Azerbaijan Motorway Improvement And Development

Baku – Shamakhi Road Widening: Km 15 to Km 45

Environmental Assessment Report

(To be read in conjunction with the Outline Environmental Management Plan)

Contents

List of Abbreviations

Abbreviation	Meaning
AA	Alternative Alignment
ADB	Asian Development Bank
AIDS	Acquired Immunodeficiency Syndrome
ARS	Azerroadservice
asl	above sea level
AZN	Azeri Manat
BP	Bank Procedure
BTC	Baku-Tbilisi-Ceyhan
BTE	Baku-Tbilisi-Erzurum
CENN	Caucasus Environmental NGO Network
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
EA	Environmental Assessment
EA&MF	Environmental Assessment and Management Framework
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EP	Environmental Protection
ESS	Ecology & Safety Sector (Department in ARS)
FAO	Food and Agriculture Organisation
fSCE	former State Committee for Ecology
fSU	former Soviet Union
GDP	Gross Domestic Product
GEF	Global Environment Fund
ha	Hectare
HGV	Heavy Goods Vehicle
HIV	Human Immunodeficiency Virus
IBRD	International Bank for International Development
IBA	Important Bird Area
IDA	International Development Association
IDP	Internally Displaced Persons
IFI	International Financing Institution

Abbreviation	Meaning
km	Kilometre
LAD	Land Acquisition Department
LAP	Land Acquisition Plan
LEB	Local Executive Body
LHS	Left Hand Side
MED	Ministry of Economic Development
m	Metre
MDG	Millennium Development Goal
MENR	Ministry of Ecology and Natural Resources
MES	Ministry of Emergency Situation
MYST	Ministry of Youth, Sport and Tourism
MoT	Ministry of Transport
NGO	Non Government Organisation
OD	Operational Directive
OP	Operational Policy
PAP	Project Affected People
PIU	Project Implementation Unit
RAP	Resettlement Action Plan
RER	Regional Environmental Review
RHS	Right Hand Side
ROW	Right Of Way
RPF	Resettlement Policy Framework
RPS	Road Protection Service
SCCA	State Committee of Construction and Architecture
SEE	State Ecological Expertise
SNIP	Construction Norms and Rules
SPPRED	State Programme on Poverty Reduction and Economic Development
TENs	Trans-European (Transport) Networks
ToR	Terms of Reference
TRACECA	Transport Corridor Europe Caucasus Asia
UN	United Nations
UNECE	United National Economic Commission for Europe
UNEP	United Nations Environment Programme

Abbreviation	Meaning
UNESCO	United Nations Education, Science and Culture Organisation
US$	United States dollars
vpd	vehicles per day
World Bank	World Bank (i.e. IBRD and IDA)

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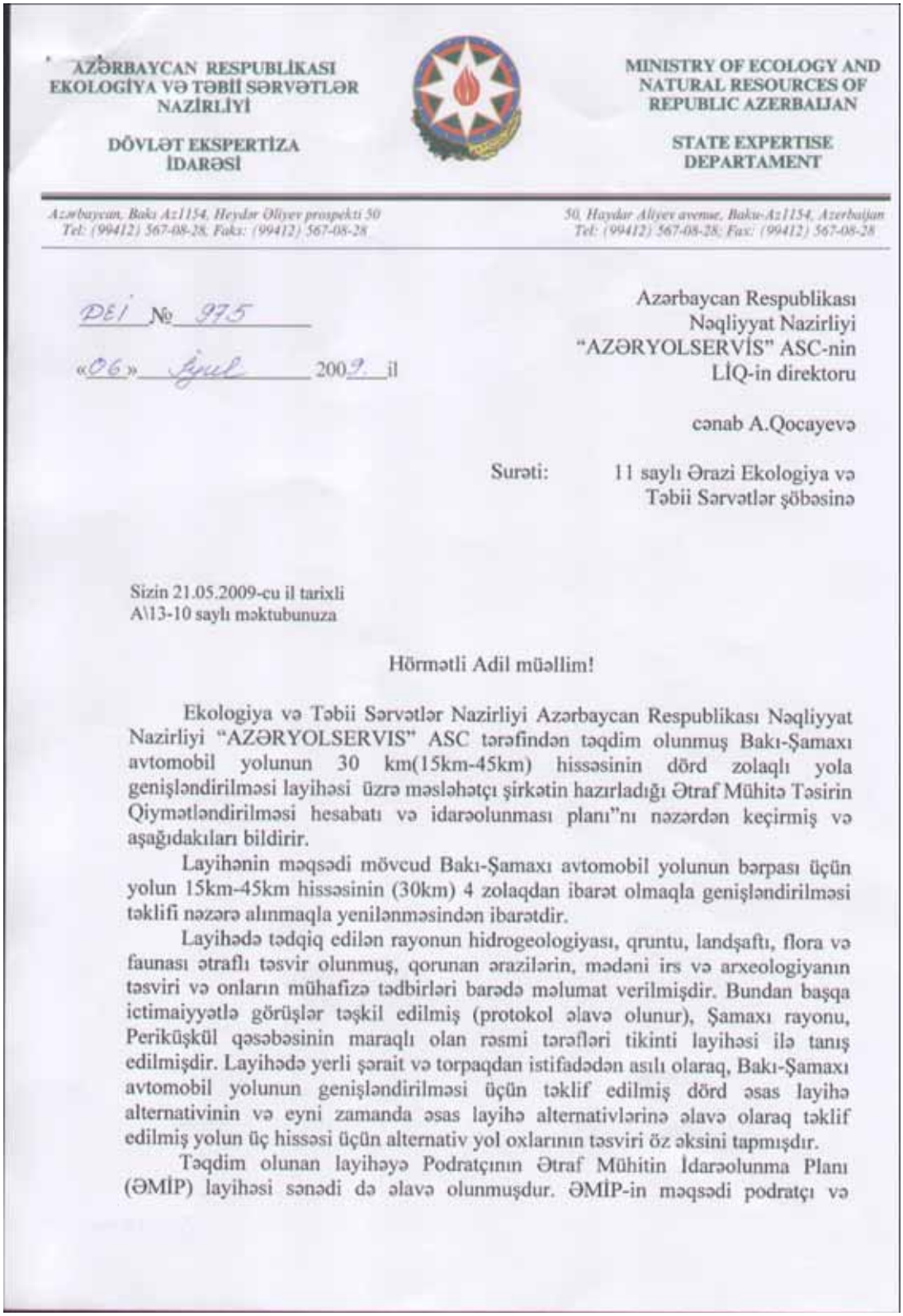

