## Contents

## List of Tables



## List of Figures

# Executive Summary

## Brief Project Description

*Introduction*

Scott Wilson has been commissioned to carry out an independent review and update of the EIA for the Durres-Morine Road Corridor. This review is to cover the specific 26km section of the route from Milot to Rreshen. The most significant changes to the original design are the construction of an embankment across the river terrace to the south of Milot and the overpass at Milot. The alignment is shown in Figure 1.1. This document is the non-technical summary of the main issues and impacts.

*Alternatives*

The Alternatives that were considered under this project were:

*Alternative 1: Milot – Mejha Dilemma – Puke – Hodroja Dilemma - Kukes – Morine*

*Alternative 2: Milot – Rreshen – Blinisht – Hodroja Dilemma– Kukes – Morine*

*Alternative 3: Milot – Rreshen – Blinisht - Reps - new alignment up the River Fani i Vogel River valley including tunnel – Kolshi -- Kukes – Morine*

## Main Environmental Impacts

*Natural Soils and Agricultural Soils*

The proposed road could have a significant impact on soil erosion, particularly where increased cuttings and embankments are required. This erosion would lead to loss of land for production, loss of habitat, increased flood risk (by more rapid and higher levels of runoff), undermining of the road and increased siltation of the River Fani and the River Matit. This would have to be mitigated through proper engineering, the use of gabions (stackable wire cages filled with stone rubble) in appropriate places and the rapid replanting of bare soil with grasses and other ground cover. In the absence of detailed information on the design of the gabions this impact is predicted to be significant.

The road design incorporates groynes that can result in erosion on the opposite river bank. As the current design does not include mitigation measures to protect the opposite bank this impact is predicted to be significant.

The proposed road embankment to the south of Milot, may affect groundwater flows, resulting in water ponding behind the embankment and an adverse impact on agricultural land. Any flood flows that overtop the embankment could also pond behind it

and have a similar impact on the agricultural land. Consideration should be given to the inclusion of flood relief outlets (with flat-valves) in the detailed design. As the current design does not include such measures the proposal is predicted to have a significant impact on agricultural land.

There is likely to be contaminated land within the vicinity of the abandoned copper processing plant a Rubik, a detailed survey of this complex is required to identify any contaminated land within the footprint of the proposed road. Any contaminated areas would present a risk to construction workers, road users, the environment and maintenance workers in the future. Any contamination would need to be mitigated either through bio-remediation or the removal of contaminated soil. Construction workers must be provided with the appropriate safety equipment. The contaminated soil would need to be remediated before being reused.

*Air Quality and Noise*

Locating construction compounds away from sensitive receptors and standard good site management practices, as detailed in the Environmental Management Plan, will be required to keep the impact on air quality and noise to a minimum level during construction. Due to the low predicted increases in the level of traffic on the road the predicted increase in noise and decrease in air quality are not considered to be significant.

*Climate*

The proposed road scheme is not predicted to have a significant impact on climate.

*Surface and Groundwater*

The impacts on water quality during construction are likely to be low, provided good site management practices are adopted.

During operation, the proposed road embankment to the south of Milot could have a significant adverse impact on flood risk, upstream and downstream of the embankment. This could have a major impact on the local population, houses, land and the livelihood of the population. The impacts of flooding are exacerbated when the inundation of access roads impedes emergency services. It is unlikely to be possible to mitigate this risk and on the basis of the information provided the impacts are predicted to be moderately significant.

During operation the traffic volumes will be generally low and the drainage design would be to allow surface water to runoff to the verge of the road. This would allow some treatment of pollutants in the soil, and because there will be high levels of dilution in the rivers the concentrations of pollutants due to the road runoff would normally be undetectable.

The pollution risk from accidental spillage may increase slightly due to the higher volumes of traffic, consideration should be given to the use of retention basins with reedbeds.

Where the soft verge is limited (or non-existent) then drains must be installed and directed to a specific discharge point. This should be designed to ensure that erosion around the discharge point does not take place. It should also be designed to ensure that the flood risk presented by the receiving body of water is not increased, which might require attenuation ponds to be constructed.

*Flora and Fauna*

The scheme is unlikely to have significant impact on fauna and flora. The construction of the road will be scheduled to prevent the destruction of habitats used by nesting birds in the breeding season. Construction compounds will be located away from sensitive habitats and fenced to minimise intrusion into adjacent habitats. During operation, the risk of traffic hitting wild fauna will be reduced through the use of traffic warning signs.

*Landscape*

The construction of the scheme is likely to have a significant impact on the landscape. However, it will be possible to reduce the severity of the impact through the adoption of measures set out in the Environmental Management Plan, and any remaining impacts will be of limited duration.

The proposed overpass at Milot can be expected to have a significant impact on the residents of Milot and the character of the surrounding area. It may be possible to reduce the severity of the impact on residents by giving them advanced notice of the proposals and the opportunity to comment on the detailed design.

The current problems of illegal dumping of waste adjacent to roads could increase significantly once the proposed road is constructed. Increase enforcement of illegal dumping would be required to mitigate the potential impact, and prevent it having an adverse impact on the landscape.

*Land Use*

The construction of the scheme may have a minor beneficial effect on the land value of the potentially contaminated land adjacent to the copper processing complex in Rubik.

The scheme would result in the irreversible loss of high quality agricultural land on the low flood plain fields of the Matit and Fani Rivers. The loss of agricultural land would be mitigated through compensation as part of the resettlement plan.

The proposal to upgrade the route to a dual carriageway at some stage in the future would result in an even greater cumulative impact on agricultural land.

Residential and commercial properties that would be destroyed by the scheme would be compensated as part of the resettlement plan.

*Social and Economic*

The social impacts from construction camps in relatively remote areas can be significant, especially when the workforce is not from the same cultural background as the resident community. Importing diseases can be a particular problem, especially HIV. This risk is less likely to be problematic where women traditionally avoid contact with non-family males. However, it can be reduced through education and raising awareness of the health risks prior to the commencement of construction.

The operation of the road can be expected to have a significant beneficial effect on the economy of the area through increased access to markets, enhanced agricultural production and secondary processing of materials, increased tourism and associated services, leading to an increase in employment. Improved access to health services and other facilities would have positive effect on social welfare.

The proposed scheme can be expected to lead to increased residential and commercial development adjacent to the road. If development takes place on valuable agricultural and forestry land along the route, the scheme could have a moderately significant impact on these resources. Enhanced enforcement is required to reduce the high levels of illegal construction and protect this land and prevent the scheme leading to an increase in unlicensed logging and quarrying, and illegal waste dumping.

*National and Cultural Heritage*

The potential impact on undiscovered archaeology at the construction stage would be mitigated through employing an archaeologist to supervise any works in sensitive areas. If any archaeology were found then the construction works would be stopped and the appropriate authority informed. The scheme is not predicted to have a significant impact on built heritage.

The impact on social culture depends on the values of the communities affected. There may be a slow decline in traditional lifestyles and cultural values, but the local population may wish to embrace the potential changes and improve their quality of life through modernisation.

## Institutional Strengthening

*Environment Unit*

Institutional strengthening of the GDR should be implemented through the project. This would involve training the new staff in the environmental team on best environmental management practice, and an international consultant providing support in the interim. This has been proposed in response to the concern expressed within GDR that the environmental management plan would not be implemented to the level required, due to the lack of expertise in GDR to supervise such works. The output should be trained staff and a set of guidelines to act as national guidelines or standards on environmental management for all road projects in Albania.

*Road Maintenance Department*

Road maintenance in Albania is problematic at present. Institutional strengthening of the Road Maintenance Department is currently been carried out under a separate project. This is considered to be essential to secure the long-term benefits of this proposal.

# 1 Independent EIA Review by Scott Wilson

## 1.1 Introduction

The World Bank is considering financing road projects in Albania that would improve (a) the road connection from the Port of Durres to the city of Morine and (b) a portion of the Middle Ring Road in Tirana.

An EIA document has been prepared by the joint venture collaboration of consulting firms Tecnic and Mott McDonald, as part of their overall effort in preparing the feasibility study for the Durres-Morine Road.

However, the World Bank EA policy cited above forbids the same consultant or entity responsible for the feasibility study to prepare the EA. The rationale is that for category A projects the EA document, which is the responsibility of the Borrower, should be prepared by an independent group to assure no bias is introduced into the environmental impact assessment process.

Scott Wilson has been commissioned to carry out an independent review and update of the EIA for the Durres-Morine Road Corridor. This review is to cover the specific 26km section of the route from Milot to Rreshen.

In the interest of clarity we have been directed to remove those parts of the assessment which relate to other sections of the route (this does not apply to Chapter 5, the Analysis of Alternatives). This is primarily a review and update of the existing EIA in view of the changes to the proposed alignment, the route is now entirely on the left banks of the River Fani and River Matit.

Where detailed design information was available this has been incorporated into the assessment. The most notable changes to the design are the construction of an embankment across the river terrace to the south of Milot and an overpass at Milot.

## 1.2 Confirmation that the project falls within the A Category Rating

In accordance with World Bank safeguard policies and procedures (OP/BP/GP 4.01 Environmental Assessment), this review confirms that project falls within an "A" category rating and a detailed environment assessment (EA) must be prepared accordingly. The project is likely to have significant adverse environmental impacts, such as the increased flood risk upstream and downstream of the proposed highway embankment between the Fush – Kruje to Lezha highway and Milot. Furthermore, the scheme would affect a broader area than the physical alignment of the scheme, and without mitigation the scheme would have an adverse impact on the surrounding environment, including the high quality landscape, water quality, air quality and noise environment.

A detailed EA is therefore required to examine the project's potential negative and positive impacts, to compare them with the impacts of feasible alternatives, and recommend any measures to needed to prevent, minimise, mitigate or compensate for adverse impacts and improve environmental performance.

## 1.3 Priority Environmental Issues Identified

The EIA prepared by Mott MacDonald and Tecnic Consulting Engineers identified most of the priority environmental issues. However, further details of the scheme have been made available since MacDonald and Tecnic Consulting Engineers completed their report and based on our assessment additional important environmental issues have been identified. These issues have been identified through a through review of the original Mott MacDonald and Tecnic EIA information, supplementary environmental information that has been prepared on behalf of ITP since then, and the information that was available on the revised design and further verified through a site visit.

The priority environmental issues are:

- the potential adverse impacts of the proposed highway embankment on upstream and downstream flood risk;
- the potential increase in river bank erosion and the risk of this undermining the proposed road;
- the adverse visual impact of the overpass at Milot.

## 1.4 Appropriateness of the EA Document

The document has been updated as necessary, for the 26km Milot to Rreshen section, to bring the document to World Bank Standards. Where necessary more rigorous impact analysis has been carried out and further mitigation measures proposed, to ensure the document reflects a professional and competent discussion of the issues.

## 1.5 Appropriateness of the Environmental Management Plan (EMP)

The EMP has been updated to ensure it contains:

- A mitigation plan which relates to all the impacts identified during construction and operation. However, it should be noted that it would be difficult to mitigate the increased flood risk upstream and downstream of the highway embankment, as engineering measures to reduce flood risk tend to reduce flood storage capacity and generally transfer the problem to another location.
- The monitoring plan has been elaborated to ensure the priority elements which require mitigation and monitored to ensure the measure is effective.

- The sections on Institutional Strengthening and Institutional Arrangements have been updated to reflect the current situation, taking into account the progress that has been made and those measures which have been implemented since Mott MacDonald and Tecnic Consulting Engineers completed their report.

- The implementation schedule will be agreed through discussion with the GRD and World Bank and reported in the final document.

## 1.6 Assistance with Public Consultation

A Scott Wilson Environmental Specialist held scoping meetings with key parties involved in the scheme to brief them on the work to be undertaken by Scott Wilson, the Terms of Reference and information required to undertake the review. Meetings were held with the following:

- The Ministry of Transport: General Roads Directorate (GRD) PIU Unit – Adem Duka (Director), Stephen Kay (Procurement Advisor);

- The Ministry of Transport: General Roads Directorate: Sokol Agaraj (GRD Deputy Director), Genci Dautaj (Head of Environment Unit);

- The Ministry of the Environment – Etleva Canaj (Deputy Minister);

- The Ministry of the Environment – Petraq Llambushi (Chief Inspector);

- INFRATRANSPROJECT LTD (ITP) – Dr Eng Faruk Kaba (General Manager);

- World Bank, Albania – Artan Guxho (Projects Officer).

Scott Wilson also assisted the GRD with their consultation programme, including providing guidelines on the process, undertaking the preparation of the questionnaire and offering to review the material to be presented in advance of the meetings. In view of the GRD's limited experience in undertaking public consultation we have advised that they enlist the assistance of a local organisation, such as the Regional Environmental Center for Eastern Europe. On completion of the consultation the GRD provided Scott Wilson with the completed questionnaires and meeting notes from the discussions with the local population and key stakeholders.

## 1.7 Resettlement Plan

The resettlement information will be incorporated in this EIA on completion of the Resettlement Plan.

## 1.8 Introduction to the Mott Macdonald/ Tecnics EIA Report

The project is to construct a trunk road to connect Port of Durres on Albania's Adriatic coastline with Morine, the border crossing into Kosovo. The route from Durres to Milot is common to all the three Alternatives and is being upgraded under a separate programme of work and as such this assessment does not cover that section.

The environmental assessment for route selection was not as detailed as that prepared for a specific alignment, as it was not cost effective to conduct detailed monitoring, surveys and other works for the full suite of alternatives, some of which would never be implemented. Furthermore many of the detailed environmental impact assessments rely on detailed engineering information to be available, and this is not produced until a specific route has been selected. Therefore the environment assessment set out information on the various Alternatives covering a range of environmental aspects. Where detailed information was available from existing sources of information and/or observations in the field then this was presented. The impacts of each alternative route were identified as specifically as possible and generic mitigation measures proposed. An assessment of the impacts during construction, operation and maintenance was conducted. The assessment identified both positive and negative benefits clearly and assigned a "severity score" to each. The assessment also sought to identify if impacts were direct or indirect, avoidable or unavoidable.

## 1.9 Description of the Proposed Project assessed by the Mott Macdonald/ Tecnics EIA Report

A detailed description of the various project components is reported in the Mott Macdonald/ Tecnics Feasibility Study, Draft Final Report (FS) completed under the Mott Macdonald/ Tecnics project. This section summarises the key issues of the proposed project of most relevance to environmental issues.

Three alternative routes were assessed and there is commonality of alignment with these Alternatives:

- Alternative 1 has a common alignment with Alternative 2 from Hodroja Dilemma to Morine (96.5 km) and with Alternatives 2 & 3 from Kolshi to Morine (32.9 km)
- Alternative 2 has a common alignment with Alternative 3 from Milot to Blinisht (45.2 km) and from Kolshi to Morine (32.9 km).

The Alternatives assessed under this project are:

**Alternative 1 : Milot – Mejha Dilemma – Puke – Hodroja Dilemma - Kukes – Morine**

The section of RN 1 from Milot to Mjeha Dilemma has been and/or will have been constructed and is not considered further in this assessment. The Alternative then follows the existing road alignment running east through Puke and Kukes to Morine.

**Alternative 2 : Milot – Rreshen – Blinisht – Hodroja Dilemma– Kukes – Morine**

This Alternative follows the existing roads. The Alternative has shown to have the highest traffic levels in the traffic surveys conducted during December 2002 and January 2003.

**Alternative 3 : Milot – Rreshen – Blinisht - Reps - new alignment up the River Fani i Vogel River valley including tunnel – Kolshi -- Kukes – Morine**

This Alternative involves significant new road construction and a tunnel in the northern area where the road would cross under the Kalimash massif before joining the existing Puke – Morine road. The tunnel would be 6.1 km in length.

There is a second option for Alternative 3 to avoid Fani i Vogel River valley by moving up to the ridge line along an existing track before going through a shorter tunnel west of Kalimash. This option was evaluated as being technically difficult and eliminated. As such this is not dealt with in detail in this EIA.

Alternative 3 has a number of minor variations of potential routes in the northern section of the Alternative where tunnels were required and have been technically eliminated. These variations are shown in Volume 1, Feasibility Study, and the Interim Report.

The three Alternatives are shown in Figure 1.1

Alternative 1 and 2 would involve the rehabilitation of existing roads. However, in places the pavement assessments have indicated that rehabilitation might not be sufficient and that full - scale replacement might be required. This is dealt with in more detail in the Feasibility Study.

Alternative 2 joins Alternative 1 at Hodroja Dilemma (62.5 km on Alternative 1) and then follows the same alignment to Morine (158km).

Alternative 3 bifurcates from Alternative 2 at Blinisht and joins Alternative 1 some 43 km further on at Kolshi.

This section of Alternative 3 would involve the construction of a new road, although much of it would be along existing (or very close to) tracks in the Fani i Vogel valley. Thirty kilometres north of Blinisht would be the southern portal of the tunnelled section. The tunnelled section will have two sections of tunnel (one 0.48kms long and then almost immediately a 5.56km long tunnel) constructed to pass below the Marjathit Mountain. The northern portal would be about 6.5 km south of Kolshi where it would rejoin Alternative 1. Five new bridges would be required and one existing bridge would have to be substantially upgraded on this section of Alternative 3.

The Albanian standard for new roads is to establish a right of way 44 m wide within which no development is permitted on either side of the pavement. In areas where development exists that is either older than 1992, or that has been approved since 1992,

the standard is relaxed to a 10m pavement with a 5m to 7 m corridor either side of the road (ie. the right of way is reduced to a 20m to 34 m wide corridor).

The basic design for new roads proposed by this project is a carriageway that has a 12.5 m wide pavement (7.5m carriageway with 2.5m paved shoulders). To maintain the 44m wide right of way this will require two 15.75m wide rights of way on either side of the paved area.

Existing roads will be rehabilitated to accommodate a 7.5m wide carriageway with 1.0m paved shoulders as a minimum.

Structures such as bridges and major culverts will have a 7.5m wide carriageway with a 1.0m wide paved walkway on either side across the structures.

Within any tunnel the design is to have a 7.5m wide carriageway with a 1.0m wide paved walkway on either side of the carriageway.

On all alternative routes retaining walls would be constructed on the edge of the pavement when this was required.

## 1.10 Milot to Rreshen (26km Section) Reviewed by Scott Wilson

This is the section that is being considered under the Scott Wilson Review, and a detailed design is now being produced for this section. The route passes along the left side of the River Matit and River Fani River Valleys between Milot and Rreshen, on the existing earth road. The route starts at the intersection with the Fush – Kruje to Lezha highway, near the new Matit Bridge. The route passes across the river terraces of the Matit River on a 5m high embankment to the intersection with the existing old road to Lezha and the Milot to Rreshen railway.

The route passes over the Milot to Rreshen railway on a viaduct 11m x 30m long, this road then intersects at grade with the existing Milot Road. The route then runs parallel to the Milot to Rubik railway on the left side of the valley to Rubik. A number of bridges and culverts are required to cross the various tributaries along this route, including a 120m long bridge across the Matit River in Skuraj.

The route passes close to the boundary of the Copper Plant in Rubik within an 18m deep cutting until it reached the Rubik to Rreshen railway, the railway will be deviated on to the other side of the river. The route then partially follows the existing route and is partially located on an embankment on the river terraces. The 26km section ends at the Fani Bridge near the town of Rreshen. The 26km Milot to Rreshen section is common to both Alternative 2 and Alternative 3.

**Figure 1-1: Location Map**

**Figure 1-2: 26km Milot to Rreshen Section**

# 2 Policy, Legal and Administrative Framework

## 2.1 Policy

During the last decade the government began developing a framework to reverse the environmental degradation that had arisen from previous industrialisation under the socialist regime, which neglected the protection of the environment almost entirely. Environmental management and protection is clearly part of the Constitution that requires the Republic to:

*"maintain a healthy and ecologically suitable environment for the present and future generations".*

In addition, the Constitution requires natural resources to be rationally exploited in accordance with sustainability principles.[1]

The most up to date policy on the environment is in the 2002 law[2] where Chapter II, Environmental Policies, sets out governmental policy on:

- environment state policy – sets the position of the environment in the constitution, the place of national sector strategies and local plans as part of the environmental policy and defines the bodies who are to administrate the policy
- environment strategies and programs – states a National Environment Action Plan (NEAP) is to be produced every ten years and that an annual environmental report on the implementation of the NEAP is to be produced for the Council of Ministers
- environment local plans – requires local government to develop local Environmental Action Plans (EAPs) using national bodies to provide technical support and data, for local government to engage the public, NGOs and business in development of the plans and mayors to report to district councils on the implementation of the plans at the end of each year.

Specific statements on the protection of environmental aspects are included in Chapter III, Utilisation and Protection of the Environmental Components. These include the need for equal protection of all resources; the need for development activities (including agriculture and waste management) not to pollute the land, air or water; sets out criteria to define how water resources are used; bans import or use of ozone depleting substances; protects biodiversity and the built environment; places limits on residues; controls dangerous substances; and sets out tariffs and environment taxes.

[1] UNEP : Post conflict Environmental Assessment in Albania, 2000

[2] Law Nr 8934, on Environment Protection 5/09/2002.

GoA published the first National Environmental Action Plan (NEAP) in 1993 that set environmental goals and an action plan for the country. The first State of the Environment report was produced in 1994 and a second was produced in 1998. The State of the Environment report for 1999/2000 has been produced but not published – although this is anticipated to be published soon. The delay has been caused by the changes in the institutional set up of the Ministry of Environment (MoE)[1] that replaced the National Environmental Agency (NEA). The poor delivery of the annual report on implementation of the NEAP is due to lack of resources and institutional changes that have been going on in the last three years.

## 2.2 Legislative Background

The legislation governing environmental protection is being strengthened relatively rapidly in Albania. The first Law on Environmental Protection was enacted in 1993 and amended in 1998 and 2001. That law states in Chapter II, Environmental Impact Assessment, Article 7 that:

*"all the activities of natural and legal persons, native or foreign, who exercise their activities in the territory of the Republic of Albania, shall be subject to environmental impact assessments".*

Article 8 gives in general terms the types of activities for which the authorities shall require an Environmental Impact Assessment (EIA) to be conducted. Article 9 specifies the responsible authority to be the Committee of Environmental Protection, and its regional activities. The law does not specify individual stages for the EIA process.

More recently Law No. 8934 on Environmental Protection 5/09/2002 was enacted. This abrogated all previous environmental protection laws and has ten principal areas of governance:

- Environmental Policy
- Utilisation and Protection of Environmental Components
- Environmental Impact Assessment
- Permission for the Activities that Impact the Environment
- Prevention and Limitation of the Environment's Pollution
- Monitoring and Data
- Environmental Control
- Environment State Bodies Duties
- Public Role
- Sanctions

Law No. 8934 on Environmental Protection 5/09/2002 states that environmental protection is the obligation of all states, judiciary and individuals with activities in Albania.

Article 34 requires any person or state organisation to obtain permission from the responsible bodies (MoE) in order to carry out any specific works in Albania that has an impact on the environment. In order to obtain this permission an environment impact assessment is to be conducted.

Until recently there has been no legally defined process for the development of EIA's. A law on Environmental Impact Assessment was drafted in 1995 that hitherto was never adopted by GoA. This draft law has been used on occasion as the guideline on EIA procedures in Albania. However, Law No. 8990 on Environmental Impact Assessment 10/02/2003 has been enacted and now sets out the procedures for the preparation and submission for approval of EIAs. The law also sets what level of EIA has to be conducted for the various types of development.

A series of other enabling legislation is under preparation to support Law No. 8934 on Environment Protection 5/09/2002 and include:

- pollution control
- protection of habitats and biodiversity
- waste management
- setting environment standards
- monitoring requirements
- protection of values of cultural, scientific, religious and social heritage

Other legislation exists that has an impact on the environment and these include:

Law No. 8093 On Water Resources 1996 as amended by Law Nos. 8375, 8605 and 8736 – regulates the exploitation of gravel from the bed of rivers, streams etc

Law No. 8561 On Expropriations and Temporary Taking of Property for a Public Interest 12/22/1999 – defines land expropriation procedures and compensation levels

Law No. 7623 On Forests and Forest Policing 1992 and as amended (Articles 63 & 64 only) by Law No. 7839 – define exploitation of forests

In extreme instances, the public have the right to demand partial or national referendums on specific environment issues under Law No. 7866 On Referenda 6/10/1994.

Law No. 8561, 22/12/1999, states that private persons have rights with respect to private property they own and that the right of public property is exercised only for a public interest and cannot be realised and protected in another manner. It further states that the rights of the owners of properties are protected and that the rights of third parties to those properties are devalued as a result of expropriation.

In the case of expropriation by the state for public interest the competent minister (Minister of Transport and Telecommunications in this case) appoints a special commission to adequately administer the expropriation and sets the value of the

properties to be expropriated. The expropriation decisions of the Minister are submitted to CoM for its decision with the property owners having a right of appeal but the appeal may not delay the expropriation. Figure 1.5.1.1 Process of Expropriation Diagram, FS, clearly show this flow process.

## 2.3 Institutional Regulatory Framework

The National Environment Agency (NEA) was established in 1998[1]. In 2002, the new law defined the Ministry of the Environment, which is required to provide centralised control of the environment on behalf of the MoE (Article 67).

Article 64 sets out that the MoE is supported by:

- Regional Environment Agencies, of which there are 12
- Environmental Inspectorate
- Environmental bodies (to be implementing institutes under MoE, such as the Environment Institute that is responsible for monitoring)
- Local government bodies and other inter-ministerial bodies as set up from time to time.

MoE's draft environmental policies set out pollution restriction norms and coordinates with executing agencies how environmental policies are implemented in the field. As commonly occurs in countries with high levels of poverty, environmental protection is afforded low priority in budgetary terms within government (only 0.01% of the national budget assigned in 2000)[2]. The result is that implementation and enforcement of environmental policy and regulations is weak due to inadequate staff resources, equipment and facilities.

Financing the MoE is supposed to come in part from licence fees and other sources of funding as set out in the Law No. 8934 on Environmental Protection 5/09/2002[3].

MoE is responsible for environmental protection and was created by Law No. 8934 on Environmental Protection, 5/09/2002. NEA, the forerunner of MoE, was established through Law No. 7664 on Environmental Protection, 21/01/1993. Law No. 7664 was based on the European Directive 85/337/EEC and was further amended by Law Nos. 8364 and 8825. Law No. 8990 on Environmental Impact Assessment, 10/02/2003, now details the procedures and fees for preparing Environmental Impact Assessment, Law No. 8934, 5/09/2002 abrogated Law Nos. 7664, 8364 and 8825.

[1] The Albanian Statistical Yearbook 1991-1999, Instat.

[2] UNEP : Post conflict Environmental Assessment in Albania, 2000

[3] Article 25 - Tariffs and Environmental Taxes; Article 82 – Sanctions;" and Article 87 - Environment Fund".

MoE has overall responsibility for the environment and it does this through its six Directorates and twelve Regional Environmental Agencies (REAs).

MoE Directorates are:

- Directorate of Environmental protection
- Directorate of Air and Water Quality and Waste Management
- Directorate of Project Implementation
- Directorate of Human Resources and Services
- Directorate of Environmental Impact Assessment; and
- Directorate of Law and Foreign Co-operation

MoE has a REA located in each Prefecture and one in Tirana. MoE is responsible for the implementation of permits, licences and penalties legislated under Law No. 8934. However, at the time of writing of this report MoE had not developed the regulations for the implementation of Law No. 8934. And in many instances Albanian environmental standards are not yet developed for the transport sector such as for air, noise and water.

In addition to the duties set out directly for MoE, it would appear that a number of other state organisations have a role in monitoring and protection of flora and fauna and include:

- National Museum of Natural Sciences
- Research Institute of Forestry, Pastures and Meadows
- Research Institute of Fisheries
- Institute of Biological Research
- Ministry of Agriculture and Food (responsible for control of forestry)

Despite (or because?) of this plethora of institutes responsible for monitoring there have been few actual studies conducted in the field into the status of flora and fauna in Albania. This is primarily due to budget restrictions.

Other implementing agencies that have environmental roles are:

- Ministry of Transport and Telecommunications (MTT)
- Ministry of Territorial Adjustment and Tourism (MTAT) with responsible for water supplies etc.
- Ministry of Public Economy and Privatisation (MPEP)
- Ministry of Health (MoH) and Institute of Public Health - responsible for monitoring potable water quality and air quality
- Hydro-meteorological Institute – collection of meteorological data and was responsible for monitoring water and air quality.

