deadline must be set for construction activities that emit noise.
- Applying silent construction methods where practically possible.

10.1.6. Protection of Flora and Fauna

Surface work and alienation, damage and loss of structure can affect the right conditions for plant growth and this impact can also result in wildlife migration as a result of poor vegetation. Mitigation and elimination of possible project side effects will be carried out by the company itself.

Enforcement of applicable laws and regulations in Albania for biodiversity protection through large-scale national wildlife and plant protection programs will be ensured.

Therefore, the following measures should be taken:

- Before starting work, woody vegetation must be eliminated from the entire work area.



- The extracted material must be collected at a site for later dissemination or can be used for erosion protection.
- During the elimination phase of vegetation, the surface layer of the soil should not be damaged and this effect must be reduced as best as possible.
- The ESMP must provide that all work done is in such a manner as to minimize the impact on the outside vegetation of the work area.

Vegetation close to / or near the work area

- The contractor must avoid as much as possible damage to vegetation and shrubs apart from those inside the project trail.
- Vegetation clearing shall be limited within the boundaries of the project footprint areas where it is absolutely necessary;
- No trees or shrubs that are inside the project trail will be cut down or damaged.
- Also, the area will not be used for the collection of materials or improvised buildings.

Transplantation of rare or endangered plant species and recovery of animal species

- Prior to the plant clearing process, any rare or endangered species identified by the EIA per se should be removed or transplanted to an unmarked area. Any relocation of endangered species should be discussed with the environmental authorities before such a measure is taken.
- If sensitive habitats shall be destroyed due to the project, then a recovery program should be conducted. The rescued animals can be located in particular areas close to the project. The existence of a similar alternative must be analysed before making a final decision.

Plant Protection

A number of measures will be incorporated into the Project ESMP to prevent and/or minimize impacts on flora. These measures will include (but not limited to):

- Demarcate work areas clearly for construction workers to ensure that the disruption of vegetation does not occur outside of designated areas;
- A Biodiversity Management Plan (BMP) which will include demarcation of the flora species on-site by a botanist, identifying measures to protect them from any accidental damage during construction is developed;
- To the extent possible the site design will consider retaining as many flora species as possible, and the relocation (if necessary) of those that cannot be retained and protected;

Fauna Protection

- Require the presence of a qualified ecologist or environmental expert during major earthworks in particular for works on drainage channels
- Restriction on access to forested areas during and following construction;
- Demarcate work areas clearly for construction workers to ensure that work activities do not occur outside of designated areas of the project;
- Incorporation of protection measures for the protected fauna species as some of them hold a protection status according to the Albanian and IUCN Red Lists;



- Ensure that all drivers receive training on the ecological sensitivities and driving techniques required to minimize disturbance to fauna which may be nocturnal or have specific migratory routes during the day;
- Identify post construction rehabilitation measures that seek to enhance the local biodiversity and create habitats that support the local population of the identified key species
- provide for worker awareness and training sessions in relation to protection of local fauna, and a code of conduct that forbids poaching or deliberate killing of animals listed in baseline studies.
- Ensure a gap (around 15-20 cm) is provided under the fence around the whole site to ensure that small faunal species can continue to move through the site.
- Reduce vehicle speed while travelling on all construction roads (20 km/h at the project area, for other access roads limits will be established at the Traffic Management Plan);
- Fauna species should not be caught or killed during construction;
- Establishment for a procedure to avoid, monitor and control invasive species if necessary;
- At trenches, trench plugs to be incorporated and daily fauna retrieval is to be conducted; • Works to be supervised by on-site ECoW;
- Where appropriate, temporary or permanent provisions for fauna to cross the working strip/ roads using underpasses, tunnels or other measures should be installed;
- Incorporate specific measures for protected species across the entire study area (refer BAP); Restrict construction to certain periods/seasons where possible to be outside the breeding season ie 1st March – 31st July for birds. No tree cutting shall be performed during the nesting/maternity period for birds and bats (between April and July). During the same period new ground disturbance activities shall also be limited in order to avoid disturbing ground nesting species.
- Night works shall be avoided (from 8 pm to 6 am at least) to reduce impacts to nocturnal fauna species, in particular for bats.
- Establish on-site conservation areas for natural habitats adjacent or within the Project sites that need to be protected from accidental disturbance during construction.
- Define temporary demarcation by highly visible wooden sticks (50 cm high) planted into the ground and /or flagging tape, while a more permanent fencing could be provided in areas of particular sensitivity (e.g. channels and wetlands).
- Avoid the accumulation of stagnant water and organic waste within the construction site and on the roads, that could attract wildlife, especially amphibians;
- Avoid spreading of invasive species by implementing an appropriate eradication and checking prior to commencement of any activities.
- Restrict vehicle movement to the existing roads that connect the Project site with the surrounding areas. Off-road driving shall be prohibited in order to avoid any unnecessary disturbance of natural vegetation and fauna.
- Speed limits of vehicles shall be established and enforced during works on site. Install animal crossing signs on the access road and enforce speed limit along the site access road.
- Domestic wastewater shall be treated and/or disposed accordingly. No wastewaters shall be directly discharged to the environment. Chemical toilets shall be provided to workers and regularly emptied and cleaned under a safe protocol.
- Use of culverts/channels as appropriate to avoid impact on the stagnant water within and around the construction areas.