AZƏRBAYCAN RESPUBLİKASI
EKOLOGİYA VƏ TƏBİİ SƏRVƏTLƏR
NAZİRLİYİ

DÖVLƏT EKSPERTİZA
İDARƏSİ

MINISTRY OF ECOLOGY AND
NATURAL RESOURCES OF
REPUBLIC AZERBAIJAN

STATE EXPERTISE
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DEİ № 975

«06» İyul 2009 il

Azərbaycan Respublikası
Nəqliyyat Nazirliyi
"AZƏRYOLSERVİS" ASC-nin
LİQ-in direktoru

cənab A.Qocayevə

Surəti: 11 saylı Ərazi Ekologiya və
Təbii Sərvətlər şöbəsinə

Sizin 21.05.2009-cu il tarixli
A\13-10 saylı məktubunuza

Hörmətli Adil müəllim!

Ekologiya və Təbii Sərvətlər Nazirliyi Azərbaycan Respublikası Nəqliyyat Nazirliyi "AZƏRYOLSERVIS" ASC tərəfindən təqdim olunmuş Bakı-Şamaxı avtomobil yolunun 30 km(15km-45km) hissəsinin dörd zolaqlı yola genişləndirilməsi layihəsi üzrə məsləhətçi şirkətin hazırladığı Ətraf Mühitə Təsirin Qiymətləndirilməsi hesabatı və idarəolunması planı"nı nəzərdən keçirmiş və aşağıdakıları bildirir.

Layihənin məqsədi mövcud Bakı-Şamaxı avtomobil yolunun bərpası üçün yolun 15km-45km hissəsinin (30km) 4 zolaqdan ibarət olmaqla genişləndirilməsi təklifi nəzərə alınmaqla yenilənməsindən ibarətdir.

Layihədə tədqiq edilən rayonun hidrogeologiyası, qruntu, landşaftı, flora və faunası ətraflı təsvir olunmuş, qorunan ərazilərin, mədəni irs və arxeologiyanın təsviri və onların mühafizə tədbirləri barədə məlumat verilmişdir. Bundan başqa ictimaiyyətlə görüşlər təşkil edilmiş (protokol əlavə olunur), Şamaxı rayonu, Periküşkül qəsəbəsinin maraqlı olan rəsmi tərəfləri tikinti layihəsi ilə tanış edilmişdir. Layihədə yerli şərait və torpaqdan istifadədən asılı olaraq, Bakı-Şamaxı avtomobil yolunun genişləndirilməsi üçün təklif edilmiş dörd əsas layihə alternativinin və eyni zamanda əsas layihə alternativlərinə əlavə olaraq təklif edilmiş yolun üç hissəsi üçün alternativ yol oxlarının təsviri öz əksini tapmışdır.

Təqdim olunan layihəyə Podratçının Ətraf Mühitin İdarəolunma Planı (ƏMİP) layihəsi sənədi də əlavə olunmuşdur. ƏMİP-in məqsədi podratçı və

subpodratçının Bakı-Şamaxı yolunun tikintisi ilə bağlı yaranan hər hansı ətraf mühit və ictimai təsirlərin azaldılması və onlara nəzarət üzrə minimal tələblərinin müəyyən olunmasından ibarətdir. ƏMİP-də tikinti və istismar zamanı yaranacaq müəyyən olunmuş təsirlər, onların qarşısının alınması, azaldılması və onlara nəzarət tədbirlərinin təşkili ətraflı təsvir olunmuşdur.