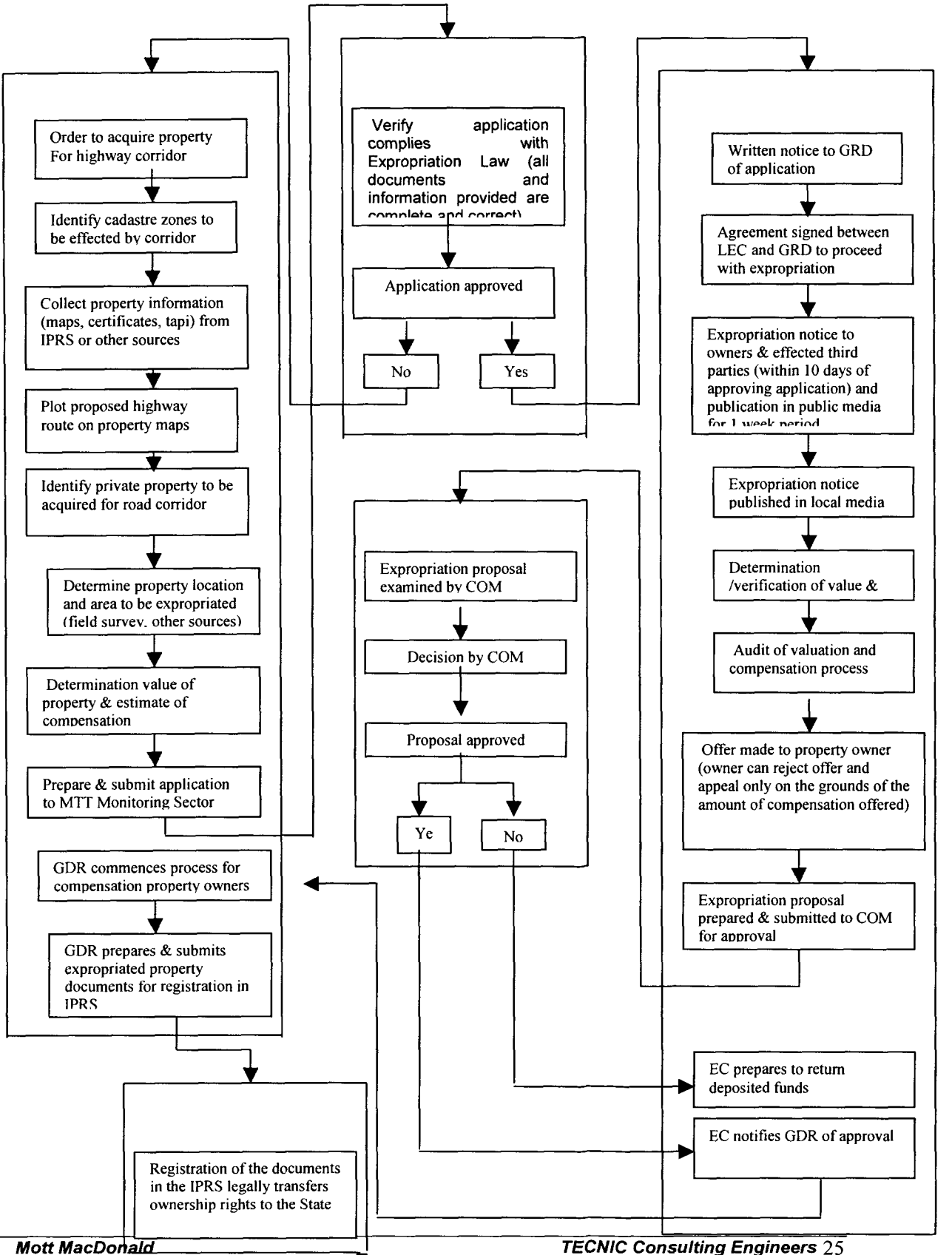
- National Territory Adjustment Council (NTAC) – responsible for issuing construction permits with conditions that could include requirements for environmental protection.

## 2.4 The Rights of the Citizen

Law No. 8934 on Environmental Protection 5/09/2002 sets out the role and rights of the public in environmental matters. Chapter X, Public Role, includes statutes on the following:

- public's right to get environmental data
- public participation in decision taking on environmental issues
- the role of NGOs in the protection of the environment
- the role of business and other professional organisations in the protection of the environment
- the right for private persons to demand the protection of the environment by authorised bodies and the right to take to court any organisation or person who causes damages to the environment, or risks causing damage to the environment.

## Fig. 2.4.1 Process of Expropriation Diagram



# 3 Environmental Baseline

The baseline information presented here is for the region, with specific information about local variations where this is clearly identified as unique or specific to that location.

## 3.1 Geology

An extensive reconnaissance study into the geology and geomorphology was conducted as part of the Volume 1, FS. The FS should be read to obtain detailed information from this study (Appendix 13, Chainage Summary Tables), this document shows sections of extensive land sliding, ongoing rapid gully erosion, poor sub-grade conditions, unstable adjacent river channels, steep rock slopes subject to falls and slides that are to be traversed. The summary tables aim to highlight sections where there are limited engineering constraints and even potential benefits, which would include the possibility for gaining construction aggregate locally.

The sections below provide a general background to the geological and geomorphological setting of the Milot to Rreshen section identifying some particular issues that should be considered.

### 3.1.1 Tectonic Zones

The study area can be divided into two main tectonic zones – these are areas where significant faulting and earthquakes occur due to the collision of the Arabo-African and European continental plates[1]. These tectonic zones are areas where crustal movements take place. This results in numerous faults and frequent earthquakes as these plates adjust their position.

The two tectonic zones are the Krasta Zone, from Milot until Fangu, and the Mirdita Zone, from Fangu until Rreshen. A map of these zones is provided in Appendix 13, Figure 1.1.

#### 3.1.1.1 Krasta Zone

The western end of the section crosses this zone from 69 km (Fangu village) to 79 km (ie. the last 10km down the River Matit valley). However, over most of this length the bedrock is covered by recent (Quaternary) alluvial deposits.

The Krasta Zone represents a basinal zone between the 'external' Kruja Zone, which is present to the northwest and the southwest, and the 'internal' Mirdita Zone to the east.

[1] "Geology of Albania". Selam Meco, Shyqyri Aliaj. 2000.

There is a distinctive NNW to SSE alignment of the Krasta Zone that is sub-parallel to the coastline. Overall the width of the Krasta Zone rarely exceeds 10km.

It has three main components:

- Maastrichtian to Eocene (i.e. Upper Cretaceous to Lower Tertiary) - Flysch deposits
- Senomian to Maastrichtian (Upper Cretaceous) - Limestones
- Albian to Cenomanian (Upper Cretaceous) – Flysch deposits

The Krasta Zone has been subject to major tectonic deformation.

#### 3.1.1.2 Mirdita Zone

The vast majority of the study area is within the Mirdita Zone. This is characterised by transitions through Jurassic neritic (i.e. continental shelf) to pelagic (open sea) facies and the occurrence of significant ophiolites. These are basic and ultrabasic lavas and intrusions. Some metamorphic equivalents may also be present. Therefore the depositional environment of the Mirdita Zone was an oceanic basin with ophiolite development.

The Mirdita Zone overthrusts the Krast Zones to the west.

### 3.1.2 Stratigraphy

A summary of the stratigraphy of the study area is presented in Table 3.1 below.

**Table 3.1 : Stratigraphy of the Study Area**

| Tectonic Zone | Age | Units | Comments |
|---|---|---|---|
| All Zones | Recent | Alluvial Plain Deposits | Comprise alluvial fine grained clays and silt |
| | | River Valley Deposits | Dominated by sands, gravels, cobble and boulders |
| | | Landslide and colluvial Deposits | Often extensive and variable in content depending on the nature of the mass wasting processes |

| | | | |
|---|---|---|---|
| | Quaternary | Fluvial Terraces<br><br>Colluvial Terraces | Developed in predominately bedded sand and gravels but with local argillaceous materials as well<br>Tend to more variable and less structures than the fluvial terraces. Complex mix of colluvial fans, river terrace deposits and landslide debris |
| | Upper Tertiary | Neogene and Oligocene | Some conglomerate or cemented sandstones, but primarily argillaceous rock types. |
| Krasta Zone | Lower Tertiary | Flysch | Argillaceous rocks, impure sandstones and local breccia. Beds typically <1m thick |
| | Upper Cretaceous | Limestones and other sedimentary units including sandstones and conglomerates<br>Flysch | Argillaceous rocks, impure sandstones |
| Mirdita Zone | Upper Cretaceous | Neritic Limestone | Up to 150m thick |
| | Jurassic | Younger Upper Jurassic sedimentary series<br>Upper Jurssic gabbro, gabbro-norite and plagio-grantic rocks<br>Lower Jurassic ultra-basic and ultra-mafic rocks | Sandstone and marl units each 10m-50m thick<br>Iherzolite types in the west<br><br>Harzburgite types in the east |
| | Lower Lias to Upper Triassic | Neritic Limestones | |
| | Lower to Middle Triassic | Volcano-sedimentary Series | 'Hanbulog' nodular limestone series |

### 3.1.3 Structure

The Krasta Zone is very complicated with the presence of over thrusts, tectonic windows and nappes. On the western flanks of the zone are steep mountain fronts that for the study area have relief ranging from 10 m AOD on the plains up to 500 m AOD within the 10 km wide zone. Cretaceous carbonate rocks are primarily present on these western slopes with younger Eocene flysch deposits on the gentler eastern flanks of the zone.

Initially, the Jurassic and older rocks of the Mirdita Zone were uplifted during the Cretaceous and the associated folding was completed by the end of the Maastrichtian. However, subsequent powerful earth movements at the end of the Eocene (Lower Tertiary) caused the over thrusting of the Krasta Zone. This caused the Mirdita Zone to generally move towards the Krasta Zone. Structures are typically oriented north-northwest to south-southeast.

Normal faulting is dominant and has been developed further by neotectonic activity through the Upper Tertiary and Quaternary, which has formed horst / graben structures.

The ophiolites in this region have been recorded as up to 14 km thick

### 3.1.4 Seismicity

Albania is affected by intense microseismic activity and small-scale earthquakes are quite common. Larger magnitude earthquakes are relatively rare although they do occur.

Over the past 2,200 years Albania has had 15 recorded major earthquakes. Some 55 relatively severe earthquakes have been recorded. The majority of these high intensity earthquakes in the study area have taken place close to the western boundary of the Krasta Zone, where there is reaction between the Adria microplate and the Albanian orogen. Foci are concentrated along active faults and fault zones.

Of particular note in the study area were the Shkodar earthquake of 1 June 1905 where 200 people were killed and 500 injured, with over 1,500 homes ruined (Kociaj & Sulstrarova 1980), and the Durres earthquake of 17 December 1926 where many homes were destroyed in Durres and the surrounding area[1].

The maximum magnitude (Richter Scale Magnitudes) of any expected earthquake should be in the order of 5.5 to 7.5 M in the Krasta Zone. A map of the seismogenic zones of Albania is provided in Appendix 13, Figure 1.3. This area is a magnitude-8 zone according to the Mercalli Scale (Seismic Map Issued by Ministerial council No. 371 date 20.12.1979).

### 3.1.5 Slope Stability

The relative relief is often in excess of 500 m with major river valleys developed that are antecedent to the geological structure in the east / west valleys with a north northwest / south southwest structural trend.

Cretaceous rocks are quite obvious on the western part of this zone, and being calcareous dominant are often white / light grey in colour and with rather limited vegetation. The natural slopes and particularly rock cuttings are susceptible to rock fall and even rockslides locally. Much of this instability is possible caused by the ongoing

[1] UNDP (2003) Disaster Risk Assessment in Albania, Executive summary Report.

marginal river erosion and the seismic activity in this area.

On the eastern flanks are the more argillaceous flysch deposits. Quite complex fold structures are often exposed in failure scars or river valley sides where soil development has been limited. Major instability is however, rather limited outside engineered cuttings. Erosion in gullies is the more dominant mass wasting process. Sub-grade conditions are likely to be quite poor and variable in the Krasta Zone flysch.

The route passes through the Krasta Zone within the Matit River valley, close to the northern edge of the river. Indeed the road ranges from about 10 m to locally 50 m above the valley bottom through this zone. It is clear that the river is associated with major low frequency high magnitude flow event; probably in response to winter snow melts. The channel is up to 500 m wide and is full of thick (estimated 40 m) sand, gravel, cobbles and boulders. During the reconnaissance the river was braided and broadly meandering. There was extensive aggregate extraction taking place, with local processing plants on the alluvial plains to the west of locally in towns in the Matit River valley. The channel is probably highly unstable and local undermining of the existing road support slope / embankment was observed which could have a significant risk to long-term safety if not protected in vulnerable locations.

The predominately basic and ultra basic country rocks that form the Jurassic ophiolites and harzburgites of the Mirdita Zone are highly susceptible to weathering, debris slides and gully erosion. These significant hazards are promoted by the active incision occurring in the river valleys, and rainfall and snowfall events on the valley side slopes.

The existing road is mainly along the lower valley side slopes of the lower Fani and Matit Rivers. These rivers have a significant influence on the geomorphological hazards that affect the road alignment. Side slopes are generally steep (>35 degrees), so that cuts are required up to 10 m high in the valley side spurs. These are locally affected by instability that can cause larger debris slides from the slopes above the cuttings. Also stream channels have to be crossed at regular intervals in small bridges or culverts. In addition there is the threat of the river eroding and undermining the road side slopes.

## 3.2 Soils

### 3.2.1 Natural Soils and Agricultural Soils

The majority of the roads in the higher topography (where slopes are generally relatively steep to very steep) have thin, poorly developed soil horizons. The thickness of the soil horizon in these areas varies from about 1 metre to as little as five centimetres. In areas of fracturing where weathering has taken place to significant depths there can be localised development of soil to depths of more than 3 metres – but these are limited in extent.

Soils in the high mountains are generally not well developed and often would be more accurately defined as a well weathered bedrock material, rather than a developed soil. In many places soils are entirely absent and bedrock is exposed at the surface.

Soils suitable for use for agriculture are extremely limited on all the routes. Areas which have important agricultural soils are the low lying flood plains in the Matit and Fani River Valleys. These valley soils can be very limited in area (individual fields are frequently less than 0.2 ha in area, and even larger areas of flatter land are often less than 2 ha in area).

### 3.2.2 Contaminated Land

The method of assessment used was the hazard-pathway-receptor methodology, which is used to identify significant pollutant linkages. The following definitions apply:

- Hazard: source of contamination
- Pathway: the means by which the hazardous contamination can come into contact with the receptor; and
- Receptor: the entity which is vulnerable to harm from the hazard.

Potential areas of contamination identified during field visits are located as follows:

Rubik (on the left bank, opposite the Byzantine Church is an area of abandoned industrial workings which might be contaminated).

Rubik (there is a copper mine well away from the alignment of the road (on the opposite side of the river at 29 km); but there could be associated spoil dumps along the road in the area that were not detected during field surveys)

Milot (petrol station on the left bank which might be contaminated)

Milot (industrial workings, including a bitumen factory, adjacent to the railway on the line of the proposed route which might be contaminated)

The land (soil) in the vicinity of the abandoned mines is likely to be contaminated to varying degrees. These contaminated sites are limited in extent but are likely to be severe where they do exist. Dust blows from the infrastructure of the abandoned mines – this dust will also contain contamination to varying levels.

Heavy metals have been detected in a very limited survey of soils around Rubik copper mine as follows[1]:

- Copper 1,696 mg/kg, chromium 492 mg/kg and lead of 99 mg/kg.

The New Dutch List[2] has action levels at which remediation is recommended be implemented as follows:

- Copper 190 mg/kg, chromium 380 mg/kg and lead 530 mg/kg.

This confirms that soils in the proximity of the old mines are likely to be severely contaminated with heavy metals. Other contaminants associated with the industrial workings may include asbestos from buildings, hydrocarbons, and organic compounds such as solvents and PCBs (from electrical transformers). The hazard ranking for these sections of route is high.

The contaminated run-off will clearly affect surface waters, but could also be affecting groundwater. This is not an issue for this project to address, however, the implications should be considered when producing the detailed design for the scheme and seeking water sources for construction near to these contaminated sites.

## 3.3 Air Quality and Noise

### 3.3.1 Air Quality

There is no air quality information available which is specific to the proposed route. As the proposed alignment is currently subject to air quality impacts from the existing road, the default UK air quality background levels for roads have been used.

The effect of topography is unlikely to be a significant issue in predicting pollutant concentrations along the route. Emissions from road vehicles decrease with distance from the road. Beyond approximately 200m, pollution levels are likely to have fallen to background levels.

Pollutants from cars emitted to atmosphere are:

- Carbon dioxide ($CO_2$)
- Carbon monoxide (CO)
- Hydrocarbons
- Oxides of nitrogen and sulphur ($NO_x$ and $SO_x$)

[1] UNEP Balkans Post-Conflict Environmental Assessment, Analytical Results of UNEP Field Samples from Industrial Hot Spots. 2000.

[2] The Ministry of Housing, Spatial Planning and Environment, Netherlands

- Particulates (exceptionally small solid matter – the reference size is PM10 which are particles less than 10 microns in diameter)

The pollutants with an impact on human health are $NO_x$, hydrocarbons (through photochemical reactions producing toxic chemicals as by-products), $PM_{10}$ particles which penetrate lung tissue and cause lung problems, CO which makes people drowsy and can lead to death in extreme concentrations due to a reduction in the ability to absorb oxygen in the lungs (never found in an open atmosphere such as a road).

Default background air quality concentrations for the indicators listed above are provided in the DMRB[1] for the UK as:

- Carbon monoxide 0.2 ppm (equivalent to $mg/m^3$)
- Oxides of nitrogen 20 ppb (equivalent to $\mu g/m^3$)
- $PM_{10}$ 20 $\mu g/m^3$

As stated above, these figures are for the UK, which is very much more heavily populated with vehicles and industry than the routes in Albania. However, the vehicles in the UK are regulated far more stringently than in Albania and the efficiency of motors is much greater. Thus the unit emissions from cars are much lower in the UK than in Albania. Nevertheless, it is to be expected that concentrations of these parameters along the three Alternative scenarios would be significantly lower than the levels quoted for the UK due to the much lower traffic volumes on these routes.

### 3.3.2 Noise

Point of Reference noise levels (measured in dBA or decibels) are provided below for normal activities[2].

- 0 - the softest sound a person can hear with normal hearing
- 10 normal breathing
- 20 whispering at 150 cm
- 30 soft whisper
- 50 rainfall
- 60 normal conversation

[1] The Department of Transport, Design Manual for Roads and Bridges, Volume 11, Section 3 Part 1: Air Quality. May 1999.

[2] http://www.lhh.org/noise/decibel.htm - as of 6 May 2003

- 110 shouting in ear
- 120 thunder

Noise levels related to traffic activity are provided below:

- 40 quiet residential area
- 70 freeway traffic
- 85 heavy traffic (equivalent to a noisy restaurant)
- 90 truck, shouted conversation
- 95 - 110 motorcycle
- 110 car horn
- 125 auto stereo (factory installed)
- 143 bicycle horn
- 163 rifle
- 166 handgun
- 170 shotgun

The consultants have not been able to locate ambient noise standards for Albania.

Noise is an unwanted sound. This definition holds within it one of the core aspects of noise impact assessment, it deals with peoples' subjective responses to an objective reality (sound).

The physical level of noise does not directly correspond to the level of annoyance it causes. Noise impact assessment involves the concept of quantifying peoples' personal responses.

Noise is measured as an instant noise, which varies over time, or as an equivalent energy level over a set period that represents the sum of the noise energy measured over the same period average, known as Leq.

A number of factors influence how much effect a sound will have on a potentially affected receptor. These include:

- Geometric dispersion: as one gets further away from a sound source the sound power from the source is spread over a larger and larger area. The rate at which this happens is approximately 3 dB per doubling of distance for very large sound sources such as roads.

- Obstruction to the propagation path from the noise source to the receiver such as a large building or topographic features. The degree of attenuation depends upon the geometry of the obstruction and the frequency characteristics of the sound source.

- The type of ground over which sound is passing can have a substantial influence on the noise level at the receiver eg crops, trees etc

- Meteorological characteristics such as wind speed and direction can affect noise levels
- Ambient or background noise levels

No background noise measurements were made during this study.

Noise levels along the route are generally low and this relates to the current low level of traffic. There are some exceptions occur in some towns where traffic may have been temporarily congested due to poor traffic management. However, in these instances the vehicles are not travelling at speed – the higher the speed of a vehicle the higher the noise levels from the friction of tyres on the road surface. This is one of the prime causes of high road traffic noise and not the noise of engines operating.

No precise measurements are available for the route but there are not anticipated to be any sites where noise levels approach those that present a significant nuisance to local residents, or that present any sort of threat to health.

Road noise is often assumed to be relatively constant, but this is not true of the traffic levels along the existing roads along the existing road as in most localities as the density is not high enough to generate constant levels of noise.

## 3.4 Climate

The project area has a typical Mediterranean climate: hot dry summers and cold wet winters. The extreme variation in elevation means that the climatic changes across the project area are also extreme.

### 3.4.1 Snowfall

Most of the western portion of the project area experiences little snow each year. However, the rest of the project area (especially the central highland massifs around which the route skirts) has average annual snowfall depths between 26cm and 100cm.

Snow falls generally between November and March, although snow falls on the higher elevations frequently occur earlier and later than these months. Some areas of the mountains retain their snow almost all year round – particularly on north facing high elevation slopes.

The main snow melt occurs in springs – bringing with it the highest river flows and flood risks.

### 3.4.2 Temperature

Temperature ranges for Lezhe (on the coastal plain between Alternates 1 and 2); and Kukes are represented below[1].

**Figure 3.1: Daily Temperature Data, Kukes**

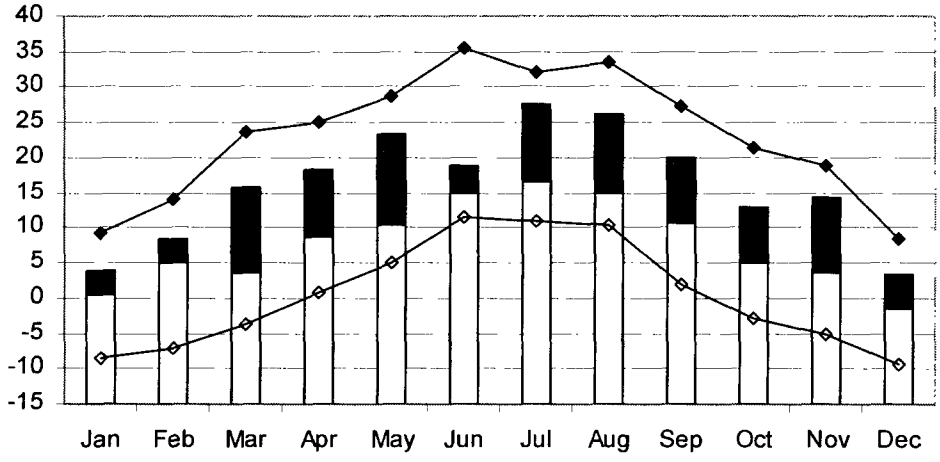
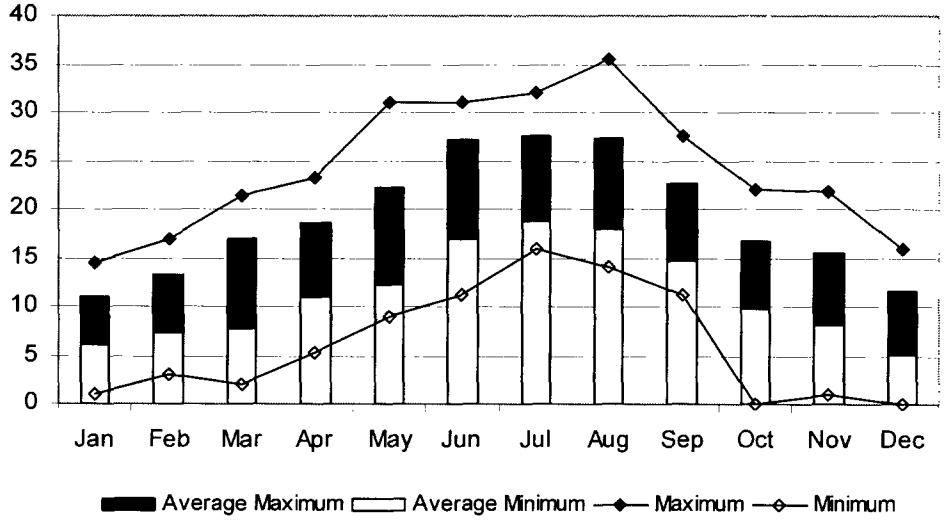



**Figure 3.**




### 3.4.3 Wind

Wind roses for the project area indicate that at Kukes the wind is predominantly from the north/north east or from the south/south westerly or the west. This is quite different from Peshkopi (south of the project area) where wind direction is predominantly in an east/west orientation and in Tirana where wind is predominantly in a north west/south

[1] "Studim Elementive Klimatik", Qarku Kukes. Organizata Kukes Energy. Undated (but in 1990's).

easterly direction. It is possible that these wind directions are affected by topography in the mountainous areas. Certainly for most of southern Albania the predominant wind directions are northwest to south easterly. On the western borders with Kosovo and Macedonia the prevailing directions tend to move to become north/south orientations.

Thus it is anticipated that along the 3 Alternatives the prevailing direction of wind in the western portion will be north westerly to south easterly. Towards the eastern part of the project area the prevailing directions will tend to become more north/south orientated, but that at all locations the topography may have the most significant impact on wind direction[1].

### 3.4.4 Rainfall

Annual average rainfall data for area ranges from less than 1,600mm on the coastal plain to over 3,000 mm on the highest peaks to a low around Kukes of about 1,100mm. The Kukes plain may be in the rain shadow of the mountains to the east. As mentioned above most rain falls as winter rain, but summer storms are also common in the mountain areas. The summer storms will create rapid runoff and may generate flash floods in the streams and rivers in the mountain areas.

Table 3.3 below provides an indication of the rainfall depths for various return period events and storm durations. This shows that Kukes area receives much lower rainfall than Pukes or at any of the monitoring stations on the coastal plain for the various return period events. This confirms the rain shadow impact of the mountains around Kukes.

**Table 3.2: Rainfall Depth/Duration/Frequency Curves[2]**

| | Storm duration | Annual probability of occurrence (%) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 5 | 10 | 20 | 50 | 75 | 90 | 95 | 99 |
| | | Return period (years) | | | | | | | | | |
| | | 100 | 50 | 20 | 10 | 5 | 2 | 1.33 | 1.11 | 1.05 | 1.01 |
| Kukes | 15 min | 31 | 28 | 23 | 20 | 16 | 12 | 10 | 8 | 7 | 5 |
| | 30 min | 47 | 42 | 34 | 30 | 25 | 18 | 15 | 12 | 10 | 7 |
| | 1 hr | 62 | 55 | 45 | 39 | 32 | 24 | 20 | 16 | 13 | 9 |
| | 2 hr | 78 | 69 | 57 | 49 | 41 | 30 | 25 | 20 | 16 | 12 |
| | 3 hr | 87 | 77 | 64 | 55 | 45 | 33 | 29 | 22 | 18 | 13 |
| | 4 hr | 96 | 85 | 70 | 60 | 50 | 36 | 31 | 24 | 20 | 14 |
| | 6 hr | 102 | 91 | 75 | 64 | 53 | 39 | 33 | 26 | 21 | 15 |
| | 12 hr | 114 | 101 | 83 | 72 | 59 | 43 | 37 | 29 | 24 | 17 |
| Durres | 15 min | 44 | 39 | 32 | 28 | 22 | 15 | 13 | 11 | 9 | 7 |
| | 30 min | 71 | 63 | 51 | 43 | 36 | 24 | 21 | 17 | 15 | 12 |
| | 1 hr | 98 | 86 | 71 | 60 | 49 | 33 | 28 | 24 | 21 | 17 |
| | 2 hr | 125 | 110 | 90 | 76 | 63 | 43 | 36 | 30 | 25 | 21 |
| | 3 hr | 135 | 119 | 97 | 82 | 68 | 46 | 39 | 32 | 28 | 23 |
| | 4 hr | 151 | 125 | 107 | 93 | 77 | 53 | 40 | 32 | 28 | 23 |

[1] "Studim Elementeve Klimatik", Qarku Kukes. Organizata Kukes Energy. Undated but in the 1990's.

[2] "Hydrology of Albania", Academy of Science, 1984

| | Storm duration | Annual probability of occurrence (%) 1 | 2 | 5 | 10 | 20 | 50 | 75 | 90 | 95 | 99 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Return period (years) 100 | 50 | 20 | 10 | 5 | 2 | 1.33 | 1.11 | 1.05 | 1.01 |
| | 6 hr | 154 | 136 | 111 | 94 | 77 | 52 | 45 | 37 | 32 | 26 |
| | 12 hr | 180 | 167 | 147 | 131 | 106 | 72 | 56 | 48 | 44 | 42 |
| Tirane | 15 min | 32 | 29 | 25 | 22 | 19 | 14 | 11 | 8 | 6 | 3 |
| | 30 min | 51 | 45 | 37 | 31 | 25 | 17 | 15 | 12 | 11 | 9 |
| | 1 hr | 120 | 110 | 90 | 73 | 60 | 40 | 35 | 30 | 25 | 20 |
| | 2 hr | 215 | 200 | 170 | 150 | 130 | 100 | 76 | 51 | 40 | 30 |
| | 3 hr | 220 | 200 | 180 | 170 | 130 | 100 | 75 | 50 | 40 | 30 |
| | 4 hr | 250 | 210 | 155 | 120 | 100 | 50 | 40 | 30 | 30 | 30 |
| | 6 hr | 260 | 240 | 210 | 180 | 150 | 100 | 70 | 54 | 50 | 40 |
| | 12 hr | 260 | 220 | 170 | 140 | 100 | 60 | 50 | 40 | 40 | 35 |
| Puke | 15 min | 29 | 26 | 23 | 20 | 17 | 13 | 11 | 9 | 8 | 7 |
| | 30 min | 50 | 46 | 39 | 34 | 29 | 21 | 16 | 12 | 10 | 8 |
| | 1 hr | 83 | 76 | 65 | 55 | 45 | 30 | 21 | 16 | 13 | 10 |
| | 2 hr | 95 | 82 | 63 | 51 | 35 | 26 | 20 | 15 | 14 | 11 |
| | 3 hr | 120 | 103 | 79 | 64 | 44 | 32 | 25 | 19 | 18 | 14 |
| | 4 hr | 132 | 113 | 87 | 70 | 49 | 36 | 28 | 21 | 20 | 16 |
| | 6 hr | 156 | 134 | 103 | 83 | 58 | 42 | 33 | 25 | 23 | 19 |
| | 12 hr | 197 | 176 | 148 | 126 | 105 | 73 | 57 | 49 | 46 | 43 |
| Shkoder | 15 min | 55 | 50 | 42 | 36 | 30 | 20 | 13 | 9 | 7 | 4 |
| | 30 min | 91 | 82 | 70 | 56 | 45 | 28 | 19 | 13 | 11 | 8 |
| | 1 hr | 135 | 122 | 103 | 86 | 62 | 35 | 21 | 14 | 12 | 10 |
| | 2 hr | 177 | 160 | 137 | 116 | 80 | 50 | 33 | 25 | 23 | 21 |
| | 3 hr | 225 | 198 | 162 | 134 | 105 | 62 | 40 | 28 | 23 | 18 |
| | 4 hr | 251 | 221 | 181 | 151 | 119 | 75 | 52 | 40 | 36 | 31 |
| | 6 hr | 259 | 234 | 200 | 171 | 141 | 96 | 68 | 52 | 43 | 33 |
| | 12 hr | 298 | 270 | 230 | 199 | 162 | 105 | 76 | 58 | 52 | 44 |

The following figures, Figure 3.5 and Figure 2.6, are plots of the data shown in the preceding table for Kukes and Puke.

