MINISTRIA E BUJQËSISË DHE ZHVILLIMIT RURAL

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ENGINEERING CONSULTANCY



Project: Climate Resilience and Agriculture Development Project in Albania

Assignment: Pre/Feasibility Studies for the entire scheme (Lushnja irrigation scheme)

Contract No.: AL-MARD-389925-CS-QCB

Preliminary ESIA

Contracting Authority:

Ministry of Agriculture and Rural Development

Consultant:

JV Lorenco & Co Shpk - E.B.S Shpk

September 2026

Project Name:	**Pre/Feasibility Studies for the entire scheme (Lushnja irrigation scheme)**		
Contract:	AL-MARD-389925-CS-QCB		
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Project Region:	Lushnje, Albania	**Reporting Focus:**	Preliminary ESIA
		Report No.:	06
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List of Abbreviations

Abbreviation	Definition
ARAP	Abbreviated Resettlement Action Plan
ASIG	Autoriteti Shtetëror për Informacionin Gjeohapësinor (State Authority for Geospatial Information)
BOD_5	Biochemical oxygen demand over five days
C3S	Copernicus Climate Change Service
CCKP	Climate Change Knowledge Portal (World Bank Group)
CEIA	Centre for Environmental Impact Assessment
CFU	Colony-forming unit
CMIP6	Coupled Model Intercomparison Project, Phase 6
COD	Chemical oxygen demand
CRAD	Climate Resilience and Agriculture Development project
DN	Nominal diameter of pipework
EC	Electrical conductivity
ECMWF	European Centre for Medium-Range Weather Forecasts
EIA	Environmental Impact Assessment
ELSUS	European Landslide Susceptibility Map
ERA5 / ERA5-Land	Fifth-generation atmospheric and land-surface reanalysis of the ECMWF
ESF	Environmental and Social Framework of the World Bank
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESS1 to ESS10	Environmental and Social Standards 1 to 10 of the World Bank ESF
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GIS	Geographic Information System
GRP	Glass-reinforced plastic
HSE	Health, Safety and Environment
IFC	International Finance Corporation
INSTAT	Instituti i Statistikave (Institute of Statistics, Albania)

IOM	International Organization for Migration
IPM	Integrated Pest Management
ISO / IEC	International Organization for Standardization / International Electrotechnical Commission
IUCN	International Union for Conservation of Nature
JRC	Joint Research Centre of the European Commission
MARD	Ministry of Agriculture and Rural Development
MARDWA	Ministry of Agriculture, Rural Development and Water Administration (former designation)
OHS	Occupational Health and Safety
PE	Polyethylene
PM_{10} / $PM_{2.5}$	Particulate matter of aerodynamic diameter below 10 and 2.5 micrometres
PS6	IFC Performance Standard 6
RAP	Resettlement Action Plan
SAR	Sodium adsorption ratio
UNEP-WCMC	United Nations Environment Programme World Conservation Monitoring Centre
WHO	World Health Organization

1 Introduction

1.1 Purpose of this Report

This Preliminary Environmental and Social Impact Assessment has been prepared for the rehabilitation and modernisation of the Lushnje Irrigation Scheme, under Contract AL-MARD-389925-CS-QCB for the Ministry of Agriculture and Rural Development, within the Climate Resilience and Agriculture Development (CRAD) project financed by the World Bank. It accompanies the Final Pre-Feasibility Study and forms one of the deliverables of the final phase of the assignment.

The purpose of the assessment is to identify, at a level of detail commensurate with the pre-feasibility stage of design, the environmental and social effects of the proposed works; to determine whether any of those effects would be of a nature or scale that would constrain the scheme as designed; and to set out the measures by which adverse effects are to be avoided, minimised, mitigated or, where residual effects remain, offset. It further establishes the management and monitoring framework within which the works are to be delivered.

The assessment is preliminary. The conceptual designs on which it rests are developed to pre-feasibility level, and certain elements of the scheme remain to be confirmed with the Client. A definitive assessment, prepared once the scheme is fixed and detailed design is available, will be required before works proceed. Section 1.4 identifies the matters that the definitive assessment must address.

1.2 Scope of the Assessment

The assessment covers the whole of the scheme developed in the Pre-Feasibility Study, comprising the following components:

- the 800 ha pressurised pilot area, developed as two candidate options of which Plug-Dushk is identified as preferred, comprising a central pumping station, a buried pressurised distribution network and on-farm application systems;
- the conveyance works through the Lushnje section, developed as three alternative schemes, comprising box culverting, covering and channel reinstatement along the existing route, or an urban bypass;
- the integration of the Kasharaj Reservoir as a supplementary source, comprising a covered box culvert over 800 m;
- the reinstatement of the Lushnje Branch over approximately 12 km downstream of the urban section, together with the 2,717 m of the urban stretch outside the culverted length.

The assessment addresses the construction and operational phases of each component, together with cumulative effects arising from their delivery as a single programme. It considers effects on soil and land, water resources and water quality, air quality, noise and vibration,

biodiversity, landscape, cultural heritage, waste, climate, and the social environment including land acquisition, resettlement, livelihoods, community health and safety, and employment.

1.3 Assessment Methodology

Effects have been assessed by examining the interaction between the activities of each project component and the receiving environment across the project life cycle. For each environmental and social component the assessment considers the nature of the effect, whether beneficial or adverse; its spatial extent, whether local or regional; its duration, whether short, medium or long term; its reversibility; its intensity; the probability of its occurrence; and its significance once mitigation has been applied.

The assessment draws on the field investigations undertaken for the Pre-Feasibility Study, including the topographic and drone survey, the GIS-based encroachment inventory, the wastewater discharge-point inventory, the water-quality sampling campaign of June 2026, the socio-economic survey of beneficiaries, and the site reconnaissance of the project corridor. It is supplemented by the environmental baseline compiled for the national environmental impact assessment prepared in parallel under Albanian legislation.

Significance has been assigned on a four-point scale, applied consistently throughout:

Table 1-1 Significance criteria applied in the assessment

Significance	Definition
Negligible	No perceptible change to the receptor, or change within the range of natural variation.
Minor	Perceptible change, localised and short term, within the capacity of the receptor to absorb without lasting effect.
Moderate	Clearly perceptible change affecting the receptor over an extended area or period, requiring specific mitigation to render acceptable.
Major	Change that materially alters the character or function of the receptor, or affects a receptor of high sensitivity, requiring avoidance or substantial mitigation.

1.4 Limitations and Matters for the Definitive Assessment

The following limitations attach to this preliminary assessment, and the matters identified are to be resolved in the definitive assessment prepared at detailed design stage:

- The conveyance scheme is not yet selected. Three alternatives are assessed, and their environmental and social profiles differ materially, most significantly in respect of resettlement.
- The census of persons and assets affected by the option involving removal of structures is preliminary. A full census establishing occupancy, tenure, household composition,

vulnerability and business activity is required, and a full Resettlement Action Plan must be prepared before any displacement occurs.

- Ecological survey has been limited to reconnaissance and desk assessment. Seasonal survey of breeding birds and of aquatic fauna in the canals is recommended where works affect vegetated reaches.
- The correction of the sewer connections discharging into the canal is essential to the water-quality outcome of the scheme but lies with the municipal sewerage network and outside the scope of these works. Its programme must be coordinated with that of the irrigation works.

1.5 Structure of the Report

Section 2 sets out the policy, legal and administrative framework. Section 3 describes the project. Section 4 examines the alternatives considered. Section 5 establishes the environmental and social baseline. Section 6 records stakeholder engagement. Section 7 assesses the effects and identifies mitigation. Section 8 sets out the Environmental and Social Management Plan, and Section 9 the monitoring programme. Section 10 describes the grievance mechanism. Section 11 presents the conclusions and recommendations, and Section 12 lists the references.

2 Policy, Legal and Administrative Framework

The project is subject concurrently to Albanian environmental legislation and to the Environmental and Social Framework of the World Bank. Where the two differ, the more stringent requirement governs, and World Bank requirements prevail where national provisions do not meet them.

2.1 Albanian Legislation

The principal instruments applicable to the project are as follows.

Table 2-1 Applicable Albanian legislation

Field	Instrument
Environmental protection	Law no. 10431 of 09.06.2011 "On Environmental Protection", as amended
Environmental impact assessment	Law no. 10440 of 07.07.2011 "On Environmental Impact Assessment", as amended
Water resources	Law no. 111/2012 "On Integrated Water Resources Management", as amended, and subsidiary legislation on water use permits and the protection of water bodies
Territorial planning	Law no. 107/2014 "On Territorial Planning and Development", as amended
Biodiversity	Law no. 9587 of 20.07.2006 "On Biodiversity Protection", as amended
Protected areas	Law no. 81/2017 "On Protected Areas", as amended
Waste	Law no. 10463 of 22.09.2011 "On Integrated Waste Management", as amended
Air quality	Law no. 162/2014 "On the Protection of Ambient Air Quality"
Noise	Law no. 9774 of 12.07.2007 "On the Assessment and Management of Environmental Noise", as amended
Cultural heritage	Law no. 27/2018 "On Cultural Heritage and Museums", as amended
Occupational safety	Law no. 10237 of 18.02.2010 "On Occupational Safety and Health", as amended
Civil protection	Law no. 45/2019 "On Civil Protection"
Plant protection and pesticides	Law no. 105/2016 "On Plant Protection", governing the registration, trade and use of plant protection products
Expropriation and property valuation	Constitution of the Republic of Albania, Article 41 (expropriation only against fair compensation); Law no. 8561 of 22.12.1999 "On Expropriations and Temporary Taking of Private Property for Public Interest", as amended; Council of Ministers Decision no. 457 of 26.07.2023 establishing reference property prices

2.2 World Bank Environmental and Social Standards

As a World Bank financed operation the project is subject to the Environmental and Social Framework. The Standards relevant to the scheme, and the manner in which each is engaged, are set out below.

Table 2-2 Applicability of the World Bank Environmental and Social Standards

Standard	Relevance to the project
ESS1 - Assessment and Management of Environmental and Social Risks and Impacts	Engaged. This assessment, and the Environmental and Social Management Plan in Section 8, are prepared under ESS1.
ESS2 - Labour and Working Conditions	Engaged. Construction workforce, contractor labour management procedures, occupational health and safety, and workers grievance mechanism.
ESS3 - Resource Efficiency and Pollution Prevention	Engaged. Water use efficiency is a principal objective of the scheme; construction waste, fuel and lubricant management, and fertigation are addressed. The intensification of fertiliser and pesticide use induced by improved irrigation requires an Integrated Pest Management approach.
ESS4 - Community Health and Safety	Engaged. Construction in an urban corridor, traffic management, excavation safety, and the sanitary condition of the canal.
ESS5 - Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Engaged for the conveyance option involving removal of structures, and for the right of way associated with the bypass option. Not engaged by the option retaining the existing structures.
ESS6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources	Engaged at a low level. The project affects a modified agricultural landscape; no natural or critical habitat is affected.
ESS8 - Cultural Heritage	Engaged through chance-find procedures only. No designated heritage asset lies within the project footprint.
ESS10 - Stakeholder Engagement and Information Disclosure	Engaged. Consultation undertaken to date is recorded in Section 6 and in the Stakeholder Engagement Plan.

ESS7 on Indigenous Peoples and ESS9 on Financial Intermediaries are not engaged by this project.

2.3 European Union Legislation and International Conventions

The assessment has been prepared having regard to European Union legislation, in particular the Environmental Impact Assessment Directive 2011/92/EU as amended by Directive

2014/52/EU, the Water Framework Directive 2000/60/EC, the Habitats Directive 92/43/EEC, the Birds Directive 2009/147/EC, the Waste Framework Directive 2008/98/EC and the Ambient Air Quality Directive 2008/50/EC.

Account has also been taken of the international conventions ratified by the Republic of Albania, including the Aarhus Convention on access to information, public participation in decision-making and access to justice in environmental matters; the Espoo Convention on environmental impact assessment in a transboundary context; the Convention on Biological Diversity; the Ramsar Convention on wetlands of international importance; and the Bern Convention on the conservation of European wildlife and natural habitats.