Yuxarıda qeyd olunanlarla yanaşı təqdim olunan layihə sənədində ayrı-ayrı hissələrin təkrar olunması ilə yanaşı bəzi çatışmazlıqlar da aşkar edilmişdir:

-yaşayış məntəqələrinin genişləndirilən yoldan nə qədər məsafədə olması, nəzərdə tutulan keçidlərin, müvəqqəti yolların, tikinti düşərgələrinin, asfalt zavodlarının, doğrayıcı və çeşidləyici qurğuların, karxana ərazilərinə çıxış yollarının harada yerləşəcəyi təqdim olunan sxemdə öz əksini tapmalı idi;

-layihədə sözü gedən mövcud yol bir neçə yerdən əvvəllər dəfələrlə deformasiyaya uğramışdır. Bu da gələcəkdə yolun genişləndirilməsində mühüm amillərdən biri hesab olunduğundan layihənin icrası zamanı qeyd olunan təhlükənin nəzərə alınacağı barədə qeyd olunmamışdır;

-layihədə materialların təkrar istifadəsi və ya tullantıların təkrar emal edilməsi dedikdə konkret olaraq köhnə asfalt örtüyünün və ya hansı materialların nəzərdə tutulduğu məlum deyildir. Eyni zamanda qeyd etmək lazımdır ki, köhnə asfalt örtüyünün emal edilməsi prosesi, münbit torpaq qatının dəqiq hara daşınacağı da qeyd olunmamışdır;

-layihədə qorunması nəzərdə tutulan palçıq vulkanları ərazilərinin toxunulmaz qalması üçün müfəssəl dizayn zamanı müvafiq yol genişləndirilməsi alternativi işlənib hazırlanmasının zəruriliyi barədə qeyd olunmuşdur. Konkret bu variant barədə dəqiq məlumət verilməmişdir.

Ekologiya və Təbii Sərvətlər Nazirliyi Bakı-Şamaxı yolunun 15km-45km (30km) hissəsi üzrə tərtib edilmiş layihə sənədini görülən işlər zamanı atmosfer havasına, flora və faunaya, torpağa olan təsirlərin ətraflı araşdırılmasını, ətraf mühitə dəyəcək təsirlərin qarşısını almaq məqsədilə ətraf mühitin mühafizəsi zəmnində müvafiq tədbirlərin ƏMTQ hesabatında və podratçının Ətraf Mühitin Idarəolunma Planında ətraflı öz əksini tapmasını nəzərə alaraq, qeyd edilən çatışmazlıqlara aydınlıq gətirilməsi və aşağıdakı şərtlərlər daxilində razılaşdırdığını bildirir:

-tikinti materiallarının götürülməsi üçün dəqiq hansı karxanadan istifadə olunacağı aydınlaşmalı və karxanalardan istifadə üçün müvafiq qaydada ETSN-dən icazələrin alınmasının təmin olunması;

-zərurətdən tikinti altında qalacaq və köçürülməsi mümkün olmayan ağacların Azərbaycan Respublikası Nazirlər Kabinetinin 19.09.2005-ci il tarixli 173 saylı Qərarı ilə təsdiq edilmiş "Azərbaycan Respublikasında meşə fonduna aid olmayan ağac və kol bitkilərinin istifadəsi, mühafizəsi və qorunması Qaydaları" haqqında Qərarın tələblərinə əsasən aidiyyatı yerli icra hakimiyyəti (şəhər rayonları istisna olmaqla) və özünüidarəetmə (bələdiyyə) orqanlarının qərarları və sərəncamları əsasında kəsilməsi təmin olunmalıdır. Eyni zamanda yol genişləndirilməsi zamanı Cəngi rayonu ərazisində yaşıllıq zonasına dəyəcək ziyanın müəyyənləşməsi və bu təsirin qarşısının alınması məqsədilə lazımi tədbirlərin həyata keçirilməsi;

-tikinti işlərinin başlanılmasına qədər nəzərdə tutulan yol hissəsinin bərpası üzrə təsirə məruz qalacaq ərazilərin torpaqayırma sənədlərinin müvafiq qaydada razılaşdırılmasının təmin olunması;

-yol genişləndirilməsi zamanı Ətraf Mühitin İdarəolunma Planının icrası barədə 11 saylı Ərazi Ekologiya vəTəbii Sərvətlər şöbəsinə müntəzəm hesabatın verilməsi;

-aparılacaq mütəmadi monitorinq proqramının tərtib edilib ETSN ilə razılaşdırılması və bu işdə Ekologiya və Təbii Sərvətlər Nazirliyinin mütəxəssislərinin iştirakının təmin olunması;

-yol boyu yerli təbii şəraitə uyğun ağac növlərindən yaşıllıq zolaqlarının salınmasının təmin olunması.

Hörmətlə,

Rəis əvəzi A.Aslanov

Translation

Ministry of Natural Resources & Environment
Approval of the Environmental Assessment Report and Environmental Management Plan

Azerbaijan Republic
The Ministry of Transport
Azerroadservice OJC
PIU Director
Mr.Adil Qocayev

Response to your letter No.A/13 dated 21.05.2009

Dear Mr.Adil Gojayev,

MENR has reviewed the Environmental Assessment Report and Environmental Management Plan developed by the Consultant for Baku – Shamakhi Road Widening (km 15- km 45) to four Lanes and submitted by Azerroadservice OJC of the Ministry of Transport of Azerbaijan Republic and has the following comments.

The objective of the project is to improve the road section from km 15 – km 45 (30 km) of existing Baku – Shamakhi Road with the widening to four lanes. The hydrology, soil, landscape, flora and fauna of the studied region have been widely described and information on the protected areas, cultural heritage and archaelogy and on their protection measures has been provided. Furthermore, public meetings have been held (the Minutes of the meeting is attached) and official stakeholders of the Perikuskul, Shamakhi region have been familiarized with the design of the construction. Four main design options have been proposed for the widening of road between Baku and Shamakhi, depending on local topography and land use. In addition to the main design options alternative alignments have been proposed for three stretches of road between km 15 and km 45.