- Awareness raising among employees and subcontractors working on-site regarding the protected species/habitats potentially present in the area will be developed, in order to ensure constant monitoring and promote mitigations or actions to be taken if wildlife is encountered.
- The use of pesticide for the management of alien invasive species will be under strict control and on as necessary. No agents identified as being prohibited will be used and wherever possible mechanical means will be the preferred method. Particular care will be taken to avoid vegetation management during spring so as to avoid impacting pollinators and any nesting fauna. The use of herbicides will not be allowed. Consideration will be given to allow local grazers to periodically use the site for grazing sheep in order to manage vegetation.

Birds protection

- The contractor must ensure that the glass panels to be used for noise mitigation are well marked in order to avoid the flight of these birds over these panels.
- The Project should develop the BMP to cover the construction phase of the Project and includes the identification and implementation of biodiversity enhancement measures.
- Avoid construction works during breeding season, i.e., between late March-mid-August or require the presence of a qualified ornithologist during major earthworks in particular for works on soil levelling and work in drainage channels;
- During the construction activities, identify places where fauna species with protected status are most often observed, demarcate the area and install warning signs for workers/drivers.
- Maintain a distance of at least 30 m “no-go area” from the primary and second grade drainage channels as they are important breeding and migratory habitats for several bird species;
- No tree cutting and vegetation clean shall be-up should be performed during the breeding season. During the same period new ground disturbance activities shall also be limited in order to avoid disturbing the ground nesting species;
- Pre-clearance checks will be undertaken by an experienced ornithologist for ground and tree nesting birds within the working width prior to the commencement of the habitat clearance works to avoid causing disturbance or harm to nesting birds and their young from collisions with machinery. A ‘no-go area’ comprising a 5 m radius will be demarcated around each active nest by the Project contractors with guidance from the ornithologist. And the habitat clearance will be prohibited within these ‘no-go areas’ until the birds have fledged.
- Monitoring of bat collision fatalities following a standardized methodology potentially using trained dogs. Monitoring to be completed monthly and concurrently with bird collision monitoring.
- A post-construction bird survey will be conducted along the OHL route to inform the design of a post-construction fatality monitoring (PCFM) program to evaluate the effectiveness of mitigation and monitor bird flight activity.
- Night works shall be avoided (from 8 pm to 6 am at least) to reduce impacts to nocturnal birds;
- Restrict vehicle movement to the existing roads that connect the Project site with the surrounding areas. Off-road driving shall be prohibited in order to avoid any unnecessary disturbance of natural vegetation and fauna. Speed limits of vehicles shall be established and enforced in order to avoid any accident with birds;
- Conduct regular awareness-building and environmental education campaigns for workers:
- Ensure construction site areas and base camp are kept clean, and that good practice with respect to waste management is applied, to ensure food attraction sources are eliminated;
- Engage suitably qualified biodiversity expert(s) to undertake the necessary training, awareness raising, and necessary survey work.



10.1.7. Possible Incidents and Emergency Procedures

Leakage

The contractor must ensure that a preparatory emergency plan is set up in order to deal with accidental leaks of chemicals, hydrocarbons, oils, etc.

Fires

- The contractor must ensure that a preparatory emergency plan is set up in order to combat accidental fires that can happen. Home-owners / users / managers who are close to the line should also be informed and involved.
- Food preparation areas will be provided and contractors should rigorously prohibit open fires for cooking or heating purposes.
- The use of trees and shrubs for lighting fires is prohibited.
- The contractor must take all necessary steps as a means to avoid increasing the risk of fire in the work area. Fire ignition is forbidden.
- The Contractor shall ensure that fire extinguisher is adequate for the Local Emergency Services.
- The Contractor shall provide fire extinguishers approved and tested at all offices, kitchens, warehouses and other areas.
- The contractor will take action when working with welding equipment close to areas that are a source of fire. This kind of caution means having a suitable, tested and approved fire extinguisher and the use of insulating coverings.
- The developer must subcontract the Traffic Contractor to create and implement the Traffic Management Plan for the roads used during the construction phase.