2.4 Institutional Responsibilities

Table 2-3 Institutional responsibilities

Institution	Role
Ministry of Agriculture and Rural Development	Project owner; responsible for implementation of the environmental and social instruments
National Environment Agency	Competent authority for environmental permitting under Albanian legislation
Municipality of Lushnje	Local authority; owner of the Kasharaj Reservoir; responsible for the municipal sewerage network
Drainage and Irrigation Board of Fier	Operator of the irrigation and drainage system
World Bank	Financier; supervision of compliance with the Environmental and Social Framework
Contractor	Implementation of the ESMP, site-level environmental and social management
Supervising Engineer	Monitoring and verification of contractor compliance

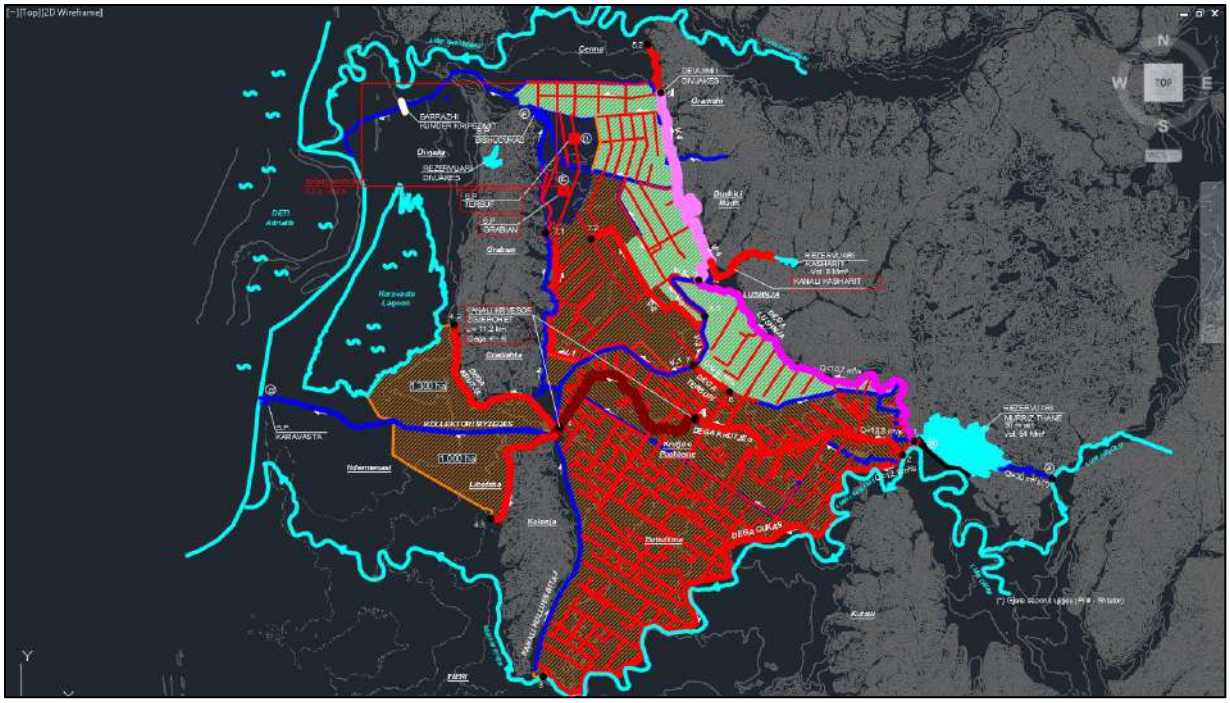
3 Project Description

3.1 Location and Setting

The project is located in the Municipality of Lushnje, Fier County, in the Myzeqe plain of western Albania. It concerns the Lushnje Branch of the Murriz-Thana irrigation and drainage system, together with its V4 extension, which command approximately 6,850 ha of the Terbuf plain. The wider Murriz-Thana system serves approximately 29,270 ha through four branches. The scheme is a gravity-fed, open-canal network comprising a main canal of 39.8 km and approximately 124 km of secondary canals, with a design irrigation flow of 7.9 m^3/s corresponding to a design hydromodule of 1.15 l/s/ha. The main canal passes through the urban area of Lushnje before continuing north through open agricultural land.

The scheme was managed by state agricultural cooperatives until 1992, when the cooperatives were dissolved and the land distributed to private owners. Since then, divided responsibility for operation and maintenance between the Drainage Board and water user organisations has been accompanied by the progressive decay of the system. The Lushnje main branch serves some 1,500 ha directly over its first 18 km and, downstream of the city, divides into two branches of 5.1 km and 6.7 km, the latter extending to the Cerme area. Its capacity up to Lushnje has fallen from 14 m^3/s to about 10 m^3/s owing to restrictions in its section, and through the 4 km urban crossing the canal meanders and suffers silting and instability from hillside slips and urbanisation, to the point that water had ceased to reach the downstream section at Dushk (ARAP, 2017). Rehabilitation of the canal downstream of Lushnje is also a condition of supply to the Divjake scheme of some 3,000 ha.

Figure 3-1 Murriz–Thana irrigation and drainage system in the Myzeqe Plain, showing main irrigation branches (Çukas, Krutje, Lushnje, Terbuf) and drainage network. Lushnje irrigation area (green hatching), overall Lushnje irrigation channel (purple)



3.2 Components of the Scheme

3.2.1 Pressurised pilot area, 800 ha

The pilot replaces open-channel, gravity-fed distribution within an 800 ha command area with a buried, pressurised piped network supplied from a central pumping station. Two candidate areas have been developed to conceptual design, of which Plug-Dushk is identified as the preferred option.

Figure 3-2 Pilot area: general conceptual layout, Plug-Dushk and Dushk-Cerme systems

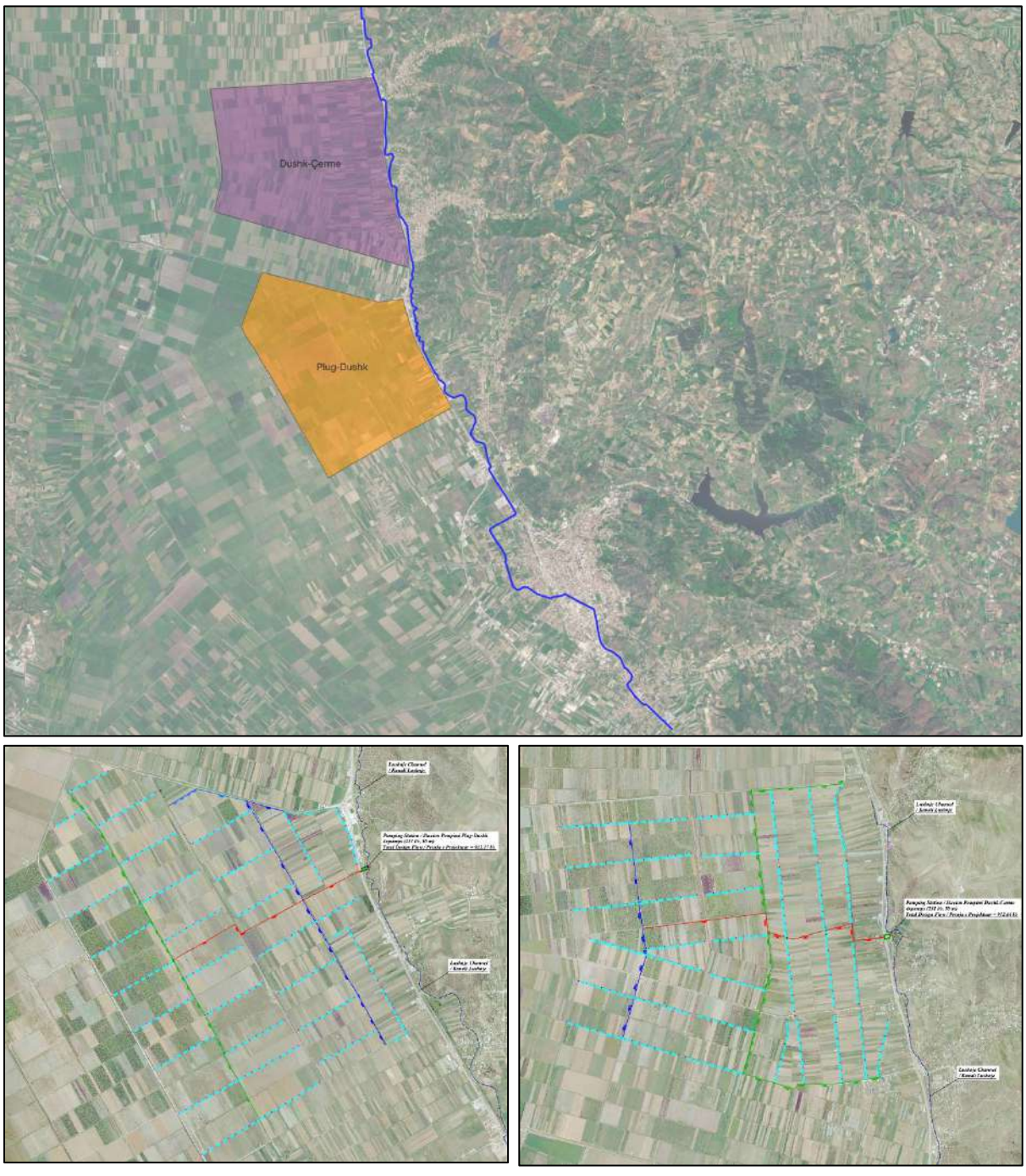


Table 3-1 Principal parameters of the pilot options

Parameter	Plug-Dushk (preferred)	Dushk-Cerme
Command area	~802 ha	~794 ha
Peak design discharge	922 L/s	913 L/s
Distribution network length	19,264 m	20,117 m
Primary branches	4	5
Offtake hydrants	270	287
Pumping station	4 pumps at 230 L/s	4 pumps at 230 L/s

On-farm application is by sprinkler for field, forage and cereal crops, and by drip for high-value row crops, vegetables, orchards and vineyards. The pilot also provides for fertigation, solar-powered pumping, demand-based control with metered hydrants and telemetry, and soil-moisture-based scheduling.

3.2.2 Conveyance through the Lushnje section

Three alternative schemes have been developed and costed. Their environmental and social profiles differ materially and each is assessed in this report.

Figure 3-3 Conveyance options and segment treatments through the Lushnje urban section

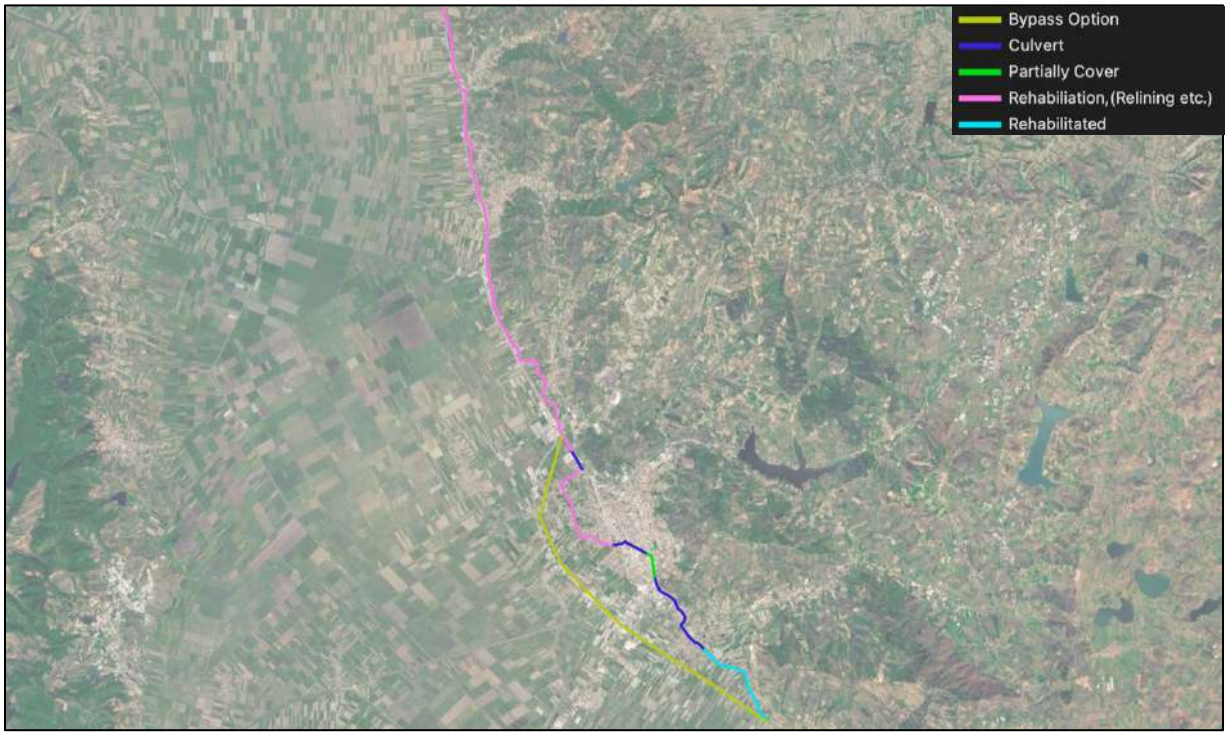


Table 3-2 Conveyance schemes assessed

Scheme	Principal works	Structures affected
Sub-option A1	Continuous reinforced-concrete box culvert over 3,644 m along the existing route, with reinstatement of 2,717 m	60 structures removed
Sub-option A2	Box culvert over 3,086 m along the existing route, covering of 150 m of open channel between retained structures, with reinstatement of 2,717 m	None
Option B	Urban bypass of approximately 7.9 km west of the city, as twin GRP DN2300 inverted siphon	None

3.2.3 Kasharaj Reservoir integration

The Kasharaj Reservoir, of 9.6 Mm^3 designed storage, is confirmed as a supplementary source for the July-August peak, contributing a conveyance capacity of 1.5 to 2.0 m^3/s drawn intermittently. The works comprise a covered reinforced-concrete box culvert of 2.0 by 2.0 m over 800 m, replacing a blocked open channel between the existing covered box and the junction with the Lushnje main channel. The alignment lies within the existing channel corridor and passes through private properties and gardens.

3.2.4 Channel reinstatement

Reinstatement of the existing channel is required over 2,717 m of the urban stretch outside the culverted length, and over approximately 12 km of the Lushnje Branch downstream of the urban section. The works comprise clearance and excavation of the existing prism, granular sub-base and concrete blinding, a reinforced-concrete lining and sealing of joints, within the existing channel alignment throughout.

3.3 Construction Phase

Construction comprises excavation and trenching within and alongside the existing channel alignment; installation of pipework and casting of concrete structures; construction of the pumping station and inspection chambers; haulage of materials and spoil; and operation of construction plant. Works are linear in character and will progress in segments, so that at any one location the period of disturbance is limited.

Construction materials comprise concrete, reinforcement, GRP or PE pipework, granular fill and aggregates, sourced from licensed commercial suppliers. No borrow pits or quarries are to be opened for the project. Temporary site compounds will be required for plant, materials and welfare facilities, to be located on previously disturbed land and clear of watercourses.