Environmental Management Plan developed by the Contractor is also attached to the submitted documents. The purpose of EMP is to identify and set out the minimum requirements the Contractor, and his sub-contractors, must take to control and mitigate for any environmental and social issues relating to road construction along Baku to Shamakhi route. The impacts in project construction and operation period, the control and mitigation measures have been detailed in EMP.

In addition to the aforementioned notes, the repetitions of the separate sections and some deficiencies have been also identified in submitted documents:

- The distance between project road and settlements and potential location of intended crossings, temporary roads, construction camps, asphalt plants, crushing and screening plants, access roads to borrow pit areas should be indicated in the submitted scheme;
- The existing road mentioned in documents has been subjected to deformation many times. Since it should be taken into account as the main factor in widening of existing road, nothing is mentioned about the potential risk to be taken into account in project implementation;

- it is not clear whether old asphalt pavement material or another materials are being considered for reuse of materials and recycling of wastes. In addition, it should be noted that, no information has been provided on recycling technology of old asphalt pavement and the place where topsoil will be transported has not been indicated;
- It has been mentioned that, appropriate road widening option taking into account protection of mud volcanoes areas should be developed during detailed design. No detailed information has been provided on this option.

MENR accepts this documents developed for Baku – Shamakhi Road Section (km 15 – km 45) given that, identification of impacts on ambient air, flora and fauna and soil and implementation of adequate protective measures considered in EIA Report and EMP developed by the Contractor will be ensured and the above mentioned deficiencies will be eliminated and the following requirements will be met:

- It is necessary to identify the location of borrow pits and to ensure obtaining of permissions from MENR for use of these borrow pits;
- In accordance with the provisions of the Decision No.173, dated 19 of September of 2005 on “Rules for Use, Protection and Preservation of Trees and Bushes which are not included to the Forestry Fund of Azerbaijan Republic ” and based on the decisions and directives of the appropriate local executive power authorities (excluding city districts) and municipal authorities the cutting of trees which relocation is not possible should be ensured. At the same time, during widening of road section the damage to the roadside vegetation in Cangi region should be identified and adequate necessary measures should be taken.
- Land Acquisition Documents of the affected areas should be appropriately agreed before construction starts;
- During widening of the existing road regular reports on implementation of EMP should be submitted to the Area Ecological and Natural Resources Department No.11;
- Monitoring Program to be implemented continuously should be agreed with MENR and participation of the experts of MENR in this process should be ensured;
- To provide plantation of tree species along the route considering local topography.

Sincerely Yours,
Deputy Chief A.Aslanov

Environmental Assessment Report

(To be read in conjunction with the Outline Environmental Management Plan)

1 Project Background

The Government of Azerbaijan requested the World Bank's support for improving several road segments to the west and south of Baku. It was proposed that the Azerbaijan Motorway Improvement and Development or 'Highway II' Additional Financing Project ('the Project') will include widening of the existing two lane road to a four lane road from Baku to Shamakhi, a 120 km section of the east west transport corridor between Baku and Tbilisi; and in particular the road section from Km15 to Km45. The entire road is currently being rehabilitated within the Highway II Project.

It is envisaged that the Project will be implemented over a period of two years. The first year construction programme will include the widening to a four-lane highway of section 15Km to 45Km of the Baku-Shamakhi road, with the remaining distance being completed in year two.

2 Scope and Purpose

The purpose of this document is to provide an update[1] of the existing Environmental Assessment (EA) for Baku – Shamahki Road Rehabilitation[2] in relation to the proposed 4-lane highway upgrade between km 15 and km 45. The document is to be read in conjunction with the Environmental Management Plan[3] and the Impact Register.

An Environmental Assessment was prepared by Kocks Consult GmbH as part of the initial planning phase for the Rehabilitation stage of this project; and this has been approved by the State Ecological Expertise (SEE) of the Ministry of Environment and Natural Resources (MENR) of Azerbaijan. This document describes any additional, or amplified, impacts due to the proposed 4-lane upgrading along the 30 km stretch from km 15 to km 45. It has entailed a desk study with site visits in February and March 2009.

This update was undertaken based on the Study of Widening Options for a Four Lane Road between Baku and Shamakhi in Azerbaijan, Final Report, February 2009, prepared by Kocks Consult GmBH. This study is a pre-feasibility study of the widening of the road.

The detailed design for the road has not yet been undertaken.

The Regional Environmental Review for Baku Shamakhi Road Widening[4] and the Environmental Assessment for Baku – Shamakhi Road Rehabilitation, Final Report, April 2006[5], were used in the assessment of any additional or amplified impacts resulting from the upgrading to a four-lane highway between km 15 and km 45.

[1] Terms of Reference for the Preparation of Safeguard Reports for the Proposed Highway III Project, Task iii (b)
[2] Kocks Consult GmbH Baku – Shamakhi Road Rehabilitation, Environmental Assessment Final, April 2006
[3] The EMP determines effective management and control of construction activities, and also details the way in which road edges, access roads, borrow pits, camp sites and all affected areas are reinstated. The EMP incorporates the environmental and social constraints and concerns into proactive management procedures and work Method Statements
[4] Scott Wilson Ltd - Regional Environmental Review, April 2009
[5] Kocks Consult GmbH Baku

If any additional impacts are identified as part of the detailed design, the environmental assessment will be updated by the ARS environmentalist.