Crossing rivers / Changing River flow

- River flow (1:50 and 1:100 year) should be determined before construction begins in order to ensure proper risk management.
- Construction activities should be foreseen to occur during the period when the river flow is low and the construction area has as little contact as possible with the river flow.
- Mitigation measures will be required throughout the construction phase to control sediment entering rivers. After the completion of the construction phase, all construction material should be removed from the rivers and the area should be rehabilitated.
- The areas changed because of the project should be replanted using specific seeds belonging to the plants of the area.

Adaptation and public safety

- Interruption of daily entry and population movement should be as the lowest possible.
- Interruption of essential services such as electricity and water supply, should be the lowest possible. The Contractor shall provide an Essential Services Interruption Management Plan, in which measures are taken to manage and mitigate the situation.
- Attention should be paid during the construction phase as the safety risk increases. Particular attention should be paid to safety areas before construction begins.
- It is advisable to close the project area for visitors during the construction phase.
- The workers who will work should be easily identifiable. This can be achieved by using the same way of dressing, with the relevant personal protective equipment and placing signs announcing the works that are being carried out.



The usage of water for washing and toilets

- Facilities for workers such as toilets and bathing water should be provided.
- The toilets provided by the contractor should be in a manner that one toilet is used for 30 workers (preferably 1:15).
- Cleaning facilities will be located 100 m from each work site, but not closer than 50 m from any water body.
- All temporary / portable toilets must be embedded in the ground in order to ensure their stability in case of emergency or any other cause.
- The contractor must ensure that the entrances to the toilet are convenient to the public eye.
- Only approved toilets should be used in the vicinity of residential areas.
- These facilities must be hygienically maintained. Toilet paper must be provided.
- The contractor must ensure that there is no leakage of toilets when they are cleaned or emptied and their contents disposed of in an approved storage area.
- Waste dumping from toilets into the environment is categorically prohibited.
- The contractor must ensure that the toilets are emptied before workers' break time.
- Washing areas should be located and constructed in such a way as to provide surrounding areas, which prevent groundwater contamination.

Waste water

- The contractor must prevent any contaminants such as cement, concrete, lime, chemicals and hydrocarbons from spilling into any water source.
- The water from kitchens, showers, sinks, etc., must be discharged into collecting water tanks to be subsequently removed from the area or discharged into the area sewer system.
- Spills from hydrocarbon depots / truck wash areas will be transported to storage tanks and dumped in areas approved by the NEA and local authorities. The areas around the hydrocarbon tanks must be isolated in accordance with the requirements and the applicable law for Petroleum and products of this industry.
- Washing areas should be located and constructed in such a way as to provide surrounding areas that prevent groundwater contamination.

Treatment, storage and use of materials

- Material storage areas should be located away from environmentally sensitive areas and should be outside the 1:50 line of watercourse flooding.
- All materials produced and / or imported will be stored adequately by the camp contractor. Storage areas shall be covered with non-sensitive material.
- Hazardous chemicals used during construction will be stored in second-hand containers. Material Safety Data Sheet (MSDS) will be available at the construction site.
- The contractor must prevent any contaminants such as cement, concrete, lime, chemicals and fuels into any water source.

Flammable materials (Gasoline / Oil / Gas)

- Storage of fuels such as gasoline and diesel in the project area is not allowed.

Socio-economic impact

To increase the possibility of socio-economic impacts during construction, the following measures are recommended:

- The increasing of costs in the area by project staff whenever possible.



- The procurement of construction materials and other services to supply the project from the area when possible.
- To provide an entrance for workers moving in the area, so that workers understand the local culture and customs.
- To maintain continuous communication and engagement with stakeholders.
- To involve the community and disseminate information on future / ongoing construction activities. To establish a community complaint mechanism that allows residents to communicate concerns and address them in a timely and effective manner.