**Figure 3.3: Rainfall Depth/Return Period/Duration Curves – Kukes**

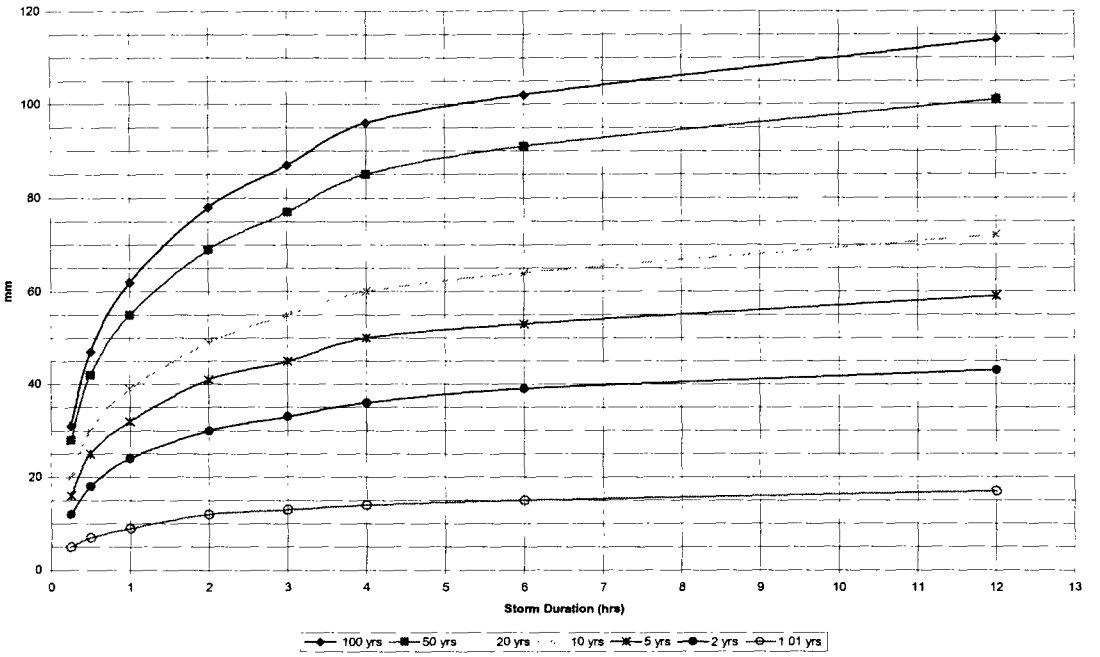
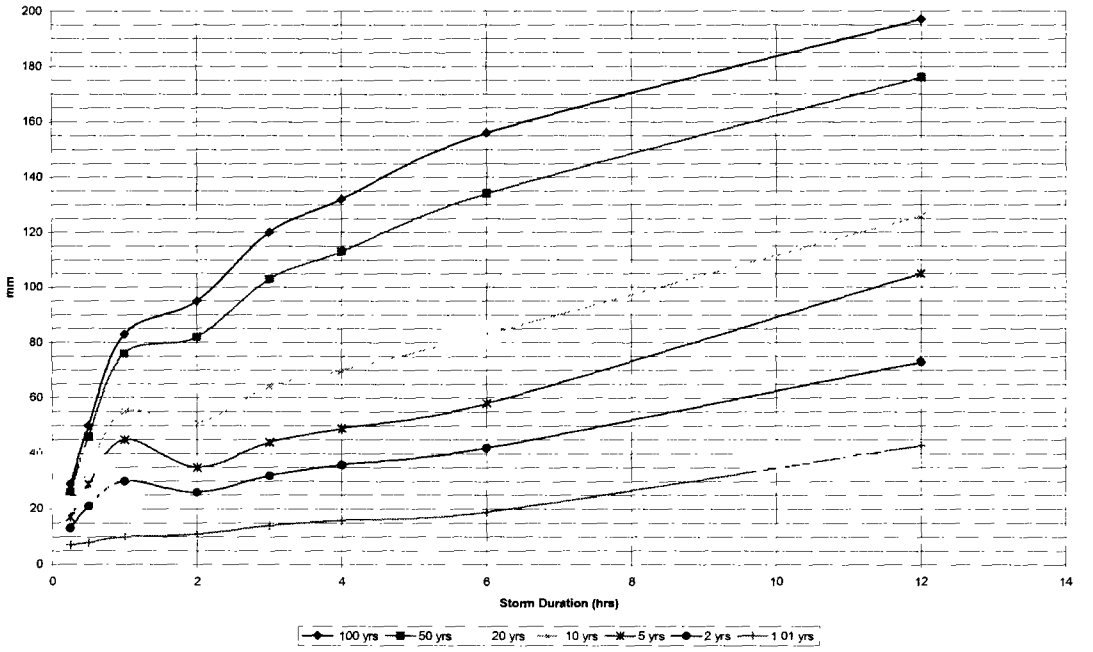



**Figure 3.4: Rainfall Depth/Return Period/Duration Curves - Puke**



### 3.5.1 Surface Water

The project area is drained by the Fani major river system. The Fani River rises in central Albania as the Fani i Madh (Big) and the Fani i Vogel (Small) which join to form the Fani River just west of Rreshen. The Fanit River then flows westerly and then southerly through Rubik. South of Rubik it joins the Matit River and is then called the Matit River as it flows westwards through Milot. In the lower reaches (from Rreshen) the river steadily increases in width as the gradient decreases and it is over 1,300 m wide at Milot (78.5 km). The flow in the lower reaches does not fill the entire river floor except at times of high flows generally in spring when snow melt occurs rapidly in the mountain areas. The floor of the river is a gravel bed with few areas of silt, which reflects the rapid flow velocities that occur.

Rivers and tributary generally have steep gradients, leading to high flow rates and sediment loads in rivers. As a result, riverbeds are rocky with little sediment overburden, giving good foundations for bridge piers. This is supported by observation: there is little evidence of scour around existing bridge piers and no evidence of damage.

Watercourses are deeply incised, inevitably resulting in road levels significantly higher than the streambed. Bridges and culverts have sufficient hydraulic capacity as a matter of course.

Erosion is evident along riverbanks which are frequently steep or vertical, particularly along the Fani River below Rreshen where undercutting makes some sections of road potentially very dangerous.

It is recommended that surface water sampling is carried out as part of the monitoring programme and prior to the commencement of construction, to ascertain the baseline conditions. The baseline conditions should be established in case a pollution incident happens during the construction phase that is detrimental to the water resources and environmentally sensitive receptors. Recent monitoring/baseline data would help establish the likelihood of a link between pollution incident and the construction works.

The samples should be taken by a technically competent person and analysed at an UCAS accredited laboratory and should include in situ measurements of pH, dissolved oxygen, temperature, turbidity and electrical conductivity.

### 3.5.2 Groundwater

The geology of the area creates three distinctive groundwater systems, which are:

- Recent formations with high porosity and permeability (gravels in valley floors)
- Karstic hard rock formations with high yields where springs or boreholes intersect karstified layers

- Bedrock formations with poor fracture permeability and low yields.

The Recent formations (alluvium and colluvium) provide high yielding aquifers in the valley floors. This occurs as follows

- in the lower Fani/Matit valley from Milot to Rreshen (alluvium in the valley floor)

Aquifers in the Recent formations will be limited in extent laterally away from the centre line of each valley, due to the hard rock formations outcropping the valley sides. The extent of the aquifers up and down the river valleys will depend on the nature of the bedrock surface. In places bedrock is exposed at the surface, and where this occurs aquifer connectivity is disrupted. As such Recent aquifers are limited in extent and not continuous.

An assessment of the quality of the aquifers has not been feasible in this study. The depth to groundwater will generally be small (from less than 1 metre to a few metres). These aquifers are vulnerable to contamination from surface sources. Therefore, the quality will be good as long as mine drainage, runoff from contaminated mine workings and waste dumps (including domestic waste dumps on the outskirts of towns) and sewage has not contaminated the aquifer.

The main karstic formations will be the dolomite of the Krasta Zone. These could provide significant quantities of water from boreholes drilled into karstic formations. Karstic formations develop in rocks that can be dissolved by water as the water moves through small fractures. Over time significant karstic features develop along the original fracture lines – storage and transmitting very significant amounts of water. Karstic formations are only found in the dolomitic formations. The most significant area of exposed dolomite is at Fangu (about 69 km).

It is worth noting that the larger springs in the region that flow in excess of 1,000 l/s are often associated with fault zones along the boundary of dolomitic formations. The depth to groundwater in karstic formations can be very variable, and it is possible to have flowing artesian conditions – although this is not reported to be the case in the study area. Recharge to the karst formations is estimated to be between 650mm and 1000mm per year.

The Ophiolites (gabbros, hartzburgites etc) and Flysch deposits will be generally impermeable and produce low yielding aquifers. The mechanism of groundwater flow in the Ophiolites will be almost entirely fracture flow (ie. through secondary permeability). The formations themselves are not readily dissolved by water moving through them, so fractures will not be enlarged over time. As a result the Ophiolite units will have limited aquifer zones and will generally yield low quantities of water. If the rainfall moves from a high topographic elevation into the rock and then to the surface (as springs or "Burim") relatively quickly the water will normally be palatable. There are a number of springs that are located along the edge of the existing carriageways as shown in the following table. Some of the springs listed as Alternative 1 or 2 are common to the three Alternatives.

**Table 3.3: Spring Locations and Approximate Flows[1]**

| Alternative | Approximate Chainage (km) | Approximate flow (l/s) |
|---|---|---|
| 1 | 10.5 | 100-1000 |
| | 21.5 | 0-1 |
| | 36.25 | 0-1 |
| | 36.5 | 0-1 |
| | 45.25 | 0-1 |
| | 47.4 | 0-1 |
| | Approx. 70 | 1-10 |
| | 76.2 | 0-1 |
| | 85.9 | 1-10 |
| | 95.4 | 0-1 |
| | 106.7 | 0-1 |
| | 115.4 | 0-1 |
| | 132.9 | 0-1 |
| | 139.8 | 0-1 |
| | 140.5 | 1-10 |
| | 144.7 - 145.5 | 1-10 |
| | 151.25 | 1-10 |
| | 152.3 | 1-10 |
| | 157.3 | 1-10 |
| 2 | 67.3 | 1-10 |
| | 28.6 | 0-1 |
| | 19.5 - 21.4 | 0-1 |
| | 9.6 | 10-100 |
| | 1.2 | 0-1 |
| 3a | 6.25 | 0-1 |
| | 18.5 | 10-100 |
| | 26.9 | 0-1 |
| | 36.4 | 1-10 |
| | 3.1, north of tunnel | 0-1 |

In some areas of significant faulting there might be fracture zones that will permit the deep movement of groundwater and it is possible that such groundwater could be discharged as heavily mineralised (normally hyperalkaline, and sometimes hot water) springs.

[1] "Harte Hidrogjeologjike e RPS te Shqiperise", Ministerie e Industrise dhe e Minierave

This is commonly found in such geology in other parts of the world (e.g. Sultanate of Oman). Such springs can be very important sources of irrigation and drinking water in areas where water resources are scarce. However, whilst mineralised springs exist in the Fani and Drini catchments none are within 1 kilometre of any of the three Alternatives.

It is recommended that groundwater sampling is carried out to ascertain the baseline conditions. This should be carried out a part of the monitoring programme, but prior to the commencement of construction. The baseline conditions should be established in case a pollution incident occurs during the construction phase that is detrimental to the water resources and environmentally sensitive receptors. Recent monitoring data it required to establish a link between the pollution incident and the construction works.

Groundwater sampling should be carried out at the following areas:

- At least four wells or boreholes (equally spaced along the route if possible) that abstract water from the alluvium and colluvium from the high yielding aquifer in the valley floor.
- At spring locations at approximate chainage 10.5 km.

The groundwater sampling should take in situ measurements of pH, dissolved oxygen, temperature, turbidity and electrical conductivity. The groundwater water samples taken should be of a sufficient amount to analyses for major cations and anions, BOD, COD, heavy metals, BTEX, VOCs and TPH.

The samples should be taken by a technically able person and analysed at an UCAS accredited laboratory.

## 3.6 Fauna and Flora

There are no major protected areas directly affected by the route. However, there is the possibility that the Fani i Vogel River valley could be the focus of conservation efforts in the future[1].

### 3.6.1 Fauna

#### (i) Mammals

There is little information available on the distribution and numbers of protected species on the precise route options. The most recent published data on fauna[1] provides

[1] Personal communication with Director of Environmental Impact Assessment, Ministry of Environment.

information in a general sense. This report states that Albania has an important diversity of animals in a European and global sense, with 20 species (or 25%) of the mammals in Albania belonging to the list of globally endangered species. It is estimated that almost half of all mammal species in Albania are now under threat of extinction in the country. This is due to human pressures leading to destruction of habitat, fragmentation of habitat, overgrazing, hunting, illegal forestry and the impoverishment of habitats due to poor management.

Albania has important populations of large mammals including the bear (*Ursus arctos*), the wolf (*Canis Lupus*), the lynx (*Lynx lynx*), the jackal (*Canis aureus*), the chamois (*Rupicapra rupicapra*), roe deer (*Capreolus capreolus*) and wild boar (*Sus scrofa*).

The Albanian statistical yearbook produces some information on populations of mammals[2]. The precision quoted leads one to doubt the accuracy of the data presented (it is not possible to know precisely how many foxes or rabbits live in Albania). However, it is known that by 1998 in the mountains of Albania wolves had increased from around 400 to an estimated total of around 2,500 while there are an estimated 600 bears. However, the yearbook also quotes substantial decreases in the population of some species (e.g. around 600 wolf and 13,000 fox) between 1998 and 1999. The information therefore presents information that is difficult to rely on totally. If the decreases quoted from 1998 to 1999 is correct then some species are being decimated. A wolf was seen crossing the road near Milot by members of the team on 6 February 2003.

### (ii) Fish

Most fishing in Albania is not controlled, leading to degradation of fishing stocks through inappropriate fishing (eg. during breeding seasons) and over fishing. Most inland fishing is carried out on the lakes (natural and the hydroelectric power lakes). Fish in these lakes include carp, trout and eel. The spotted lake trout and carp are in particular danger of over fishing and attempts to improve levels of stock by seeding lakes with spawn were not proving very successful in 1998[3].

The presence of migratory salmonids (especially), resident salmonids and cyprinids in the rivers of the region will be dictated by the degree of pollution at the most downstream reaches and also the barriers caused by dams. The collapse of the mining industry has resulted in many of the mines on the route options being abandoned, with no management of tailings and the runoff from the obviously badly contaminated factory/smelter sites. This runoff does enter the rivers and affects the ecology of the

[1] State of the Environment Report 1997-1998, National Environmental Agency, Tirana.

[2] The Albanian Statistical Yearbook, 1991-1999, Instat, Tirana.

[3] State of Environment Report 1997-1998, National Environmental Agency, Tirana.

rivers in a significant manner. Therefore, whilst it might be anticipated that mammals such as otters could be found in the rivers it is likely that their presence will have been affected by the pollution arising from these abandoned mining sites.

### (iii) Birds

There are about 330 recorded species of bird in Albania. The record of species is not complete due to the lack of competent observers in the country. However, it is noted that there has been a significant reduction in the number of nesting birds and in the number of over-wintering species. Certainly during this study it was notable that the number of birds (in total numbers) and the range of species observed was very limited and much lower than expected for the diversity of habitats traversed.

Albania provides habitats for 120 species that are classified as being vulnerable in Europe. Among these are Redbeak Gull, Bearded Vulture, Imperial Eagle and the White-tailed Owl. Golden eagle, ravens and other raptors are well recorded in the mountains. Birds are particularly vulnerable to loss of habitats as this can affect their breeding locations, their feeding areas and their over-wintering areas (all of which can be different).

Bird species identified along the three Alternatives in April 2003 included:

- Heron, *Ardea cinera*
- Kestrel (male displaying to female near Kukes), *Falco tinnunculus*
- Rock Partridge, *Alectoris graeca*
- Collared Dove, *Streptopelia decaocto*
- Hoopoe, *Upupa epops*
- House martin, *Delichon urbica*
- Pied wagtail, *Motacilla alba yarrellii*
- Magpie, *Pica pica*
- Hooded crow, *Corvus corone cornix*
- Raven, *Corvus corax*
- Wren, *Troglodytes troglodytes*
- Blackcap, *Sylvia atricapilla*
- Black Redstart, *Phoenicurus ochrurus*
- Wheatear, *Oenanthe oenanthe*
- Robin, *Erithacus rubecula*
- Blackbird, *Turdus merula*
- Blue tit, *Parus caerulus*

- Great tit, *Parus major*
- House sparrow, *Passer domesticus*
- Chaffinch, *Fringilla coelebs*
- Goldfinch, *Carduelis carduelis*
- Feral Pigeon, *Columba sp*

### 3.6.2 Flora

Albania is suffering very high levels of degradation of flora, with some species being driven to extinction through uncontrolled logging and the collection of medicinal herbs. This is reported to have been especially severe since the collapse of the communist regime. Low oak is a species reported to be at risk and this species is observed over most of the route.

There are four main natural vegetation zones in Albania (labelled for ease of reference Zones 1 to 4):

- Zone 1: a coastal belt of maquis and agricultural land;
- Zone 2: a broad Mediterranean deciduous forest zone;
- Zone 3: central European montane forest
- Zone 4: a subalpine and alpine zone.

Alternatives 1 & 2 and Alternative 3 (Milot to Blinisht & Thirra to Morine) cross through Zones 1, 2 and 3 between the coastal plain and the Kosovo border.

Between Milot and Rreshen in the valleys of the River Fani (54km) and River Matit (79km) the main vegetation is comprised of oak pines, forsythia, juniper. Compared to the vegetation beyond Rreshen the oaks are no longer found to the same degree and the heather *Erica arborea* is more common. The valley sides contain typical maquis vegetation. The shrub layer includes tree heather, *Erica arborea* on the lowest slopes, box, *Buxus sempervirens,* strawberry tree, *Arbutus unedo* and juniper, *Juniperus communis. Prunus sp* and *Salix sp* are found in many of the cultivated areas, the latter often near streams and rivers.

## 3.7 Landscape

The 26km section commences at Milot and the route runs to the side of the Matit and then the Fani Rivers up and until Rreshen. This valley is picturesque and the small town of Rubik has a very attractive Byzantine church located high above the river and town. The route provides very scenic vistas, which contributes to a good journey ambience for travellers. The landscape around the towns has been degraded by poor waste management, illegal dumping of waste at the roadside, and the deterioration of the

mining industry. The baseline landscape is considered in terms of Landscape Resources and Visual Receptors.

### 3.7.1 Landscape Resources

Albania does not yet have designated areas of landscape or townscape value. Table 3.7.1 provides a brief description of the Landscape Character Areas (a geographical area...with a distinct pattern of combination of elements that occur consistently[1]) identified within the vicinity of the route. The main settlements are Milot, Rubik and Rreshen (not immediately on the route but adjacent to the route). There are numerous minor settlements along the Matit River and Fani River valleys and in places these link together as pastoral settlements

**Table 3.7.1 Landscape Character Areas**

| Landscape Character Area | Brief Description | Sensitivity |
|---|---|---|
| Fushe-Miloti River Terrace | Agricultural land and orchards | Low |
| Milot | Residential and commercial properties. Industrial works. | Medium |
| Rubik | Residential and commercial properties, disused copper mines and associated works. Attractive Byzantine church. | Medium |
| Minor settlements along the Matit River and Fani River valleys | Small settlements and scattered dwellings. Mainly single and two-storey residential buildings. Scenic vistas. | High |

### 3.7.2 Visual Receptors

Table 3.7.2 identifies the individual receptors, for whom views of the proposed road may be possible, and allocates them to receptor groups according to their sensitivity. Those receptors located at some distance from the route are considered to be of lower sensitivity than those adjacent to the alignment.

**Table 3.7.2 Visual Receptors**

| Visual Receptor | Sensitivity |
|---|---|

[1] Guidelines for Landscape and Visual Assessment 1st edition (1995), (edited by Scott Wilson) and 2nd edition (2002) The Landscape Institute and the Institute of Environmental Management and Assessment

| | |
|---|---|
| Residents of Milot | Medium |
| Residents of small settlements and scattered dwellings | High |
| Residents of Rubik | Medium |
| Visitors to Rubik Church | High |
| Road users on opposite bank of the River Matit | Low |

## 3.8 Land Use

The main economic activity in the region is agriculture, with many individual families or small communities entirely dependent on agriculture for their livelihood. In relatively flat areas (Matit and Fani River Valleys) the land use is usually used as arable fields, grape vines and hay meadows.

There is residential and commercial land use in the main towns (Milot, Rubik and Rreshen) and scattered settlements along the route. There are also active and redundant industrial areas in Rubik and Milot.

Much of the remaining land could be classified as wilderness areas (i.e. natural vegetation on steep sided mountains and hills). The wilderness areas are used for forestry and grazing by roaming livestock, where the topography allows animals to move.

## 3.9 Socio-Economics[1]

### 3.9.1 Introduction

This following is an extract from the World Bank report "Albania – Filling the Vulnerability Gap"[2], it is provided in full as it clearly states the position of the country in terms of basic infrastructure.

> *"The country's level of economic development and its physical and social infrastructure are akin to those of the poorest and least-developed areas in Africa and Latin America. This condition not only classifies Albania as the most backward country in Europe in relative and absolute terms, but it highlights the enormous development gap*

[1] Data taken largely from "The Population in Albania 2001" published by Instat.

[2] World Bank Technical Paper No 460. Albania – Filling the Vulnerability Gap. Gloria La Cava, Rafaella Y. Nanetti, 2000.

*that separates it from the rest of Europe, particularly the European Union, which Albania aspires to join.*

*It is perhaps the countries physical infrastructure that most vividly conveys to the observer the anomaly of this country, so centrally positioned in southern Europe. The road system is suitable only for a pre-industrial country, except in the capital city of Tirana and its surroundings.*

*Other essential infrastructure systems and the services dependant on them are equally minimal: from water supply, power and transportation lines, to telephone and communication systems, to airports and port facilities".*

### 3.9.2 Population

The population in Albania has an average life expectancy of over 70 years – having increased from a life expectancy of 54 years in 1950. The crude increase in population (taken as the net percentage increase in population) is about 1.2%. Oddly, it is reported that over 40% more male babies died than female babies in 2001 and overall 37% more males died than females. This ratio has been preserved generally since 1993 – with a significant increase in reported male deaths (56% more male deaths than females) in 1997[1].

The route passes through the Mirdita District, Lezha Prefecture. Mirdita District has an area of 867 $km^2$. It has five communes, two municipalities and 80 villages. The population is ethnic Albanian and is mostly Catholic (some Muslims, Romas and Evgjits live in Mirdita as well). Since the mines closed the main economic activity has centred on small scale agriculture and forestry. Rreshen is the administrative centre of Mirdita District.[2]

A commune normally is made up of several villages, governed by a chief who is elected for three year terms by the commune residents.

The population of the Mirdita District has fallen in the last 12 years (1983 – 2001 census data) by a very significant 26.5% (from over 50,000 people to less than 38,000). This represents a substantial demographic shift that would have had a significant impact on the socio-economic structure of the district as well.

The main cause of the fall in population will have been the closure of the mines leading to outwards migration as people have moved to find new employment. In addition, after

[1] Instat Statistical Yearbook 1993 - 2001

[2] World Bank Technical Paper No 520 – "Poverty in Albania - A Qualitative Assessment". H. de Soto et al., 2002.

the communist regime fell many Albanians emigrated out of Albania, mainly the young males.

Despite the outward migration of young males, both districts have populations with a significant proportion of young people (children), estimated to be between 31% and 40% of the total population. Mirdita District 21% - 30% of the total population has households with more than 6 residents.

The literacy rate improved dramatically in Albania since 1989. In 2001 less than 2% of the population over 6 years were illiterate in Mirdita District.

### 3.9.3 Employment

Most of the population of Albania is still employed in the agricultural sector (over 50%). In Mirdita District it is estimated that 63% to 78% of the working population is involved in agriculture.

Given that the unemployment rate in the districts is high, between 25% and 34% of the economically active population was unemployed at the time of the census in 2001, which implies that there are few people working outside of the agricultural sector.

The decline in the mining industry has been the main cause of the unemployment according to interviews with local residents in Rreshen. This is substantiated in the World Bank report on poverty in Albania which states that 38% of the workforce in Rreshen is unemployed, as a result of the closure of the mining industry in the town and the surrounding area.

The agricultural sector has a very low earning potential, with as little as US$16.00 per month. The agricultural sector faces a great many problems in promoting earnings from agriculture.

Not least is the availability of irrigation water, which has been exacerbated by the fragmentation of the farming sector by government led agricultural reform programmes in the 1990s, which has lead to smaller farms operated by individual land owners. Access to land that is suitable for irrigation is equally problematic, making the fields and hay meadows in the valley floors and on the small piedmont areas of the higher mountains very important.

However, market related problems abound as well. It is understood that access to markets is hampered in many areas by a lack of adequate roads to get products to markets. As a result many of the products are consumed locally, marketing is often done on the side of whatever road system exists. As Tirana and Durres continue to grow, and as the access to this market remains poor the demand for good agricultural produce (vegetables, cereals, fruit and meat) will be high. The key for Albanian agriculture will be to satisfy this demand with local produce and not from imports from Italy and other European nations.

### 3.9.4 Housing

Only 8% of the housing in Albania pre-dates 1945, which make the remaining old houses potentially important cultural heritage items. Of these older buildings the vast majority were built of stone or brick, having one or two floors.

In rural areas, 15% have water supplied inside the house, 43% outside the house, 21% from a well or water tank and 20% do not have a water supply. This is significant along the route as many springs are found and there are significant number of small aqueducts taking water from springs towards habitation and fields.

### 3.9.5 Industries

The route has little significant industrial development although the main towns were based on some type of industrial activity. The main economic activities are:

- small holder (even subsistence level) farming;
- "uncontrolled" forestry; and
- mining (largely abandoned).

## 3.10 National and Cultural Heritage

### 3.10.1 Cultural Heritage and Undiscovered Archaeology

There is the potential to find tumuli, buried artefacts, especially metal, from about 2000 BC. Roman artefacts and evidence of settled communities from about 165 B.C. Byzantine settlements from about 395 A.D and Ottoman settlements from the early 1500's. Although the construction of the existing road will have resulted in some disturbance, the location of the route in the floodplain means the footprint has a high potential for containing buried, and as yet undiscovered, archaeological resources.

### 3.10.2 Built Heritage

A principal item of cultural heritage on the route is the magnificent XII Century Byzantine Church and associated monastery at Rubik, which dates back to 1162. This church is located on a small rocky hill overlooking the town and the Fani River. Rubic church is considered to be one of the most precious monuments in the inventory of Albanian cultural heritage, as it is among the most ancient cultural objects in the Balkans. The church is currently undergoing reconstruction.

There are a number of older houses along the route of the proposed scheme. As only 8% of the housing in Albania pre-dates 1945, the remaining old houses are potentially important cultural heritage items.

Older bridges exist in places and these might need to be preserved, this will require liaison with the relevant authorities in Tirana.

## 3.11 Traffic and Road Safety

### 3.11.1 Traffic

Traffic is composed of three segments of freight and passenger demands and these are:

o Domestic demand

o International demand

o Transit demand

Local demand is formed by the flows generated and attracted and/or from the transport zones internal to Albania. International demand includes the flows generated by internal zones and attracted from foreign countries (exports or outgoing visitors) and by flows generated by foreign countries and attracted by Albania (imports or incoming visitors).

Transit demand consists of flows of freight and passengers generated and attracted by foreign countries that travel through the Albanian network. Different methodologies are used for estimating and projecting the demand segments over the time horizon for this study that is set in 25 years.

Domestic demand generally follows the economic behavior of the transport zones in terms of transport attraction and generation of freight and passengers. Usually domestic demand is related to the GDP and population of each zone. In this case it is assumed an identical GDP development for all internal transport zone. Domestic demand projections are calculated using three relationships according to the three main vehicle types considered:

o Cars

o Bus

o Trucks

The analytical form of these relationships allows establishing the growth factors for the three vehicle classes, once population and GDP are projected.

International demand of freight is related to foreign trade development with existing and potential foreign partners. An analysis of foreign trade has been carried out establishing the global relationship between GDP and merchandise foreign trade. Merchandise foreign trade shares to GDP have been established over time in order to project total imports and exports in value.

Surveys and analyses were made of existing traffic and the forecasts made for future traffic demands for the 'do nothing' and the three Alternatives scenarios using the program 'TransCAD'. Table 3.8 shows the average annual daily traffic (AADT) projected for years 2003, 2009, 2014.