3 Overall Project Objectives

The main Project objective is to reduce road transport costs and improve access, transit and safety within Azerbaijan's East-West corridor, through the implementation of a number of sub-projects in relation to widening of the Baku-Shamakhi road.

For road users, the Project will lead to better road quality and better safety through new alignments, lower travel costs and a shorter travel time.

Economic growth for Azerbaijan is expected to come as a result of returns on investments through the marked growth of the traffic on the subject roads and an increase in speed, and consequent decrease in travel time, due to reduced delivery time following roads development and improved road technical specifications. Improved east-west connections will foster economic integration and growth within the country, in particular non-oil growth, leading to a degree of economic diversification.

4 Justification for the Road Widening between km 15 to km 45

The widening of the existing Baku to Shamakhi road from a two lane to a four lane road is intended to meet an anticipated growth in demand for road transport services.

Detailed traffic surveys carried out in 2005 indicate that traffic growth on the study road has been insignificant in recent years. Nevertheless, the refurbishment of the existing road which will take place under the Highway II Project is likely to generate a marked increase in road traffic with consequent economic development alongside the road route. It is thought that the development of the four-lane road will further intensify the levels of traffic in the area, thus promoting economic growth along the corridor.

The Baku-Shamakhi road is a section of the shortest way from Baku to Georgia and to western Azerbaijan. As well as many long, straight sections through unpopulated semi-desert areas, the road includes a number of steep, winding sections through the mountains with tight, blind corners. The road surface, which was constructed around "40 years ago" (Head, Local Executive Power, Shamakhi), is uneven in many places due to structural problems, damage from overloaded heavy vehicles and repeated 'patching' of the surface during road maintenance. It is presently being refurbished as part of the Highway II Project and it is assumed that the refurbishment of the road under the Highway II Project will be finalised before commencement of the road widening.

The "without project" scenario will mean that the widening of the refurbished road from a two-lane to a four-lane road will not take place. Under this scenario it is likely that traffic and traffic

speed will increase significantly on the two lane road following its refurbishment[6], potentially giving rise to increased numbers of traffic accidents and road accidents involving pedestrians, livestock and wildlife crossing the road.

However, as Table 4-1 indicates, road improvement carries its own risks, and in many cases can exacerbate the existing ones. Road upgrade will certainly improve the road related hazards in terms of road surface, straightening, signage; but it will not change behavioural related risks. In fact, the greater speed afforded by wider, smoother, straighter roads exacerbates these issues, which can only be addressed through a national programme of road safety awareness.

Table 4-1: Road Related Hazards

Category	Hazard	Effect on safety in 4xlane
Road-Related Hazards	• Uneven road surface • Tight corners/poor visibility • Lack of distinct road junctions • Inadequate road furniture, e.g. road markings and guard rails • Inadequate directional road signage • Inadequate advance warning of road works and temporary contra-flow systems	• Improved • Improved • Improved • Improved • Improved • Improved
Transport-Related Hazards	• Overloaded vehicles • Defective/un-roadworthy vehicles • Slow vehicles, e.g. road maintenance and agricultural vehicles • Vehicles travelling at night with no or inadequate front and rear lights	• Unchanged • Unchanged • Exacerbated • Exacerbated
Driver Bahaviour –Related Hazards	• Inexperienced or inadequately trained drivers • Drunk and/or over-tired drivers • General poor standard of driving • Drivers driving too fast for road conditions • Drivers mis-judging the distance between them and on-coming vehicles when overtaking or when crossing opposite carriageway • Drivers mis-judging the length of vehicles they are overtaking • Drivers not indicating prior to leaving or turning across carriageway • Drivers stopping suddenly, without warning (e.g. drop/pick up passengers or to buy fruit and vegetables or other goods from roadside vendors) • Drivers stopping to pick up passengers whilst driving around roundabouts • Drivers flashing headlights to alert on-coming traffic of their existence, which has effect of temporarily blinding driver of on-coming vehicles	• Exacerbated • Exacerbated • Exacerbated • Exacerbated • Exacerbated • Exacerbated • Exacerbated • Exacerbated • Improved • Unchanged/Improved

[6] Pers. Comms

Other Hazards	• Pedestrians walking alongside or crossing road • Unsupervised herds of cattle, sheep and goats crossing road • Unsupervised flocks of geese crossing road • Lone cattle standing in road at night • Piles of building materials stored temporarily in road	• Exacerbated • Exacerbated • Exacerbated • Exacerbated • Exacerbated

5 Scope of Work

The two lane Baku – Shamakhi Road is classified as Category II road with a right-of-way (ROW) of 60 metres; i.e., 30 m on each side from the existing road centre-line. Generally, this provides enough room for road widening for the following alternatives:

- Building a second carriage-way adjacent to the existing carriage-way;
- Widening the existing carriage-way on either side.

However, at certain sections of the road, the ROW is significantly reduced. Therefore, the implementation of the above alternatives would involve land acquisition as well as additional land acquisition to allow for embankments, the construction of interchanges and local connector roads, and possible bypasses and realignments.

Improvements to the road include traffic safety features such as road illumination, road signs, road marking and road furniture, including appropriate road safety barriers (guardrails). Other design issues include underpass structures to enable the safe crossing of domestic animals and wildlife. These features will be accurately described in the Detailed Design.