Construction of the works affecting the canal must be programmed outside the irrigation season, or be accompanied by temporary over-pumping arrangements, so that supply to the command area is maintained.

3.4 Operational Phase

In operation the scheme conveys irrigation water by gravity through the rehabilitated and enclosed main channel, and distributes it within the pilot area under pressure from the pumping station. Operation and maintenance comprise routine inspection and desilting of the conveyance, operation and maintenance of the pumping station and network, and management of the delivery schedule. The principal operational input is electrical energy for pumping, which the solar provision is intended to offset in part.

4 Analysis of Alternatives

4.1 The No-Project Alternative

Under the no-project alternative the existing system would continue to deteriorate. The canal would remain open through the urban section and would continue to receive the wastewater discharges recorded along its length, so that irrigation water of demonstrably degraded sanitary quality would continue to be applied to crops including vegetables eaten raw. Conveyance losses would remain at their present level, with the consequence that abstraction from the Murriz-Thana reservoir would remain some 5 m^3/s higher at peak than a rehabilitated system would require. Cropping intensity in the poorly served sub-areas would remain depressed, and reliance on private groundwater abstraction would continue to grow. The no-project alternative is therefore environmentally and socially inferior to the project in every material respect and is not preferred.

The earlier studies confirm the direction of this trend. By 2017 the capacity of the Lushnje main branch had already fallen from 14 to about 10 m^3/s and water no longer reached Dushk; without rehabilitation, the Divjake scheme of some 3,000 ha that depends on the branch downstream of Lushnje would also remain without reliable supply.

4.2 Water Source Alternatives

The Shkumbin River was examined as an alternative or supplementary source and has been excluded. Beyond the hydrological grounds set out in the Pre-Feasibility Study, the exclusion carries a positive environmental consequence: the residual flow below the Rrogozhina bridge is insufficient in the dry month, and any abstraction for irrigation during the dry period would have been at the expense of the environmental flow required to be maintained in the river. Its exclusion therefore avoids an adverse effect on a river already under pressure from committed abstractions and from gravel extraction.

The Kasharaj Reservoir is retained as a supplementary source. Its integration requires no new corridor, no permanent land acquisition and no new impoundment, and uses infrastructure already in place. It is accordingly the least environmentally intrusive means of reinforcing peak supply.

The lower Shkumbin is already under sustained anthropogenic pressure, including the extraction of sand and gravel that has lowered its bed by some 2 to 3 m (Lata, 2021), and its lower reaches are exposed to extensive flood hazard (Barko and Lami, 2026). New abstraction and pumping infrastructure in that corridor would have added to those pressures.

4.3 Conveyance Alternatives

The three conveyance schemes differ in environmental and social profile as follows.

Table 4-1 Environmental and social comparison of the conveyance alternatives

Criterion	Sub-option A1	Sub-option A2	Option B
Corridor	Existing	Existing	New, 7.9 km across farmland
Physical resettlement	60 structures	None	None
Permanent land acquisition	None	None	None; right of way required
Temporary agricultural disturbance	Urban corridor only	Urban corridor only	Extensive along 7.9 km
Vegetation clearance	Limited, urban	Limited, urban	Along the full bypass corridor
Water-quality outcome	Flow fully enclosed	Flow fully enclosed	Canal removed from urban area, but existing channel retains discharges
Construction disturbance to residents	High and prolonged	Moderate	Low
Total cost (Mln leke)	1,856.9	594.4	2,045.9

Sub-option A2 avoids physical resettlement altogether, confines the works to the existing corridor, and is the least-cost scheme. Sub-option A1 achieves a marginally more complete technical result and clears the canal corridor of the structures that obstruct it, but requires the displacement of the occupiers of 60 structures, an effect of major significance that the alternative avoids. Option B avoids both resettlement and urban construction disturbance, but requires a new corridor across 7.9 km of agricultural land and would leave the existing channel in place through the city, no longer conveying irrigation water but still receiving the wastewater discharges along its length, so that the sanitary condition of the urban corridor would require separate resolution.

Under the mitigation hierarchy required by ESS1 and ESS5, avoidance of involuntary resettlement takes precedence where a technically and economically feasible alternative exists. Sub-option A2 is such an alternative. On environmental and social grounds it is therefore the preferred conveyance scheme.

4.4 Pilot Area Alternatives

The two candidate pilot areas are closely comparable in environmental terms. Both lie in cultivated agricultural land of the same character, both replace open-channel distribution with buried pipework, and neither requires land acquisition or affects any sensitive receptor. Plug-Dushk involves a marginally shorter network, 19,264 m against 20,117 m, and therefore marginally less excavation and temporary agricultural disturbance. It was also the option preferred by beneficiaries during consultation. There is no environmental or social ground on which to prefer the alternative.

5 Environmental and Social Baseline

5.1 Physical Environment

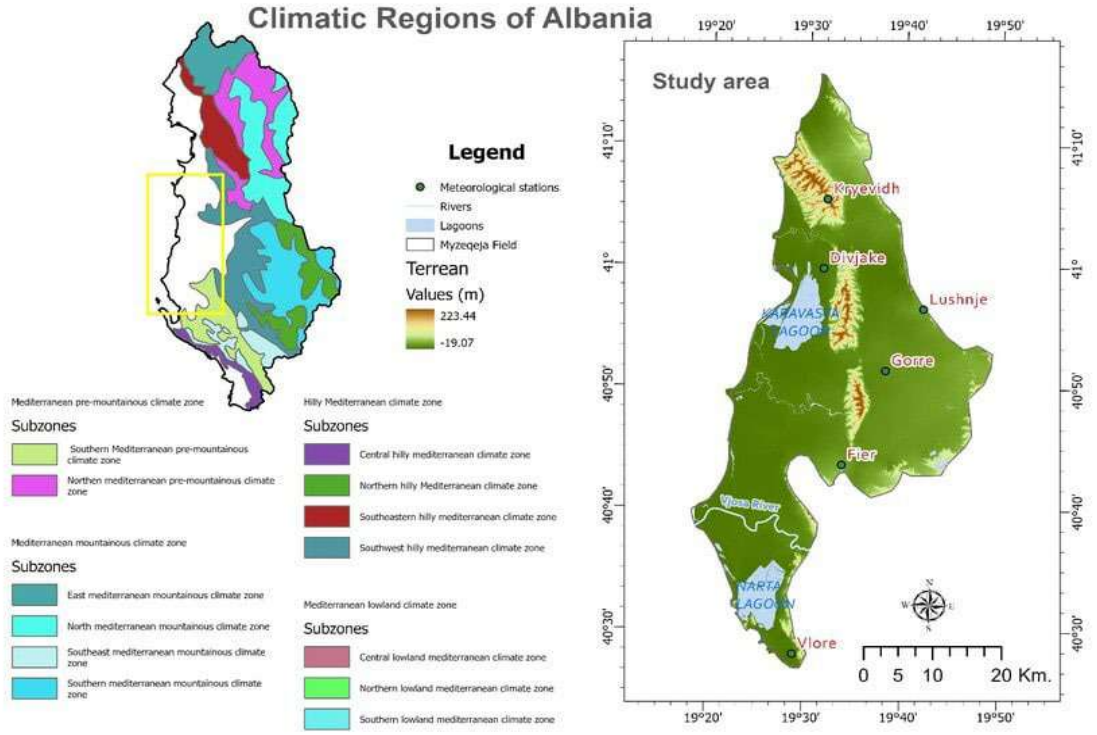
5.1.1 Climate

The project area lies in the Mediterranean climatic zone of the western Albanian lowland, with hot dry summers and mild wet winters. Peak reference evapotranspiration occurs in July and August, when effective rainfall is negligible; this coincidence of maximum crop demand with minimum rainfall is the governing condition for the irrigation scheme.

Climate-change screening based on World Bank CCKP and CMIP6 projections indicates significant summer warming and reduced summer precipitation over the coming decades, with an increase in peak-season irrigation demand of the order of 15 to 25% by the 2070 horizon. Because supply originates largely from the regulated Devoll system, the resource is relatively well buffered on the supply side; the principal effect is a tightening of the supply-demand balance through rising demand.

The project area lies in the central Mediterranean lowland climatic zone of Albania, as shown below.

Figure 5-1 Map of Climatic Regions of Albania and Study Area (Çela et. Al, 2025)



The Murriz-Thana area has a Mediterranean climate with hot, dry summers and mild, wet winters. Over the 1991–2020 reference period, mean annual air temperature is about 16.0 °C. Monthly means range from 6.6 °C in January to 26.1 °C in August. Mean daily maxima exceed 31 °C in July and August, while mean daily minima stay above freezing all year (2.7 °C in

January). Mean annual precipitation is about 890 mm, of which roughly 64% falls between October and March. June to September receives only about 165 mm (19% of the annual total), with July and August the driest months at about 25 mm each (Figure 5-1, Figure 5-2). Year-to-year variability is high, with annual totals ranging from about 590 mm (1994) to 1,370 mm (2010).

The monthly distribution shows the pronounced summer deficit that makes irrigation necessary in July and August.

Figure 5-2 Mean monthly precipitation, Murriz-Thana area, mm (Source: ERA5 reanalysis, Copernicus C3S, 1991–2020)

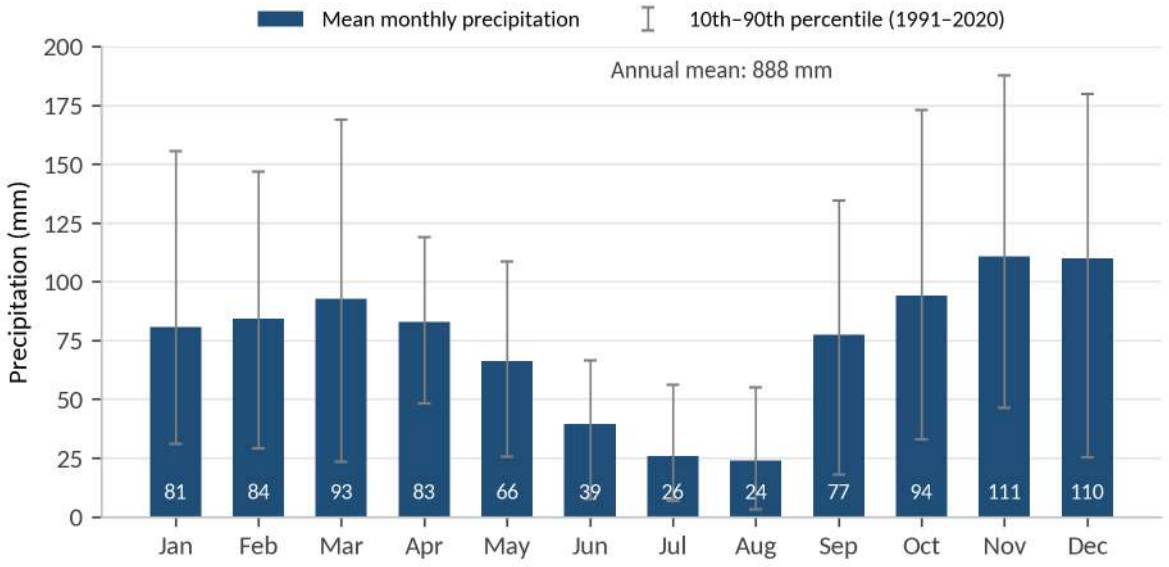
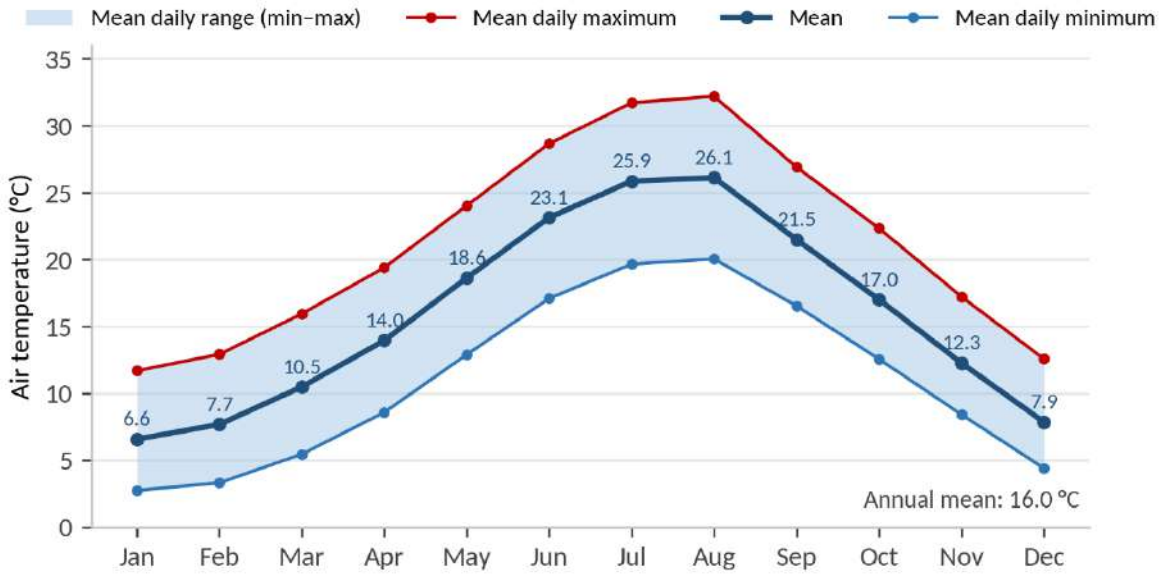