**Table 3.11: Average Annual Daily Traffic (AADT) figures projected for the Milot – Rreshen road link**

| Sect_ID | Scenario | AADT All vehicle modes (Number of Trucks in parenthesis) | | | |
|---|---|---|---|---|---|
| | | 2003 | 2009 | 2014 | 2023 |
| 3421964 | Do Nothing | 1,360 **(99)** | 2,100 (147) | 2,827 (189) | 5,113 (282) |
| 3421964 | Alternative 1 | 1,360 **(99)** | 1,924 (131) | 2,588 (165) | 4,665 (233) |
| 3421964 | Alternative 2 | 1,360 **(99)** | 2,647 (181) | 3,570 (240) | 6,514 (384) |
| 3421964 | Alternative 3 | 1,360 **(99)** | 2,581 (181) | 3,478 (240) | 6,328 (384) |

Table 3.11 shows the current traffic levels and predicted rise in the total number of vehicles along the route without the proposed road.

### 3.11.2 Road Safety

The current traffic demand in Albania follows patterns that the existing infrastructure was never intended to service. Roads and bridges are often too narrow, rough, lack adequate signing and are unsafe.

In 1999, **SweRoad** wrote[1]:

> *'the road network including streets in towns is generally in a bad shape. The roads are too narrow with a rough surface and often lacking road signs and railings. Barriers are often missing or badly damaged. Less than one-third of the roads have asphalt surface and a number of individual roads have deteriorated beyond repair. Many of the rural roads are passable only to four-wheel drive vehicles during the dry season.'*

[1] Albanian National Road Plan, Existing Conditions, SweRoad, 1999

Official fatality rates in Albania are widely estimated to be under-reported and yet are already recognised to be amongst the highest across European countries. The issue of road safety and the need for adequate road maintenance is a significant priority particularly in the light of official statistics which indicate levels of road traffic to be increasing at a rate of over 10% per annum. The economic rationale underlying the project is provided by the fact that traffic accidents cost Albania approximately 1–3 % of its GDP.

A project providing technical assistance to the Directorate of Road Safety and Traffic, has been put in place to address the technical issues of road safety with the aim of reducing the number of traffic accidents. Importantly, the project will address the lack of institutional capacity identified by the Government's own Action Plan for Road Safety, particularly in the implementation of road and vehicle safety legislation.

The Road Safety Project is expected to last for 24 months with the following principal objectives:

- Foster greater awareness of road safety issues at all levels.
- Provide technical assistance and training to the Directorate of Road Safety and Traffic in its role as the co-ordinator of road safety initiatives in Albania.
- Develop institutional capacity within the General Roads Directorate to conduct road safety initiatives and remedial measures.
- Provide technical assistance and training to implementing agencies such as the traffic police, emergency services and the local governing units who have obligations under Albanian law.

Participatory approaches will be fostered and include the formation of local community-based associations to formulate road safety initiatives.

# 4 Environmental Impact Prediction and Effect

## 4.1 Construction Camps, Borrow Pits and Quarries

The most immediate impact will be the construction of camps for workers and batching plants along the route. Potential camp sites together with comments on the key environmental issues that would need addressing at each site are provided in Table 4.1 These are indicative only; the precise sites chosen for construction would require negotiation and agreement with local landowners and authorities.

**Table 4-1 : Possible Construction Camp Locations**

| Construction Camp | Location | Approximate Chainage (km) | Potential Impacts and Issues |
|---|---|---|---|
| From previous draft of EIA | | | |
| C2-7 | Milot | 74.0 | Adjacent to l. Matit – serious flooding risk, pollution control, waste management. Possible flat land used for smallholder crops/livestock pens. |
| C2-5 | Munaza | 60.25 | Adjacent to l. Fanit – flooding, pollution control, waste management. Possible flat land used for smallholder crops/livestock pens. |
| From Geology Report[1] | | | |
| 1 | Skuraj | | Near the village Skuraj |
| 2 | Rubik | | Near the existing road |
| 3 | Rreshen | | Near the town of Rreshen |
| 4 | Ura e Zogut | | Near the town of Ura e Zogut |

Borrow pits will be required to provide fill materials for road bases and are constructed to obtain subsoil or aggregate (from river beds in the project area). The locations of these will depend on the geotechnical properties of the soils and rocks along the routes. The contractor is responsible for deciding which borrow pits to use but the following key impacts are identified with borrow pits:

- Permanent visual and physical impact on the area
- Loss of habitat
- Loss of vegetation
- Loss of agricultural land
- Siltation risk if in river bed
- Pollution risk if in river bed

Borrow pits might represent opportunities for re-use as follows:

[1] GeoStudio 2000 (December, 2003) Report on the Geological and Geotechnical Conditions of the Milot to Rreshen Road

- Sites for waste management (on a limited scale) to dispose of waste where not in river beds, especially if groundwater is deep or a non-significant resource as in most of the area. Dilute and disperse approach to leachate would have to be accepted.
- If flooded can provide new wetland habitat (especially if on side of river courses).
- Locations to discharge road drainage into, with wetland establishment can produce natural vegetated treatment system (provided measures are taken to protect groundwater).
- Source of building materials for local peoples.

Quarries are more substantial and are developed to obtain hard rock materials. These have the same types of impact as borrow pits, but those impacts are often of a higher magnitude. As quarries are often larger in size than borrow pits, fewer quarries are likely to be required. The opportunities for establishing wetland systems in quarries are much lower.

## 4.2 Soils

### 4.2.1 Natural and Agricultural Soils

The impact on soils as such will generally be limited, but as soil of suitable quality for agriculture is a valuable commodity even the loss of minor quantities due to bad construction practice, as set out below, or poor design leading to erosion, could have significant impacts on local habitants.

**Construction**

Soil will be disturbed where the road has to be widened and on any new alignment. Any topsoil of value will be lost if it is not stripped, stored and reused appropriately.

Soil horizons, which are thin or almost non-existent must be treated with great care – as disturbance to this soil layer will result in rapid erosion of the slopes. This will affect the road stability, silting up of rivers and streams, landscape value, and in extreme cases it can reduce the economic productivity of entire areas of land and lead to a reduction in the biodiversity of affected regions.

Soil will be subject to erosion where

- Ground cover is removed and inadequately re-established
- runoff from the road scheme is concentrated onto areas where insufficient protection has been provided to the soils.
- cuts or embankments are completed with improper drainage or at too steep an angle (thus encouraging the mass wastage of materials as the slopes achieve a more natural slope angle).

The volume of soils that might have to be stripped to account for re-alignments or new road sections is provided in the following table. The actual volumes will depend on the suitability of subsoils to be used as sub-base for the road. If the subsoil is acceptable then the soil strip volumes assumed here will be reduced.

If the subsoil is not suitable and requires a deeper strip then, naturally, the volumes will increase. The table is intended to show the anticipated soil strip volumes between the three Alternatives, rather than especially accurate calculated volumes.

**Table 4.2: Top Soil and Subsoil Strip Volumes for all 3 Alternatives**

| Alternative Section. | Start Chainage (m) | End Chainage (m) | Realigned Length (m) | Volume of Top Soil ($m^3$) | Volume of Subsoil ($m^3$) |
|---|---|---|---|---|---|
| 1.1 | 124 | 806 | 682 | 2,558 | 4,263 |
| 1.2 | 48 | 2,733 | 2,685 | 10,069 | 16,782 |
| 1.3 | 17 | 1,453 | 1,435 | 5,384 | 8,973 |
| 1.4 | 33 | 2,052 | 2,018 | 7,569 | 12,615 |
| 1.5 | 90 | 2,008 | 1,918 | 7,195 | 11,992 |
| 1.6 | 0 | 4,777 | 4,777 | 17,915 | 29,859 |
| | | | Total Alternative 1 | 50,690 | 84,484 |
| 2.1 | 109 | 416 | 307 | 1,151 | 1,919 |
| 2.2 | 0 | 3,570 | 3,570 | 13,389 | 22,316 |
| 2.3 | 0 | 2,060 | 2,060 | 7,728 | 12,880 |
| | | | Total Alternative 2 | 22,268 | 37,115 |
| 3a.1 (south of tunnel) | 0 | 30,000 | 30,000 | 56,250 | 187,500 |
| 3a.2 (north of tunnel) | 0 | 5,000 | 5,000 | 0 | 31,250 |
| | | | Total Alternative 3 | 56,250 | 218,750 |

**Definition**
Topsoil taken as soil suitable for agricultural use.
Subsoil taken as weathered subsoil below topsoil.
**Assumptions are the new realignments identified by FS**
Top soil stripped to 300mm depth, subsoil below topsoil stripped to 500mm

The environmental management plan (EMP) includes strict measures for managing the wasting of soil.

**Operation**

The chemical quality of soil can be impacted by road schemes where contaminants from vehicle exhausts settle onto border areas. This leads to increases in heavy metal concentrations which can be taken up into vegetation growing in affected soils. This is a potential risk to human health if crops or vegetables are grown for human consumption close to the road verge – particularly if they are grown for personal consumption, thus increasing the long term exposure to the heavy metals. However, research in the UK has shown that this increase in heavy metals (eg. lead) is generally limited to a narrow border along the edge of the road and concentrations rapidly fall away with distance from the hard shoulder. This should reduce the potential long term impact on neighbouring fields if the Albanian of 44m right of way is maintained.

### 4.2.2 Contaminated Soils

**Construction and Operation**

A major problem to be faced will be how to deal with contaminated soil. Working within ground that is contaminated areas produces risks to construction workers, to the environment, to materials used in the road construction and a potential risk to maintenance workers in the future. Therefore any contaminated land in the footprint of any route must be properly dealt with. This poses significant challenges to any of the alternatives, as the capacity to deal with contaminated land in Albania is limited. Treatment methods to remove heavy metals and any organic contamination might be possible (eg. soil washing, air sparging, bioremediation) for in situ remediation, or it might be necessary to "dig and dump" the contamination. However, any disposal of contaminated materials must be done in accordance with environmental best practice (not entailing excessive cost). There are limited landfills designed to deal with hazardous waste such as contaminated soils – so in-situ remediation may be the most cost effective environmental solution.

The abandoned industrial complex on the left bank at Rubik is close to the working area of the route. A detailed survey of this complex will be required to identify any contaminated land associated with the complex that would be within the road footprint. The road provides an opportunity to seal some of the contaminated land beneath the surface of the road thereby removing the risk of soil in those areas becoming a windblown containation hazard. The mitigation section details construction site practices that should be adopted in this area.

## 4.3 Air and Noise

### 4.3.1 Air Quality

**Construction**

The construction activities can cause dispersion of dust in the atmosphere and a significant reduction in local air quality mainly due to dust from the passage of vehicles over unpaved surfaces and through emissions from poorly operated or maintained machinery. These impacts can be reduce to minor levels through the adoption of standard good site management practices, such as watering surfaces.

**Operation**

#### 4.3.1.1 Background

This report provides a relative comparison of the air quality of each proposed alternative route for each link of the Durres-Morine Road Corridor, as compared to the 'do-minimum' scenario option.

The key pollutants associated with the local air quality impact of road traffic are total nitrogen oxides ($NO_x$), nitrogen dioxide ($NO_2$) and particles (as $PM_{10}$). In terms of health impact, the key pollutants are $NO_2$ and $PM_{10}$. $NO_x$ can affect sensitive vegetation directly and contribute to regional acid deposition. In addition to these pollutants, motor vehicles also emit carbon dioxide ($CO_2$),

carbon monoxide (CO) and, to a much lesser extent, nitrous oxide ($N_2O$). CO is unlikely to be of concern if the both $NO_2$ and $PM_{10}$ are shown to have no significant impact.

Calculations presented below are traffic-derived contributions of $NO_2$ and $PM_{10}$ to ambient air quality concentrations (in $\mu g/m^3$) for four assessment years (2003, 2009, 2014 and 2023).

#### 4.3.1.2 Methodology

As it was not possible to source any appropriate background ambient air quality monitoring data for the study area, results provided enable a purely comparative assessment between the do-minimum scenario and the three Alternative scenarios proposed for each link.

Given the length of the proposed road project, it was not possible to assess in detail the number of residential or sensitive receptors close to the route. Assessment of traffic-related emissions contribution to local ambient air quality along the route has been limited to pollutant quanitification at 50 m intervals up to a distance of 200 m from the roadside.

The methodology employed involved processing traffic data (flows, vehicle composition in terms of percentage heavy duty vehicles and speeds) using the 1994 Version of the UK Highways Agency's Design Manual for Roads and Bridges (DMRB) methodology.

For both light and heavy-duty vehicle flows, DMRB provides flow factors corresponding to assessment years and emissions factors to account for pollutant species, speed and distance from the roadside for each assessment case. DMRB functions are applicable to peak hour flows, therefore, annual average daytime flow (AADTF) data were adjusted accordingly.

The 1994 version of DMRB was used as emissions factors therein are more representative of the Albanian vehicle fleet than those within the 2003 version DMRB which pertain to the current UK vehicle fleet with its more modern technology and use of more efficient fuel types. Additionally, resultant calculated pollutant concentrations were multiplied by a factor of two throughout to compensate for the age and technology of the current Albanian vehicle fleet.

No reduction in emissions factors was assumed for future years, as at present no legislation exists for emissions control of the Albanian vehicle fleet.

#### 4.3.1.3 Results

Data displayed in Table 4.3.1 below are estimated traffic-derived contributions to ambient level of both $NO_x$ and $PM_{10}$ for each alternative option and each assessment year for the Milot - Rreshren link. Contributory concentrations from the road in each case have been calculated at four 50 m intervals from the roadside, up to a distance of 200 m.

The current EU air quality limit values for both annual mean $NO_2$ and annual mean $PM_{10}$ for the protection of human health are $40\mu g/m^3$ . Any link that contributes more than 25% of the limit value ($10\mu g/m^3$) to ambient pollutant concentrations at a distance of 50 m from the roadside may be considered significant and worthy of further, more detailed assessment.

Using the definition stated above, the Milot – Rreshen link exhibits a significant contribution to ambient levels of $NO_2$ with generally greater impacts for Alternative scenarios 2 and 3, although all three scenarios are similar.

The Milot-Rreshen road link, in common with the other road links, does not exhibit a significant contribution to ambient levels of $PM_{10}$ for any of the alternatives or assessment years.

It should be noted that levels of $PM_{10}$ and $NO_2$ do not exceed the EU limit value concentrations for any scenario or assessment year.

**Table 4.3.1: Milot – Rreshen link ($NO_2$ and $PM_{10}$)**

| Assessment Year | Option | $NO_2$ contribution from link ($\mu g/m^3$) | | | | $PM_{10}$ contribution from link ($\mu g/m^3$) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 50 m | 100 m | 150 m | 200 m | 50 m | 100 m | 150 m | 200 m |
| 2003 | Do-minimum | 15 | 5 | 2 | 1 | 1 | 0 | 0 | 0 |
| | Alternative 1 | 15 | 5 | 2 | 1 | 1 | 0 | 0 | 0 |
| | Alternative 2 | 12 | 4 | 2 | 1 | 1 | 0 | 0 | 0 |
| | Alternative 3 | 12 | 4 | 2 | 1 | 1 | 0 | 0 | 0 |
| 2009 | Do-minimum | 15 | 5 | 2 | 1 | 1 | 0 | 0 | 0 |
| | Alternative 1 | 13 | 4 | 2 | 1 | 1 | 0 | 0 | 0 |
| | Alternative 2 | 15 | 5 | 2 | 1 | 1 | 0 | 0 | 0 |
| | Alternative 3 | 15 | 5 | 2 | 1 | 1 | 0 | 0 | 0 |
| 2014 | Do-minimum | 16 | 5 | 2 | 1 | 1 | 0 | 0 | 0 |
| | Alternative 1 | 15 | 5 | 2 | 1 | 1 | 0 | 0 | 0 |
| | Alternative 2 | 16 | 5 | 2 | 1 | 1 | 0 | 0 | 0 |
| | Alternative 3 | 16 | 5 | 2 | 1 | 1 | 0 | 0 | 0 |
| 2023 | Do-minimum | 25 | 8 | 3 | 2 | 2 | 1 | 0 | 0 |
| | Alternative 1 | 21 | 7 | 3 | 1 | 1 | 0 | 0 | 0 |
| | Alternative 2 | 27 | 8 | 3 | 2 | 2 | 1 | 0 | 0 |
| | Alternative 3 | 26 | 8 | 3 | 2 | 2 | 1 | 0 | 0 |

### 4.3.1.4 Conclusions and Recommendations

Of the links that are not expected to significantly contribute to local air quality, there is generally little difference between alternative options, as shown above. This reflects the findings of the projected levels of traffic for the do-nothing and the three Alternative scenarios presented in Section 3.11.

For the Milot – Rreshen link which is predicted to have a more significant impact on ambient levels of $NO_2$, more detailed air quality assessment is recommended to gauge population exposure and risk.

Local air quality is generally degraded by the construction of a road as all vehicles emit pollutants as exhaust fumes. In Albania, lead-free petrol is not widely available and the maintenance of vehicles is frequently not conducted in accordance with manufacturers' recommendations. As a result the exhaust emissions from vehicles include significant quantities of unburnt fuel and particulate matter. Dealing with such problems is a national issue that requires implementation of standards and regulations, and the requirement for lead-free fuels to be more widely used.

Reductions in air quality can be minimised by roads that reduce engine strain and which maintain speeds relatively constantly with little stop-start or idling vehicle movements. However, a good road may attract more traffic that would reduce the air quality simply by adding more exhaust emissions. Whilst this study has not quantified the air quality variations, this trend is backed up by traffic predictions documented in Section 3.11.

In summary, the proposal is not predicted to have a significant impact on air quality, as levels of $PM_{10}$ and $NO_2$ are not expected to exceed the EU limit value concentrations in any assessment year.

### 4.3.2 Noise

#### Construction

Significant noise generating construction activities include pilling, compaction using vibratory rollers, formation of sub base, roadbase surfacing and associated drainage works. These impacts apply to most major road construction activities. While they have potential to give rise to significant effects they can be reduced by adopting good site management practices. Impacts can be reduced substantially by locating construction camps away from sensitive receptors, particularly the more heavily populated areas such as Milot and Rubik. With these measures in place any effects relating to these impacts are anticipated to be at most minor in severity.

#### Operation

It is not possible to make a quantitative prediction of the increase in sound associated with road vehicle traffic based upon Average Annual Daily Traffic (AADT) flow data in isolation from the environment factors listed in Section 3.3.2. However, the links for which AADT data is available cover significant lengths of road, which have widely varying environmental factors that cannot be taken into account in detail.

Nevertheless an indication of the impact of the roads under operational conditions can be made by comparing predicted traffic levels with the "do-nothing" base case for each design year. This allows an absolute assessment to be made as to whether the various links for each alternative will experience increases in road noise compared to what might happen even if no work is carried out,

and the degree of any increase in noise levels. The assessment does not account for increases in road noise simply due to predicted growth under the "do-nothing" case.

Guidance contained within the Design Manual for Roads and Bridges[1], suggests that an increase in traffic flow by 25% is approximately equivalent to a change in noise levels of 1dB(A)[2]. Furthermore, a change of 3dB(A) is the minimum level perceptible under normal conditions and would be regarded as a substantial adverse impact. A change of 10dB(A) corresponds roughly to a halving or doubling of the loudness of a sound and would be regarded as a substantial adverse impact.

Based upon the above assumptions and the AADT data, the Milot – Rreshen link will not generate an increase in noise levels from traffic which exceed 10dB(A).

Noise associated with traffic is generally considered to be a fairly constant impact, although this is not going to be the case on these roads where traffic volumes are low enough to cause significant interruptions in traffic flow when no noise will be generated. Furthermore at night traffic volumes are anticipated to be much lower.

The World Bank has developed noise values which should not be exceeded to protect a range of receptors. These noise levels are presented as average noise levels (denoted as $L_{eq}$).

**Table 4.2: World Bank Recommended Noise Levels ($L_{eq}$ as dBA)**

| Receptor | Daytime | Night time |
|---|---|---|
| Residential, Institutional (hospitals) and educational (schools) | 55 | 45 |
| Industrial/Commercial areas | 70 | 70 |

Noise data is not available for these routes, but using the guideline values presented in Chapter 3 freeway traffic generates noise levels of about 70dBA. This is for a free flowing freeway in developed countries with high volumes of traffic. It is likely that for the volumes of traffic for these routes that the noise levels will be between 40 and 70 dBA. It is reasonable to assume that at night the lower traffic volumes will generate noise levels similar to a quiet residential area (ie. about 40 dBA).

With increasing traffic levels and higher road speeds the noise levels will increase.

The proposed road scheme might experience significant increases in noise along the Matit and Fani River valleys where the generally flat gradient will encourage higher speeds on the rehabilitated road. The route then climbs and falls dramatically, or will have to be relatively winding

[1] Design Manual for Roads and Bridges, Volume 11. Environmental Assessment. DETR. HMSO, London (1993).

[2] dB(A) refers to decibels measured on a sound level meter incorporating a frequency weighting, which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness.

until it joins Alternative 1. This route will not facilitate high speeds so road noise levels should not be excessive and will be similar to those experienced at present.

Where roads pass through settlements speed limits might have to be enforced to ensure the safety of non-vehicular traffic and pedestrians/residents of the settlements. This would mitigate noise levels. Where roads pass close to schools or other institutions it might be appropriate to construct noise bunds to mitigate any long-term impact from noise.

It is anticipated that the proposed scheme would often have ambient noise levels related to road traffic of 40 to 60 dBA.

The proposed scheme could potentially have a significant adverse impact on noise levels in the adjacent towns and settlements. The most significant impact would be in Milot due to the larger number of potential receptors. This area is likely to require mitigation through the enforcement of speed limits. In the smaller settlements it may be more appropriate to construct noise bunds to mitigate the impact on local schools and other institutions.

## 4.4 Climate

A new road will have insignificant impact on climate locally. However, by reducing the mileage that vehicles travel, and making the journey less arduous for engines should lead to a reduction in the amount of ozone depleting or greenhouse gas emissions. This will benefit the global climate change, but to a degree that cannot be quantified by this study and which would be almost insignificant in global terms. Thus the shortest route with fewest changes in elevation would be the most beneficial.

This the proposed road scheme is not predicted to have a significant impact on climate.

## 4.5 Surface and Groundwater

### 4.5.1 Surface Water

**Construction**

The potential impacts and resulting effects on surface water during construction comprise:

- Construction earthworks and construction site drainage which could give rise to changes in runoff, peak flows or low flows;
- Construction dewatering which could temporarily alter local flow regimes;
- Incorrect storage of contractors' plant/fuel storage and site activities which could lead to the accidental spillages of liquids or contaminated runoff, and the subsequent deterioration in surface water quality;
- Construction works which could cause temporary obstruction of watercourse channels (i.e. arterial drainage) and floodplains leading to flooding;
- Construction works in the river which could give rise to local increases in sediment loads resulting in temporary deterioration of water quality; and

- Storage of contaminated material from topsoil stripping, bored piles and utility works, which could leach contaminants into runoff and cause subsequent deterioration in surface water quality.

These impacts apply to most major construction activities. While they have potential to give rise to significant effects they can be avoided by adopting good site management practices, as set out in the Environmental Management Plan, Section 6. With these measures in place any effects relating to these impacts are anticipated to be at most minor in severity.

The potential for increased sediment loads, due to embankment and bridge works adjacent to the rivers and their tributaries, could give rise to effects of moderate severity, such effects should be avoided through the use of standard construction practices, as set out in the environmental management plan, Section 6, together with silt curtains and coffer dams. With these in place effects would be reduced to minor.

**Operation**

The uncontrolled discharge of road run off has the potential to impact the local water environment both in terms of quantity, though localised and downstream flooding and of quality through pollution. Typical pollutants associated with road run off include:

- Hydrocarbons such as fuel and polycyclic aromatic hydrocarbons (PAHs) (EC Groundwater Directive List 1 substance) from wear and tear of the road surface, from tyres, from lubricants leaking from vehicles and from unburnt fuels.
- Heavy metals including cadmium (EC Groundwater Directive List 1 substance) and copper, zinc and iron (EC Groundwater Directive List II substances) derived from unburned fuels, corrosion products from vehicles, from wear and tear of tyres and the road surfacing. Some heavy metals are largely insoluble (eg. copper) and some are soluble (eg. zinc).
- Suspended solids (including insoluble heavy metals as colloidal materials)
- De-icing agents (road salting – likely to be significant on this project)
- Herbicides and pesticides used to clear out drainage runs (considered to be insignificant on this project)
- Nutrients (concentrations of nutrients are reported to be very low and are not considered significant)

The worst contamination occurs in the first flush of runoff from roads after a period of dry weather, or after salting of roads in winter has taken place. The level of contamination in road runoff is directly related to the traffic volume. The AADT values for this project are relatively small and it is anticipated that contamination in road runoff will be very low as a result. This will rapidly be diluted in receiving bodies to insignificant (even undetectable levels) or will be attenuated in the soil horizons of the hard shoulders either side of the road where most road drainage will leave the carriageway.

The proposed road drainage system will generally be natural runoff to road verges (the soft grassed edge of a road). Where drainage is concentrated into point discharges it is likely that

dilution from high rainfall and rapidly flowing rivers will dilute contamination relatively quickly. The pollution risk from accidental spillage may increase moderately as although the method of drainage would be the same as on the existing road, the higher volumes of traffic and faster traffic speeds would increase the risk of accidental spillage. This could potentially have a major adverse impact on surface water quality

Where drainage of roads leads to concentration of water from a large area of carriageway and this is discharged into streams or small rivers this could have a significant adverse impact on the flood risk to downstream locations.

Road drainage and traffic safety is intimately related. Good surface drainage and rapid removal of storm water require adequate cross-slopes and longitudinal drainage. The road drainage on the existing roads is very poor so a new or rehabilitated road with properly designed and built drainage would enhance the infrastructure and the safety of the travelling public and users. Well-designed cross-drainage structures limit ponding against embankments and ensure rapid removal of storm water from the road vicinity. Most of this water will arise from upstream land areas.

The embankment height calculation for the proposed road scheme has been based on the assumption of normal flow[1]. This is reasonable though the roughness factor used to allow for friction and other basic data are not stated in the supporting documentation. It is not therefore possible to verify the assumptions underlying these calculations, nor has it been possible to determine what freeboard, if any, has been allowed in the embankment height above the flood level. Freeboard is essential to allow for uncertainties in the calculations as well as wave action. If the road were to flood the consequence may be significant. This could potentially have a major impact on the local population, houses, land and the livelihood of the population, The impacts of flooding are exacerbated when the inundation of access roads prevents the emergency service and rescue workers getting to those in need of help.

The construction of large embankments will affect flows on the flood plain. This will cause three effects:

1. There will be a reduced cross-section to convey flows. This will tend to raise water levels and increase water velocities.

2. This will reduce the available storage with a consequent increase in peak flows downstream.

3. The area behind the road embankment will be protected from flooding.

The consequence of the first two effects would be an increase in the frequency and severity of flooding both upstream (due to the reduced cross-section) and downstream (due to the reduction in flood plain storage). On the information provided it is not possible to precisely quantify the impacts but they may be moderately significant, it should be noted that the ITP hydrology study appears to be based on all the historic flooding information that is available. The third effect may be considered beneficial.

Erosion control on the side of the road embankment is proposed. Depending on the width of the flood plain either groynes or a linear protection is proposed. The scour protection is based on the

[1] ITP-Infratransproject (2004) Climatic, hydrologic and Hydraulic Calculations of the 'Milot-Rreshen' Highway

use of gabions. No construction details have been provided. In erosion protection the detail is essential to avoid potential problems such as the loss of fines through the gabions and potential undermining. There also needs to be consideration for the opposite bank, as groynes will deflect the flow and narrow the channel both of which can lead to erosion on the opposite bank. In the absence of measures to protect these banks this impact is considered to be significance.

### 4.5.2 Groundwater

**Construction**

- Stripping of natural vegetation which could decrease the permeable areas through which groundwater recharge takes place;
- Construction activities which could result in temporary interception or loss of perched water table and associated seepage zones;
- Spillages of contaminated liquids or runoff, or the interception, disturbance and mobilisation of pollutants in existing areas of contaminated ground could lead to a deterioration in ground water quality;
- Ground investigation drilling, could lead to the interception, disturbance and mobilisation of pollutants in existing areas of contaminated ground;

These impacts apply to most major construction activities. While they have potential to give rise to significant effects they can be avoided by adopting good site management practices, as set out in the monitoring plan, Section 6. With these measures in place any effects relating to these impacts are anticipated to be at most minor in severity.

The construction of large embankments will affect the flows of groundwater through alluvial gravels on the flood plain. If not addressed this may cause ponding on the up gradient side of the highway embankment, which would have implications for the agricultural land on that side of the embankment, as discussed in Section 4.8 on Land Use. The public consultation questionnaire responses indicated that there are important groundwater resources that could be affected by the proposed alignment. The embankment construction may alter near surface groundwater flows and cause ponding on the surface behind the embankment. The design should be amended to ensure vents or gates are incorporated within the embankment to let out any excess groundwater that may build up.

**Operation**

Road drainage impacts surface and groundwater resources. The public consultation identified a number of locally important springs along the alignment thay may be affected by the scheme. The proposed drainage measures and emergency response proceedures can be expected to prevent the road having a significant impact on the quality of water in the springs.

## 4.6 Flora and Fauna

### Construction

Impacts on flora occur would as a result of topsoil stripping, the construction of work camps, batching plants, borrow pits and quarries. The impact can be minimised by routing the road around significant stands of trees and natural vegetation (where possible).

Most fauna will move away from the road during construction. A new road can sever habitats, this is most significant if the habitat is restricted in size and the road causes one or both parts of the affected habitat to become unviable on their own. Identifying such small pockets of habitat requires an in-depth understanding of the ecological status of the route. This is missing in Albania and the project area. As such, identifying habitats that must be avoided will be difficult. However, much of the 26km section from Milot to Rreshen is on an existing road alignment, so the majority of the land take and disturbance impact will have already occurred. Furthermore, the Matit and Fani Rivers are already likely to sever the habitat of larger mammals, and having a parallel road will not have a significant additional impact. The route passes through large expanses of similar habitats and so any severance issues are likely to be insignificant.