5.1 Main Design Options

Four main design options are proposed for the widening of the road between Baku and Shamakhi, depending on local topography and land use – to be used alternatively on different sections of the road:

(i) Construction of the additional carriageway to one side, either the right hand side (RHS) or left hand side (LHS) of the existing carriageway (see Figure 5.1) with a total width of 27.5m;
(ii) Widening of the existing carriageway on both sides, either by:
  (a) Widening at both sides with a reduced median and shoulder, total width 22.5m (see Figure 5.2); or
  (b) Widening at both sides without median and reduced lane width and shoulder, total width 17.5m (see Figure 5.3).
(iii) Widening in sections with climbing lane, total width 20.5m (see Figure 5.4).

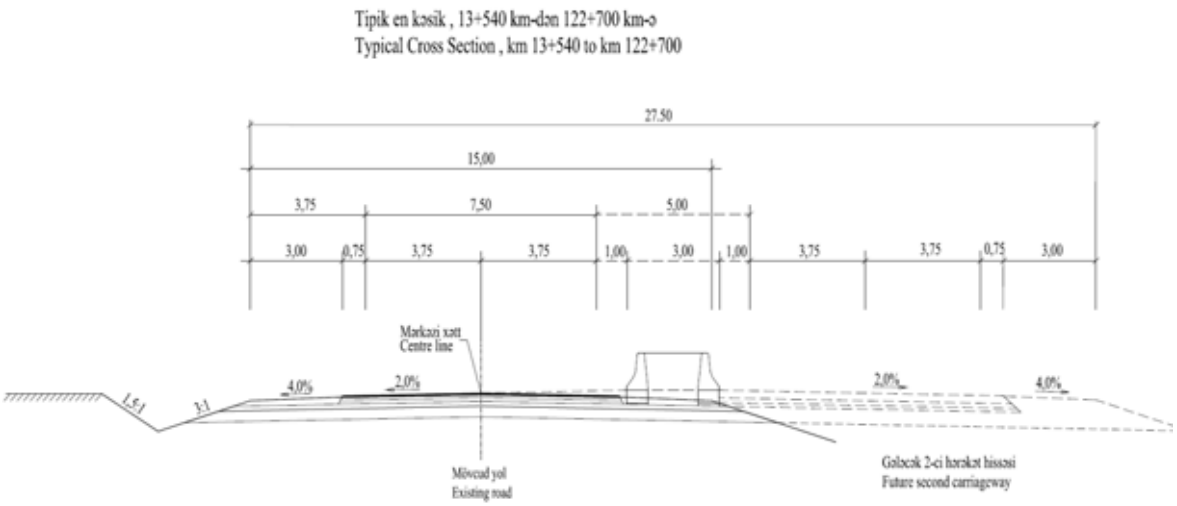


Figure 5-1: Option (i) Typical Cross Section for Widening to One Side

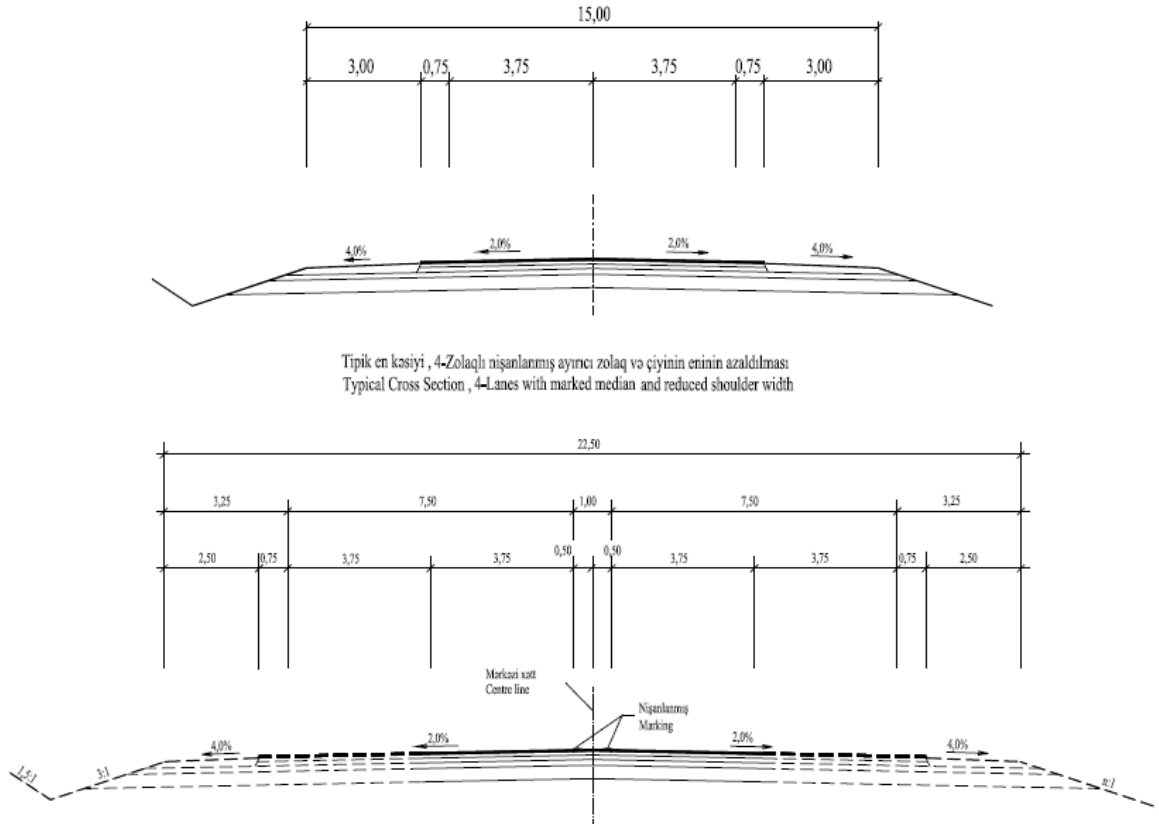


Figure 5-2: Option (iia) Typical Cross Section for Widening at Both Sides with Reduced Median and Shoulder