Figure 5-3 Mean monthly air temperature, Murriz-Thana area, °C (Source: ERA5-Land reanalysis, Copernicus C3S, 1991–2020)

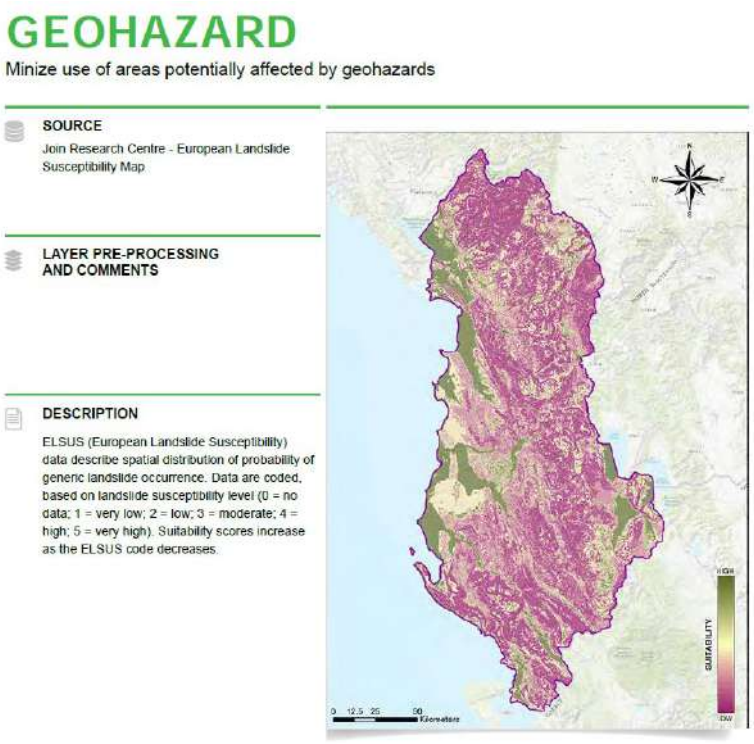


5.1.2 Geology, topography and seismicity

The scheme lies on Quaternary alluvial deposits of sand, grit and clay, over weak inter-bedded sandstones and mudstones; oil and gas deposits underlie parts of the Murriz-Thana scheme and scattered wells occur in its vicinity. The topography is flat or gently undulating: the Murriz-Thana reservoir lies at about 30 to 35 masl, with surrounding hills of 60 to 150 masl. Through Lushnje the canal skirts the foot of the eastern hills, where slope slips have contributed to silting of the channel.

The area lies in a zone of medium to high seismic and the culverts, pumping station and chambers are to be designed to the applicable seismic provisions. National landslide susceptibility screening, shown below, concentrates in the hill and mountain belts; the lowland command area is of low susceptibility, the local exposure being the hill slopes adjoining the canal at Lushnje.

Figure 5-4 Landslide susceptibility in Albania (Source: JRC, European Landslide Susceptibility Map)



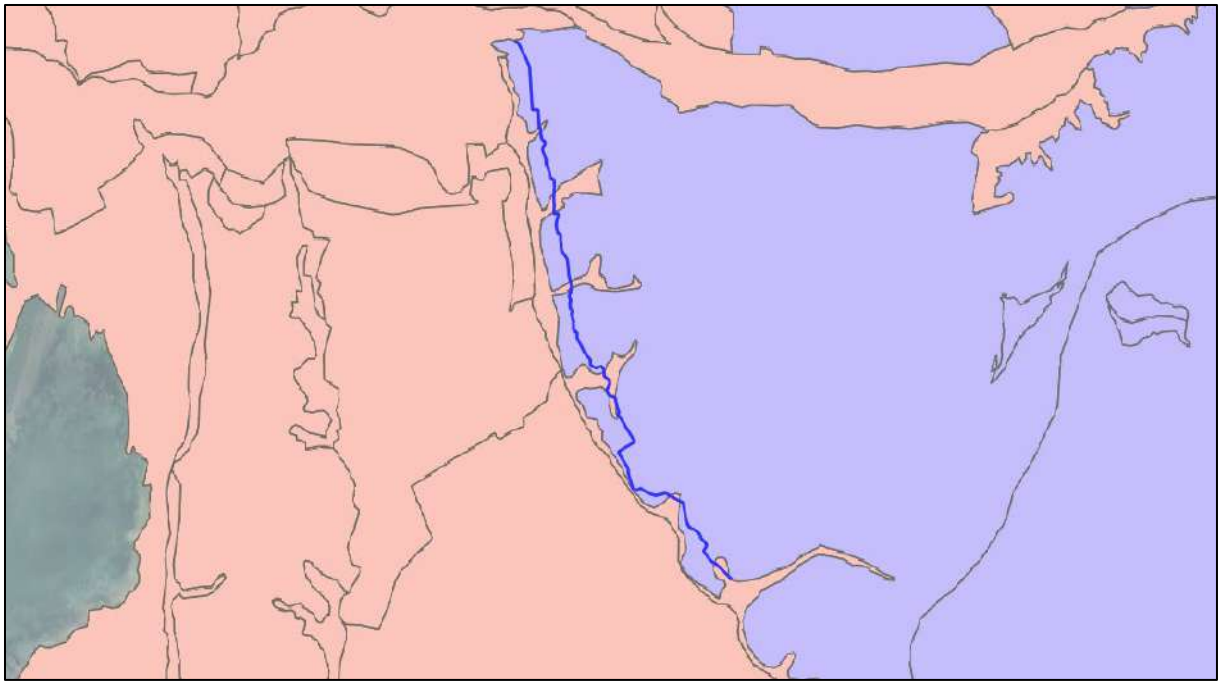
5.1.3 Soils and land use

The soils of the Myzeqe plain are among the most fertile in Albania and constitute a resource of considerable economic importance to the local community. Land use within the project area is predominantly agricultural, with a cropping pattern dominated by cereals, forage crops and vegetables, and a strongly vegetable-oriented pattern within the focus area. Cropping intensity is reported at approximately 130 to 140% in well-served sub-areas, falling to 33 to 65% where water availability is limited.

The urban section of the canal passes through the built-up area of Lushnje, where land use is residential and commercial and where structures have been erected within the canal corridor.

The soils of the Lushnje area are predominantly grey-brown alluvial soils formed by river deposition. The meadow soils of the area have a high humus content of about 4.3%, nitrogen of 0.22% and phosphorus of 0.12%; they are rich in calcium carbonate, of near-neutral reaction at pH about 6.8, with terminal infiltration rates of 0.4 to 1.6 mm/min. Luvisols, Vertisols and Cambisols occur in the surrounding area. The swelling and shrinkage of Vertisols with changing moisture is relevant to the bedding and joint design of buried structures.

Figure 5-5 Pedology along Lushnje canal, dominated by Rhodic Luvisol (shown in purple colour, source: ASIG)



Soil erosion is significant in the Seman basin, of which the Devoll catchment supplying the scheme forms part, at the highest rate of the major Albanian basins. Within the command area erosion arises mainly from flood irrigation and furrow alignment, a pressure that conversion to pressurised application reduces.

Table 5-1 Soil erosion in the river basins of Albania (Source: Qiriazi and Sala ,1999)

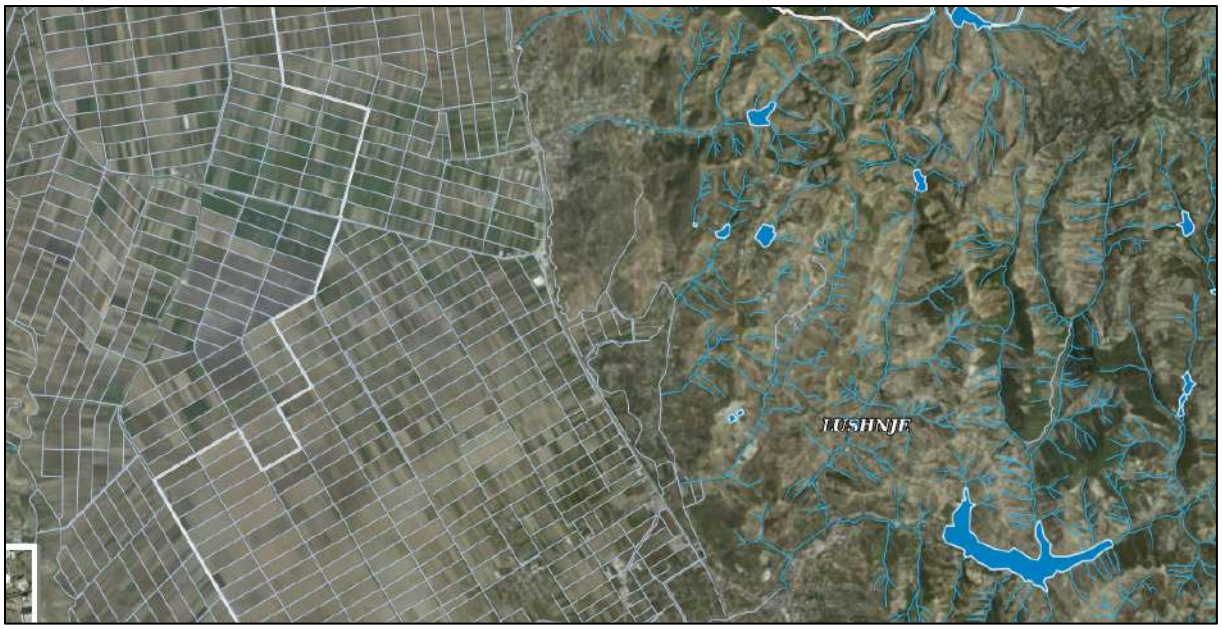
River basin	Area (km^2)	Loss (t/ha/yr)	Total (1,000 t/yr)
Drini	11,756	15.43	18,145
Seman	5,649	30.85	17,429
Other rivers	18,330	16.28	29,844

No hydrocarbon, mining or quarrying activity causing soil contamination has been identified within the scheme; sewer discharges and runoff carrying fertiliser are the potential sources.

5.1.4 Water resources

The project area is served by a developed network of surface water resources created to support agriculture in the Myzeqe plain. The principal source is the Murriz-Thana reservoir, supplied largely by the Devoll feeder canal, supplemented at peak by the Kasharaj Reservoir. Within the project area a dense network of irrigation and drainage canals constitutes the main hydraulic infrastructure. Hydrogeologically the area is characterised by alluvial aquifers associated with the Quaternary deposits of the plain; groundwater is abstracted on a limited scale through private wells, a practice that has expanded in response to unreliable canal supply.

Figure 5-6 Hydrographic network of the study area (source: ASIG)



Groundwater in the Seman basin is drawn from aquifers protected by intervening clay layers, with a moderate pollution risk. The growth of private well abstraction recorded by the beneficiary survey is a pressure on this resource that reliable canal supply would relieve.

At the end of each irrigation season a volume of some 8 to 12 Mm^3 is retained in the Murriz-Thana reservoir for its fishery. Reducing conveyance losses reduces the drawdown needed to deliver a given irrigation service, and so supports that reserve.

5.1.5 Water quality

A water-quality sampling campaign was undertaken on 17 June 2026 at three points along the project reach, during the active irrigation season. Samples were analysed by an ISO/IEC 17025 accredited laboratory. The findings establish the baseline against which the effects of the scheme are assessed and are summarised below.

Table 5-2 Summary of baseline water quality along the project reach

Aspect	Finding	Assessment

Salinity and sodicity	EC 1,118 to 1,175 µS/cm; SAR 0.06 to 0.07; class C3-S1	Usable for irrigation; slight to moderate salinity restriction; no sodium or infiltration hazard
Organic load	COD 61 to 62 mg/L; BOD5 11.7 to 12.1 mg/L, uniform along the reach	Moderate wastewater load already present where the project reach begins
Suspended solids	4 to 13 mg/L	Low; limited clogging risk for pressurised systems
Nutrients	Total N 3.1 to 3.4 mg/L; total P below 0.01 mg/L	Low; limited eutrophication risk
Microbiology	E. coli rising from 98 to 346 CFU/100 mL through the urbanised reach	Below the WHO guideline for unrestricted irrigation, but active faecal contamination confirmed
Trace metals	Lead well below the guideline; arsenic not detected; cadmium 0.0258 mg/L at a single downstream point	Single exceedance of the FAO guideline of 0.01 mg/L for cadmium; requires confirmation

The campaign was undertaken at high flow, which represents the favourable case. The critical condition for irrigation water quality is low flow, when abstraction demand is high and dilution least, and when the fixed urban discharge loads would have their greatest proportional effect.

For regional context, investigations of the Seman River in the late 1990s recorded marked heavy-metal pollution in its lower reaches, with dissolved cadmium up to 3.2 µg/L, but not in the upper Devoll catchment from which the scheme is supplied; monitoring from 2007 to 2010 placed the Seman within national standards for physico-chemical irrigation parameters, with electrical conductivity of 0.20 to 0.54 dS/m (ESMP, 2016). The conductivity recorded in the Lushnje Branch in June 2026, of 1.12 to 1.18 dS/m, is higher than those regional values, and the cadmium concentration at the downstream point, of 25.8 µg/L, is well above the historic regional maximum. Both findings reinforce the recommendation for repeat sampling, including at low flow, before detailed design.

5.1.6 Air quality and noise

The project area is rural and peri-urban in character with no significant industrial sources. Ambient air quality is governed by agricultural activity, road traffic and, in the urban section, domestic sources. The noise environment is correspondingly low in the rural reaches and dominated by road traffic within the city. Sensitive receptors comprise dwellings along the urban section of the canal, together with scattered rural dwellings along the remainder of the alignment.