Road construction can have a significant impact on breeding birds. Best practice would require that destruction of habitat should be scheduled to ensure nesting birds are not disturbed. This will be most important where the alignment is routed through hedges alongside fields or through natural woodlands. Commercial forestry areas tend to have low biodiversity and provide limited opportunities for nesting birds.

Any potential hibernation sites (eg. for bears) should not be disturbed during winter. It is highly unlikely that such sites will be close to existing roads or to existing habitation. This is therefore not considered a significant impact.

### Operation

As the road will enhance access to rural areas and natural resources that have been left relatively undisturbed due to their remoteness. More stringent environmental enforcement will be required to prevent the road exacerbating the problem of uncontrolled logging and collection of medicinal herbs that has lead to the degradation of flora, and even extinction of some species.

The proposed road would result in higher traffic speeds and an increased volume of traffic. This is could have a moderate adverse on wild fauna, due to the increased risk of vehicles hitting animals as they cross the road. Traffic signs can be used to alert drivers to areas where this is likely to occur, thereby reducing the risk of animals being hit. ITP are currently undertaking a traffic safety study to identify areas of risk and incorporate appropriate measures in to the signage design.

The release of polluted discharge from the road or an increase in the sediment load due to embankment erosion could have an adverse impact on the water quality of the adjacent watercourses, see Section 4.5.1 on Water Quality for further details. A reduction in water quality would have an adverse impact on fish and other aquatic species. Appropriate highway drainage is required to mitigate the potential for adverse impacts, consideration should be given to the use of measures such as retention ponds with reedbeds (sustainable drainage systems).

Higher noise levels along the proposed road scheme can be expected to result in a minor increase in the disturbance of birds. This impact is not predicted to be significant.

## 4.7 Landscape

Landscape value is a difficult aspect to quantify, as different cultures will place different importance on landscape. In Albania the recognition of landscape as an asset worth preserving is generally low to non-existent. If the value is difficult to quantify then assessing the impact is similarly difficult. The method of landscape and visual assessment used is based upon the general approach provide by the Institute of Environmental Assessment and Management and the Landscape Institute[1].

### Construction

Reconstruction or new construction will produce visual impacts on the landscape. These can be reduced by sound engineering practices, such as not wasting excavated material along the side of the roads and by the early establishment of vegetation on embankments and cuttings. Construction activities should be sited as far as possible from sensitive receptors, such as the residents of Milot and Rubik. It is not possible to specify a distance, it will be easier to locate facilities away from sensitive receptors in the scattered settlements than in the built up areas such as Milot. In some locations this may not be possible, and although the impact would be significant it would be short term. The existing vegetation should be retained wherever possible to screen sensitive receptors, further details are provided in the Environmental Management Plan, Section 6.

Measures to reduce the impact on landscape resources and visual receptors during construction are set out in the Environmental Management Plan, and residual impacts will be of limited duration.

### Operation

The landscape along the route is spectacular in many places and would be scarred by excessive erosion associated with any new road. The geomorphological study has indicated that erosion would be minimised with the road constructed along or near ridge lines. The location of some sections of the road away from unstable slopes should reduce the risk of landslides. Adequate embankment protection and rapid replanting will be required.

As much of the route is on an existing road alignment and as many of the sensitive receptors identified, such as visitors to Rubik Church, would only be subject to long distance views of the proposed road and they would not be significantly affected. The residential and commercial properties adjacent to the route are likely to be significantly affected, and consideration should be given to using planting along the route to screen these properties.

The proposed 5m high embankment through Fushe-Miloti River Terrace Landscape Character Area, will be a little out of scale in this low-lying area, although there are existing road and railway embankments on both sides of the River Matit.

[1] Guidelines for Landscape and Visual Assessment 1st edition (1995), (edited by Scott Wilson) and 2nd edition (2002) The Landscape Institute and the Institute of Environmental Management and Assessment.

The proposed viaduct overpass at Milot can be expected to have a adverse impact on the residents of Milot and the landscape character of the surrounding area. Although the structure would pass through an industrial area, the height of the structure would not be in keeping with the low lying character of this area and would be out of scale with the surrounding single and two-storey dwellings. This structure would be highly visible from the large number of dwellings on the hill in Milot. The residents of Milot were invited to comment on the potential impact of the overpass and did not express any major concerns, due to the low sensitivity of these receptors the scheme is not anticipated to have a significant impact on landscape.

## 4.8 Land Use

### Construction

Where the road passes over contaminated land associated with historic land use (mining) then the road might provide limited opportunities to improve the land value. It is beyond the scope of this project to remediate all contaminated land along the route, but areas of contaminated land that could affect the health of construction staff and users of the road should be made safe. This could include providing measures to stop the contamination from entering rivers.

### Operation

The scheme would result in the loss of agricultural land on the low flood plain fields alongside the Matit and Fani Rivers from Milot to Rreshen, although this is generally limited as in many areas the road is cut into the hillsides and slopes steeply down to the river below. The ponding of groundwater behind the proposed embankment could result in further loss, or lowering in the quality of, agricultural land.

Given the lack of suitable land for agricultural activity loss of such land through inappropriate road alignments would need to be minimised, and compensation provided as part of the resettlement plan.

Where the road passes through settled areas, such as Milot and smaller scattered settlements, residential and commercial properties would be destroyed. This would result in a significant adverse impact and would require compensation to be provided to affected parties.

## 4.9 Socio-economic

### 4.9.1 Population and Economy

### Construction

Social impacts from construction camps being located close to remote communities can be significant, especially if the workforce is not from the same cultural background as the resident community. Importing diseases can be problematic, especially HIV, although due to the behaviour of the mountain communities (where women traditionally avoid contact with non-family males) this is not considered a significant risk.

**Operation**

The opening of a road has secondary impacts on the local population and economy. These can be negative (e.g. erosion due to poor construction) or positive (opening up markets to rural economic activities and improving access to services such as education and health facilities).

Although some negative impacts associated with construction and operation of the road can be engineered out through careful design, other negative impacts require other authorities to enforce regulations or improve their management (e.g. waste management activities – stopping illegal logging or hunting). The roads can be expected to exacerbate existing detrimental environmental problems, such as increased waste generation from roadside development leading to further illegal dumping of waste, which has been observed around all the towns along the route. The road itself can make it easier for regulators to visit areas where such illegal activity takes place.

The route has many existing settlements, which are suffering significant unemployment so a new road along this route should bring benefits by opening markets to agriculture and possibly encouraging new commercial activities (eg. local tourism into the area from Tirana and possibly Kosovo).

An improved road along Alternative 2 would increase the potential to bring remediation or rehabilitation of the abandoned mines in Rubik.

### 4.9.2 Induced Development

The route has existing settlements, which are suffering significant unemployment so a new road along this route should bring benefits by opening markets to agriculture and possibly encouraging new commercial activities (e.g. local tourism into the area from Tirana and possibly Kosovo).

The proposed road would improve access markets, reducing the cost of producing and transporting products, thereby simulating agricultural production. It may also encourage secondary processing of agricultural products, increasing the value and marketability of products. It would also improve social welfare by improving access to health services and other facilities. Research has indicated that most Albanians in rural areas consider the current lack of transport infrastructure as being one of the key reasons for rural poverty[1]. Some have suggested that the provision of this and other essential services will reduce the high level of out-migration from these areas.

The effects induced by the new road can be summarised as follows:

Effects on existing roads

- o Increase of economy activities for existing population
- o Agriculture production increase because "reduce distance" to markets
- o Service production increase for traffic increasing
- o Service production increase for agricultural production increasing

[1] World Bank Technical Paper No 520 – "Poverty in Albania - A Qualitative Assessment". H. de Soto et al., 2002.

- Increased number of cultivated areas along the new road

The construction of a new road is normally accompanied by increased residential and commercial development adjacent to the road. Ribbon development alongside the road could lead to the loss of valuable agricultural land and forestry land, enhanced enforcement would be required to reduce the current high level of illegal construction.

The roads would bring detrimental impacts, such as increased waste generation from roadside development leading to poor waste management, as observed around all the towns along the route. There also is likely to be an increase in illegal logging and unlicensed quarrying, which would require more rigorous enforcement.

An improved road would increase the potential to bring remediation or rehabilitation of the abandoned mines in Rubik and Rreshen.

## 4.10 National and Cultural Heritage

### 4.10.1 Cultural Heritage and Undiscovered Archaeology

The primary impact on sites of cultural heritage is negative where the site is not recognised as being important and is destroyed, or which has to be excavated and then covered by the road alignment. Current best practice among archaeologists is to leave sites of interest undisturbed until properly planned and funded excavations are carried out. Road works place time constraints on excavations that make planning and execution of archaeological excavation problematic, frequently leading to poor recovery and losses of artefacts and (as a result) knowledge. Thus construction work has a generally negative impact on archaeological sites.

Excavations in the river valleys should take place with care and under the supervision of an archaeologist to ensure that no tumuli are disturbed, and to ensure that any fields in the valley floors do not contain relicts of significance. This supervision should focus on the sections where the alignment does not follow the existing road, as the potential for archaeological finds will be lower where the existing road is being upgraded and excavation and digging in new ground will be limited.

The impact on social culture is more difficult to assess. Many ancient social systems are considered of value by modern society, but frequently those living under the old social system want nothing more than to improve their circumstances in a manner that might alter the socio-cultural setting. Quantifying this impact is difficult to do. Needless to say opening up areas that have been remote from most of Albania is likely to increase the modernisation of those areas (even if this is done relatively slowly) which is generally accepted to be a benefit.

However, this might lead to a slow decline in the traditional lifestyles and cultural values of those communities (which might be considered a negative impact by some), but this will depend in part on the willingness of the communities to accept and embrace potential changes. A minor adverse impact is anticipated.

This route is already experiencing modernisation due to the existing roads.

### 4.10.2 Built Heritage

The Church of Shen Nout is on the other side of the river to the route, so will not be physically damaged by any new road works, but care must be taken to minimise impacts on the setting of the Church.

A new or an improved road into an area can improve access to sites of cultural importance. This would be a benefit to those wishing to visit the sites and have been prevented from doing so because of problems with transport in the past. It will also benefit those who live in the area through increased potential for revenue generation from provision of services to the visitors.

Older houses and bridges exist in places along the route and these might need to be preserved, this will require liaison with the relevant authorities in Tirana.

## 4.11 Traffic and Safety

### 4.11.1 Traffic

**Table 4.11: Average Annual Daily Traffic (AADT) figures projected for the Milot – Rreshen road link**

| Sect_ID | Scenario | AADT All vehicle modes (Number of Trucks in parenthesis) | | | |
|---|---|---|---|---|---|
| | | 2003 | 2009 | 2014 | 2023 |
| 3421964 | Do Nothing | 1,360 (99) | 2,100 (147) | 2,827 (189) | 5,113 (282) |
| 3421964 | Alternative 1 | 1,360 (99) | 1,924 (131) | 2,588 (165) | 4,665 (233) |
| 3421964 | Alternative 2 | 1,360 (99) | 2,647 (181) | 3,570 (240) | 6,514 (384) |
| 3421964 | Alternative 3 | 1,360 (99) | 2,581 (181) | 3,478 (240) | 6,328 (384) |

The number of truck using the road link will have an effect on noise levels. Table 4.10 shows that for all selected scenarios, including the do-nothing scenario, trucks consistently contribute between 4% and 8% of total AADT, the aggregate levels of noise could be expected to be limited due to the relatively low proportion of traffic volume contributed by trucks. However, it should be remembered that numbers of trucks are projected to steadily increase up until the final assessment year. Noise impacts are discussed in detail in Section 4.3.2.

In terms of traffic trends between scenarios, both Alternative 2 and Alternative 3 scenarios show the highest levels of total traffic for all assessment years beyond 2003. This is because the route, together with the other road proposals for the Durres - Morine Road Corridor, will provide a more

direct route between Durres and Morine, which will result in the diversion of traffic from other routes and encourage the higher traffic levels predicted, particularly for trucks.

Total traffic levels are marginally lower in the Alternative 1 scenario compared to the do-nothing scenario. This is because Alternative 1 involves upgrading a different route, which will divert traffic away from the Milot – Rreshen section.

The higher volumes of traffic on the road can be expected to result in an increase in severance along the route, which will have a particular impact on those who own land on both sides of the proposed route.

### 4.11.2 Safety

Traffic safety and road drainage are intimately related. Good surface drainage and rapid removal of storm water require adequate cross-slopes and longitudinal drainage. Well-designed cross drainage structures limit ponding against embankments and ensure rapid removal of storm water from the road vicinity. Most of this water will arise from upstream land areas.

Higher roads speeds and traffic volumes could have a significant adverse impact on pedestrians, particularly vulnerable groups such as the disabled or children.

Pedestrian crossings will be required where the road passes through settlements to reduce severance, particularly where people own land on both sides of the proposed road. ITP are currently undertaking a road traffic safety study to identify the measures required to reduce the risk of accidents.

## 4.12 Mitigation Measures

This section describes the proposed mitigation measures for both for the construction and operational phase. In addition, the environmental issues to be considered during the preliminary and detailed phase of design, prior to construction works beginning are highlighted. Mitigation measures are proposed for the impacts to the following components:

- Soil
- Air quality
- Noise
- Surface and groundwater
- Flora and fauna
- Landscape and land use
- National and cultural heritage

Mitigation of socio-economic impacts is considered in Chapter 7, and so has not been detailed here.

### 4.12.1 Preliminary and Detailed Design Phase

The preliminary and detailed stages of design of the preferred Alternative should have incorporated environmental best practice measures. The designers should have sought environmental expertise where appropriate to ensure this. The following specific environmental considerations should have been included in the detailed road design:

#### (i) Soils

The design of the alignment of the road is such that an expert should carry out a survey of the chosen alignment near Rubik to identify the extent of the potential contamination.

An environmental expert should be involved in the selection of borrow pit sites, top soil storage sites and other stockpile sites for the construction. Opportunities and options for reduction, re-use and disposal of excavation waste should be identified.

#### (ii) Surface and Groundwater

Minimise the number of crossings of watercourses and maintain a significant distance between the road and the watercourse. A 6m buffer strip would be appropriate, this is the usual extent of buffers alongside watercourses in the UK.

River crossings and culverts should be designed to be an appropriate size. Refer to ITP design for specifications[1].

[1] ITP-Infratransproject (2004) Climatic, hydrologic and Hydraulic Calculations of the 'Milot-Rreshen' Highway

River crossings should be designed to minimise scour of the river bed. Refer to ITP design calculations for specifications[1].

### (iii) Flora and Fauna

Where possible locate the road alignment at a significant distance from rocky areas, caves and woody areas;

The use of suitable, native vegetation for mitigation.

A remedial planting schedule should be established. This should be set out in the Conditions of Contract and is the responsibility of the contractor. Measures should include avoiding locating trees in those sections that can be dangerous in case of an accident and avoiding including vegetation in those sections where this may cause a reduction of the visibility

### (iv) Landscape

A Landscape architect should be involved in preliminary and detailed design, to ensure sympathetic landscape design of road alignment, road design and construction sites. The visual impact of the overpass at Milot on the residents of Milot should be reduced through the use of good design.

### (v) National and Cultural Heritage

Areas of cultural sensitivity, important archaeological areas and built heritage assets of high value should be avoided.

### (vi) Public Consultation and Institutional Involvement

This has now been carried out please see Section 6 for details.

## 4.12.2 Construction Phase

Environmental impacts during the construction phase are to be minimised by the implementation of the Environmental Management Plan (EMP), as described on Chapter 6. All construction works should be carried out according to this EMP. The mitigation measures required to reduce the impact on the various environmental issues to be incorporated in the EMP are detailed below.

### (i) Air Pollution

The construction activities can cause dispersion of dust in the atmosphere and a reduction in local air quality through emissions of poorly operated or maintained machinery. In order to mitigate this impact the following measures should be adopted:

[1] ITP-Infratransproject (2004) Climatic, hydrologic and Hydraulic Calculations of the 'Milot-Rreshen' Highway

- Water sprinkling to limit the dust emissions in the area near the construction materials and non-asphalted roads. This system is preferential to the utilisation of chemical treatments, which could have negative effects on the flora and on the fauna and could contaminate the treated materials.
- Covering the surfaces with plastic covers during storage and transportation of materials
- Planting of trees / shrubs near the construction yard. Hedges will be located near particularly sensitive receptors.
- Periodical cleaning of the construction yard and relevant access roads
- Installation and utilisation of filters in the concreting plant to eliminate concrete dust In the absence of Albanian Standards for this process, UK standards provide a reasonable alternative. Filtered emissions can be expected to be below 10mg/m3[1].
- Efficient use of modern construction machinery to minimise emissions. For each item of plant used in the works, the values quoted in the relevant EC Directive/UK statutory instrument, where appropriate, should not be exceeded (e.g. S.I1984/1992, 1985/1968, 1987/1730, 1988/361, 1989/1127). Vehicles and mechanical plant used for the purpose of the works shall be fitted with effective exhaust silencers and maintained in good and efficient working order and operated in such a manner as to minimise noise emissions.

### (ii) Soil Erosion

***Embankment & Erosion Prevention:*** shall be undertaken to ensure that all necessary actions are incorporated to ensure embankment stabilisation, including the selection of least erodable material, use of gabions and rip-rap, and good compaction, particularly around bridges and culverts. The re-vegetation will be completed as soon as possible following fill placement to facilitate regeneration of a stabilising ground cover. Trenching will be required where necessary to ensure successful establishment of vegetation.

Slopes of road embankments will be seeded with a fast growing crop and a native seed mix immediately after fill placement to prevent scour and to encourage stabilisation.

Embankment slopes and road cuttings will be stabilised by re-vegetation with grazing resistant plant species, and the use of fibre mats, rip-rap, rock gabions, or other appropriate technologies.

Discharge zones from drainage structures will be furnished with rip-rap to reduce erosion when required, particularly in instances in which drainage structures are installed and/or road formation levels are raised and create bare slopes that require stabilisation before the onset of the rainy season.

Down drains/chutes will be lined with rip-rap/masonry or concrete to prevent erosion. Side slopes will be adjusted to a range to be determined as necessary to reduce erosion potential or, if steeper, stabilised, covered with riprap or other material to prevent soil erosion.

Construction in erosion and flood prone areas will be restricted to the dry season.

[1] UK Draft Process Guidance Note 3/1 (2003).

***Temporary protection and restoration of Borrow Pits:*** Borrow pit operation will create exposed soil slopes, which can result in severe soil erosion during heavy rainfall. Drainage interception ditches will be built surrounding the borrow pits to prevent surface run off from the hills causing erosion during flash floods. While Borrow Pits have potential to give rise to significant effects they can be avoided by adopting good site management practices, as set out in the Environmental Management Plan, Section 6. With these measures in place any effects relating to these impacts are anticipated to be at most minor in severity. Pit restoration will follow the completion of works in full compliance to all applicable standards and specifications, namely the EU Landfill Directive and Supervision Consultants specifications, as outlined below.

The excavation and restoration of the borrow pit areas and their surroundings, in an environmentally sound manner to the satisfaction of the GRD or the construction Supervision Consultant (SC) acting on behalf of the GRD, will be required before final acceptance and payment under the terms of contracts. Topsoil from the opening of the borrow pits will be saved and reused to re-vegetate the pits to the satisfaction of the SC. Additional borrow pits will not be opened without the restoration of those areas no longer in use.

***Temporary protection at disposal sites:*** Prior to the use of a disposal site, a bank will be constructed at the lower end of the site to prevent the flush of the spoiled materials in the piles into nearby rivers or farmland. Interception ditches will be built at the upper side of the site to divert the runoff away from the site. Measures will be taken to ensure waste material is not dumped in streams or at the riverside.

***Mining/Quarry Activities:*** Only licensed quarrying operations will be used for material sources. If licensed quarries are not available the contractors may be made responsible for setting up their dedicated crusher plants at approved quarry sites. Selections of quarries used for the purposes of the Project should require the approval of the SC.

***Remediation of contaminated soils:*** Where contaminated soils are encountered, measures will be taken to remediate the contamination. Where the road is to pass through areas of contaminated soils, expert advice should be sought and the appropriate on site containment, on site remediation or removal for appropriate disposal are undertaken. The responsibility for this matter needs to be resolved prior to the commencement of construction, this is usually the responsibility of the developer within the boundary of the scheme. It is not within the scope of this road project to deal with the contaminated land outside the boundary of the scheme.

### (iii) Surface and Groundwater

Stockpiles of the construction materials, such as asphalt, oil and chemicals shall not be located near to any surface watercourses, fish ponds, lakes or water wells. The stockpiles will be located on sealed surfaces, covered with canvas sheets or a more permanent roof and bunded to prevent runoff of spillages. Stockpiles should be protected to prevent vandalism and theft that can lead to spillages etc.

Side ditches will be constructed prior to road construction, to prevent the road run off and constriction site run off flowing into streams, canals or farmland.

Temporary canals will be provided to replace the exiting canals to be temporarily occupied.

Retention walls and/or interception ditches will be provided at the riverside when construction is undertaken near the river.

During the phases of concrete casting, necessary for the construction of structures (piles, plinths, abutment walls), in order to avoid the dispersion of water and concrete in the soil and in the groundwater, some measures will be adopted, such as the positioning of sheet protection to contain the casting.

The site run off discharged from construction yard activities will be treated in accordance with their type.

A programme of surface and groundwater measurements should be established prior to the commencement of construction. This will form the basis on the monitoring programme as the initial measurement prior to construction would provide a reference point for the analysis of subsequent measurements during construction. This should be carried out by the contractor as part of the mitigation programme during construction.

The water coming from washing of the machines and from the equipment requires sedimentation treatment in a settling tank for coarse particles and oil interceptors to allow the fine particles and the oils to be then eliminated.

The water coming from washing of the aggregates and from the production of conglomerates will be treated by sedimentation in tanks and then used again or sent to another place

Where the site run off is to be discharged to a river, the rate of discharge will be controlled so that it does not cause localised flooding in the watercourse.

### (iv) Noise

The construction schedule will be carefully developed for the section near sensitive receptors (schools, hospitals, residences, animals, etc.) to minimise the impact of noise. If necessary, temporary facilities to reduce noise, such as wood acoustic insulation barriers, will be installed.

The temporary access road will be designed away from villages or schools where possible. The transportation of construction materials on the exiting roads will be carefully scheduled to avoid any disturbance to the local traffic. At night, construction vehicles will be requested to operate at low speeds and the use of horns will be banned.

The operation of noisy equipment will be prohibited from 22.00 – 6.00 each day.

### (v) Flora and Fauna

The land temporarily occupied by the project would be re-cultivated or re-habilitated immediately after the construction. The topsoil layer (about 30-40 cm thick) removed during construction will be collected and stored. When the construction activities at the site terminate, the soil will be returned to cover the temporarily occupied land and then landscaped and planted to rehabilitate the habitat.

In the mountain area, tall trees will be retained as much as possible in the land temporarily occupied. For any areas requiring complete disturbance, the surface layer of soil will first be removed and stored, and then be used for restoration, reclamation and landscaping after the construction.

A survey of the trees on the route alignment should be carried out prior to construction starting to identify those that are to be protected during construction activities.

Forestry is a key habitat for ecological protection. The construction activities will be scheduled to minimise the construction period on the forests. Any necessary explosion operations or other particularly noisy operations will be minimised in order to minimise the disturbance to wild animals in the area. The operation of noisy equipment will be prohibited from 22.00 – 6.00 hours each day. Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.

The operator will be required to co-operate with the Forestry Department to locate construction sites, camps and temporary access roads. The construction camps will not be allowed to be located in forestland and the construction of the camps will be controlled to minimise damage to soil and vegetation.

In order to protect the habitats adjacent to the route alignment, the area of construction should be delineated and a line/protection zone should be defined to protect the habitats outside of the immediate construction area. This should be agreed with the local Forestry Department.

The construction activities will be carefully scheduled to avoid disturbing fauna activities. Vegetation that is likely to be used by nesting birds that is to be directly impacted on by the construction activities should be surveyed prior to construction starting, identified and removed during the non-breeding season.

### (vi) Landscape and Land Use

Fencing walls will be constructed around the construction sites near to sites of landscape sensitivity. These will be landscaped with vegetation or other means to minimise the visual impacts created by the construction sites.

The solid waste from construction and domestic sources will be disposed of regularly in engineered and designated facilities identified by the contractor. Random dumping of solid waste will be strictly banned

The material storage and mixing stations will be located at least 6 metres from the river side and landscape sites, and where they will not be visible from major public areas.

The existing roads will be used as much as possible to access construction sites. If not possible, the access roads will be selected in places that would minimise the damage to vegetation and to scenic sites.

Measures will be undertaken to minimise erosion, and the visual impacts that this has, as discussed earlier.

### (vii) National and Cultural Heritage

The areas of archaeological significance are at a sufficient distance from the proposed road, therefore specific archaeological protection measures are not required. However if during the excavations some archaeological remains are found, works will immediately be stopped and the local competent authority will be informed. The works will resume only after appropriate measures have been taken as requested by the appropriate authority and confirmation has been received from them that works can continue. During excavation in known areas of archaeological significance and areas of archaeological potential it is recommended that a watching brief is undertaken by an archaeologist.

**(viii) Stakeholder Involvement**

A stakeholder team should be established the members of which would have the responsibility of informing and consulting with the local population prior to and during the construction phase. One of the roles of this stakeholder team should be to identify through consultation with the local population, the areas of significant cultural heritage that will require protection during construction. It would be advisable to introduce a 24hour hotline with logging of calls and a list of actions to be taken.

**(ix) Traffic and Road Safety**

A Road Safety Audit program, as defined by the Transport Research Laboratory, UK[1], or equal, would be undertaken in conjunction with the design. This shall specify design measures, vertical and horizontal signage, guard rails and all other measures necessary to ensure maximum traffic safety. These measures shall be included in the contract drawings and technical specifications as appropriate. Further safety audits should be undertaken during construction and operation to ensure that measures are implemented and successful.

The road safety program will include audits at the following stages:

- Prior to final design a road safety expert would visit the selected road alignment and, after discussions with GRD, prepare an audit report indicating road safety elements to be included in the road design and incorporated into the construction contract drawings and specifications.
- Prior to acceptance of the design, the safety expert would review the design drawings and specifications to ensure that the safety requirements have been met.
- On completion of construction and prior to commissioning of the road the safety expert would inspect the road to ensure that the required safety features have been incorporated. He may also recommend additional administrative measures to be taken such as speed limits. He would submit an audit report indicating either acceptance of the road or listing items that need to be completed as well as his recommendations for administrative measures to be taken during operation of the road.
- Approximately two years after the road has been opened the safety expert would inspect the road and review safety experience with the responsible authorities. He would prepare an audit report detailing any further measures he would recommend measures to improve safety.

It is recommended that the safety audit procedure be combined with training in the procedure for GRD staff such that they would be capable of undertaking the audit procedure for other roads in Albania in the future.

### 4.12.3 Operation phase

Remedial and rehabilitation works would be undertaken after the construction phase to restore where possible the environment impacted upon by the road. Certain measures are required to

[1]Transport Research Laboratory, Old Wokingham Road, Crowthrone, Berkshire RG45 6 AU, U.K., Tel: 44.1344.773131, Fax:44.1344.770356, Email enq@bdu.trl.co.uk

ensure continued best environmental practice in the post construction operation of the road. The following sections detail the mitigation measures required post construction and remediation.

### (i) Soils

On completion of the road, visual inspections of all the structures along the alignment, including bridges, embankments and culverts would be undertaken to ensure that the road structures are not causing erosion, and to identify the requirements for and to carry out any remedial work. This would minimise the potential future impact of loss of soils and the associated landscape impacts caused by erosion.

### (ii) Noise

The road should include speed restrictions in built up areas to minimise the impact of noise to the local population, and also to improve safety. These could include physical structures to manage traffic (eg. speed humps) as well as signposts clearly identifying the speed limit.

### (iii) Landscape and Land Use

All housing and other properties with the exception of authorised service stations and rest facilities should have access via side roads. The construction of housing within the 44m right of way of the new toad should be prohibited. All construction is subject to licensing by the district, as the responsible unit of local government. GRD will make representations to the local authorities of the Lezhe, Rreshen and Kukes districts to implement these requirements and would use their influence to ensure that they are implemented.

Reduced impacts to agricultural land use can be achieved by including signposts in areas of significant livestock movements to alert the drivers of the presence of livestock and so protect the livestock.

### (iv) Surface and Groundwater

The use of sustainable drainage systems, such as retention basins with reedbeds should be considered. These can reduce flood risk through the storage and controlled release of storm water runoff. They can also improve the water quality of road runoff prior to discharge into watercourses.

Appropriate protection measures are required on the banks of the River Fani and Matit, opposite the proposed groynes, together with adequate bank projection measures which are currently being designed by ITP at the side of the proposed road.

### (v) Flora and Fauna

Appropriate signposts would be provided in areas of significant wild fauna movements to alert the drivers of the presence of wildlife and so protect the species.

### (vi) Institutional Strengthening

The existing structure and staffing of GRD does not include any staff with sufficient environmental knowledge and experience. Therefore GRD would not be in position to enforce the requirements of

the Environmental Management Plan without some form of additional support. In order to make such support sustainable it is recommended that an element of technical assistance and institutional strengthening be provided through the project to GRD. They have recently employed and Environmental Technician, but would also benefit from employing a Senior Environmental Scientist and an Environmental Scientist.