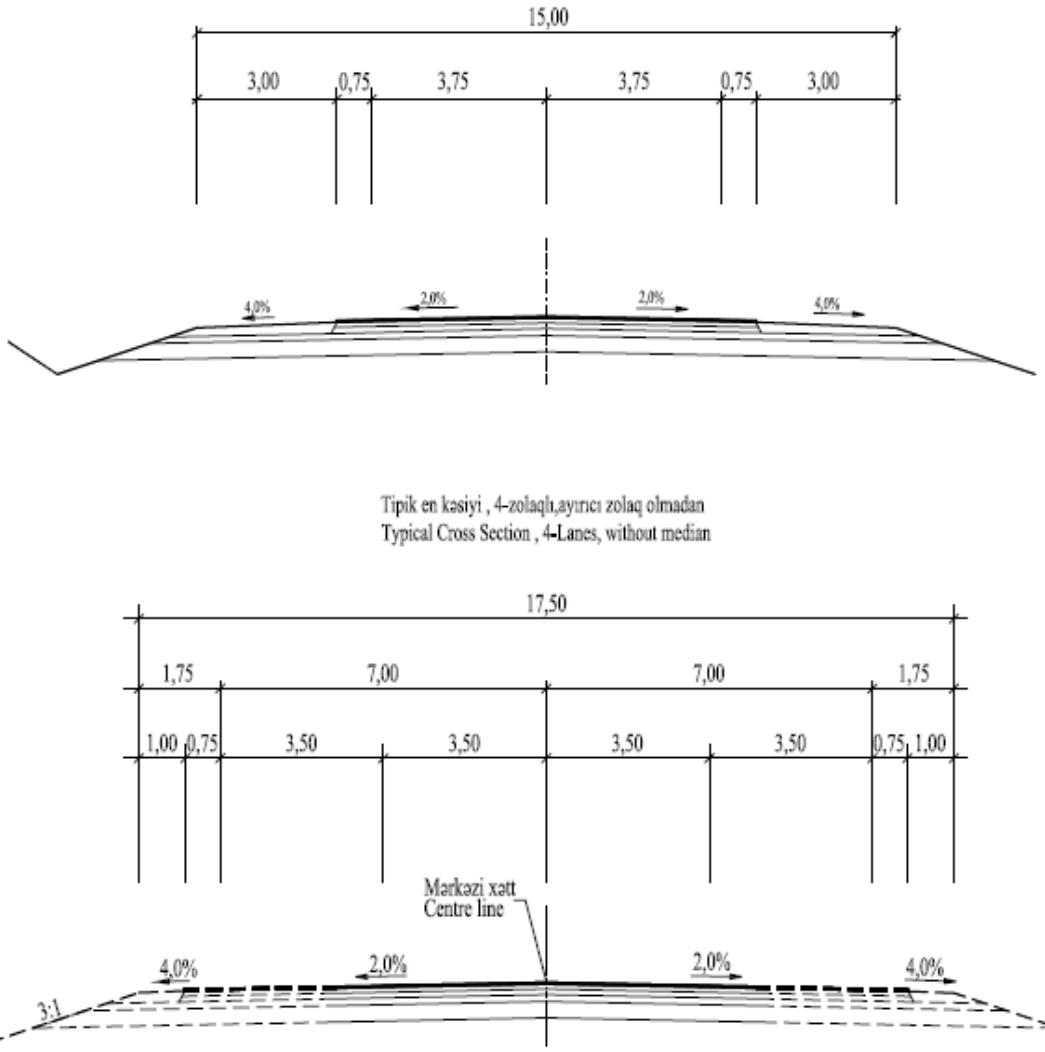


Figure 5-3: Option (iib) Typical Cross Section for Widening at Both Sides Without Median and Reduced Lane Width and Shoulder