10.1.8. Employment and Economy

- To develop and implement a Local Employment and Procurement Plan to maximize local employment during the construction phase. Priority will be given first to recruiting the local community, followed by the region, as far as possible, considering the skills and experience requirements of the various jobs. The development of the plan should include consultation with relevant stakeholders, including government authorities.
- To develop and implement a workforce code of conduct that addresses issues such as anti-social behaviour and drug and alcohol consumption. Provide ongoing training for staff and ensure that instructions are clearly communicated to all workforce and that those measures are strictly enforced.
- To review the possibility of creating a skills training program in order to train local residents interested in contributing to the Project.
- Recruitment and training to be transparent and equal (e.g. by implementing procedures that prevent the payment of bribes for recruitment) and training programs to meet national and international standards for employment, health and safety at work.
- Distribute information about local employment and contracting opportunities equally using accessible communication channels, such as local government bulletins, village notice boards, district employment department registration, and local newspaper advertising.
- The project can create direct employment opportunities for local communities, where qualification and necessity will make it possible, thus helping a community's economy, otherwise, lack such opportunities.
- To establish transparent procedures and recruitment rights.
- To implement a training program for the local workforce to enable them to benefit from this opportunity.
- The project will provide goods and services on site whenever possible, to promote the origination of indirect employment opportunities.

With regard to construction-related employment, hiring each individual for the operation should follow best practices. Mitigation and remedial measures are as follows:

- To continue transparency in recruitment procedures.
- To enable locals who have knowledge of specific positions and Safety and Maintenance staff to be employed in the recently created structure.

10.2. Mitigation Measures During the Operation Phase

An accredited EMP will have all the processes, procedures and policies in place to ensure that environmental impacts are properly managed during the operational phase and also to ensure continuous improvement through regular audits and management reviews.



10.2.1. Waste Management

10.2.1.1. Solid Waste Management

Waste generated by photovoltaic park activity should be collected in specific bins for urban waste. If it is possible to differentiate the waste and then it will be done by licensed recycling companies. If this is not possible, according to the agreement, the Municipality of Fier will send the waste to the landfill.

The developer will prepare and maintain a Waste Management Plan (WMP) in compliance with Albanian legislation that will include arrangements for the disposal of hazardous and non-hazardous waste through licensed waste disposal subcontractors/ companies. The plan will also include measures to ensure:

- Food/organic waste and recyclables such as. paper, plastic, scrap metal waste, etc. must be properly segregated and stored in designated waste bins/containers and periodically deposited in approved disposal areas or either sold to licensed recycling companies.
- Ensure electrical waste (consumables, spare parts and obsolete equipment) and broken solar panels are properly packed and sent back to manufacturer and/or reused in other forms and locations;
- Generated waste quantities - must be recorded in a separate/dedicated register according to the type of waste and the quantities generated. During the waste transfer process, a waste transfer format (Waste Transfer Format) shall be filled out to determine the respective quantities according to the type of waste leaving the site and the name of the company/entity that will handle these wastes. These data shall be regularly kept by the Developer during the operation activity, and presented/reported to the government authorities if required;
- Conduct continuous training and education awareness of all employees of the project in regard to waste management practices in order to avoid, reduce the risks of waste generation and potential impact during the operation phase.

10.2.1.2. Electric Waste Management, Damaged Photovoltaic Panels and Underground Connecting Infrastructure

Electrical connections, equipment in the inverter and transformer area, and other area related equipment will be removed as part of replacement and / or disassembly. Prior to the commencement of replacement / removal of electrical equipment, the system will be de-energized and all external power lines fed inside or outside the project will be disconnected. Electrical components containing the inverter zone and the interconnection transformer zone will be disconnected and placed in containers suitable for their transport, also they will be sent to a licensed site for recycling or reuse.

The electrical connections on each panel will be disconnected together with the combinator boxes and the switches will be disconnected, while the bolts and connections linking each module to the metal structure will be removed. The modules will be removed from the metal structures and placed in secure transport boxes and then moved to the place where they will be reused or recycled. Reusable bolts and screws will be stored for reuse as well.

Once the photovoltaic modules have been removed, the metal support structures will be dismantled including the supporting scaffolding. Metal retaining trestles will be restored and transported in a metal recycler for reuse. Underground electrical equipment, including electrical installations, will be removed and eliminated from the area. Electrical installations are either copper or aluminium (depending on their function / location) enclosed in a plastic insulating material. Electrical materials consist mostly of recyclable materials.

Recycling practices of the PV modules – This type of “electronic equipment” is intended to have a useful lifespan of approximately 25-30 years. SPV Blue 1 confirmed that until the end of works broken solar panels will be stored on site in containers. The beginning of the implementation of large PV parks in Europe, and



also in the rest of the world, started around 2007, and therefore limited experience or industrial recycling practices have been developed at a large scale until very recently. Nevertheless, there is always a fraction of supplied PV modules that are damaged or need to be replaced, becoming waste, and therefore require recycling. Voltalia also has extensive experience in O&M sites and PV modules waste management, since these early times.