An initial Environmental Team for GRD could be staffed as follows:

- Senior Environmental Scientist (minimum 5 years post graduate experience in environmental sector)
- Environmental Scientist (graduate in one of environment sciences, earth sciences, biology, landscape)
- Environmental Technician (holder of diploma in civil engineering, earth sciences or geography)

This institutional strengthening should address the following issues:

- Training of the Environment Unit (GRD) in good and best practice in terms of environmental management in relation to road construction, operation and maintenance (this would require training needs assessment to identify the most appropriate training intervention – selecting an appropriate mix of full time academic training, short courses in Albania or elsewhere in Europe, on the job training). Refer to section 6.4.1.3 for further details.
- Procurement of equipment required by staff responsible for environmental management in GRD, including:
  - 4WD vehicle,
  - laptop computers,
  - flat bed A3 colour scanner,
  - Laserjet printer with double sided printing,
  - Colourjet Plotter (for A0 size drawings),
  - photocopier with capability for double sided printing and enlargements,
  - GPS equipment,
  - on site monitoring equipment (air quality, noise and water quality),
  - laboratory equipment as identified in the monitoring plan and this should be obtained prior to the construction stage. (if no other suitable lab available for GRD to use),
  - digital camera,
  - reference materials (birds, mammals, reptiles, flora identification books, water quality guidelines, contaminated land guidelines, environmental standards and European Directives relating to environmental protection, copies of Albanian Legislation),
  - software (both standard such as MS Office and project specific [eg. drawing and digitising packages])

Training staff in the use and maintenance of equipment to a good standard of understanding and competence during the project should be conducted by on site supervision and inspection. An

Environmental Specialist who has at least 5 years experience of site supervision as an Environmental Clerk of Work should carry out this work.

Training staff in environmental management objectives, processes and procedures (i.e. assisting the team to develop and publish guidelines for environmental management in Albania) should be conducted by an Environmental Specialist with at least 10 years experience of training, productions of guidelines and standards related to environmental management. This training should use this project as the basis for developing the guidelines.

The output would be documents that are adopted as national environmental management standards for all roads in Albania, and a team that is fully conversant with the implementation and the implications of the standards. The standards clearly need to reflect the level of economic development in Albania but should always seek to maintain good environmental management and protection. A procedure for full review and updating of the standards must also be developed and adopted under this support element.

This team should also be trained in public participation techniques, so that they can provide support within GRD to the expropriation department responsible for resettlement issues. In the interim period there are NGO's in Albania with the appropriate public participation experience (such as the Regional Environmental Center for Central and Eastern Europe) that could provide assistance with this task.

Clearly institutional strengthening would only be possible if staff is recruited to work within GRD. The establishment of the required institutional structure and commitment to recruitment of staff should be a condition of any external support to GRD for this project.

#### (vii) Maintenance

The maintenance strategy for the roads in Alternatives 1, 2 and 3 is modelled on the GRD's current strategy. This strategy presumes that the non-upgraded roads on the national network would receive the same as maintenance as that the reconstructed or new construction.

This maintenance is overlay when roughness is >= 8 IRI, overlay; patching when more than 5 potholes occur per km and repair shoulders every 7 years.

### 4.12.4 Road Maintenance Institutional Strengthening

The Government of Albania has now awarded a consultancy assignment to prepare a detailed road maintenance project. This project applies to a proportion of the total road network, however, the new maintenance management systems established during the project will enable GRD to extend these improvements to the total road network.

# 5 Analysis of Alternatives

## 5.1 Alternatives

The main Alternatives have been described in Chapter 1.

Alternative 3 had several options which were assessed and discounted at an early stage for technical reasons. The discussion on the specific options is included in Chapter 5 of the FS but in summary most of the options in Alternative 3 were all on tracks or in valleys that have serious rock slide problems. The topography of these routes did not appear to allow sensible road alignments to be achieved, thereby reducing dramatically the speeds that could be achieved on them. Therefore these options were not included in the overall assessment of the Alternative. The only option that had a good technical basis for proceeding was Alternative 3A-2 with a 6.1 km tunnel.

## 5.2 Assessment

The analysis of Alternatives has been carried out in two stages. Firstly a detailed assessment of all the impacts for the three Alternatives has been carried out without mitigation measures being implemented. This was used to identify which mitigation measures would be required, to feed through into the development of the Environmental Management Plan.

Secondly, a review of the impacts has been carried out assuming mitigation is implemented (in accordance with the mitigation measures discussed in the preceding chapter).

The initial assessment of impacts has been carried out through the use of a matrix as set out below. Each environmental asset has been qualitatively assessed as to whether the proposed route would have a significant benefit, some benefit, neutral impact, some negative impacts or significant negative impacts. This assessment is complicated by the fact that the routes have benefits in places and detrimental impacts in others. Therefore this assessment has tried to examine the overall impact as perceived by the environmental staff carrying out this survey, but based on the separate sections of each route as follows:

**Alternative 1**

- Section 1.1 Alternative 1 starts on the coastal plain to the junction with Alternative 2 at Hodroja Dilemma
- Section 1.2 Alternative 1 from Hodroja Dilemma to the junction with Alternative 3 at Kolshi
- Section 1.3 Alternative 1 from Kolshi to the Kosovo border at Morine

**Alternative 2**

- Section 2.1 Alternative 2 from Milot to its bifurcation from Alternative 3 at Blinisht
- Section 2.2 Alternative 2 from Blinisht to the Junction with Route 1 at Hodroja Dilemma
- Section 1.2 Alternative 1 from Hodroja Dilemma to the junction with Alternative 3 at Kolshi

- Section 1.3 Alternative 1 from Kolshi to the Kosovo border at Morine

**Alternative 3a – Valley Route**

- Section 2.1 Alternative 2 from Milot to its bifurcation from Alternative 3 at Blinisht
- Section 3a.1 Alternative 3 from Blinisht through Thirra and the tunnel to Alternatives 1 and 2 at Kolshi
- Section 1.3 Alternative 1 from Kolshi to the Kosovo border at Morine with Kosovo

The matrix shows scores assigned in a qualitative assessment of the assets according to the follow structure:

-2 severe negative impact leading to permanent or significant loss or change to an asset

-1 moderately negative impact leading to relatively localised or short term impact that is recoverable

0 neutral impact in terms of the overall project – this includes negative or positive impacts that are very localised and limited in number

1 moderately positive impact leading to relatively localised or short term benefits

2 substantial positive impact leading to permanent or significant improvements to society or environmental assets

The assessment builds on that presented in the FS. It considers construction and operation and maintenance phases and whether impacts are:-

- Direct or indirect
- Immediate (taken to be within one year of construction commencing) or long term (this impact will last for many years and could be permanent)
- Avoidable or unavoidable

Note that it is possible for impacts to be both direct and indirect, immediate and long term. Most impacts are either avoidable or unavoidable.

The resulting matrices are shown in Appendix 1, EIA, for each Alternative.

Building on from this a summary of the Alternatives is provided below – taking into account mitigation and also assessing the "no action" option.

**Table 5.1: Analysis of Alternatives**

| Environmental Aspect | No Action – Alternative 1 & 2 remain as now | Alternative 1 – rehabilitation of road | Alternative 2 – rehabilitation of road | Alternative 3 (Section 3a.1) (Blinisht and Kolshi) |
|---|---|---|---|---|
| Topsoil Loss | No change to current situation – no loss of topsoil in agricultural lands | Middle level impact – between Alternative 2 and 3. | Least topsoil and subsoil required to be stripped. | Largest volume of topsoil and subsoil has to be stripped |
| Contaminated Land | Contaminated run off continues uncontrolled where roads pass through existing abandoned mine workings.<br><br>Potential risk that contamination land (tailings dam) at Fushe-Arrez fails if no action taken under this project to rectify erosion of the dam face. This would impact severely on water quality and the road. | Contamination land controlled at Perbregu and Fushe-Arrez where road crosses old mine workings.<br><br>Potential risk that contamination land (tailings dam) at Fushe-Arrez fails if no action taken under this project to rectify erosion of the dam face. This would impact severely on water quality and the road. | Contamination land controlled at Rubik, Perbregu and Fushe-Arrez where road crosses old mine workings.<br><br>Potential risk that contamination land (tailings dam) at Fushe-Arrez fails if no action taken under this project to rectify erosion of the dam face. This would impact severely on water quality and the road. | Contaminated land controlled at Rubik, Reps, Perbregu where road crosses old mine workings.<br><br>Potential risk that contamination land (tailings dam) at Fushe-Arrez fails if no action taken under this project to rectify erosion of the dam face. This would impact severely on water quality and the road. |
| Tunnel Waste | No Impact | No Impact | No Impact | Up to 760,000 $m^3$ of tunnel waste material to be disposed of. If tunnel can be driven from north (downhill) then options for disposal greater than if tunnel driven from the south (uphill). |

| Environmental Aspect | No Action – Alternative 1 & 2 remain as now | Alternative 1 – rehabilitation of road | Alternative 2 – rehabilitation of road | Alternative 3 (Section 3a.1) (Blinisht and Kolshi) |
|---|---|---|---|---|
| Air Quality | No change to current situation | Little difference to current situation – marginal improvement due to better alignment probably outweighed by increases in traffic volumes.<br><br>Could lead to improved air quality on western half of Alternative 2 – but as Alternative 2 is shortest route to Tirana/Durres there may be less change in traffic volumes than hoped for on this route. | Little difference to current situation – marginal improvement due to better alignment probably outweighed by increases in traffic volumes.<br><br>Would lead to improved air quality on western half of Alternative 1. However, as Alternative 2 already has much higher traffic load than the western half of Alternative 1 then improvement on Alternative 1 may be insignificant. | Largest impact on new road alignment – where exceptionally little traffic experienced at present – would lead to improved air quality on large part of Alternative 1 and 2. Open country makes air quality a low significance impact.<br><br>Major impact on air quality at tunnel portals – potentially much more severe air quality issue than on other two alternatives – mitigated by remoteness of site and lack of receptors. |
| Noise | No change to current situation – not a significant impact generally. | Slight increase in traffic would increase sound levels but not considered major issue. | Slight increase in traffic would increase sound levels but not considered major issue. | Major impact on the new road section – where noise levels very low – enclosed nature of the valley makes noise more noticeable. Tunnel boom as traffic enters and leaves portals |

| **Environmental Aspect** | **No Action – Alternative 1 & 2 remain as now** | **Alternative 1 – rehabilitation of road** | **Alternative 2 – rehabilitation of road** | **Alternative 3 (Section 3a.1) (Blinisht and Kolshi)** |
|---|---|---|---|---|
| | | | | but lack of receptors makes this less important. |
| Climate (not significant issue – relates to emission of greenhouse gases) | Worst case as existing roads cause traffic to drive least efficiently. | Less impact due to improved road alignment than "no action" | Less impact due to improved road alignment than "no action" | Least impact as road has lowest gradient and vehicles able to operate more efficiently |
| Surface and Groundwater | Erosion siltation) continues unabated. | Improved situation as erosion control measures implemented. Most effective on common section beyond Fushe-Arrez. Erosion control still required on western half of Alternative 2. | Improved situation as erosion control measures implemented. Most effective on common section beyond Fushe-Arrez – erosion control still required on western section (Mjeda to Fushe-Arrez) of Alternative 1 | Erosion potential should be lowest of three alternatives on the new section of road. Erosion control on western part of Alternative 2 (Milo to Blemish) and eastern part of Alternative 1 (Kolshi to Morine) improved.<br><br>Erosion control still required on Alternatives 1 and 2 were these not rehabilitated. |

| Environmental Aspect | No Action – Alternative 1 & 2 remain as now | Alternative 1 – rehabilitation of road | Alternative 2 – rehabilitation of road | Alternative 3 (Section 3a.1) (Blinisht and Kolshi) |
|---|---|---|---|---|
| Road Drainage | Risks to environment from spillages continue as now as majority of drainage is natural runoff to road verge. | Risks to environment from spillages continue as now as majority of drainage is natural runoff to road verge. Road alignment will discourage fast road speeds – thus reducing risk of accidents involving HGVs as they will be travelling slowly on winding roads. | Risks to environment from spillages continue as now as majority of drainage is natural runoff to road verge. Road alignment will discourage fast road speeds – thus reducing risk of accidents involving HGVs as they will be travelling slowly on winding roads. | Over most of road risks of spillages continue as now. Risk is potentially highest on new road section where good road alignment and gradient will encourage faster speeds – thus increasing risk of accidents. This alignment is near to river – important receptor.<br><br>Tunnel drainage requires holding tanks/pollution control system at south portal. In event of major contaminating incident water cannot be released to environment – must be taken away for treatment at nearest appropriate wastewater plant. If incident is extreme risk to river in valley is greatly increased. |

| **Environmental Aspect** | **No Action – Alternative 1 & 2 remain as now** | **Alternative 1 – rehabilitation of road** | **Alternative 2 – rehabilitation of road** | **Alternative 3 (Section 3a.1) (Blinisht and Kolshi)** |
|---|---|---|---|---|
| Flora and Fauna | No change | No significant impact – minor loss of flora due to road widening – as length of road is longest then this would have greater impact than Alternative 2. | No significant impact – minor loss of flora due to widening of existing road. Potentially less impact than Alternative 1 due to shorter distance. | Greatest potential impact despite much shorter distance. Disposal of tunnel waste will cover significant area of flora. Flora will be lost where new road alignment is constructed. |
| | | No loss of flora on western half of Alternative 2 if this route preferred. | No loss of flora on western half of Alternative 1 if this route preferred. | |
| | No change to impact on fauna | No significant impact on fauna | No significant impact on fauna | Potentially largest impact on fauna through opening up of wilderness with good access in the new road section. Unable to quantify – this impact could be mitigated by third party (regulator) enforcement. |

| **Environmental Aspect** | **No Action – Alternative 1 & 2 remain as now** | **Alternative 1 – rehabilitation of road** | **Alternative 2 – rehabilitation of road** | **Alternative 3 (Section 3a.1) (Blinisht and Kolshi)** |
|---|---|---|---|---|
| Landscape | No change to existing impact. Impact on landscape is noticeable – but not extreme. | No significant change to existing impact – some increased areas of embankments and cuttings required to accommodate wider carriageway – but mitigated against by planting etc. | No significant change to existing impact – some increased areas of embankments and cuttings required to accommodate wider carriageway – but mitigated against by planting etc. | Largest impact of all three Alternatives is the new road through the valley north of Blinisht will be significant landscape impact. |
| Land Use | No change to current situation. Poor access to markets continues potentially restricting agricultural economy. | Improved access to markets – minor increase in land take for the several realignments of the carriageway. | Improved access to markets – least increase in land take from farms and inhabited areas of all three options. | Largest potential loss of agricultural and inhabited land – increased access to markets for rural communities in the valley (a major benefit) – potential increase in access to rich timber resources on mountains around the valley (which are already being logged without control). |

| **Environmental Aspect** | **No Action – Alternative 1 & 2 remain as now** | **Alternative 1 – rehabilitation of road** | **Alternative 2 – rehabilitation of road** | **Alternative 3 (Section 3a.1) (Blinisht and Kolshi)** |
|---|---|---|---|---|
| Population and Economy | No significant change | Improved access to markets – but no increase in number of communities exposed to markets. Longest route so provides least benefit to national economy. | Improved access to markets – but no increase in number of communities exposed to markets. Second shortest route so provide second highest level of benefit to national economy.<br><br>Currently lower levels of traffic on Alternative 1 from Fushe-Arrez to coast mean that the decrease in road condition (access) in this section not as great as the loss of access for people on Alternative 2 if Alternative 1 selected. | Increased access to markets for communities in new road section. However, this benefit should not be over-estimated as most agriculture is subsistence agriculture and consumed by the farmers.<br><br>Shortest route so provides greatest benefit to national economy.<br><br>Potential loss of access to markets and less attractive for civil servants working in towns on Alternatives 1 and 2 if maintenance is not improved and maintained. |

| **Environmental Aspect** | **No Action – Alternative 1 & 2 remain as now** | **Alternative 1 – rehabilitation of road** | **Alternative 2 – rehabilitation of road** | **Alternative 3 (Section 3a.1)**<br><br>**(Blinisht and Kolshi)** |
|---|---|---|---|---|
| National & Cultural Heritage | No change to current situation – neutral impact | No significant impact. | No significant impact | Potential loss of cultural values in remote areas made more accessible along the new section of road. This brings both benefits (reduction in influence of Kanun of Lek) and disbenefits (loss of individual character and cultural values that provide some of the attractiveness of the area). |
| Protected Areas | No routes pass through protected areas – no difference between "no action" and any of the three options | | | |

## 5.3 Cumulative Assessment

This report assesses three routes, Alternatives 1, 2 and 3, as follows:

**Alternative 1 : Milot – Mjeda Dilemma- Puke – Hodroya Dilemma - Kukes – Morine**

The route from Milot to the junction south of Shkodar will have already been constructed and is not considered further in this assessment. The route then follows the existing road alignment running east through Puke and Kukes to Morine.

**Alternative 2 : Milot – Rreshen – Blinisht – Hodroja Dilemma– Kukes – Morine**

This road will follow the route of existing roads. This route was shown to have the highest traffic levels in the traffic survey of December 2002 and January 2003.

**Alternative 3 : Milot – Rreshen – Blinsht—Thirra—tunnel- Kolshi- Kukes – Morine**

This route involves new road construction north of Blinisht and a tunnel through the Kamimachi massf to link with RN 5 at Kolshi. The tunnel would be 6.1 km in length.

Options for Alternative 3 were considered and these are shown on Drawing No. 66254/HWY/WIN/DRG/3001 that is included in Appendix 12, FS. These are alternatives 3A-1, 3A-1a, 3B-1, 3B-2, 3B-3 and 3C were rejected technically. These routes were not surveyed for this EIA.

This assessment covered the following:

- soils
- air and noise
- surface and groundwaters
- flora and fauna
- landscape
- traffic
- land use
- socio-economics and
- cultural heritage.

The impacts of Alternatives 1 & 2:

- Reasonably equal potential improvements in controlling erosion, much of the worst erosion takes place on the common stretch of the two alternatives.
- Minimal impact on social values of communities along both Alternatives.
- No loss of landscape character for the routes.
- No significant increase in potential for illegal logging or hunting.
- No significant increase in maintenance requirements.
- Slight increases in land taking but not severe.
- Slight improvement in travel times and road safety – thus providing some benefit to the national economy, but not as much as Alternative 3.
- The potential to have increases in illegal logging and hunting in the widerness area due to improved access – countered by increased access making policing of such activities slightly easier as well.

The impacts of Alternative 3 (Milot-Blinisht and Kolshi-Morine) are:

- The need to dispose a very large quantity of tunnel waste and subsoil from the new road alignment (estimated at over 760,000 $m^3$ to 1,000,000 m3).
- The impact on social values of remote communities (which could be both beneficial and negative).
- The loss of special wilderness feel of the Fani i Vogel valley - which might not be valued by local communities but by potential visitors.
- The potential to have increases in illegal logging and hunting in the wilderness area due to improved access – countered by increased access making policing of such activities slightly easier as well.
- The opening of access to services, facilities and markets to the area that has previously poor access. However, most agriculture is subsistence level and farming potential is low (due to lack of suitable land) so market access is less important.
- The potential increase in pollution and waste management problems if ribbon development takes place along the new section of the road (possible but unlikely to be severe due to remoteness and low population density of the area).
- The need to continue maintenance of large sections of Alternative 1 and 2 for very much lower traffic volumes – and potentially leading to very reduced access in the long term of communities currently served by Alternative 1 and 2.

As can be seen the major impacts have been integrated with regards ecology, landscape and cultural heritage and socio-economics/land-use. Soils, water quality, air and noise issues are considered to be less important and broadly similar for all the Alternatives except the new road section of Alternative 3 (Blinisht to Kolshi), where there are no existing roads on the national road network and where the tunnel drainage requires special attention.

Alternatives 1 and 2 are broadly similar in environmental terms since they involve upgrading and minor re-alignment of existing roads through mainly a very mountainous terrain. Alternative 3 (Blinishti – Kolshi) involves a tunnel that would present a major environmental problem of spoil disposal. It would have to be wasted on level land, which is in short supply and would therefore expend a scarce agricultural resource.

The tunnel would also concentrate air pollution at its portals. The northern portion of Alternative 3 would require the construction of a new road, Reps to Kolshi, in a remote area where only a dirt road now exist. The project area is earthquake prone and earthquakes (or an accident in the tunnel) could destroy or damage the transport links severely and so incur major costs in re-establishing them.

In terms of landscape, ecology and national heritage, the northern portion of Alternative 3, Reps to Kolshi, would impact a precious resource. The remoteness of the valley means that the landscape has high wilderness quality and its ecosystem is less damaged and is more vulnerable to access such as to timber stripping, waste dumping, etc. as now occurs along Alternatives 1 and 2 and Albania in general. In addition, the cultural heritage of the Mirdita region centres around Orosh where the old fortress (kulla) and cathedral are historical monuments. The long-term potential of this valley as a tourist resource to experience wilderness, landscape and culture would maybe compromised by the development of a national road. It is recognised that this touristic potential would not necessarily bring major benefits to many residents of the area who now seem to prefer better access to services and facilities.

Alternative 2 would provide an effective gateway to the Mirdita without destroying their uniqueness.

Finally, the communities along this portion of Alternative 3, Blinisht-Thirra, are rural and smaller than those along Alternative 1 and 2 where larger existing communities could be by-passed. Therefore, the positive gains from ancillary development potential are less along this portion of Alternative 3 than on Alternatives 1 and 2 where they now exist. For these reasons Alternative 3 is considered the least desirable in socio-economic terms – excluding the very major benefit of reducing travel times between Durres and Morine by almost 50%.

Environmentally, the decision for selecting the preferred option lies between Alternative 1 and 2 where the environmental impacts are broadly similar. However, Alternative 2 passes through or near to more towns than Alternative 1 and is shorter than Alternative 1. Alternative 2 is the preferred route for most traffic between the border and Tirana/Durres at present.

Therefore, Alternative 2 would bring benefits in terms of potential socio-economics to more people rather than opening an undisturbed area of the Fani i River valley for development.

On these grounds Alternative 2 is recommended the best route for development environmentally.

## 5.4 Main Conclusions of Assessment of Alternatives

On behalf of the GRD, the Consultant prepared the FS and EIA evaluating the three main Alternatives to improve road transport between the Port of Durres and the Albania-Kosovo border crossing at Morine. EIA considered three routes, Alternatives 1, 2 and 3, as follows:

**Alternative 1: Milot – Mjeda Dilemma- Puke – Hodroya Dilemma - Kukes – Morine**

The route from Milot to the junction south of Shkodar would have already been constructed and is not considered further in this assessment. The route would then follow the existing road alignment running east through Puke and Kukes to Morine.

**Alternative 2: Milot – Rreshen – Blinisht – Hodroya Dilemma– Kukes – Morine**

This road would follow the route of existing road passing through Rubik-Rreshen-Fushe Arrez- Kolshi, Kukes and Morine

**Alternative 3: Milot – Rreshen – Blinsht—Thirra—tunnel- Kolshi- Kukes – Morine**

This route would follow the existing road from Milot to Blinisht and then run almost parallel to Fani ii Vogel River to Thirra where there would be a tunnel. The tunnel would link the Fani i Vogel valley to Kolshi and then running east through Kukes to Morine.

The assessment covers the following:

- soils
- air and noise
- ecology
- landscape value
- land use
- socio-economics
- cultural heritage.

Therefore the environmental decision lies between Alternative 1 and 2 where the environmental impacts are broadly similar. However, Alternative 2 passes through or near to more towns than Alternative 1. Therefore, Alternative 2 should bring benefits in terms of potential socio-economic development to more people and less destruction of undisturbed environment. Alternatives 2 and 3 would also make the abandoned mines more easily accessible, facilitate moves to re-open the mines and/or remediate the contamination at these sites.

## 5.5 Preferred Alternative

As a result of the studies carried out, Alternative 3 is the preferred Alternative. It is shorter and requires a shorter time to cover the distance: 2 hours 28 minutes compared with 3 hours 47 minutes for Alternative 1 and 3 hours 32 minutes for Alternative 2. It has also geometric and safety standards that give the possibility to reach a design speed of about 70-80 km/h, compared with 40-50 km/h of the other two solutions. It is also very important to point out that the new road section of Alternative 3 (Blinisht-Kolshi) is located in the Fani ii Vogel River valley and in a 6.1 km tunnel so it can be used during the whole year. On the contrary parts of Alternative 1 & 2 are located at high elevations and are subject to closure during the winter period from ice and snow.

# 6 Public Consultation

### 6.1.1 Consultation undertaken by Mott Macdonald/Tecnics on Alternatives in Durres Morine Road Corridor

Public consultation was undertaken to disseminate information about the project to the affected population and to incorporate their views and suggestions in the preparation of engineering design. At local government level, a scoping workshop was held at Shkoder (22.07.03), Rreshen (17.06.2003) and Kukes (16.6.2003) to determine the people's and civil society's ideas and opinions about the project.
People invited were:

- The Prefects
- The mayor of each involved town council
- Elders of the smaller communities
- Businessmen's Association
- Public representatives
- NGOs

During the meetings the project was described verbally and through documentation. Questionaire 2 was distributed and completed by all attendees. Data from the completed questionnaire were used to identify opinions on the Alternatives and environmental aspects.

For the Districts of Kukes and Mirdita (Rreshen) 76 persons have filled the Questionnaire (42 in Kukes and 34 in Rrsheni). All persons declared that they are favourable for the realization of the project and chose Alternative 3 predominantly. At both locations, the interviewees identified that the road would contribute to the economic development of the area and that the negative environmental impacts would be less than the advantages accrued to improving the road.

In the district of Shkodar 12 people held the meeting and 7 of them completed the Questionnaire. All persons declared that they are favourable for the realization of the project but chose mainly Alternative 1 because Alternative 1 is the solution that across this area .

### 6.1.2 House–to–House Survey of Inhabitants

The interviews were performed during June 2003 and the residents of 141 structures along the centreline of Alternative 3 were interviewed. The types and numbers of buildings surveyed are shown in Table 6.1.1 and Table 6.1.2 that detail the structures by type, number and location.

**Table 6.1.1 Type of Buildings**

| Type | Total no. |
|---|---|
| Residence | 87 |
| Gas station | 6 |
| Garage | 3 |
| Kiosk | 7 |
| River plant | 2 |
| Bar | 7 |
| Bar-restaurant | 9 |
| Shop | 6 |
| Commercial centre | 9 |
| Service department | 2 |
| Agricultural activities | 2 |
| Cultural centre | 1 |
| School | 1 |
| Health service | 1 |
| Warehouses | 1 |
| Other | 3 |

In details, there are 5 buildings located in the district of Lezha, 117 in the district of Mirdita, and 25 in the district of Kukes.

**Table 6.1.2 Location of Buildings**

| Location | Districts | Total no. |
|---|---|---|
| Lezha | Lezha | 5 |
| Rreshen | Mirdita | 9 |
| Fierze | Mirdita | 13 |
| Rubik | Mirdita | 42 |
| Rreps | Mirdita | 2 |
| Mashterbor | Mirdita | 1 |
| Vorpaj | Mirdita | 3 |
| Bisak | Mirdita | 3 |
| Klos | Mirdita | 14 |
| Domgjon | Mirdita | 2 |
| Thirra | Mirdita | 7 |
| Kukes | Kukea | 25 |
| Ura e Fanit | Mirdita | 4 |
| Geziq | Mirdita | 4 |
| Qaf Segjel | Mirdita | 2 |
| Blinisht | Mirdita | 11 |

### 6.1.3 Characteristics of the Communities

The interviewees were mainly over 30 years old (80.0%) and the majority (65.0%) are Roman Catholic, while the others (35.0%) are Muslim. Religious affiliation does not establish social conflicts but they do influence the way of living.

The average family consists of 7 members, 30% 5 members and 6% have 8 to 13 members. Very often different generations live together as large families with children, old aged and unemployed predominating.

### 6.1.4 Economical and Living Characteristics

Most have built their own houses themselves. They are owners of the structures surveyed (90%) but their economic status and standard of living are low. Some 25% receive pensions, 22% are employed in business trade, 15% receive a government subsidy, 17% is employed in the private sector, 5% is employed in agriculture, 7% work in the state administration and 8% is unemployed. It appears that the road would provide an opportunity to develop activities trade and social services but little to develop agricultural activities.

## 6.2. Public Consultation undertaken during Scott Wilson EIA Review

### 6.2.1 Scoping Meetings

Scoping meetings were held with key parties involved in the scheme to brief them on the work to be undertaken by Scott Wilson, the Terms of Reference and information required to undertake the review. Meetings were held with the following:

- The Ministry of Tranport: General Roads Directorate (GRD) PIU Unit – Adem Duka (Director), Stephen Kay (Procurement Advisor);
- The Ministry of Tranport: General Roads Directorate: Sokol Agaraj (GRD Deputy Director, Genci Dautaj (Head of Environment Unit);
- The Minstry of the Environment – Etleva Canaj (Deputy Minister);
- The Minstry of the Environment – Petraq Llambushi (Chief Inspector);
- INFRATRANSPROJECT LTD (ITP) – Dr Eng Faruk Kaba (General Manager);
- World Bank, Albania – Artan Guxho (Projects Officer).

### 6.2.2 Public Meetings

The public meetings were undertaken by the GRD, based on the advice provided by Scott Wilson. The findings were subsequently prepared by the GRD and sent to Scott Wilson for incorporation in this EIA Review Document. Following World Bank Procedures for category A projects and the EU Directive, consultation is required with all project affected groups and local NGOs. Public consultation was carried out in Milot, Rubik and Rreshen.

The consultation agenda at each event was as follows:

- Welcome by Chairman of Local Power (Chairman of District)
- Presentation on purpose of this meeting and presentation of participants
- A specific and illustrative description of purpose of debate on Public Consultations
- A technical summarized description of Project and Technical Report

- Introduction of EIA draft (Enviromental Impact Assesment)
- A non-technical summarized report of Environmental Study draft (provided by Scott Wilson)
- Presentation of EIA draft according to main chapters
- Public debate with questions, answers, clarifications etc.
- Providing participants with access to the technical file, maps and environmental record.