5.2 Biological Environment

5.2.1 Vegetation

Vegetation cover in the project area is typical of the agricultural landscape of the Myzeqe plain and has been formed largely by intensive cultivation and continuing anthropogenic intervention. Cultivated parcels occupy the greater part of the territory, planted with seasonal crops including wheat, maize, alfalfa, forage and vegetables. Scattered parcels of fruit trees and olives occur locally.

Along the banks of the existing canals a narrow belt of spontaneous vegetation has developed, which plays a role in stabilising the banks, reducing erosion and providing microhabitat for local fauna. It is composed principally of herbaceous and hygrophilous species, including common reed, bulrush, members of the Poaceae, Asteraceae and Fabaceae, bramble and nettle. Woody species along the canals and parcel boundaries include white willow, white and black poplar, black locust, mulberry, fig and scattered eucalyptus planted in the past as shelter belts.

The vegetation cover does not constitute undisturbed natural habitat. No plant communities of particular conservation importance, and no plant species protected under Albanian legislation or European Union directives, have been identified within the project footprint. In the urban segments the vegetation cover is more limited still, consisting mainly of ornamental planting, street trees and spontaneous growth along the canal banks.

Table 5-3 Vegetation cover types in the project area

Cover type	Dominant species	Distribution	Ecological value
Cultivated agricultural land	Wheat, maize, alfalfa, vegetables, forage	Dominant throughout the project area	High for agriculture, low for natural biodiversity
Orchards and perennial crops	Olive, fig, mulberry, fruit trees	Locally, in private parcels	Economic and landscape value
Spontaneous herbaceous vegetation	Poaceae, Asteraceae, Fabaceae, Urtica dioica	Along roads, parcel margins and uncultivated ground	Moderate; soil protection and insect habitat
Hygrophilous vegetation along canals	Phragmites australis, Typha latifolia, Scirpus spp.	Along the whole canal network	Important for bank stabilisation and aquatic habitat
Spontaneous scrub	Rubus ulmifolius, Crataegus monogyna, Rosa canina	Locally along canals and parcel boundaries	Moderate; shelter for small fauna
Linear trees along canals and roads	Salix alba, Populus alba, P. nigra, Robinia pseudoacacia	Along canals and some rural roads	Important for soil stabilisation, shade and landscape

At national level, the Important Plant Areas of Albania lie principally in the mountain, lake and coastal-lagoon systems; the project footprint does not fall within any of them.

Figure 5-7 Important Plant Areas of Albania (Source: Shuka, Xhulaj and Qirjo)



Figure 5-8 Hygrophilous vegetation along the banks of the Lushnje Branch



5.2.2 Fauna

The fauna of the area is characteristic of the agro-ecosystems of western Albania and is dominated by widely distributed species adapted to human activity. Mammals recorded or expected include brown hare, fox, hedgehog, weasel, field mice and water vole near the canals. Birds constitute the richest faunal group, including house sparrow, swallow, collared dove, magpie, hooded crow, nightingale and wood pigeon, together with little egret, grey heron and white stork observed feeding in the agricultural parcels and along the canals. Reptiles and amphibians present include green and wall lizards, grass snake, marsh frog, green toad and tree frog. The canals support common fish species including carp, Carassius species and mosquitofish, together with aquatic macroinvertebrates. The area supports a rich insect community associated with agricultural activity and spontaneous vegetation, including pollinators of importance to the crops themselves.

No species of particular conservation concern has been identified within the direct footprint of the project, and the habitats present are modified rather than natural.

Table 5-4 Species of conservation interest recorded in or near the scheme

Species	Group	Occurrence	Status
European eel, Anguilla anguilla	Fish	Murriz-Thana reservoir; may enter the canal network	IUCN Critically Endangered; EU Eel Regulation 1100/2007
Hermann's tortoise, Testudo hermanni	Reptile	Recorded around the scheme	IUCN Near Threatened; Bern App. II; Habitats Dir. Annexes II and IV
Nose-horned viper, Vipera ammodytes	Reptile	Recorded around the scheme	Bern App. II; Habitats Dir. Annex IV
Balkan green lizard, Lacerta trilineata	Reptile	Recorded around the scheme	Bern App. II; Habitats Dir. Annex IV
Green toad, Bufotes viridis; tree frog, Hyla arborea	Amphibian	Recorded in the project area	Bern App. II; Habitats Dir. Annex IV
White stork, Ciconia ciconia; little egret, Egretta garzetta	Bird	Feeding in parcels and along canals	Birds Dir. Annex I
Common crane, Grus grus	Bird	Occasional migrant, associated with Karavasta	Birds Dir. Annex I

Status is given as the IUCN global category where above Least Concern, and as listing under the Bern Convention and the EU Habitats and Birds Directives. Species without such a designation are not repeated.

The Murriz-Thana reservoir supports a fishery for common carp, silver carp, mullet and barbel, and holds European eel. The eel is catadromous, migrating between fresh water and the sea, and its presence in the reservoir indicates that it may occur in the canals supplied from it. Hermann's tortoise and the listed reptiles and amphibians are likely on the vegetated canal

banks and margins. None of these species depends on the canal corridor as critical habitat, but their presence requires specific construction-stage measures, set out in Sections 7 and 8.

5.2.3 Protected areas and designated sites

The project footprint does not overlap any protected area declared under Albanian legislation, and does not affect any national park, nature reserve, natural monument or protected landscape. The nearest site of high ecological importance is the Divjake-Karavasta National Park, lying to the west of the Municipality of Lushnje and including the Karavasta Lagoon, a wetland of international importance. The project does not discharge to, abstract from, or otherwise interact hydrologically with that site in a manner capable of affecting it.

Regarding natural monuments, the nearest lies at around 850 m from the channel at Karbunare, namely Karbunara Thermo-mineral source (Burimi termoninerar i Karbunarës).

The Divjake-Karavasta National Park, reported at some 22,230 ha, adjoins the western extremities of the Murriz-Thana scheme. It includes the Karavasta Lagoon, a Ramsar wetland of international importance which holds a breeding colony of Dalmatian pelican (Pelecanus crispus). Drainage from the scheme does not discharge to the lagoon: it is conveyed to the coast south of the lagoon through the Bitaj drain and the Myzeqeja collector, or north and west through the Bishcukas pumping station and the anti-salt barrage to the Adriatic. The Lushnje Branch lies some 18 km east of the lagoon, and the works do not interact with the park.

Figure 5-9 Natural Monuments (red) & Protected areas (green) near Project Area (Source: ASIG)

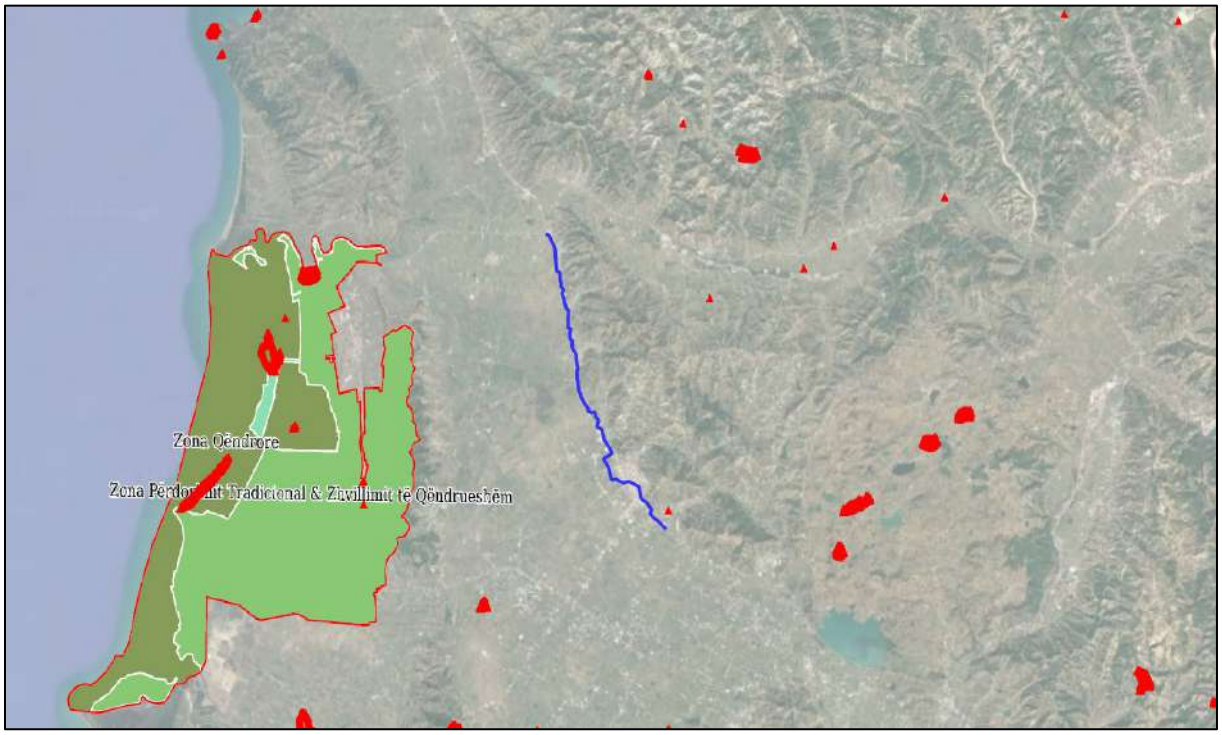
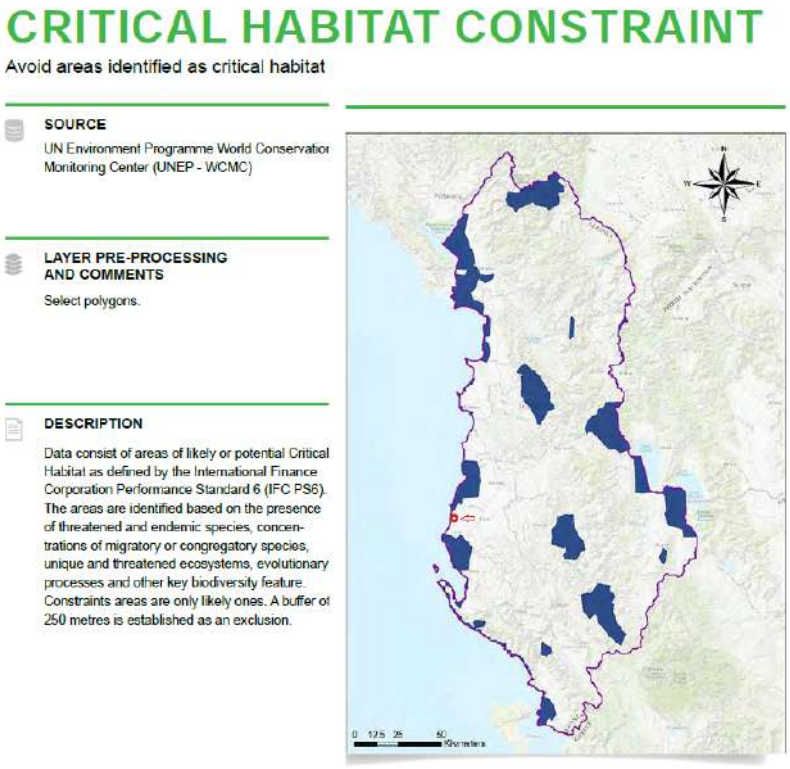


Figure 5-10 Areas of potential critical habitat in Albania (Source: UNEP-WCMC, after IFC Performance Standard 6)



Global critical habitat screening identifies potential critical habitat along the coastal lagoons and in parts of the interior. The project footprint, within modified agricultural and urban land, does not fall within the areas identified, which supports the conclusion that ESS6 is engaged only at a low level. The indirect pathway requiring attention is agricultural: improved irrigation may increase the use of fertilisers and pesticides whose residues reach the drainage network and ultimately coastal waters. This is addressed in Section 7.

5.3 Cultural Heritage

No cultural monument of the first or second category, protected historic zone, historic centre or known archaeological site has been identified within the direct footprint of the project. The territory of the Municipality of Lushnje does contain objects and monuments of historical value, but these lie outside the project area and are not expected to be affected by construction or operation.

Because the project is linear in character and involves excavation, a low residual possibility of chance archaeological discovery exists. A chance-find procedure is accordingly required and is included in the Environmental and Social Management Plan.

5.4 Socio-Economic Environment

The beneficiary population comprises farming households in the command area, characterised by small holdings with a strongly vegetable-oriented cropping pattern. The socio-economic survey undertaken for the Pre-Feasibility Study established the following.

Table 5-5 Principal findings of the beneficiary survey

Indicator	Finding
Use of pressurised on-farm systems	88% of respondents
Primary water source	Private wells predominant, in the absence of reliable canal supply
Supply rated unreliable	63% of respondents
Peak interruption period	July to August
Low water availability cited as a constraint	75% of respondents
Poor water quality cited as a constraint	75% of respondents
Observed water-quality problems	100% of respondents
Willing to follow an irrigation schedule	63% of respondents
Willing to contribute to operation and maintenance	63% of respondents
Would expand irrigated area if service improved	25% of respondents

Two features of the beneficiary profile bear on the assessment. Farmers have already invested at field level, so the binding constraint lies upstream in the conveyance infrastructure; and the population is ageing with low formal education, implying that modernisation must be supported by practical, demonstration-based extension if its benefits are to be realised.