In most European countries there is a monetary contribution from the manufacturer to a system that deals with these "electronic waste", which define the methodologies and targets for them. targets – that since 2019 is the recycling of 65% of the average of the produced WEEE. In the meantime, some experimental electronic waste treatment companies have been created, but the numbers concerning the recycling of the more complex and dangerous part of the panels: glass and photovoltaic elements are very low. On the other hand, the frame in aluminium, plastics and cables can be recycled without problems. Silicon-based photovoltaic panels require normal treatment of flat glass and no specific removal of the semiconductor layer. Photovoltaic panels not based on silicon require special technology to remove semiconductors and isolate toxic heavy metals.

A European entity called the "European Recycling Platform" is responsible for the management of the discarded/damaged PV panels, sending them for recycling units that separate the aluminium frame, metal conductors, plastics and the glass and photovoltaic elements. The first ones are completely recycled. The destination of the major part of plastics and the glass and photovoltaic elements is a controlled specific landfill indicated by European Recycling Centre (ERC).

As an example, in Portugal, from 2017 to 2020 were collected and sent for treatment 7.5 ton of photovoltaic panels. As each panel weighs approximately 20 kg, about 375 PV panels were processed.

In conclusion, waste during normal operations will be minimal and will largely consist of municipal waste (e.g., food; packaging) and over time potentially defunct panels, cabling and control equipment etc. Waste management arrangements for the construction phase should be continued (proper control of collection, storage and final disposal via licensed contractors).

10.2.2. Water Emissions Management

The preventive and mitigation measures should be taken during the operation phase as follows:

- In cases of detection of hydrocarbon leaks, immediate measures should be taken to stop the activity, repair and clean the contaminated surface.
- Regular maintenance of the necessary technical works must be done, for the drainage of their designed flow. Periodic maintenance of technical works should include waste removal, debris and cutting of harmful plants. Non-periodic maintenance will include erosion control, sedimentation or even cases of technical malfunctions.
- Sewage from the project area will be sent to the collection stations and from there will be directed together with the sewage stations, to the sewerage systems.
- Periodical training is needed to be provided to workers for best utilization of water during operation;
- Potential provision of rainwater harvesting and use during the wet cleaning process of PV modules;
- Recycle/reuse of water to the extent possible.
- In the event of an accident of a load of toxic or hazardous substances, the latter may end up in surface or groundwater. Therefore, the preparation of a Risk Assessment Study should be proposed. This study shall be prepared under the care of the project operator.

10.2.3. Mitigation measures for impacts on geology and soil

During the operation of the project, the contractor responsible for the operation of the project should monitor the development and overall stability of the geological formations affected by the project, or embankments. When significant changes occur, appropriate mitigation measures will be implemented.



During the operational phase, the following measures will be implemented:

Surface rainwater should be transmitted to the drainage channels.

The stability of the slope of the embankments and cuts will be monitored and if possible, corrective actions will be taken.

10.2.4. Noise management

- Traffic noise monitoring;
- In case of high noise levels in areas where there is a sensitive area, further measures should be taken by adding a protective barrier against noise.

10.2.5. Mitigation Measures for Flora and Fauna

- A biodiversity management plan needs to be developed by the Developer.

10.2.6. Socio-Economic Impact

- To develop a Traffic Management Plan. The developer should draft and maintain a Traffic Management Plan in cooperation with local institutions.

To develop a Preparation and Response for Emergencies: The operator must prepare the Emergency Preparation and Response plan during the operation.



11.POSSIBLE IMPACTS ON THE CROSS-BORDER ENVIRONMENT

The development of the project for the construction and operation of the Photovoltaic Park "Blue 1" will take place in the Albanian territory and it is estimated that it will not cause impacts at the cross-border level.

12.ENVIRONMENTAL AND SOCIAL MONITORING PLAN

The Environmental and Social Monitoring Plan must be drafted by the Contractor and will be implemented by him after the approval of this plan both during the construction process and during its operation. Most of these procedures refer to this EIA, and form part of the rules and key management issues under which the project will be developed.

12.1. Environmental Monitoring parameters and monitoring methodology

Specific measures to be taken during the construction phase of the project are included in the table below. The table also includes monitoring measures intended to ensure compliance with plans that can be controlled and documented during implementation, and to assign responsibilities for these actions.