### 6.2.3 Attendees

Attendees included the following:

- Representatives of relevant communities and not excluding here concerned persons affected by this project;
- Central and local power experts of different Ministries as Ministry of Environment, Ministry of Agriculture, Ministry of Territory Adjustment and Tourism;
- Municipalities;
- Prefecture of Lezha, Prefecture of Districts of Mirdita and Kurbin;
- Communes and concerned municipalities;
- Representatives of regional environmental agencies of Lezha, Mirdita and Kurbin;
- Environmental associations of Lezha Mirdita and Kurbin; and
- Citizens, farmers, experts of different fields, professors and representatives from small middle and large businesses.

Attached in Appendix 1.A are the relevant details on participants of this meeting.

### 6.2.4 Public Debate with questions, answers, clarifications etc.

Table 6.2.1 to 6.2.3 list the key concerns raised at the three debates organized displayed by topic area. The full text of the public debates is available in Appendix 1.B.

**Table 6.2.1 Key issues of public debate at Milot**

| Environmental factor | Question/ Discussion | Answer |
|---|---|---|
| Geology | - | - |
| Soils | - | - |
| Air Quality | - | - |
| Noise | What are the mitigation measures for noise and air quality during construction? | The mitigation measures during the construction stage are being reviewed. |
| Climate | | |

| | | |
|---|---|---|
| Surface & Ground Water | Will it destroy the existing sewage and potable water system? | ITP engineers guarantee to not destroy the system. |
| | Will there be any problem with irrigation system? | Answer from ITP engineers. The project is likely to increase the safety of the irrigation system. |
| | Had concerns over problems with potable water systems. Asked that standards and rules are respected during works and that there is care towards the sewage system | |
| | Is there any protection for the irrigation system | In general no problems to Irrigation foreseen in Project. Form 3/1 of urban planning brief is the agreement between GRD and Directorate of Water System and should solve concerns of all farmers. |
| Flora & Fauna | Is there any foreseen problem with respect to the passage of animals across the road? | Yes, a study on a signaling system will be delivered by the end of April. |
| Landscape | - | - |
| Socio Economic | Is it possible to link the other branch roads with the main road to exactly connect further villages and neighbourhoods? | Road is based on advanced European standards and which informs intersection frequency. So we can´t construct enter – link roads for any km of road (based on the old Albanian standards). |
| | How many interchanges will be along the road starting from the trumpet (first interchange in km 0,000) up to exit of Milot? | Two interchanges as shown in the Project drawing |
| | If there is any possibility of citizen employment during road construction stage, from the relevant company | Yes |
| | If there is foreseen in the project the declaration as a | Not yet, up to now, for more this is not under our competence, but |

| | | |
|---|---|---|
| | tourism area? | under the competence of National Council of Tourism. |
| National & Culture Heritage | - | - |
| Traffic & Road Safety | - | - |

**Table 6.2.2 Key issues of public debate at Rubik**

| Environmental factor | Question/ Discussion | Answer |
|---|---|---|
| Geology | | |
| Soils | How will you deal with lands which under risk of erosion due to the army? | These will be immediately rehabilitated when the river level reduces. |
| Air Quality | - | - |
| Noise | - | - |
| Climate | - | - |
| Surface & Ground Water | In 1992, the level of the river passed this bridge. Is this known? | Yes |
| | Concerns about waste disposal by the side of the river. | The expert in this field promised an urgent solution on this topic. |
| | Will there be interference with the irrigation system? | Project implementation does not interfere with irrigation system, but GRD representatives argued once more the fact of 3/1 relevant form signed between Urban Planning department and Water system Directorate as a guarantee of this problem. |
| Flora & Fauna | Is any consideration taken of climate conditions and how flooding may affect fauna and flora? | Data is not available on the first draft but such data will be made be available and inserted into the final report. |

| | | |
|---|---|---|
| | Will there be any vegetation of the area in this project? | No, this is not included in the project. This issue belongs to Ministry of Agriculture and Forest Directorate. |
| Landscape | | |
| Socio Economic | What is the legal basis for land liquidation? | Legal basis is Law for Expropriates No. 8561, dated in 22-12-1999 relevant legal acts in power |
| | What are time limits to perform expropriation? | Due to continue up until end of July 2004. |
| | Where is the money taken from the "Majko tax"? | This not a problem anymore. |
| | How will the land be expropriated? What will happen with third parties? | It will proceed on the basis of Expropriate law, and assets shared out to all third parties based on damage caused. |
| | Who is entitled to expropriate, the Ministry or Municipality (Local Power). | Based on Expropriate Law there is a direct right for the Ministry of Transport to perform expropriates procedures. |
| | Is there any procedure in the World Bank to employ local labour? | We are not aware of the World Bank procedures. |
| National & Culture Heritage | - | - |
| Traffic & Road Safety | What are the measures preposed for individual safety in the road? | We are preparing again the study on traffic safety. |

**Table 6.2.3 Key issues of public debate at Rreshen**

| Environmental factor | Question/ Discussion | Answer |
|---|---|---|
| Geology | If there is any chance to control the contracting companies to find out the location where the crushed stone will be taken out? | Yes, this is also underlined in the EIA draft (Scott Wilson), every step will be well checked and monitored by the relevant structures of Environmental Departments |

| | | |
|---|---|---|
| | | (there is included a cooperation scheme between GRD (Environmental sector) Supervision, Ministry of Environment, Environmental Agencies and other relevant local departments) |
| Soils | What about the agricultural land, if there exist any possibility to transform them into bogs and swamps? | ITP engineers have explained the calculations done, pipe culvert size and their placements, not causing their transformation into swamps. |
| Air Quality | - | - |
| Noise | - | - |
| Climate | - | - |
| Surface & Ground Water | Need to consider the flooding of year 1992, when Fan River surpassed any foreseen limit. | - |
| | A big problem for the city of Rreshen is waste disposal which is polluting the river | The Mayor of Rreshen is committing himself to adjust this problem – possibly within this year – in close cooperation with Ministry of Local Power, which will finance this project. |
| Flora & Fauna | Need to pay attention to the large amount of cornfields. | - |
| Landscape | Need to consider equipment needed to maintain the green areas of the road. | - |
| Socio Economic | Is it planned to link the divided agricultural areas? | This is not in the project. |
| | Request was made for locals to prepare the necessary documentation needed during the expropriate stage in order that they do not face any problems. | - |
| | Is there any Directive in the World Bank to hire locals? | - |

| | | |
|---|---|---|
| National & Culture Heritage | - | - |
| Traffic & Road Safety | - | - |

### 6.2.5 Questionnaires

Two questionnaires were distributed at the public meetings to assess opinion on the impact of the construction of the Milot-Rreshen Road section. The first questionnaire focused on the impact on water resources used for drinking. The second, on the community that will be affected. There were twelve replies to Questionnaire 1 and eight replies to Questionnaire 2. The completed questionnaires are included in Appendix 1.D.

To summarise the responses from the Questionnaire 1, the following was evident:

- The community drinking water is mostly taken from personal wells:
- In all cases water for households needs and for agriculture is also resourced from running water;
- In half of all cases the quality of the water has not been analysed before and during its use; and
- In the villages of Eper and Fang a number of wells and/or drinking resources that are used by the community (for drinking water or agriculture) will be affected by the construction of the road.

The following points summarise the replies to Questionnaire 2:

- The Zogu Bridge could be affected by the construction of the road;
- A number of Natural Commodities are listed that could be affected, such as state reserves, Milot Traditional Market and forest areas;
- All respondants replied that families and houses would be directly affected by the road construction except one respondant from Mal Milot;
- The community believes the construction will cause damage to a large range of the existing infrastructure.

# 7 Environmental Management Plan

The monitoring programme will be prepared in accordance with what is foreseen in the ToR according to the World Bank procedures and Albanian national legislation. The Albanian environmental laws, Policy, Legal and Administrative Framework, are identified in Chapter 2.

The World Bank's procedures are outlined in the following documents:

- Environment Department of the World Bank, Environmental Assessment Sourcebook Update – Environmental Management Plans, Number 25, January 1999
- The World Bank Operational Manual, Operational Polices, Environmental Management Plan, OP 4.01 – Annex C, January 1999

## 7.1 Environmental Management Plan Components

The Environmental Management Plan (EMP) presents a set of mitigation, monitoring and institutional measures to be adopted during the construction and operational phases to eliminate or reduce adverse environmental and social impacts arising from the construction of the Milot to Rreshen section of the Durres – Morine Road Corridor.

The EMP mainly consists of the following components:

- Environmental mitigation measures, are a series of specific measures developed on the basis of the understanding of future impacts of the road's construction and operation. The mitigation measures are designed to mitigate these potentially negative impacts and reduce them to acceptable levels as can be defined by applicable standards, where appropriate;
- Environmental monitoring plan, will be very important for environmental supervision and management and will be carried out periodically to monitor specific components and provide data quantifying the level of impacts;
- Institutional arrangements, to include the definition of the responsibilities for the implementation and monitoring of the mitigation measures as defined.

## 7.2 Environmental Mitigation Measures

To reduce the levels of negative environmental impacts mitigation measures have been identified. Mitigation measures will be implemented during the construction and operation phases. Measures such as construction camps will be indicated. The following components of mitigation are foreseen:

Construction Phase

- Materials Supply
- Materials Transport
- Noise and Dust
- Traffic Disruption
- Vehicular/Pedestrian Safety
- Disposal of Construction Waste
- Solid Waste and Sediments in Drains

- Water Pollution
- Soil Erosion
- Flora & Fauna
- Archaeological Discoveries
- Siting of Construction Camps and Related Facilities

Operation Phase

- Maintenance of the Road
- Road Safety

**Construction Phase**

- *Materials Supply:* Contractors will be required to use or buy material from existing asphalt plants, stone quarries and borrow pits operating with valid environmental and other permits and licenses. Appropriate provisions to this effect will be made in the contract documents as follows.

- *Mining/Quarry Activities.* Contracts shall specify that only licensed quarrying operations are to be used for material sources. If licensed quarries are not available the contractors may be made responsible for setting up their dedicated crusher plants at approved quarry sites. Selections of quarries for the purposes of the Project will require the approval of the environmental authority.

- *Asphalt Plants.* Contract provisions shall require that asphalt and hot-mix plants will be located at least 500 meters away from the nearest sensitive receptor (e.g., school or hospital) and subject to licensing and approval of the environmental authority, and that operators are required to install emission controls in accordance with the local environmental regulations. It should be clear that the stipulations apply to all such facilities, including those that are privately negotiated.

- *Borrow Pit Restoration Requirements.* Contracts will ensure enforceable provisions stating that: (i) Only existing borrow areas approved by the environmental authority will be used for the project ; (ii) Pits management, (including restoration if it will follow the completion of certain works) shall be in full compliance with all applicable environmental standards and specifications; (iii) The excavation and restoration of borrow areas and their surroundings, in an environmentally sound manner to the satisfaction of the GRD (or RRDs), or the construction Supervision Consultant (SC), acting on behalf of the road owner, will be required before final acceptance and payment under the terms of contracts; (iv) Borrow pit areas will be graded to ensure drainage and visual uniformity or to create permanent tanks/dams; (v) Topsoil from the opening of borrow pits will be saved and reused to re-vegetate the pits to the satisfaction of the SC. Additional borrow pits, if necessary, will not be opened without the restoration of those areas no longer in use, and without the approval of the environmental authority.

- *Materials Transport:* Truck operators will be required to cover or wet truck loads, haul materials at off peak traffic hours, and use alternative routes to minimize traffic congestion. The contractor will be required to prepare and submit to the works supervisor a traffic management plan showing routes and times to be used for materials delivery off and on site.

- *Noise and dust:* Construction contractors will be required to limit activities to daylight working hours (not between 11 p.m. and 7 a.m. or as agreed with the public and authorities) and use equipment with noise mufflers. Construction site and materials storage sites will be watered as appropriate to bring down dust.

- *Traffic Disruptions and vehicular/pedestrian safety:* Contractors will prepare a traffic management plan with appropriate measures to redirect traffic.

- *Disposal of construction waste:* Milled asphalt and demolition debris from the construction site will be disposed of in accordance with the local environmental regulations and at sites approved by the environmental authority.

- *Solid wastes and sediments in drains:* Solid waste clean up will be entrusted to licensed operators, with appropriate provisions in their contract documents to carry out visual inspections for toxic materials before handling, segregate waste fractions as necessary, use appropriate safety measures while handling and transporting the wastes, and disposal at authorized dump sites with approval of the local authorities.

- *Water pollution:* Contractors will be required to properly organize and cover material storage areas; isolate concrete, asphalt and other works from any watercourse by using sealed formwork; isolate wash down areas of concrete and asphalt trucks and other equipment from watercourse by selecting areas for washing that are not free draining directly or indirectly into any watercourse. Contractors will further ensure proper handling of lubricants, fuel, and solvents by secured storage; ensure proper loading of fuel and maintenance of equipment; collect all waste and dispose to permitted waste recovery facility.

- *Siting of Construction Camps and Related Facilities:* Project contract specifications shall stipulate that the siting, construction and environmental restoration of facilities for the housing of construction personnel, the storage of equipment and vehicles, labor camps and similar facilities must be conducted to the satisfaction of, and are subject to the approval of, the SC. It should be clear that the stipulations apply to all such facilities, including those that are privately negotiated.

The environmental mitigation plan, Table 7.4.2 provides a synthesis of the impacts and relevant mitigation measures for the phases of construction and operation. The description of measures is detailed in Section 4.12.2 and 4.12.3.

## 7.3 Other Mitigation Measures

Institutional strengthening and appropriate staff training would take place within GRD to ensure future implementation of the mitigation measures, environmental management and resettlement plan.

## 7.4. Mitigation Programme

For each environmental aspect a mitigation programme has been prepared, which includes the costs and responsibilities. Levels of impacts should be rather low and expensive interventions not necessary. These measures should be included in the construction contract.

Costs relevant to mitigation for socio–economic aspects are detailed in Chapter 8 Resettlement Plan.

### 7.4.1.1 Costs

The cost for the execution of the monitoring surveys includes both the tests and the reports. It is about $290,187. In the table the costs for each single phase are reported. It has to be pointed out that the costs during the construction phase have been calculated supposing 5 years for the realisation of the project.

**Table 7.4.1 Mitigation Costs**

| BASELINE | CONSTRUCTION | OPERATION |
|---|---|---|
| $17,931 | $261,906 | $10,350 |
| | **TOTAL costs** | **$290,187** |

### 7.4.1.2 Institutional Arrangements

The level of detail of EMP is strictly correlated to the detail level of the feasibility study. During the preliminary and detailed design phases, as it has already been said, the mitigation measures foreseen during this phase, will be examined closely. As the monitoring plan is correlated to the mitigation measures, we think that this plan will have to be examined closely during the following phases of the project. According to the present Monitoring Plan, the contractor would have the task of preparing the detailed Monitoring Plan that would be developed in accordance with GRD and MoE. GRD will have the responsibility to co-ordinate and to control the monitoring activities.

GRD will have to constitute a group of technicians that will control the elaboration of the Plan and the execution of the measures (Environmental Protection Office).

An environmental consultant, possibly an international consultant with a significant experience, will support this group. MoE (see Figure 7.5.4.1) would propose to the Council of Ministers (CoM) the activities concerning the monitoring in order to involve the specialists of the Environmental Inspectorate (see Articles 60 and 61, Law No. 8934 of 9/5/2002). A multi-disciplinary team would be constituted that would demonstrate it has the equipment and qualified personnel to elaborate and carry out the monitoring. The Environment Management Organisation is shown in Figure 7.5.4.1.

#### 7.4.1.3 Institutional Strengthening

A full time Environmental Technician has recently been employed by the GRD, this person would ideally be responsible for undertaking adequate monitoring of construction within the Durres Morine Road Corridor, as well as of other projects for which under the responsibility of the GRD. However, the environment technician lacks practical experience and will require substantial additional training to undertake this task. The person has been selected from qualified Albanian experts, but due to the lack of expertise in this field the GRD has employed a junior member of staff with environmental qualifications and a senior member of staff (with non-environmental qualifications) to be in charge of the Environmental Unit.

The location of the Environmental Unit within the GRD is shown in the GRD's Organisation Chart, (see Figure 7.5.5). Presently, GRD does not have the capability to work on the environment. It would be necessary to carry out training to constitute the Environmental Unit that would have the environmental experts. In the interim, the unit needs the assistance of an experienced environmental consultant to develop guidelines for environmental impact assessments, mitigation measures and environmental monitoring. These skills would eventually be used on other projects within the GRD.

Table 7.4.2:ENVIRONMENTAL MITIGATION PLAN

| Phase | Issue | Mitigating Measure | Cost | | Institutional Responsibility | | Comments |
|---|---|---|---|---|---|---|---|
| | | | Install | Operate | Install | Operate | |
| **Construction** | *Material Supply* | *Material Supply* | | | | | |
| | (a) Asphalt Plant<br>-dust<br>-worker health/safety | (a) Requirement for official approval or a valid operating license from National Environmental Agency of Albania (NEAA) specified in bid document | NA | NA | (a) Asphalt Plant Owner | (a) Asphalt Plant Owner | |
| | (b) Stone Quarry<br>-dust<br>-worker health/safety | (b) See (a) | NA | NA | (b) Stone Quarry Owner | (b) Stone Quarry Owner | |
| | (c) Sand/Gravel<br>-disturbance to river bed / water quality/ ecosystem | (c) See (a) | NA | NA | (c) Sand/Gravel Contractor | (c) Sand/Gravel Contractor | |
| | (d) Borrow pits | (d) See (a) plus borrow pit areas to be restored at end of Contract | NA | NA | (d) Construction Contractor | (d) Construction Contractor | (d) to be specified in bid documents |
| | *Material Transport* | *Material Transport* | | | | | |
| | (a) Asphalt<br>-dust/fumes | (a) Asphalt<br>-cover truck load | (a) NA | (a) NA | (a) Truck operator | (a) Truck operator | |
| | (b) Stone<br>-dust | (b) Stone<br>-wet or cover truck load | (b) NA | (b) NA | (b) Truck operator | (b) Truck operator | (a), (b), (c), (d) to be specified in bid documents |
| | (c) Sand/Gravel<br>-dust | (c) Sand/Gravel<br>-wet or cover truck load | (c) NA | (c) NA | (c) Truck operator | (c) Truck operator | |
| | (d) Traffic Management<br>-noise and vehicular exhaust, road congestion | (d) Haul material at off-peak traffic hours<br>Use routes to minimize major traffic sites | (d) NA | (d) Minimal | (d) Truck operator | (d) Truck operator | |

| Phase | Issue | Mitigating Measure | Cost | | Institutional Responsibility | | Comments |
|---|---|---|---|---|---|---|---|
| | | | Install | Operate | Install | Operate | |
| **Construction** | *Construction Site* | *Construction Site* | | | | | |
| | (a) Noise | (a) Limit activities to reasonable hrs (not between 11 PM and 7 AM or as agreed at Public consultation) | (a) NA | (a) NA | (a) Construction Contractor | (a) Construction Contractor | |
| | (b) Dust | (b) Water construction site and materials storage sites as appropriate | (b) YES | (b) YES | (b) Construction Contractor | (b) Construction Contractor | |
| | (c) Traffic Disruption (during construction activity) | (c) Appropriate measures to redirect traffic that are easily seen or easy to follow including preparation of a traffic management plan | (c) NA | (c) NA | (c) Construction Contractor | (c) Construction Contractor | (a), (b), (c), (d) (e), (f), (g), (h) and (i) to be specified in bid documents |
| | (d) Vehicular/pedestrian safety (off hours when there is no construction activity) | (d) Appropriate lighting and well defined safety signs included in traffic management plan | (d) YES | (d) YES | (d) Construction Contractor | (d) Construction Contractor | |
| | (e) Water Pollution from Improper Materials Storage/Management | (e) Cover material storage areas Construct channels to direct runoff to sewage system or appropriate treatment facility | (e) YES | (e) YES | (e) Construction Contractor | (e) Construction Contractor | |
| | (f) Sediment runoff | (f) provide sediment fence, straw bales or other sediment traps | (f) YES | (f) YES | (f) Construction Contractor | (f) Construction Contractor | |
| | (g) Protection of water resources | (g) Take measures to prevent the direct entry of water from construction sites into streams, canals, lakes, wells and aquifers; provide detention basins, where needed | (g) YES | (g) YES | (g) Construction Contractor | (g) Construction Contractor | |
| | (h) Archaeological finds | (h) Notify archaeological authority and follow their directions | (h) NA | (h) NA | (h) Construction Contractor | (h) Construction Contractor | |
| | (i) Construction camps | (i) Location of construction camps to be approved by local authority | (i) YES | (i) YES | (i) Construction Contractor | (i) Construction Contractor | |

| Phase | Issue | Mitigating Measure | Cost | | Institutional Responsibility | | Comments |
|---|---|---|---|---|---|---|---|
| | | | Install | Operate | Install | Operate | |
| **Construction** | *Waste Disposal*<br>(a) Construction debris (concrete, asphalt, fuels, paints, contaminated soil)<br>(b) Solid waste | (a) Dispose of in approved locality and cover with inert material.<br>(b) Dispose of in accordance with local sanitary regulations | (a) YES<br>(b) YES | (a) NA<br>(b) YES | (a) Construction Contractor<br>(b) Construction Contractor | (a) NA<br>(b) Construction Contractor | (a) and (b) to be specified in bid documents |
| **Operation** | *Maintenance of Constructed Road*<br>(a) Noise | *Maintenance of Constructed Road*<br>(a) Limit activities to reasonable hours (not between 11 PM and 7 AM or as agreed by Local Authority | (a) NA | (a) Minimal | NA | GRD | |
| | *Road Safety*<br>Erosion, rockfall, hazardous conditions | *Road Safety*<br>Install appropriate warning signs (rockfall, landslide, wet or slippery conditions, dangerous curve, animal or pedestrian crossing, school, slow moving vehicles, merge), reflective markers to indicate steep edge, or convex mirrors to see oncoming traffic at blind curves.<br>Locate warnings at points considered appropriate by good engineering practice | YES | Minimal | GRD | GRD | |

## 7.5 Environmental Monitoring Plan

The environmental monitoring is part of the environmental management programme for the design, construction and operational phases. The objectives of the environmental monitoring programme are as follows:

Monitoring before construction has a purpose of defining the initial situation ("situation zero") and this will be compared with the data surveyed during and after the construction works.

The monitoring carried out during the construction works has the following purposes:

- To describe the environmental situation and verify that the environmental phenomena are consistent with the forecasts of the environmental impact study.
- To identify particular environmental emergencies that require mitigation and to avoid events that could affect the quality of the environment
- To control specific situations in order to rapidly modify the construction activities in accordance with particular environmental exigencies.

The monitoring after the construction works has the following purposes:

- To verify the environmental impacts caused during the construction phase
- To verify that the mitigation measures are sufficiently effective for the protection of the environment
- To adopt other mitigation measures for unforeseen effects

### 7.5.1 Monitoring Plan

The monitoring programme will cover air quality, noise, surface and ground water quality and extend to baseline, construction and operation phases. Details of the programme, including timeframe, frequency, locations and parameters are specified in Table 7.5.1.

The EMP provides a flexible plan and that could be modified during the works to satisfy the various exigencies that cannot be defined in advance, during the present phase of the feasibility study.

The monitoring programme identifies the environmental components that will be analysed and the general location of the survey points. After the elaboration of the design it will be possible to establish the exact definition of the monitoring points.

Specific baseline and periodic monitoring recommendations related to the key environmental resources are as follows:

**Air Quality**

As some important risks of impact on the quality of the atmosphere are excluded during the operational phase, the monitoring will concern those places where the construction yard activity could result in air pollution, particularly due to the transport of materials.

| Parameters | General Locations | Phases | Instruments | Actors | Duration of sampling |
|---|---|---|---|---|---|
| Monitoring of the total dust in the atmosphere (TSP) avoiding the other substances in the existing atmospheric conditions in the project areas cannot produce critical conditions. | Measures are to be taken (at the tunnel portals) and in the construction camps near the residential buildings. These locations would have to be verified during the various phases of the design in cooperation with the authorities concerned. | Baseline and Construction. The phase after the end of the works is not very significant as it is not foreseen as alteration of the quality of the atmosphere; vehicle replacement and the movement of traffic would improve the current conditions. | A sampler for the ASP would be used; the apparatus would consist of a filter, support for the filtration, pump and volumetric counter. | Contractor under supervision of GRD and MoE. | 24 hours |

## Noise

The monitoring of noise to be carried out in order to facilitate the following activities:

- To obtain background noise levels both before the construction activities commence and noise levels during the construction pe riod.
- To identify and control changes in noise levels that can occur during the operational period in the situations where it is necessary because of the duration of the events, the intensity or particular local condition s.

The noise pollution monitoring determined by the infrastructure will be carried out near to the relevant receptors, such as the construction yard or the urban areas.

| Parameters | General Locations | Phases | Instruments | Actors | Duration of sampling |
|---|---|---|---|---|---|
| ISO international recommendations, the equivalent pondered level in a curve A and expressed in decibel will be used (Leq) | The residential area near the project and at the construction camps.<br><br>Sites: R1 near Fierza; R2 near Blinisht; R3 between Bisak and Kolsh; R4 between Domgjoni and Thirra; R5 near Myci (Kukes); R6 near the centre of Kukes; R7 between Shtiqeni and Kukes; R8 near Gjegjani; R9 near Morine. | Baseline, construction and operation. Even if many buildings located along the project will be demolished it is necessary to carry out the noise measures in order to determine the acoustic environment before construction works; in fact it can be foreseen that the new road will determine the construction of new residential areas. | Photometer | Contractor under supervision of GRD and MoE | 24 hours |

### Surface Water

Tests will be carried out to evaluate any modification caused by the construction of the new infrastructure. This will include conditions (water delivery, speed etc) that can take place as a consequence of the physical interferences, even temporary, with other water courses and the quality of water near the construction yards where there can be the risk of localised pollution.

| Parameters | General Locations | Phases | Instruments | Actors | Duration of sampling |
|---|---|---|---|---|---|
| Chemical & Physical:<br>• Suspended Soilds (SS)<br>• Biological Oxygen Demand (BOD)<br>• Dissolved Oxygen (DO)<br>• pH, Conductivity<br>Heavy Metals:<br>• Lead (Pb)<br>• Chromium (Cr)<br>• Copper (Cu)<br>• Mercury (Hg)<br>• Magnesium (Mg)<br>• Calcium (Ca)<br>• Iron (Fe)<br>• Ammonia ($NH_4$)<br>• Oil Grease<br>Fecal / Total Coliform | At construction camps (n.5) and neighbouring watercourses or crossed by the project (n.9).<br>List of Sites:<br>W1 along I. Matit river near Berzhana<br>W2 near Rubik where the road crosses the Fanit river<br>W3 near Rreshen where the road crosses Fani I Vogel River<br>W4 near Blinisht and the construction camp C3.1<br>W6 near Domgjoni<br>W7 near Myci where the road crosses Liqeni Fierzes<br>W9 near Gjagjni where the road crosses Per Topjani | Baseline<br>Construction | IRSA Q 100 No. 2050<br>Multiparameters drill<br>Mult, DIN 38 409 part 52r<br>IRSA Q 100 7020 B/94<br>IRSA Q 100 7010 B/94<br>IRSA Q 100 No. 4010<br>IRSA Q 100 No. 4030<br>IRSA Q 100 No.4020 A1<br>STD Methods No.3113, 18th edition<br>Spectrometer IR | Contractor under supervision of GRD and MoE | 24 hours |

### Groundwater

- The monitoring has been planned to control the hydro-geological conditions of the sites where works could significantly modify the present conditions. The construction parameters will identify variations in the flow conditions and the variation in the quality of groundwater.

All the activities can determine some modifications of the present situation of the water creek creating some barriers or drains.

| Parameters | General Locations | Phases | Instruments | Actors | Duration of sampling |
|---|---|---|---|---|---|
| • Static level of the layer<br>• SS<br>• DO<br>• Conductivity<br>• $BOD_5$ | The measures are localised at the mouths of the tunnel. There would be two measures for each month. | Baseline<br>Construction | • Multi-parameters drill<br>• IRSA Q 100 No. 2050<br>• DIN 38 409 part. 52r | Contractor under supervision of GRD and MoE | Once for each phase |

**Vegetation and Fauna**

Monitoring of the natural ecosystems, in particular woody areas and watercourses. The monitoring would consist of the survey of non-authorised access to woody areas (facilitated by the new infrastructure) and of illegal dumps. The results of the surveys will be submitted to GRD; limitation for non-authorised access (barriers, signs) would be inserted. This aspect is very important in order to prevent the road causing degradation of adjacent areas.

Concerning the fauna, during the use of the road carry out a monitoring of most critical sections where wild animals interface with domestic animals. This activity will consist of a periodical survey (annual for two years) of the accidents at the local police authority. After this survey it will be decided the locations of signs indicating the presence of animals and speed limits imposed in the most critical sections. If the risk of accidents is high, other measures will be adopted, such as some special reflectors along the road that delineate the road. This measure reduces the frequency of animals crossing.

### 7.5.1.1 Standard Monitoring

**Groundwater**

For what it concerns the quality of the water three levels of safety are defined: attention, alert, intervention. If the average concentration calculated during the Monitoring before the construction is within the limits foreseen by DPR 236/1988 and following modifications, the attention levels will be determined in accordance with the difference between the value determined by the laws and average level before the construction of the infrastructure (the average baseline level).

The levels of attention, alert and intervention correspond to the increment of this difference higher respectively than 30%, 60% and 75%. In case the attention level is reached it is necessary to repeat immediately the sampling also for the neighbouring piezometers.