Population and demography. At the 2023 Population and Housing Census, the Municipality of Lushnje had 63,135 residents in 21,603 households. Of these, 26,036 lived in Lushnje town and 37,099 in the ten rural administrative units. Together with the Municipality of Divjakë (24,882 residents), the area of the former Lushnje district now has about 88,000 residents. That is a fall of about 25% from the 117,900 recorded at the 2011 census. The pilot areas fall within three former communes, now administrative units: Golem, which includes the village of Plug, and Dushk, both in the Municipality of Lushnje; and Tërbuf, which includes the Çermë villages, in the Municipality of Divjakë. The census indicators for these units are summarised below.

Table 5-6 Socio-economic indicators of administrative units covering the pilot areas (INSTAT, Census 2011, 2023)

Indicator	Golem (incl. Plug)	Dushk	Tërbuf (incl. Çermë)
Municipality	Lushnje	Lushnje	Divjakë
Residents, 2023	3,529	5,157	7,139
Residents, 2011	5,243	7,872	10,201
Change 2011–2023	−33%	−34%	−30%
Households	1,188	1,706	2,158
Average household size	3.0	3.0	3.3

Aged 0–14	510 (14%)	804 (16%)	1,194 (17%)
Aged 65 and over	813 (23%)	1,159 (22%)	1,356 (19%)
Aged 15+ with functional difficulty	431 (14%)	408 (9%)	492 (8%)
Lone-parent families	93	149	196

Livelihoods. Agriculture and livestock are the main livelihoods. Fier prefecture is the country's largest farming region. At the 2012 Agriculture Census it had 64,911 farms, about a fifth of the national total, and 82,447 ha of utilised agricultural area. That is an average of 1.27 ha per farm, against 1.04 ha nationally (INSTAT, 2013). Livestock is significant. In the prefecture, 43% of farms kept cattle, dairy cows made up 73% of the 64,500 cattle and nearly all adult cows, and 46% of farms fertilising arable land applied manure (INSTAT, 2013). Fier still had the largest share of the national cattle herd in 2024, at 14.8%, ahead of Korçë at 11.3% (INSTAT, 2025).

Migration. Emigration after 1990 was one of the great emigrations of recent times: ten years later at least 600,000 Albanians, one in five of the population, were living abroad, mainly in Greece and Italy (King & Vullnetari, 2003). The decline has continued. Between the 2011 and 2023 censuses the population of the three administrative units fell by 30–34%, about twice the national decline of 15%. Over the same period the share of residents aged 65 and over rose to 19–23%. Return migration has partly offset the losses. Between 2009 and 2013, 133,544 emigrants aged 18 and over returned to Albania, driven mainly by the loss of their jobs in Greece and Italy, and 70.8% of returns were from Greece and 23.7% from Italy (INSTAT & IOM, 2014). The shrinking and ageing farm workforce favours irrigation methods with low labour demand, such as the pressurised hydrant networks proposed for the pilot areas.

Land tenure. Agricultural land was distributed to rural families on a per-capita basis under Law No. 7501/1991 "On Land". In the years that followed, buildings were widely put up without permits or legal title, on both state and private land. Law No. 9482/2006 set up a legalisation process for them. That process was later placed under the State Cadastre Agency and Law No. 20/2020 on the completion of transitional property processes, and it is still not complete. This history explains the structures now standing on the canal footprint through Lushnje. It bears directly on the eligibility and entitlement questions that a Resettlement Action Plan would have to resolve.

Vulnerable groups. Older people make up about a fifth of the population in all three units. The census records 431, 408 and 492 residents aged 15 and over with a functional difficulty in Golem, Dushk and Tërbuf respectively, and 93, 149 and 196 lone-parent families. The share with a difficulty in Golem (14%) is notably higher than in the other two units. These groups need specific attention in consultation, in any resettlement, and in access to the benefits of the scheme.

5.5 Encroachments and the Canal Corridor

A GIS-based inventory identified 223 encroachments within the canal footprint across the scheme, comprising 61 permanent structures, 133 bridges and 29 other obstructions, concentrated in the urban section. Within the urban section addressed by the conveyance options, 60 structures stand on the canal footprint, with an average footprint of 150 m^2 and an average of two storeys.

A separate inventory recorded 67 wastewater discharge points along the alignment, predominantly domestic sewer connections concentrated in the urban corridor between Karbunare and the northern edge of the city. The canal accordingly functions as a de facto open sewer through much of the urban section, a condition that constitutes both the principal environmental problem the project addresses and an existing risk to public health.

Figure 5-11 Existing canal in the urbanised section of Lushnje



6 Stakeholder Engagement

6.1 Engagement Undertaken

Stakeholder engagement has been undertaken throughout the preparation of the Pre-Feasibility Study, in accordance with ESS10 and with the Stakeholder Engagement Plan prepared for the project. Engagement has comprised institutional consultation with the Ministry of Agriculture and Rural Development, the Drainage and Irrigation Board of Fier and the Municipality of Lushnje and a socio-economic survey of beneficiary households.

Two outcomes of that engagement have shaped the scheme directly. The Drainage and Irrigation Board of Fier advised that the existing buildings over the canal should be retained, that the canal should be isolated from the sewage discharges, and that the sewer connections should be corrected; this position corresponds to the conveyance alternative that avoids resettlement. Beneficiaries at the public consultation expressed a preference for the Plug-Dushk pilot area, being the closer of the two to Lushnje, which corresponds to the option identified as preferred on cost and hydraulic grounds.

6.2 Stakeholders Identified

Table 6-1 Stakeholders and their interest in the project

Stakeholder	Interest
Farming households in the command area	Reliability and quality of irrigation supply; service charges; access to parcels during construction
Occupiers of structures on the canal footprint	Potential loss of structure and displacement under one conveyance alternative
Residents of the urban corridor	Construction disturbance; sanitary condition of the canal; traffic and access
Drainage and Irrigation Board of Fier	Operation and maintenance of the rehabilitated system
Municipality of Lushnje	Urban works; sewerage connections; Kasharaj Reservoir
Ministry of Agriculture and Rural Development	Project delivery and compliance
National Environment Agency	Environmental permitting and compliance
Water user organisations	Distribution management and cost recovery

6.3 Further Engagement Required

Engagement to date has been sufficient for the pre-feasibility stage. The following is required before works proceed:

- disclosure of this assessment and of the Environmental and Social Management Plan, in Albanian, in a form and place accessible to affected communities;

- focused consultation with the occupiers of 60 structures on the canal footprint, should the alternative involving their removal be selected, beginning with disclosure of the cut-off date and the entitlement framework;
- consultation with residents of the urban corridor on the construction programme, traffic management and access arrangements;
- establishment and disclosure of the grievance mechanism described in Section 10 before construction begins.

7 Environmental and Social Impacts and Mitigation

This section assesses the effects of the scheme on each environmental and social component, for the construction and operational phases in turn, and identifies the mitigation by which adverse effects are to be avoided or reduced. Residual significance is stated after mitigation.

7.1 Soils and Land

Construction. Excavation, trenching for pipework, construction of the pumping station and chambers, haulage of materials and movement of plant will affect soils along the works corridor. Four effects arise. Topsoil will be stripped temporarily where excavation is undertaken, and fertility may be lost if it is not stored in a controlled manner. Repeated movement of heavy plant may compact soils, reducing porosity and infiltration and damaging soil structure. Bare surfaces will be exposed to erosion by rainfall and to sediment transport, the risk being greatest during months of intense rainfall. Soil contamination may occur through leakage of fuel, lubricating oils, fresh concrete or construction waste, an effect of low probability where management procedures are observed. The soils of the area are among the most fertile in Albania, which raises the sensitivity of the receptor.

Operation. Effects on soils in operation are negligible and, on balance, beneficial. Improved irrigation will raise land productivity and reduce the degradation associated with water shortage. One adverse effect requires management: the irrigation water is moderately saline at an EC of 1.1 to 1.2 dS/m, and sustained application without adequate drainage and periodic leaching would gradually raise soil salinity across the command area.

Mitigation. Works will be confined within the project corridor. Topsoil will be stripped separately in advance of excavation and stockpiled in controlled conditions for reinstatement on completion. Plant movement will be restricted to designated routes. Exposed surfaces will be reinstated progressively rather than left open. Refuelling and maintenance of plant will be undertaken only in designated bunded areas. In the event of accidental spillage, absorbent materials will be applied and contaminated soil removed immediately for treatment under approved procedures. In operation, drainage will be maintained and a leaching requirement incorporated into the irrigation schedule, with soil salinity monitored across the command area.

Residual significance: minor adverse during construction; negligible to beneficial in operation, subject to salinity management.

7.2 Water Resources and Water Quality

Construction. Works within and alongside the canal network may cause temporary turbidity and sediment transport, and carry a risk of pollution from fuel, oils and fresh concrete. Temporary interruption of supply may occur where works affect operating reaches. Dewatering of excavations may be required locally.

Operation. The operational effects on water resources are substantially beneficial and constitute a principal justification for the scheme. Enclosing the urban reach isolates the flow from the 67 recorded discharge points and from the ingress of solid waste and uncontrolled

surface runoff. Rehabilitating the conveyance raises conveyance efficiency, with the consequence that peak abstraction from the Murriz-Thana reservoir falls by approximately 5 m^3/s and seasonal losses by some 52 Mm^3. Pressurised distribution within the pilot area further reduces distribution and application losses. The exclusion of the Shkumbin River as a source avoids abstraction that would have encroached on the environmental flow of that river.

One qualification is material. Enclosing the channel does not remove the wastewater discharges entering it. Unless the sewer connections are corrected, the covered reach becomes an inaccessible sewer rather than a clean conveyance, and the water-quality objective of the scheme is concealed rather than achieved. Correction of those connections lies with the municipal sewerage network and outside the scope of these works, but it is a precondition of the benefit claimed and must be programmed accordingly.

Mitigation. Works near canals will be organised to limit turbidity and sediment transport, with sediment barriers where required. Plant maintenance and refuelling will not be undertaken near irrigation or drainage canals. Works affecting operating reaches will be programmed outside the irrigation season or accompanied by temporary over-pumping. Covered and culverted reaches will incorporate access chambers for inspection, desilting and flushing, and screened stormwater inlets where surface runoff must be admitted, so that enclosure does not transfer the gross-pollution problem into an inaccessible conduit. At the pilot intake, filtration sized for biofouling and particulates will be provided as standard, together with anti-scaling measures appropriate to the hard, bicarbonate-rich water, and provision for periodic line chlorination and flushing to control biofilm. Correction of the sewer connections will be pursued with the Municipality and the sewerage authority as a parallel and programme-linked measure.

Residual significance: minor adverse during construction; major beneficial in operation, conditional on correction of the sewer connections.

7.3 Induced Effects of Agricultural Intensification

Improved and more reliable irrigation is expected to raise cropping intensity and support the shift to higher-value crops, and with it the use of fertilisers and pesticides. The receptors are the drainage network, groundwater and, ultimately, the coastal waters to which drainage from the scheme discharges. The effect is indirect and long term, and without management would be of moderate adverse significance.

Mitigation. An Integrated Pest Management approach, consistent with ESS3 and with the Integrated Pest Management Plan prepared for the Murriz-Thana scheme, is to be promoted through the agricultural extension accompanying the scheme, restricting pesticides to products registered for use in Albania and promoting non-chemical control. Fertiliser application is to be linked to soil testing. Within the pilot area, fertigation delivers nutrients to the root zone in measured doses and is expected to reduce both application rates and losses to drainage, making the pilot a demonstration of lower-input practice. A baseline of nutrient and pesticide residues in the drainage channels is to be established before the works, followed by periodic monitoring into operation.

Residual significance: minor adverse, subject to extension and monitoring.

7.4 Public and Occupational Health

The confirmed presence of E. coli along the whole project reach means the canal water carries a faecal-pathogen risk, notwithstanding that concentrations remain below the WHO guideline for unrestricted irrigation. The risk falls on two groups: field workers and farmers in direct contact with the water, and consumers of crops eaten raw, for whom untreated canal water applied to salad and vegetable crops is a recognised transmission pathway. This is an existing condition that the project acts to improve.

Mitigation. For crops eaten raw, restricted-irrigation practices will be promoted, including drip or subsurface application that avoids wetting the edible parts, and appropriate withholding periods; alternatively, treatment at the pilot intake. Basic hygiene and protective measures will be advised for those in direct contact with the water. These measures are to be delivered through the agricultural extension component accompanying the scheme.

Residual significance: moderate beneficial, the scheme reducing an existing risk.

7.5 Air Quality

Construction will generate dust from excavation, material handling and haulage, and exhaust emissions from plant and vehicles. Effects will be local, temporary and most pronounced in the urban section where dwellings adjoin the works. In operation the scheme generates no atmospheric emissions; energy for pumping is drawn from the grid, offset in part by the solar provision.

Mitigation. Dusty surfaces will be damped periodically, particularly in dry and windy conditions. Material loads will be covered in transit. Plant will be maintained to ensure efficient combustion, and idling will not be permitted. Haulage routes will avoid residential streets where alternatives exist.

Residual significance: minor adverse during construction; negligible in operation.

7.6 Noise and Vibration

Construction plant will generate noise and, where heavy equipment operates close to structures, vibration. The sensitivity of the receiving environment is highest in the urban section, where works pass directly alongside and beneath dwellings. Under the alternative involving demolition of 60 structures, noise and vibration effects would be substantially greater and more prolonged. In operation the only continuous source is the pumping station, located in open agricultural land away from dwellings.

Mitigation. Works will be undertaken during daytime hours to avoid disturbance to residents. Plant will be maintained in good technical condition and fitted with noise-attenuation equipment. Simultaneous operation of high-noise plant near residential areas will be limited, and the most intensive activities scheduled for periods of minimum disturbance. Condition surveys of adjacent structures will be undertaken before works begin where heavy plant will operate in proximity. The pumping station will be designed with acoustic attenuation appropriate to its setting.