Table 59 Environmental and Social Monitoring Programme during construction phase

Aspect	Monitoring Task	Monitoring Indicators	Timing/ Frequency	Responsibility
Air Quality	Visual inspection and monitoring along the project footprint (PV solar plant and OHL route). Air quality monitoring (in particular dust) near sensitive receptors (e.g., dwellings, businesses, protected or sensitive biodiversity areas, etc.).	TSP; PM10; PM2.5; CO; NOx; SO2; Others (if necessary).	Periodic monitoring during construction works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any).	<ul style="list-style-type: none"> EPC Contractor; Developer; Third-party accredited laboratory.
Surface water	Visual inspection along the Project footprint (PV solar plant and OHL route). Visual inspection of working areas. Visual inspection of excavation works near water bodies, watercourse crossings and/or irrigation/drainage channels. Monitor surface water in different locations, where deemed relevant by	pH value; Dissolved oxygen (DO); Electrical conductivity; Suspended solids; Nitrate; Nitrite; Ammonium; Total Phosphorus; COD; BOD5; Dry residue; Total hardness;	Periodic monitoring during construction works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any).	<ul style="list-style-type: none"> EPC Contractor; Developer; Third-party accredited laboratory.

Aspect	Monitoring Task	Monitoring Indicators	Timing/ Frequency	Responsibility
	the experts for further evaluation and assessment.	Total iron; Petroleum products; Other heavy metals.		
Noise and vibration levels	Inspection of working areas and excavations during construction phase. Monitor noise and vibration levels/ emissions in different locations, where deemed relevant by the experts for further evaluation and assessment.	LAeq (noise); Vibration level; Other parameters.	Periodic monitoring during construction works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any).	<ul style="list-style-type: none"> EPC Contractor; Developer; Third-party accredited laboratory.
Soil Quality	Visual inspection of working areas. Visual inspection of excavation works. Identification and reporting of erosive events. Soil quality measurements, if necessary, in case of unplanned soil/land pollution or upon received complaints (if any).		Periodic monitoring during construction works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any).	<ul style="list-style-type: none"> EPC Contractor; Developer; Third-party accredited laboratory.
Biodiversity (Flora and Fauna)	Visual inspection along the project footprint (PV solar plant and OHL route) and surrounding areas. Visual inspections and monitoring during land-clearance and excavation works. Periodic monitoring of key biodiversity habitats, fauna and flora species with protection status (terrestrial and	Records and evidence of sensitive biodiversity areas/ habitats/ species/ ecosystems; Specific locations where animals risk to be trapped; Records and evidence of bird species; Evidence of waste dumping or illegal disposal outside approved waste facilities (fly tipping);	Periodic visual monitoring during construction works in accordance with the requirements of environmental national authorities, and environmental declaration.	<ul style="list-style-type: none"> EPC Contractor; Developer.

Aspect	Monitoring Task	Monitoring Indicators	Timing/ Frequency	Responsibility
	aquatic), and sensitive areas within and/or near the project footprint.	Induction training and regular toolbox talks for environmental and biodiversity protection.		
Cultural heritage	Visual inspections and monitoring during land-clearance and excavation works. Review and audit of mitigation activities to ensure satisfactory of implementation of mitigation measures.	100% completion of required reporting: Ground-disturbing activities; Chance finds; and, Periodic inspection of known cultural heritage sites in the study area; Cultural heritage induction training and toolbox talks; Implementation of all necessary additional measures such as signage, fencing, structural bracing and conservation in case of any cultural heritage findings; Cultural heritage related grievances and cultural heritage issues raised from consultation with local communities and state authorities.	Periodic visual monitoring during construction works in accordance with the requirements of national authorities.	<ul style="list-style-type: none"> EPC Contractor; Developer.
Economy and employment	Evaluate economic indicators for local content and socio-economic issues. Review and audit of mitigation activities to ensure satisfactory implementation of mitigation/ enhancement measures.	Percentage of unskilled and skilled labour from the local communities; Percentage of labour employed from local/regional communities nearby the project footprint; Percentage of EPC Contractor's personnel/ subcontractors trained on gender policies.	Continuous cooperation with governmental authorities for the employment of workers and other staff; Periodic internal audits on employment within the project.	<ul style="list-style-type: none"> EPC Contractor; Developer.