In case the alert level is reached the following interventions have to be carried out:

- Immediate repetition of the sampling also for the neighbouring pits and piezometers.

- Carrying out of the sampling at a monthly frequency and determination of the base chemical characteristics and of those characteristics having an anomalous value, continuing the three monthly determination of all other characteristics;

- Identification of the causes of pollution;

- Verification of the efficiency of the foreseen intervention for the mitigation of the environmental impact;

In case the intervention level is reached and during the whole period necessary to have the values again below the attention level the following interventions will have to be carried out:

- Immediate repetition of the sampling also for the neighbouring pits and piezometers;

- Carrying out of the sampling at a fifteen days frequency and determination of the base chemical characteristics and of those characteristics having an anomalous value, carrying out of eventual intervention for the mitigation of the impacts.

- Verification of the efficiency of the foreseen intervention for the mitigation of the environmental impact of pits

- Identification of the causes of pollution

- Preparation of a plan for the reclamation of soils and for the cleaning of groundwater at least for the sections affected by the pits.

If the values of the analysed values, determined during the MAO overcome the Limit Allowed Concentrations determined by the laws, the levels are defined as follows:

- Level of attention: when a value higher than the average plus twice the standard deviation is observed;

- Alert level: when a value higher than the average plus twice the standard deviation is observed;

- Intervention level: when a value higher than the average plus twice the standard deviation is observed and when the concentration of the pollutant substances in the pits and in the piezometers located upstream is lower than the concentration downstream.

For this situation, in case the attention level is reached it is necessary to repeat immediately the sampling also for the neighbouring piezometers.

In case the alert level is reached the following interventions have to be adopted:

- To repeat immediately the sampling also for the neighbouring pits and piezometers;

- Analysis of the concentration of the concerned parameters in pits and piezometers located in the upstream sector of the railway layout.

In case the intervention level is reached and during the whole period necessary to have the values lower than the attention level the following interventions have to be carried out:

- To repeat immediately the sampling also for the neighbouring pits and piezometers.

**Air**

The levels that have to be adopted as intervention levels for the various pollutant substances are indicated as follows:

These levels correspond to the attention levels for:

- PTS: 150 $\mu g/m^3$
- $SO_2$: 125 $\mu g/m^3$ as average of 24 hours
- CO: 15 $\mu g/m^3$ as hourly average, 10 $\mu g/m^3$ as average of 8 hours
- $NO_2$: 200 $\mu g/m^3$ as hourly average

They correspond, instead to the standard levels of air quality:

- $PM_{10}$: 40 $\mu g/m^3$ as yearly average
- $SO_2$: 80 $\mu g/m^3$ as yearly average of 24 hours, 250 $\mu g/m^3$ as $98^{th}$ percentile of the averages of 24 hours over a year, 130 $\mu g/m^3$ as average of the averages of 24 hours during the winter semester.
- $NO_2$: 200 $\mu g/m^3$ as $98^{th}$ percentile of the hourly average of the hourly average in a year
- Benzene: 10 $\mu g/m^3$ as yearly average
- Bap 1 $ng/m^3$ come media annuale

In the event of levels of attention being overcome without any meteorological cause or as a consequence of the construction activities (more than 30%), it is necessary to determine the causes for the pollution and it is necessary to adopt appropriate mitigation measures immediately.

The overcoming of the standard quality of the atmosphere caused by the construction yard activities determines the necessity of checking the activities of the construction and of adopting some mitigation.

**Noise**

In the event of diurnal levels being overcome, a report has to be prepared no later than three days from that point in time; the person responsible for the construction yard has to individuate the methodologies and the time necessary to return to the normal noise levels again.

In case the night levels are overcome, the causes have to be individuated and some necessary mitigation interventions have to be adopted; during this period all the activities causing these levels to be overcome have to be stopped. On completion of the acoustic test all the working activities will start again.

Table 7.5.1 ENVIRONMENTAL MONITORING PLAN

| Phase | What *is to be monitored* | Where | How *is the parameter to be monitored/ type of monitoring equipment* | When *is the parameter to be monitored* | Why *is the parameter to be monitored* | Cost | | Responsibility | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Install | Operate | Install | Operate |
| **Construction** | | | | | | | | | |
| *Material Supply* | | | | | | | | | |
| (a) Asphalt Plant | (a) [NEAA] approval or valid operating license | (a) NA | (a) GRD Supervision Consultant | (a) At start of contract | (a) Assure plant compliance with environment, health and safety requirements of Albania | (a) NA | (a) NA | (a) Asphalt Plant Owner | (a) Asphalt Plant Owner |
| (b) Stone Quarry | (b) See (a) | (b) NA | (b) GRD Supervision Consultant | (b) At start of contract | (b), (c) and (d) Assure that contractor has relevant permissions for material extraction | (b) NA | (b) NA | (b) Quarry Owner | (b) Quarry Owner |
| (c) Sand/Gravel | (c) See (a) | (c) NA | (c) GRD Supervision Consultant | (c) At start of contract | | (c) NA | (c) NA | (c) Sand/Gravel Contractor | (c) Sand/Gravel Contractor |
| (d) Borrow pits | (d) See (a) plus restoration at end of Contract | (d) Borrow pit sites | (d) GRD Supervision Consultant | (d) At any time borrow pits are proposed | | (d) NA | (d) NA | (d) Construction Contractor | (d) Construction Contractor |
| *Material Transport* | | | | | | | | | |
| (a) Asphalt | (a) Truck load covered or wet | (a) Job site | (a) GRD Supervision Consultant | (a) After work starts- several unannounced inspections | (a) Assure Contractor complies with requirement | (a) NA | (a) Small | (a) NA | (a) GRD Regional Maintenance Department + GRD Supervision Consultant |

| Phase | What *is to be monitored* | Where | How *is the parameter to be monitored/ type of monitoring equipment* | When *is the parameter to be monitored* | Why *is the parameter to be monitored* | Cost | | Responsibility | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Install | Operate | Install | Operate |
| **Construction** | | | | | | | | | |
| *Material Transport* | | | | | | | | | |
| (b) Stone | (b) Truck load covered or wet | (b) Job site | (b) GRD Supervision Consultant | (b) After work starts- several unannounced inspections | (b) Assure Contractor complies with requirement | (b) NA | (b) Small | (b) NA | (b) See (a) |
| (c) Sand/Gravel | (c) See (b) | (c) See (b) | (c) See (b) | (c) See (b) | (c) See (b) | (c) NA | (c) Small | (c) NA | (c) See (a) |
| (d) Traffic Management | (d) Hours and routes selected | (d) See (b) | (d) See (b) | (d) See (b) | (d) See (b) | (d) NA | (d) Small | (d) NA | (d) See (a) |
| *Construction Site* | | | | | | | | | |
| (a) Noise | (a) Noise levels | (a) At site or nearest homes | (a) Sound level detector | (a) Once/week- (AM-PM) and when locals complain | (a) Ensure noise levels at acceptable level | (a) NA | (a) NA | (a) NEAA | (a) MoE + GRD Supervision Consultant |
| (b) Dust | (b) Air quality (dust) | (b) At site | (b) Ringlemann or equivalent | (b) During material delivery and construction | (b) Ensure dust levels kept to a minimum | (b) NA | (b) NA | (b) NEAA | (b) See (a) |
| (c) Traffic Disruption (during construction) | (c) Traffic patterns + preparation of traffic management plan | (c) At or near site | (c) Approval of TMP and observation by GRD Supervision Consultant | (c) TMP as necessary + once/week at peak and non peak periods | (c) Ensure contractor's vehicles not causing congestion | (c) NA | (c) NA | (c) NA | (c) GRD Regional Maintenance Department + GRD Supervision Consultant |

| Phase | What *is to be monitored* | Where | How *is the parameter to be monitored/ type of monitoring equipment* | When *is the parameter to be monitored* | Why *is the parameter to be monitored* | Cost | | Responsibility | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Install | Operate | Install | Operate |
| **Construction** *Construction Site* | | | | | | | | | |
| (d) Vehicular/ Pedestrian Safety (after hours when there is no construction activity) | (d) Visibility and appropriateness + traffic management plan | (d) At or near site | (d) Approval of TMP and observation by GRD Supervision Consultant | (d) TMP as necessary + once/week during evening | (d) Ensure contractor's works not causing traffic safety problems | (e) NA | (e) NA | (d) NA | (d) GRD Regional Maintenance Department + GRD Supervision Consultant |
| (e) Water Pollution (from Improper Materials Storage/ Management) | (e) Water quality (primarily suspended solids) | (e) Runoff from site or materials storage areas | (e) Observation by GRD Supervision Consultant + water sample collected for analysis if necessary | (e) During precipitation (rain, snow etc.) and periodically during storage period | (e) Ensure contractor's works materials not causing water pollution | (e) NA | (e) NA | (e) MoE | (e) MoE+ GRD Supervision Consultant |
| (f) Sediment runoff | (f) Water quality (primarily suspended solids) | (f) Runoff from site | (f) Observation by GRD Supervision Consultant + water sample collected for analysis if necessary | (f) During occurrence of sediment runoff | (f) Ensure contractor's works not causing water pollution | (f) NA | (f) NA | (f) MoE | (f) MoE+ GRD Supervision Consultant |

| Phase | What *is to be monitored* | Where | How *is the parameter to be monitored/ type of monitoring equipment* | When *is the parameter to be monitored* | Why *is the parameter to be monitored* | Cost | | Responsibility | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Install | Operate | Install | Operate |
| **Construction** *Construction Site* | | | | | | | | | |
| (g) Protection of water resources | (g) Water quality of water resource | (g) At resource location | (g) GRD Supervision Consultant to collect water sample for analysis as necessary | (g) Water samples to be taken monthly and analysed by competent laboratory | (g) Ensure water resources not polluted by the works | (g) NA | (g) Small | (g) MoE | (g) MoE+ GRD Supervision Consultant |
| (h) Archaeo-logical finds | (h) Archaeo-logical finds to be reported | (h) At site | (h) Observation by GRD Supervision Consultant and notification to Archaeology Department | (h) At time of discovery | (h) Archaeological finds to be reported by Contractor | (h) NA | (h) NA | (h) MoE | (h) MoE+ GRD Supervision Consultant |
| (i) Construction camps | (i) Location of construction camps to approved by Local Authority | (i) At site | (i) GRD Supervision Consultant | (i) At start of contract | (i) Ensure contractor's choice of location for camps is approved by Local Authority | (i) NA | (i) NA | (i) MoE | (i) MoE + GRD Supervision Consultant |

| Phase | What *is to be monitored* | Where | How *is the parameter to be monitored/ type of monitoring equipment* | When *is the parameter to be monitored* | Why *is the parameter to be monitored* | Cost | | Responsibility | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Install | Operate | Install | Operate |
| **Construction** *Waste Disposal* | | | | | | | | | |
| (a) Construct-ion debris (including contaminated soils) | (a) Surplus or unsuitable materials to disposed of in authorised tips | (a) At authorised/ licensed tips | (a) GRD Supervision Consultant | (a) At time of disposal | (a) Ensure correct disposal of waste and hazardous materials | (a) NA | (a) Small | (a) MoE | (a) MoE + GRD Supervision Consultant |
| (b) Solid waste | (b) Solid wastes to disposed of to authorised receivers | (b) At authorised/ licensed tips | (b) GRD Supervision Consultant | (b) At time of disposal | (b) Ensure correct disposal of waste materials | (b) NA | (b) Small | (b) MoE | (b) MoE + GRD Supervision Consultant |

| Phase | What *is to be monitored* | Where | How *is the parameter to be monitored/ type of monitoring equipment* | When *is the parameter to be monitored* | Why *is the parameter to be monitored* | Cost | | Responsibility | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Install | Operate | Install | Operate |
| **Operation** | | | | | | | | | |
| *Maintenance of Constructed Road* | | | | | | | | | |
| (a) Noise | (a) Noise levels | **(a) At site or nearest homes** | (a) Sound level detector | (a) During maintenance activities or when locals complain | | (a) NA | (a) NA | (a) MoE | (a) MoE |
| *Road Safety* | | | | | | | | | |
| (a) Rock falls, land erosion, hazardous conditions | (a) Condition of hazard signs | (a) Along highway segment included in project | (a) Visual Observation | (a) One - two times/year | | (a) NA | (a)NA | (a) NA | (a) GRD Regional Maintenance |

### 7.5.2 Reporting

The results of the monitoring programme will be included in formal written reports and submitted to GDR, MoE and World Bank for review. The contractor and construction supervision companies will be requested to report their daily measurements and observations for environmental performance on a monthly basis. They will be further requested to report immediately any unexpected environmental pollution or impacts so that GRD and/or contractors can take appropriate actions to mitigate.

### 7.5.3 Estimated Monitoring Cost

The cost for the execution of the monitoring surveys includes both the tests and the reports. It is about $290,187. In the table the costs for each single phase are reported. It has to be pointed out that the costs during the construction phase have been calculated based on the assumption that it will take 5 years for the realisation of the project.

Table 7.5.3.1 Mitigation Costs

| BASELINE | CONSTRUCTION | OPERATION |
|---|---|---|
| **$17,931** | **$261,906** | **$10,350** |
| | TOTAL costs | $290,187 |

### 7.5.4 Institutional Arrangements

The contractor would have the task of preparing the detailed Monitoring Plan that would be developed in accordance with GRD and MoE. GRD will have the responsibility to coordinate and to control the monitoring activities. GRD will have to constitute a group of technicians that will control the elaboration of the Plan and the execution of the measures (Environmental Protection Office). This group will be supported by an environmental consultant, possibly an international consultant with a significant experience. MoE (see Figure 7.5.4.1) would propose to the Council of Ministers (CoM) the activities concerning the monitoring in order to involve the specialists of the Environmental Inspectorate (see Articles 60 and 61, Law No. 8934 of 9/5/2002). A multi-disciplinary team would be constituted that would demonstrate it has the equipment and qualified personnel to elaborate and carry out the monitoring. The Environment Management Organisation is showed in Figure 7.5.4.1.

#### 7.5.4.1 Contractor Management

Contractor would be on the construction site at all times and its activities will be the sources of adverse impacts during the construction phase. Therefore, contractor would be the key to environmental control mitigation plan implementation and as such, environmental management for contractor will be critical for successful mitigation. See summary form above.

**Figure 7.5.4.1 Environment Management Organisation**

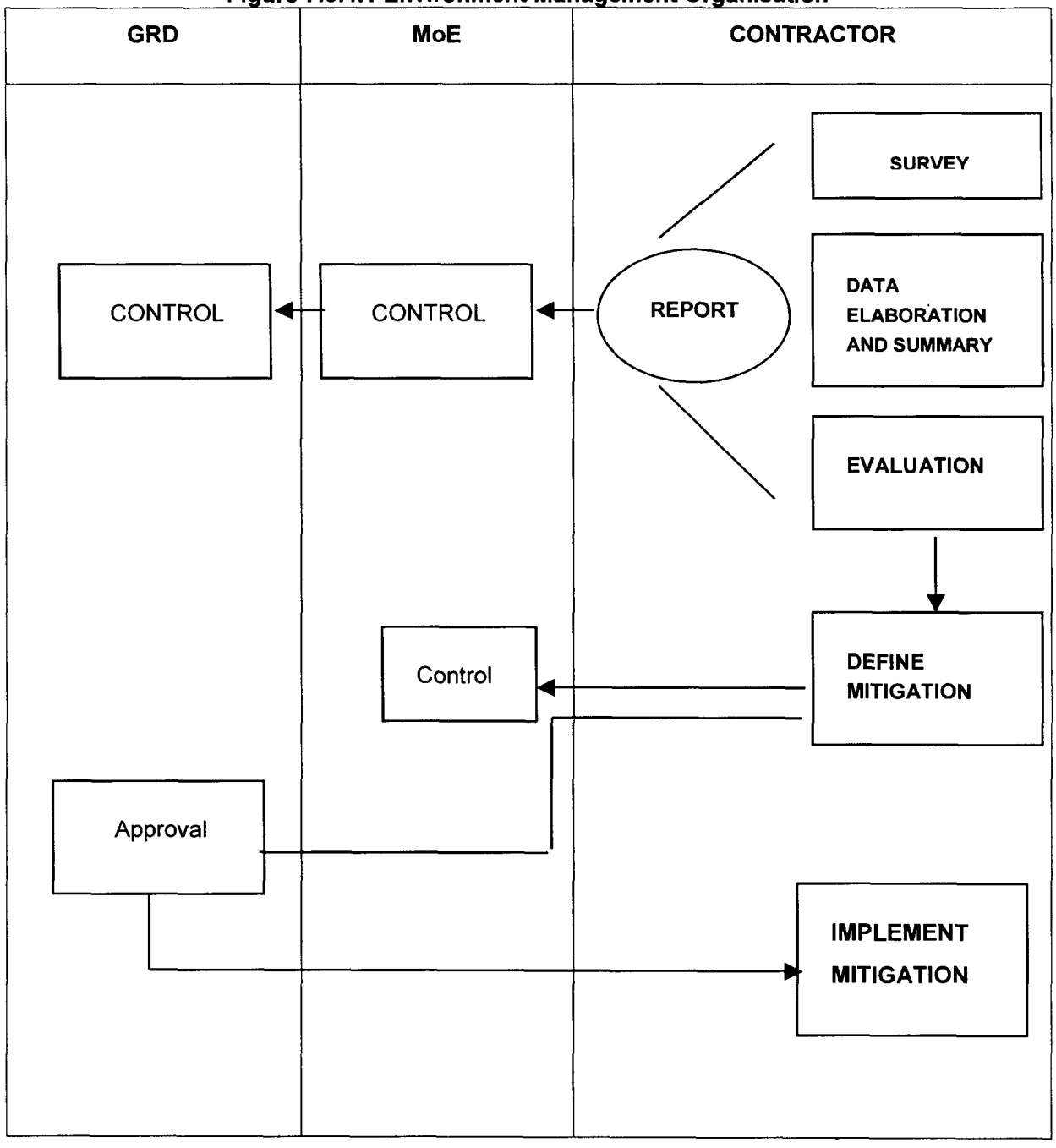


**Figure 7.5.4.2**

**Ministry of Environment**
**Organisation Chart**

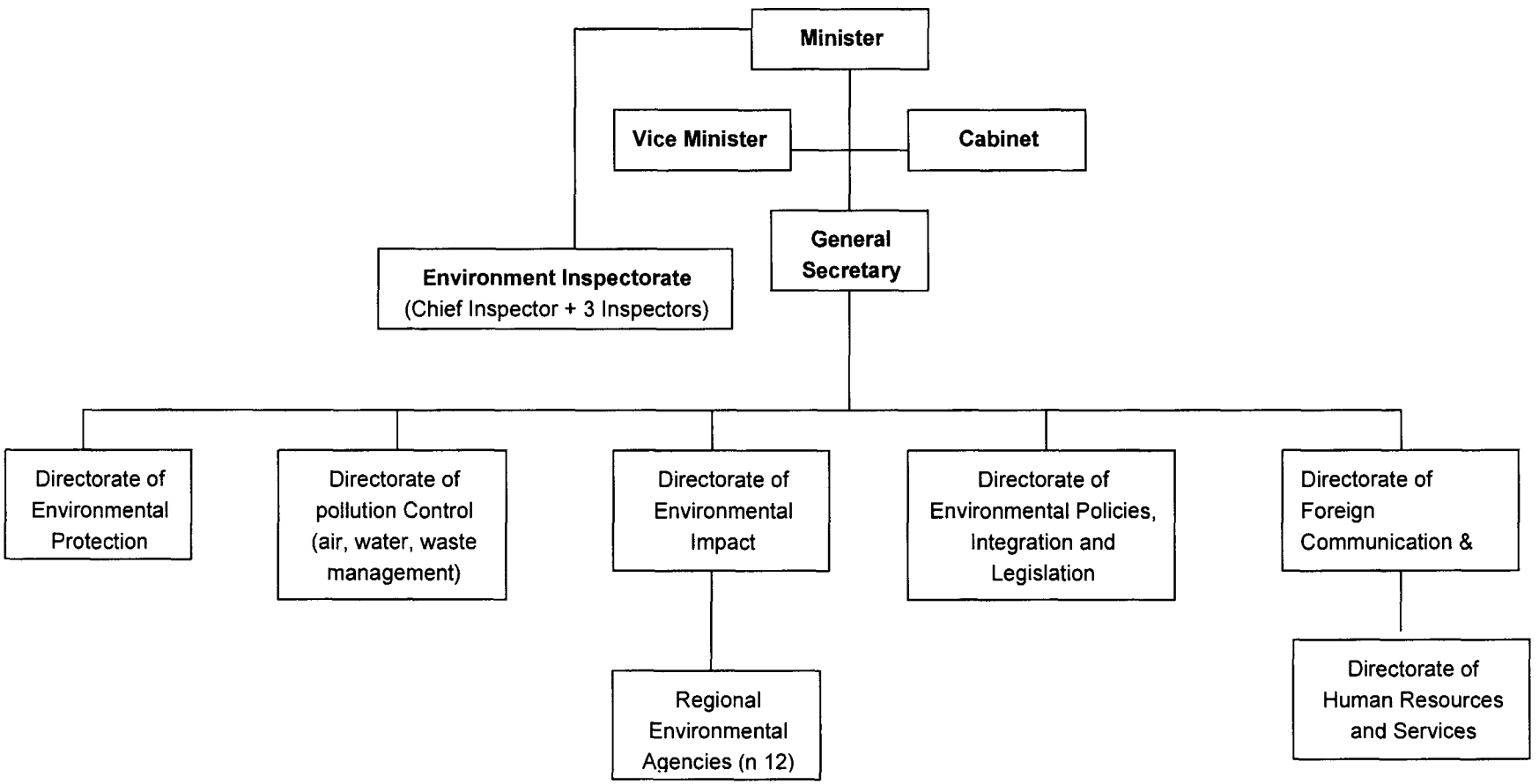


**Figure 7.5.4.3**

**Management of Environmental Aspects**
**Organisation chart**

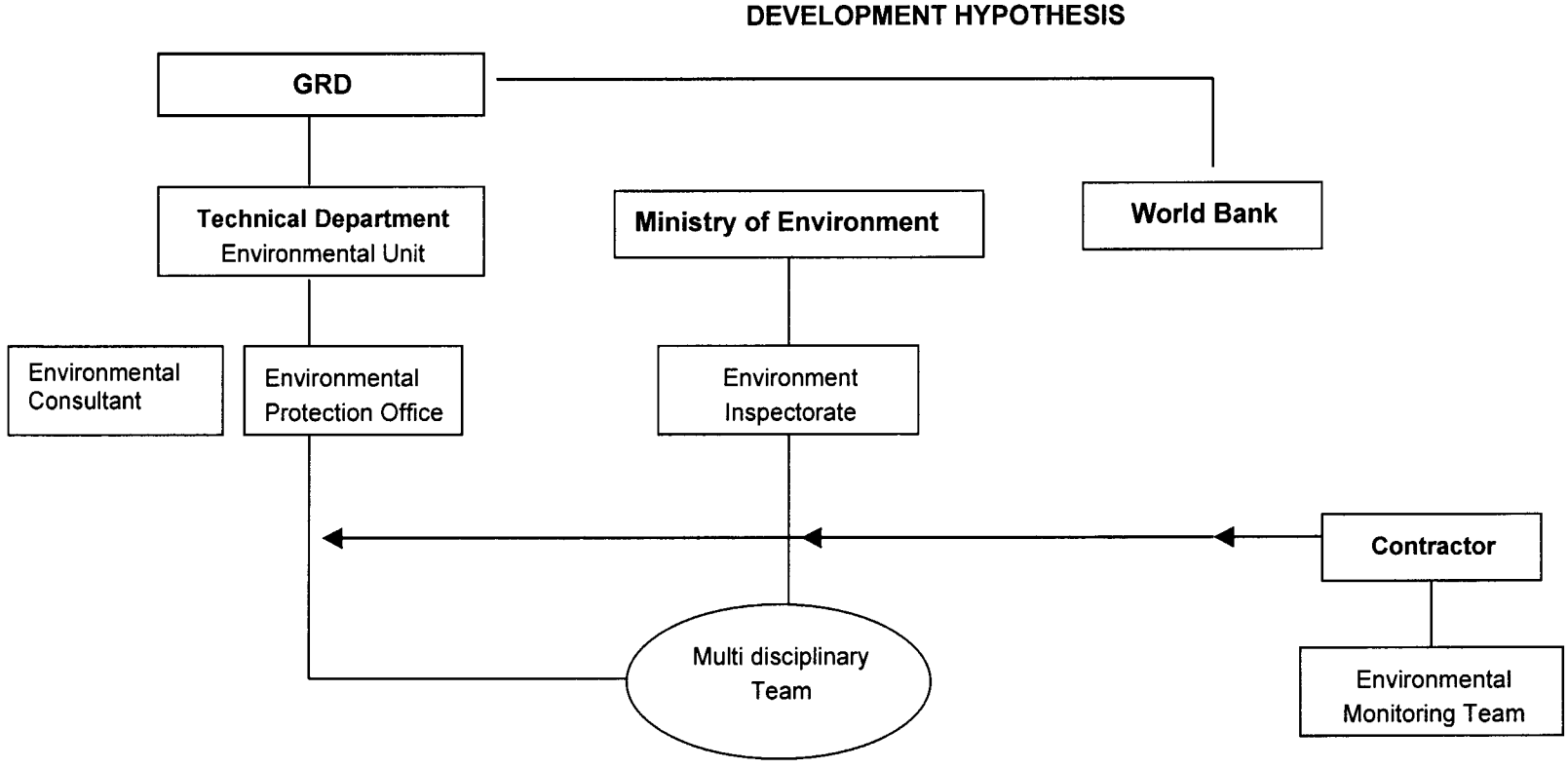
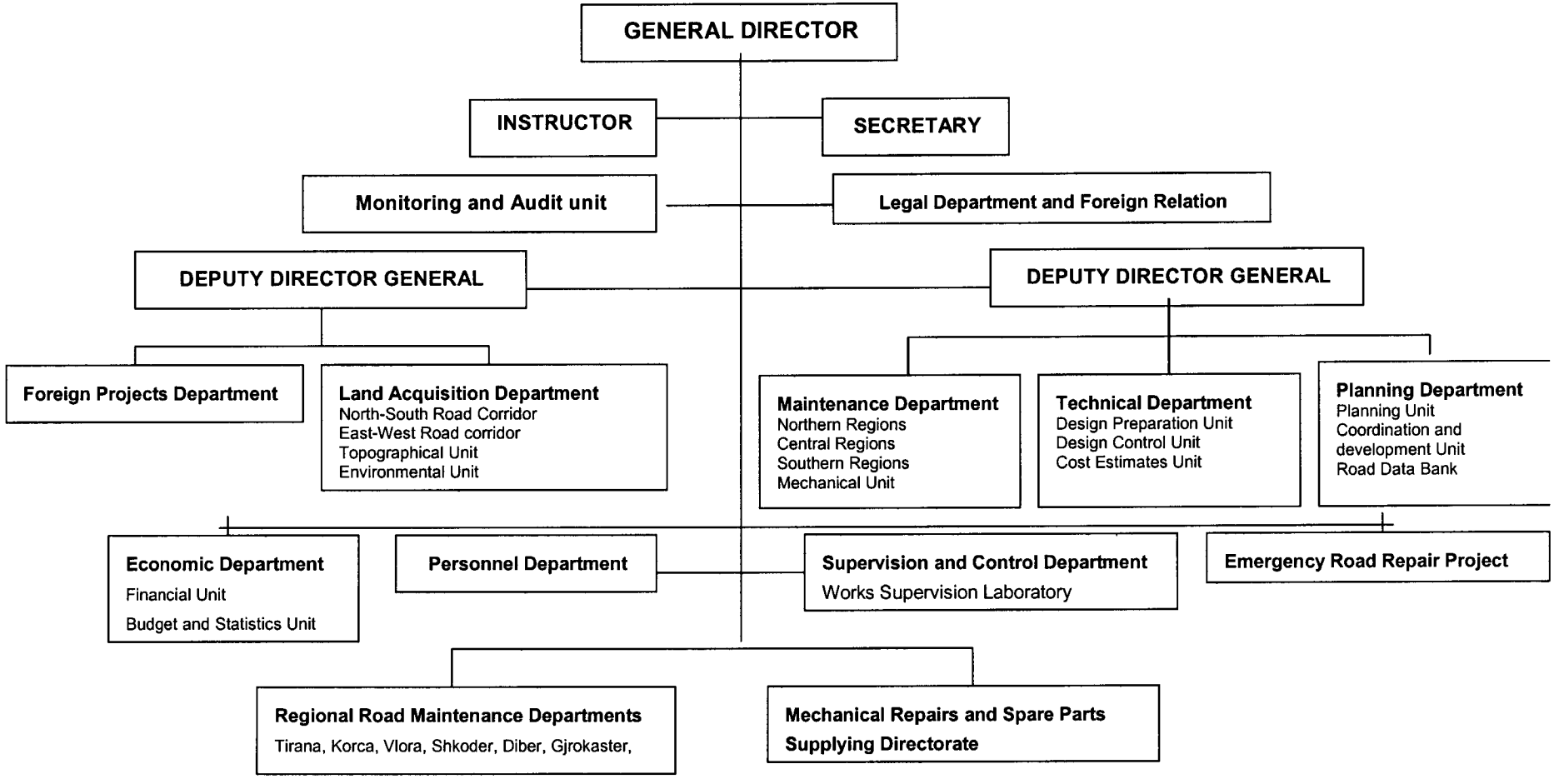


**Figure 7.5.5**

**General Road Directorate's Organization Chart**



# 8 Resettlement Plan

A resettlement plan has been prepared and is provided as a separate document to accompany this EIA. The resettlement plan should be read in conjunction with this report.