Residual significance: moderate adverse during construction in the urban section; minor elsewhere; negligible in operation.

7.7 Biodiversity

Vegetation clearance will be required where excavation, pipe laying and structures are constructed, principally affecting the narrow belt of spontaneous vegetation along the canal banks. Fauna will be disturbed temporarily by noise, plant movement and construction activity. The habitats affected are modified rather than natural, no protected species or communities of conservation importance have been identified within the footprint, and no protected area is affected. Effects are therefore local, temporary and reversible.

One effect warrants attention notwithstanding the low overall sensitivity. Enclosing reaches of canal that presently support hygrophilous vegetation and aquatic fauna removes that habitat permanently along the culverted length. Given the extent of the canal network remaining open, the effect on the local population of any species is not material, but it is a permanent rather than temporary loss and should be recorded as such.

Mitigation. Vegetation clearance will be confined to the surfaces where it is indispensable for the works. Unnecessary felling of trees and shrubs will be avoided, and affected surfaces rehabilitated on completion by regrading, replacement of topsoil and natural regeneration or replanting. Works will be organised to minimise disturbance to fauna. Where bird nests or species of particular interest are identified, protective measures will be taken and works in the immediate vicinity rescheduled where necessary. Clearance of vegetated canal banks will so far as practicable avoid the principal bird breeding season.

Residual significance: minor adverse.

Two species-specific effects arise. Dewatering of canal reaches for construction may strand fish, which in reaches supplied from the Murriz-Thana reservoir may include the critically endangered European eel; and clearance of vegetated banks may encounter Hermann's tortoise and the protected reptiles and amphibians listed in Section 5. Canal reaches are therefore to be dewatered progressively, with fish rescue and transfer to flowing water under the supervision of a qualified ecologist; and vegetated working areas are to be checked immediately before clearance, with any tortoises and other protected fauna found moved to suitable habitat outside the working corridor.

7.8 Landscape

Construction will produce temporary visual disturbance from open excavations, plant, material stockpiles and site compounds. In operation the buried works are not visible; the pumping station is the only new above-ground structure, of modest scale in an agricultural setting. Enclosing the open canal through the urban area removes a degraded and visually poor feature from the streetscape, a beneficial effect. Under the bypass alternative, an elevated bridge-canal would have introduced a bulky above-ground structure across open farmland; the inverted siphon carried forward for costing avoids this.

Residual significance: minor adverse during construction; minor beneficial in operation.

7.9 Waste

Construction will generate excavated material, construction and demolition waste, packaging, and small quantities of hazardous waste comprising used oils, filters and contaminated absorbents. Under the alternative involving removal of 60 structures the volume of demolition waste would be substantial, of the order of 10,000 m^3 of solid debris across the 60 structures. In operation the scheme generates sediment from periodic desilting of the conveyance, which given the sanitary condition of the canal requires appropriate characterisation and disposal.

Mitigation. Waste will be segregated by category at the point of generation. Recyclable materials will be sent for recycling and inert material reused on site where suitable. Hazardous waste will be stored in dedicated containers and consigned only to licensed operators. Excavated material will be reused as backfill where geotechnically suitable, minimising both disposal and imported fill. Disposal will be to licensed facilities only, with consignment records retained. Desilting arisings in operation will be characterised before disposal given the wastewater load the canal carries.

Residual significance: minor adverse, subject to management.

7.10 Climate

The construction phase generates greenhouse gas emissions from plant, haulage and the embodied carbon of concrete and pipework, of a scale ordinary for civil works of this type. In operation the scheme introduces a new energy demand for pressurised pumping that the present gravity system does not incur, offset in part by the solar provision.

Against this, the scheme is materially adaptive. Climate projections indicate a rise in peak-season irrigation demand of 15 to 25% by the 2070 horizon. Raising conveyance efficiency and introducing pressurised distribution, precision scheduling and deficit-irrigation capability directly increases the resilience of the command area to hotter and drier peak seasons, and reduces the abstraction required to deliver a given service. The net climate effect of the scheme is beneficial.

Residual significance: minor adverse from construction and pumping energy; moderate beneficial in adaptation terms.

7.11 Land Acquisition and Involuntary Resettlement

The three conveyance alternatives differ fundamentally in this respect, and the distinction is the single most significant environmental and social matter in the assessment.

Table 7-1 Land acquisition and resettlement effects by conveyance alternative

Alternative	Effect	Significance
Sub-option A1	Removal of 60 structures on the canal footprint; physical and economic displacement of their occupiers; approximately 18,000 m^2 of affected floor area	Major adverse

Sub-option A2	No structure removed; no displacement; works confined to the existing corridor	None
Option B	No permanent acquisition; permanent right of way over agricultural land across approximately 7.9 km, with restrictions on deep cultivation, tree planting and construction; temporary loss of production during construction	Minor to moderate adverse

The Kasharaj conveyance and the channel reinstatement works require no permanent land acquisition, the structures being buried within the existing corridor; temporary access to private properties and gardens will be required along the Kasharaj alignment.

Mitigation. The mitigation hierarchy requires that involuntary resettlement be avoided where a feasible alternative exists. Sub-option A2 achieves the same technical and water-quality outcome without displacement and at lower cost, and its selection would avoid the effect entirely. Should Sub-option A1 nonetheless be selected, a full Resettlement Action Plan prepared in accordance with ESS5 is required before any displacement, on the preliminary framework set out in the Pre-Feasibility Study: compensation at full replacement cost without deduction for depreciation; entitlement for occupiers irrespective of formal title; livelihood restoration; and payment in full before displacement occurs. Under the bypass alternative, right-of-way agreements and compensation for temporary loss of production must be concluded before construction.

Residual significance: none under Sub-option A2; major adverse under Sub-option A1 even after mitigation, resettlement of this scale being an effect that mitigation reduces but does not remove; minor adverse under Option B.

7.12 Community Health, Safety and Livelihoods

Construction in an urban corridor presents risks to the community from open excavations, plant movement, construction traffic and temporary obstruction of access. Access to agricultural parcels may be temporarily interrupted along the rural reaches. Temporary interruption of irrigation supply during construction would affect livelihoods directly if it occurred within the irrigation season.

Beneficial effects on livelihoods are substantial and are the purpose of the scheme: reliable supply of adequate quality supports the shift to higher-value cropping, raises cropping intensity in sub-areas presently constrained by water availability, and reduces reliance on private groundwater abstraction. Construction will generate local employment.

Mitigation. The works area will be fenced and provided with warning signage to safety standards. A traffic management plan will be prepared and implemented. Access to parcels and properties will be maintained, with temporary crossings where necessary, and interruptions notified in advance. Works affecting supply will be programmed outside the irrigation season or accompanied by over-pumping. Workers will be provided with personal protective equipment and trained in safety and environmental procedures. Local employment

will be sought where skills permit. A grievance mechanism will be established and disclosed before works begin.

Residual significance: minor adverse during construction; major beneficial in operation.

7.13 Labour and Working Conditions

The construction workforce will comprise contractor employees and, potentially, subcontracted and local labour. ESS2 requires written terms of employment, non-discrimination, the absence of forced and child labour, a workers grievance mechanism distinct from the community mechanism, and occupational health and safety management. Principal occupational risks are excavation collapse, work in confined spaces within culverts and chambers, work adjacent to water, plant movement and manual handling. Work in the covered reaches carries a specific confined-space and hydrogen-sulphide risk given the wastewater load the canal carries.

Mitigation. The contractor will prepare and implement labour management procedures and an occupational health and safety plan compliant with ESS2 and Albanian legislation. Confined-space entry procedures including gas testing and forced ventilation will apply to all work within culverts and chambers. Excavations will be supported and inspected. A workers grievance mechanism will be established at mobilisation.

Residual significance: minor adverse, subject to management.

7.14 Cultural Heritage

No designated heritage asset is affected. A low residual possibility of chance archaeological discovery exists given the linear character of the works and the extent of excavation.

Mitigation. A chance-find procedure will apply throughout: immediate suspension of works in the area of the find; securing and isolation of the location; immediate notification of the institutions responsible for cultural heritage; and resumption of works only upon authorisation by the competent authorities.

Residual significance: negligible.

7.15 Cumulative Effects

The components of the scheme will be delivered as a single programme and their construction effects will therefore overlap in time, even where separated in space. The principal cumulative effect is on the urban corridor, where conveyance works, Kasharaj works and reinstatement may proceed concurrently, aggregating dust, noise, traffic and access disturbance for the same residents. Cumulative effects also arise with the rehabilitation of the Kasharaj discharge structures undertaken separately by the Municipality of Lushnje, and with any programme for correcting the sewer connections.

Mitigation. A single construction programme will be prepared and coordinated across all components, sequencing works so that concurrent disturbance in any one locality is limited. Coordination with the Municipality will extend to the Kasharaj discharge-structure works and to the sewerage programme.

Residual significance: moderate adverse during construction, reducible by programming.

7.16 Transboundary Effects

The project lies in the territory of the Municipality of Lushnje, in the centre of the western Albanian lowland and at a considerable distance from any state border. Construction effects are local and confined to the works corridor. Operation involves no industrial process, no atmospheric emission, no discharge of polluted water and no use of hazardous substances capable of transport beyond the border. The project does not affect protected areas of international importance, does not intervene in habitats extending across a state border, and does not affect international watercourses. No transboundary effects arise, and no notification or consultation under the Espoo Convention is required.

7.17 Summary of Effects

Table 7-2 Summary of assessed effects and residual significance

Component	Construction	Operation
Soils and land	Minor adverse	Negligible to beneficial
Water resources and quality	Minor adverse	Major beneficial, conditional on sewer correction
Public health	Minor adverse	Moderate beneficial
Air quality	Minor adverse	Negligible
Noise and vibration	Moderate adverse in urban section	Negligible
Biodiversity	Minor adverse	Minor adverse, permanent habitat loss along culverted reaches
Agricultural intensification	Not applicable	Minor adverse, subject to IPM and monitoring
Landscape	Minor adverse	Minor beneficial
Waste	Minor adverse	Minor adverse
Climate	Minor adverse	Moderate beneficial in adaptation terms
Land acquisition and resettlement	None under A2; major adverse under A1; minor under B	None
Community health and livelihoods	Minor adverse	Major beneficial
Labour and working conditions	Minor adverse	Not applicable
Cultural heritage	Negligible	Negligible
Cumulative	Moderate adverse	Negligible

8 Environmental and Social Management Plan

8.1 Purpose and Structure

This Environmental and Social Management Plan sets out the measures by which the effects identified in Section 7 are to be managed, the party responsible for each, the phase in which it applies and the means by which compliance is verified. It is preliminary, corresponding to the stage of design, and is to be developed into a construction-stage ESMP by the Contractor, approved by the Supervising Engineer before mobilisation.

The Plan is to be incorporated into the works contract so that compliance is a contractual obligation, with provision for the Supervising Engineer to suspend works in the event of material non-compliance.

8.2 Management Measures

Table 8-1 Environmental and Social Management Plan

Aspect	Measure	Phase	Responsibility
Soil protection	Confine works to the corridor; strip and stockpile topsoil separately for reinstatement; restrict plant to designated routes; progressive reinstatement	Construction	Contractor
Soil contamination	Refuelling and maintenance in designated bunded areas only; spill kits on site; immediate removal and treatment of contaminated soil	Construction	Contractor
Soil salinity	Maintain drainage; incorporate leaching requirement into the irrigation schedule	Operation	Drainage and Irrigation Board
Water quality, construction	Sediment barriers near canals; no plant maintenance or refuelling near watercourses; control of concrete washout	Construction	Contractor
Irrigation supply continuity	Programme works outside the irrigation season or provide temporary over-pumping	Construction	Contractor / Engineer
Conveyance access	Provide access chambers for inspection, desilting and flushing; screened stormwater inlets	Design / Construction	Designer / Contractor
Sewer connections	Coordinate correction of connections with the Municipality and sewerage authority as a programme-linked measure	All phases	MARD / Municipality
Pilot water treatment	Filtration at intake sized for biofouling and particulates; anti-scaling measures; provision for line chlorination and flushing	Design / Operation	Designer / Operator

Air quality	Damp dusty surfaces; cover loads in transit; maintain plant; prohibit idling; route haulage away from residential streets	Construction	Contractor
Noise and vibration	Daytime working; maintained and attenuated plant; limit simultaneous high-noise operations near dwellings; condition surveys of adjacent structures	Construction	Contractor
Biodiversity	Confine clearance to the necessary footprint; avoid unnecessary felling; avoid bird breeding season on vegetated banks; protect nests where found; rehabilitate affected surfaces	Construction	Contractor
Waste	Segregate at source; recycle where practicable; reuse suitable excavated material; licensed operators and facilities only; retain consignment records	Construction	Contractor
Hazardous waste	Dedicated containers; licensed operators only	Construction	Contractor
Site rehabilitation	Remove temporary facilities, surplus material and waste; regrade; replace topsoil; reinstate access roads, canals and parcel entrances	Construction	Contractor
Community safety	Fence and sign the works area; traffic management plan; maintain access to parcels and properties; advance notification of interruptions	Construction	Contractor
Occupational health and safety	Labour management procedures and OHS plan; personal protective equipment; confined-space procedures with gas testing and forced ventilation; excavation support	Construction	Contractor
Cultural heritage	Chance-find procedure: suspend works, secure the location, notify the competent authorities, resume only on authorisation	Construction	Contractor
Fish rescue	Progressive dewatering of canal reaches; rescue and transfer of fish, including European eel, under the supervision of a qualified ecologist	Construction	Contractor
Protected fauna	Pre-clearance check of vegetated working areas; relocation of Hermann's tortoise and other protected reptiles and amphibians outside the corridor	Construction	Contractor

Agrochemical use	Integrated Pest Management through agricultural extension; soil-test-based fertiliser application; fertigation in the pilot area	Operation	MARD / Drainage and Irrigation Board
Resettlement	Where Sub-option A1 is selected: full census, Resettlement Action Plan under ESS5, compensation at full replacement cost paid before displacement	Pre-construction	MARD
Stakeholder engagement	Disclose ESIA and ESMP in Albanian; consult residents on programme and access; maintain engagement through construction	All phases	MARD
Grievance mechanism	Establish and disclose before works begin; separate mechanism for workers	All phases	MARD / Contractor
Programme coordination	Single coordinated construction programme across all components; coordination with Municipality works	Construction	Engineer

8.3 Institutional Arrangements and Capacity

The Ministry of Agriculture and Rural Development retains overall responsibility for implementation of the environmental and social instruments. Day-to-day implementation rests with the Contractor, who will appoint a dedicated environmental and social officer for the duration of the works. Verification rests with the Supervising Engineer, who will report compliance to the Ministry and to the World Bank. Training in the requirements of the ESMP will be provided to all site personnel at induction and refreshed periodically.