Table 60. Environmental and Social Monitoring Programme during operational phase

Aspect	Monitoring Task	Monitoring Indicator	Frequency	Responsibility
Surface water quality	<p>Visual inspection along the Project footprint (PV solar plant and OHL route).</p> <p>Visual inspection of working areas.</p> <p>Visual inspection of maintenance works near water bodies, watercourse crossings and/or irrigation/drainage channels.</p> <p>Monitor surface water in different locations, where deemed relevant by the experts for further evaluation and assessment.</p>	<ul style="list-style-type: none"> • pH value; • Dissolved oxygen (DO); • Electrical conductivity; • Suspended solids; • Nitrate; • Nitrite; • Ammonium; • Total Phosphorus; • COD; • BOD5; • Dry residue; • Total hardness; • Total iron; • Petroleum products; • Other heavy metals. 	Periodically assessment and monitoring. Continuous assessment and monitoring in compliance with national law requirements and international guidelines.	Developer; 3rd Party.
Biodiversity (terrestrial and aquatic)	Monitoring species identified in this ESIA and Biodiversity Action Plan (that will be developed).	Potential habitat loss and disturbance of flora, fauna and avifauna.	Daily (visual assessment); Periodic inspections during construction works based on national and international standards	Developer;

Aspect	Monitoring Task	Monitoring Indicator	Frequency	Responsibility
	Visual inspections of all sensitive habitats in accordance with the recommendations of the field survey for biodiversity and ESIA report.		and also in accordance with guidelines specified by relevant government authorities. (Specialized inspections shall be conducted by relevant biodiversity experts).	3 rd Party Environmental Consultant for Biodiversity.
Waste	Monitoring of types of waste identified in the ESIA and Waste Management Plan (that will be developed). Visual inspection in the project area for spills and leaks which might pose impacts on the environment; Visual inspection for waste management and housekeeping conditions.	Potential contamination of water and soil due to generation of waste. Potential for odor nuisances to local community and work staff.	Daily (visual assessment); Periodic inspections during operation based on national and international standards and also in accordance with guidelines specified by relevant government authorities. (Generation of waste quantities produced and record keeping in a dedicated format).	Developer; 3 rd Party.

12.2. Social economic monitoring parameters and monitoring methodology

The table below represents a summary of key social, health and safety monitoring requirements that the Contractors shall undertake during construction work activities; this will be further developed within the ESMP as required. Based on the provided table, the Contractors shall prepare the ESMP and HSMP elaborating monitoring requirements, frequencies, etc.

Table 61. Social Monitoring Programme during construction

Aspect	Monitoring Task	Monitoring Indicators	Timing/ Frequency	Responsibility
Economy and employment	<ul style="list-style-type: none"> Evaluate economic indicators for local content and socio-economic issues. 	<ul style="list-style-type: none"> Percentage of unskilled and skilled labour from the local communities; 	Continuous cooperation with governmental authorities for the employment of workers and other staff;	<ul style="list-style-type: none"> Contractor; Developer.

Aspect	Monitoring Task	Monitoring Indicators	Timing/ Frequency	Responsibility
	<ul style="list-style-type: none"> Review and audit of mitigation activities to ensure satisfactory implementation of mitigation/enhancement measures. 	<ul style="list-style-type: none"> Percentage of labour employed from local/regional communities nearby the project footprint; Percentage of Contractor's personnel/ subcontractors trained on gender policies. 	Periodic internal audits on employment within the project.	
Land use and value	<ul style="list-style-type: none"> Investigate and monitor signed agreements for compensations. 	<ul style="list-style-type: none"> Percentage of landowners/users affected with signed compensation agreements; Number of grievances registered on land compensation. 	<p>Pre-construction phase – detailed surveys along the project footprint to clearly identify all affected people/lands/properties/buildings/crops by the project development prior to work activities.</p> <p>Continuous follow-up with affected people and stakeholders in line with national and international requirements, as well as best practices.</p>	<ul style="list-style-type: none"> Contractor; Developer.
Local Communities	<ul style="list-style-type: none"> Pre-construction meetings with local communities. Continuous consultations with local communities and governmental authorities (national, regional, local). Consultation MoMs, participants and topics discussed. Analyses of registered grievances. 	<ul style="list-style-type: none"> Percentage of meetings with minutes developed; Number of community meetings held; Number of grievances responded and addressed; Community grievance trends and resolutions. 	<p>Pre-construction phase – consultation with all local communities affected directly and indirectly by the project prior to the commencement of work activities.</p> <p>Continuous follow-up with affected people and stakeholders in line with national and international requirements, as well as best practices.</p>	<ul style="list-style-type: none"> Contractor; Developer.

Aspect	Monitoring Task	Monitoring Indicators	Timing/ Frequency	Responsibility
Infrastructure and utilities	<ul style="list-style-type: none"> Visual inspection and recordkeeping of all infrastructure, utilities and community services along the project footprint (Solar plant and OHL route). Recordkeeping documented agreements with authorities and public utility companies and grievance mechanisms. 	<ul style="list-style-type: none"> Number of grievances responded and addressed; Hours of utility service interruptions (sewage, electricity, irrigation) including private irrigation systems. 	<p>Pre-construction phase – additional surveys along the project footprint to identify the existing conditions of infrastructure, utilities and community services, as well as potential risks for impacts/damages prior to the commencement of work activities.</p> <p>Regular monitoring of the conditions of infrastructure, utilities and community services during work activities.</p>	<ul style="list-style-type: none"> Contractor; Developer.
Working conditions	<ul style="list-style-type: none"> Perform workforce surveys. Maintain worker's grievance mechanisms. Analyse workers and community grievance trends. Maintain training records. 	<ul style="list-style-type: none"> KPIs for worker rights, discrimination, worker grievances; Community and workers grievance trends; Training records (compliance with assigned training); Number of times where the project's Code of Conduct has been breached. 	<p>Regular audits (i.e., monthly) for working conditions during the project development (construction phase).</p>	<ul style="list-style-type: none"> Contractor; Developer.
Community and workers health and safety	<ul style="list-style-type: none"> Monitor workers and community health. Monitor application of training. Monitor medical facilities and first aid equipment. 	<ul style="list-style-type: none"> Monitoring and audit reports; Health checks conducted for all workers periodically; Training records; Records on medical facilities and first aid equipment conditions. 	<p>Regular audits (i.e., monthly) for community and workers H&S during the project development (construction phase).</p>	<ul style="list-style-type: none"> Contractor; Developer.

Aspect	Monitoring Task	Monitoring Indicators	Timing/ Frequency	Responsibility
Traffic	<ul style="list-style-type: none"> Monitor potential impacts related to traffic. Record keeping of traffic related parameters. Continuous traffic monitoring. 	<ul style="list-style-type: none"> Percentage of total new and updated roads constructed compared to originally planned; Number of days and kilometres of road affected by the project (closed due to project's activities); Reports and records showing application of mitigation measures (communications, records of road damage and repair, approval of road drawings, training registers); Number of vehicles per category; Number of accidents and other events. 	<p>Pre-construction phase – investigate and check the conditions of transport routes along the project footprint and surroundings, prior to the commencement of work activities.</p> <p>Update the TMP if necessary.</p> <p>Monitor construction works occurring close to identified potential hot spots (based on the TMP).</p>	<ul style="list-style-type: none"> Contractor; Developer.

Table 62 Social Monitoring Programme during operation

Aspect	Monitoring Task	Parameters to be Monitored	Frequency	Responsibility
Local Communities' Health, Safety and Security	Meetings with local communities. Analyses of registered grievances and accidents. Monitor medical facilities and first aid equipment.	Increase in HSE and traffic related accidents.	Daily (visual assessment);	Developer; 3 rd Party
Occupational Health Safety and Security	HSE Management System and associated Plans, including any contractors and subcontractors. Coordination with traffic authorities prior to busy periods to coordinate predicted increase in related traffic. Register of training sessions and attendees.	Strict application of the HSE measures HSE and traffic related accidents/incidents.	Periodic inspections during operation works	Developer; 3 rd Party
Local Communities' Cohesion	Summary of SPV Blue 1 contributions to the area is regularly updated and publicized on the website Meetings with community	Records on any incidents that took place between workers and local residents. This data will be regularly included into Annual ESMP.	Periodic inspections during operation works Periodic meetings with Local community	Developer;
Local Economy and Employment	Local Employment of local people and development of the area economy related to project.	Regularly updated cumulative records on already filled and also advertised employment opportunities with clear	Periodic inspections during operational works based on national and international standards and also in accordance with	Developer; 3 rd Party.

Aspect	Monitoring Task	Parameters to be Monitored	Frequency	Responsibility
		<p>indication of the minimum level of education, training and skills required</p> <p>Records regularly supplied by all contractors on any new jobs.</p>	<p>guidelines specified by relevant government authorities.</p>	
Workforce Management	<p>Perform workforce surveys.</p> <p>Maintain worker's grievance mechanisms.</p> <p>Analyse workers and community grievance trends.</p> <p>Maintain training records.</p>	<p>Accidents on work.</p> <p>Records on all incidents, lost time incidents, and other HSE indicators submitted monthly by all contractors to the SPV Blue 1 HSE team.</p> <p>Records of spot health checks among workers at different sites (fit for work checks, dehydration/access to water, general health conditions, etc).</p> <p>PPE: records of regular training on, and monitoring of PPE condition and usage.</p> <p>Records of HSE audits of all contractors.</p>	<p>Periodic measurements during operational works based on national and international standards</p> <p>Incidents register</p>	Developer;



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