9 Monitoring Plan

9.1 Purpose

Monitoring serves to verify the effectiveness of the measures set out in the Environmental and Social Management Plan, to identify in good time any unforeseen effect, and to demonstrate compliance with the requirements of Albanian legislation and of the World Bank Environmental and Social Framework. The programme applies throughout construction and into operation.

9.2 Construction-Phase Monitoring

Table 9-1 Environmental and social monitoring programme, construction phase

Component	Parameter	Location	Frequency	Method	Responsibility
Air quality	Dust, PM10, PM2.5; visual assessment	Work areas and near dwellings	Weekly and on complaint	Visual inspection; measurement as required	Contractor / Engineer
Plant emissions	Technical condition of plant	Site compound	Monthly	Technical inspection	Contractor
Noise	Noise levels	Near residential areas and work stations	Monthly or on complaint	Sound level meter	Contractor
Vibration	Vibration near structures	Areas of heavy plant operation	As required	Inspection	Engineer
Surface water	Turbidity, fuel leakage, sedimentation	Irrigation and drainage canals	Weekly	Visual inspection	Contractor
Soil	Oil leakage, surface condition	Site compound and storage areas	Weekly	Inspection	Contractor
Biodiversity	Damage to vegetation outside the works corridor	Along the project alignment	Monthly	Field inspection	Engineer
Waste	Segregation, collection and removal	Site compound	Weekly	Documentary and site check	Contractor
Hazardous materials	Storage and handling	Plant maintenance area	Weekly	Inspection	Contractor
Rehabilitation	Replacement of topsoil and regrading	Completed segments	On completion of each segment	Inspection	Engineer
Traffic and access	Access maintained; traffic management in place	Urban corridor and parcel access	Weekly	Inspection	Contractor

Fauna	Fish rescue and protected fauna relocation records	Dewatered reaches and cleared banks	Each dewatering or clearance	Records	Engineer
Occupational safety	Accidents and near-misses	All work areas	Continuous, reported monthly	Records	Contractor

9.3 Operational-Phase Monitoring

Table 9-2 Environmental and social monitoring programme, operational phase

Component	Parameter	Frequency	Responsibility
Agrochemical residues	Nitrate, phosphate and pesticide residues in the drainage channels; baseline before works	Before works, then twice yearly	Drainage and Irrigation Board
Water quality	Full suite as sampled in the baseline campaign, at the three established points	Twice yearly, including one low-flow sample	Drainage and Irrigation Board
Soil salinity	Electrical conductivity of soil in the command area	Annually	Drainage and Irrigation Board
Conveyance condition	Siltation, structural condition, blockage of covered reaches	Annually before the irrigation season	Drainage and Irrigation Board
Covered reach atmosphere	Gas testing before any entry	Before each entry	Operator
Pilot system performance	Delivered flow, pressure, energy consumption, hydrant metering	Continuous, reported annually	Operator
Desilting arisings	Characterisation before disposal	Each desilting campaign	Drainage and Irrigation Board

9.4 Social Monitoring

Table 9-3 Social monitoring indicators

Element	Indicator	Frequency	Responsibility
Public safety	Number of incidents	Monthly	Contractor
Grievances	Number received and manner of resolution	Monthly	MARD
Access to parcels	Number of access interruptions	Monthly	Contractor
Local employment	Number of local workers engaged	Quarterly	MARD
Health and safety	Number of accidents	Monthly	Contractor HSE officer
Community information	Meetings held and notices issued	As required	MARD

Resettlement, where applicable	Compensation paid; livelihoods restored	Quarterly until objectives met	MARD

9.5 Reporting

Monitoring results will be documented in periodic reports recording the measures implemented, the results obtained, any non-compliance identified and the corrective action taken, together with grievances received and their resolution. Reports will be submitted to the Ministry of Agriculture and Rural Development, the Supervising Engineer and the competent authorities in accordance with Albanian legislation, and to the World Bank in accordance with the requirements of the Environmental and Social Framework.

10 Grievance Mechanism

A grievance mechanism will be established and disclosed before construction begins, accessible to all affected persons free of charge and without retribution. It will accept grievances in writing, orally and by telephone, and will maintain a register recording each grievance, the response given and the date of resolution.

Defined response times will apply, with acknowledgement within a short fixed period of receipt and substantive response within a defined period thereafter. An appeal route will be available to complainants dissatisfied with the response, and recourse to the courts will not be precluded at any stage. A separate mechanism will be established for workers, in accordance with ESS2.

Where the conveyance alternative involving removal of structures is selected, the mechanism must be operational before the census begins, so that questions of eligibility, valuation and entitlement can be raised and resolved as they arise.

11 Conclusions and Recommendations

11.1 Conclusions

The scheme is, taken as a whole, environmentally and socially beneficial. It addresses a canal that presently functions as a de facto open sewer through the urban area of Lushnje, receiving 67 recorded wastewater discharges and delivering water of demonstrably degraded sanitary quality to crops including vegetables eaten raw. It raises conveyance efficiency, reducing peak abstraction from the Murriz-Thana reservoir by approximately 5 m^3/s and seasonal losses by some 52 Mm3. It increases the resilience of the command area to a projected rise in peak irrigation demand of 15 to 25% by the 2070 horizon. And it supports the livelihoods of farming households presently constrained by unreliable supply.

The adverse effects identified are, with one exception, of minor or moderate significance, temporary, confined to the construction phase and susceptible to the mitigation set out in this report. They are typical of linear civil works in a partly urban setting and present no obstacle to the scheme.

The exception is involuntary resettlement. The conveyance alternative involving removal of the 60 structures standing on the canal footprint would physically and economically displace their occupiers, an effect of major significance that mitigation reduces but does not remove. A technically and economically feasible alternative exists which achieves the same water-quality and hydraulic outcome without displacement and at approximately one third of the cost. The mitigation hierarchy required by ESS1 and ESS5 accordingly points clearly to that alternative.

One condition attaches to the principal benefit claimed for the scheme. Enclosing the channel isolates it from solid waste and surface runoff, but does not remove the sewer connections discharging into it. Unless those connections are corrected, the covered reach becomes an inaccessible sewer and the water-quality objective is concealed rather than achieved. This lies outside the scope of the irrigation works but is a precondition of their environmental justification.

No protected area, natural monument or designated cultural heritage asset is affected. No transboundary effect arises. No natural or critical habitat is affected, the project operating within a modified agricultural landscape.

11.2 Recommendations

- Select the conveyance alternative that retains the existing structures, so that involuntary resettlement is avoided in accordance with the mitigation hierarchy.
- Secure a binding commitment, with an agreed programme, for the correction of the sewer connections discharging into the canal, as a condition of the water-quality benefit claimed for the scheme.
- Should the alternative involving removal of structures nonetheless be selected, undertake a full census and prepare a full Resettlement Action Plan under ESS5, with

compensation at full replacement cost paid in full before any displacement occurs, and treat its implementation as being on the critical path for the works.

- Establish a baseline of nutrient and pesticide residues in the drainage channels before the works, and promote Integrated Pest Management and soil-test-based fertiliser use through the agricultural extension accompanying the scheme.
- Provide for fish rescue during dewatering of canal reaches, with attention to European eel, and for pre-clearance checks for Hermann's tortoise and other protected fauna.
- Undertake seasonal ecological survey of breeding birds and aquatic fauna where works affect vegetated canal reaches, and programme clearance of those reaches outside the breeding season.
- Incorporate this Environmental and Social Management Plan into the works contract as a contractual obligation, with provision for suspension of works on material non-compliance.
- Programme works affecting operating reaches outside the irrigation season, or provide temporary over-pumping, so that supply to the command area is maintained throughout construction.
- Design access, ventilation and flushing provision into all covered and culverted reaches, and apply confined-space procedures to all subsequent entry.
- Prepare and coordinate a single construction programme across all components of the scheme, and coordinate with the Municipality of Lushnje in respect of the Kasharaj discharge-structure works and the sewerage programme.
- Prepare the definitive Environmental and Social Impact Assessment once the scheme is selected and detailed design is available, addressing the matters identified in Section 1.4.

12 References

Aliaj, Sh., Koçiu, S., Muço, B. and Sulstarova, E. (2004). Seismicity, Seismotectonics and Seismic Hazard Assessment in Albania. Academy of Sciences of Albania, Tirana. Cited in COWI and CEIA (2016).

ASIG (Autoriteti Shtetëror për Informacionin Gjeohapësinor). Geoportali Kombëtar / National Geoportal. Tirana.

Ayers, R.S. and Westcot, D.W. (1985). Water Quality for Agriculture. FAO Irrigation and Drainage Paper No. 29, Rev. 1. FAO, Rome. Reprinted 1994.

Barko, O. and Lami, I. (2026). Flood hazard assessment of the lower part of the Shkumbin River in the context of hydrological uncertainty. Ecological Engineering & Environmental Technology, 27(4), 118–136.

Çela, G., Gjoni, A., Zorba, P. et al. (2025). Long-term trends in average air temperature in the Central Lowland Mediterranean Climate Zone of Albania. Conference paper, February 2025.

Copernicus Climate Change Service (C3S). ERA5 and ERA5-Land monthly averaged data. Copernicus Climate Data Store, ECMWF. Reference period 1991–2020.

COWI and CEIA (2016). Environmental and Social Management Plan (ESMP), Murriz Thana, Krutje and Terbuf Branches, Final Version. Water Resources and Irrigation Project, MARDWA, Tirana.

COWI and CEIA (2016). Integrated Pest Management Plan, Murriz Thana Scheme. Water Resources and Irrigation Project, MARDWA, Tirana.

COWI and CEIA (2017). Abbreviated Resettlement Action Plan (ARAP), Lushnje Branch, Murriz Thana, Final. Water Resources and Irrigation Project, MARDWA, Tirana.

Günther, A., Van Den Eeckhaut, M., Malet, J.-P., Reichenbach, P. and Hervás, J. (2014). Climate-physiographically differentiated Pan-European landslide susceptibility assessment using spatial multi-criteria evaluation and transnational landslide information. Geomorphology, 224, 69–85.

Hersbach, H. et al. (2020). The ERA5 global reanalysis. Quarterly Journal of the Royal Meteorological Society, 146(730), 1999–2049.

INSTAT (2013). Agriculture Census 2012: Results. Institute of Statistics, Tirana.

INSTAT (2024). Population and Housing Census 2023: Results. Institute of Statistics, Tirana.

INSTAT (2025). Livestock Statistics 2024. Institute of Statistics, Tirana.

INSTAT and IOM (2014). Return Migration and Reintegration in Albania 2013. Institute of Statistics and International Organization for Migration, Tirana.

International Finance Corporation (2012). Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources. IFC, Washington, DC.

ISO/IEC 17025:2017. General requirements for the competence of testing and calibration laboratories. International Organization for Standardization, Geneva.

Joint Research Centre (2013). European Landslide Susceptibility Map ELSUS 1000 v1. European Commission, Ispra.

Jovani, A., Thomai, Gj., Fortuzi, L. and Shaha, F. (2021). Digat Kryesore në Shqipëri / Main Dams in Albania. Shtëpia Botuese FLESH, Tiranë.

King, R. and Vullnetari, J. (2003). Migration and Development in Albania. Working Paper C5, Development Research Centre on Migration, Globalisation and Poverty, University of Sussex, Brighton.

Lata, L. (2021). Studim mbi Ndikimin Antropogjen në Ekosistemin Ujor të Lumit Shkumbin me Metoda Bashkëkohore. Doctoral dissertation, University of Tirana, Tirana.

Muñoz-Sabater, J. et al. (2021). ERA5-Land: a state-of-the-art global reanalysis dataset for land applications. Earth System Science Data, 13(9), 4349–4383.

Qiriazi, P. and Sala, S. (1999).

Shuka, L., Xhulaj, M. and Qirjo, M. Important Plant Areas of Albania.

UNEP-WCMC (2017). Global Critical Habitat Screening Layer, Version 1.0, after IFC Performance Standard 6. UNEP-WCMC, Cambridge.

World Bank (2017). Environmental and Social Framework. World Bank, Washington, DC.

World Bank Group. Climate Change Knowledge Portal, CMIP6 projections for Albania.

World Health Organization (2006). Guidelines for the Safe Use of Wastewater, Excreta and Greywater. Volume 2: Wastewater Use in Agriculture. WHO, Geneva.