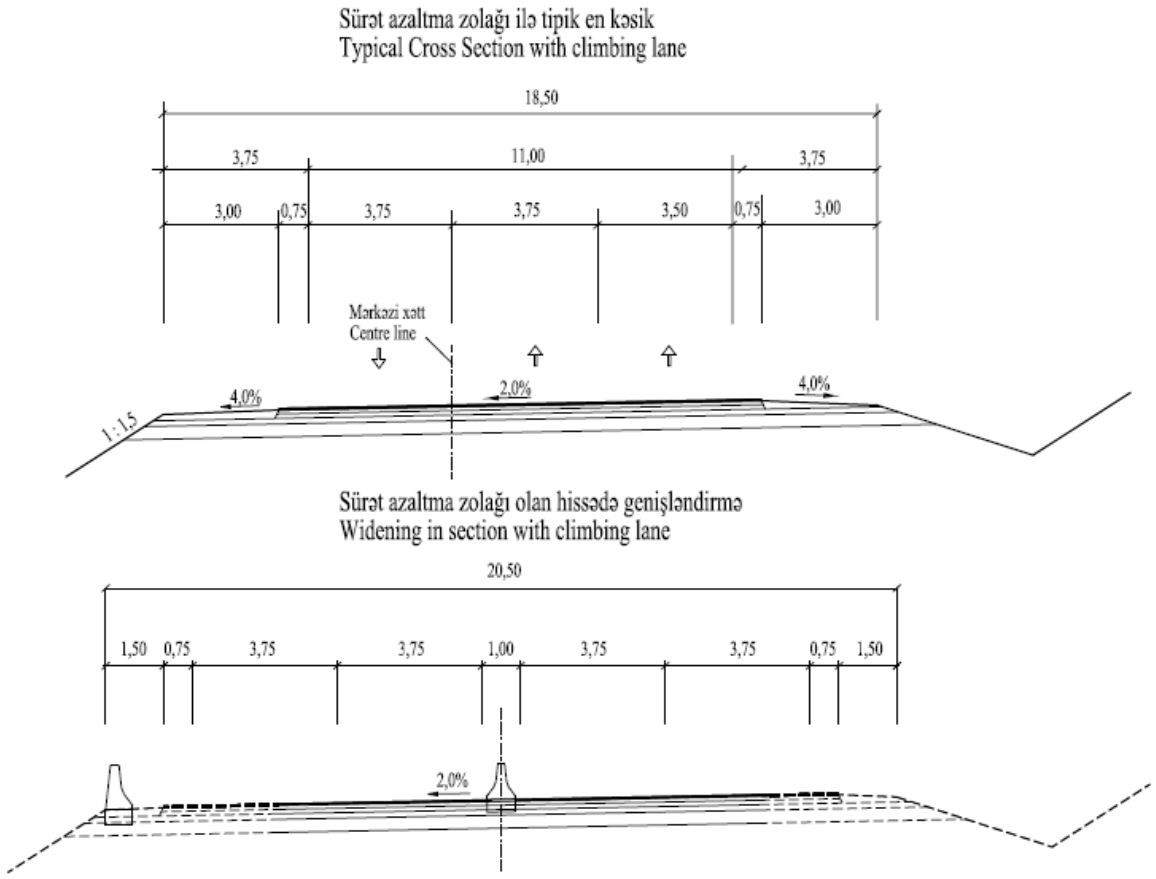


Figure 5-4: Option (iii) Typical Cross Section for Widening in Sections with Climbing Lane

Appendix A illustrates where each of the above three options is proposed along the study road. Option (i) is the only option which complies with the requirements of a Category 1b road (as per the Construction Norms and Rules – SNIP) as it provides a separation of the carriageways by a median of 5m width, of which 3m are unpaved. This option is also the preferred option by the pre-feasibility Engineering Consultant[7] as it avoids extensive demolishing work on the existing (rehabilitated) carriage-way. Options (iia), (iib) and (iii) are sub-standard solutions presented for areas where there is not sufficient available space for the implementation of Option (i).

5.2 Alternative Alignments

In addition to the main design options, alternative alignments (AA) were proposed by Kocks Consult GmbH for three stretches of road between km 15 and km 45. These routes are illustrated in Appendix A and are briefly described below. It should be remembered that, as this is an old east-west road, the best possible route has probably been selected. The only proviso is that the route up steep slopes will traditionally take the course most favoured by horse and

[7] KOCKS (2009) Study of Widening Options for a Four Lane Road between Baku and Shamakhi in Azerbaijan.

cart; i.e., zig-zagging up the hillside or going around the head of the gully; for car traffic this can result in dangerous bends. Modern construction techniques will be applied to widen these bends, but there will probably not be a more suitable topography elsewhere for the overall route.

5.2.1 AA1: Between km 26 and km 34

This proposed realignment to the south of the existing route is approximately 13km in length and will cross an area of irregular topography which features a number of hills, ridges and deep gullies. The road will first run south through a flat plain for approximately 2km; then turn north-west and rise and up a hill to cross a succession of very deep gullies (see Figure 5-5), before running alongside the hillside above the gully incisions. The route continues across a plateau with occasional broad, deep gullies before joining the existing road.

It is not clear why such an extensive re-route was selected; it is approximately twice the distance of the existing route and the fairly wide hairpin bend in the existing road could be opened out within the proposed RoW. The AA would have significant environmental implications due to its larger footprint and will actually create geohazards by excessive excavation in this very friable clay soil. The construction implications are significant as many gullies will have to be traversed and benching techniques will have to be implemented as the route traverses the cross steep slope of the hillside. This AA is not recommended.

Figure 5-5: Topography along the Proposed Route of Alternative Alignment 1

5.2.2 AA2: Between km 43 and km 46

This proposed realignment turns north from the road across flat terrain to cross a ridge (approx 30-40m high) which runs parallel to the road. The AA then takes a course for approximately 3km parallel to the existing road but the other side of the ridge; it then turns south-west to cross the ridge again to emerge behind the village of Jangi. The AA bisects the village to join the road to the south of the village.

As the existing road on this stretch is straight, more or less level and with plenty of level ground on each side, it is not clear why an alternative was deemed necessary. The AA is longer, would require technical challenges to cut through a ridge; would create erosion and land stability problems and would pose social problems as it bisects the village of Jangi (at present the village is intact and lies just to the north of the existing road). This AA is not recommended.

5.2.3 AA2x: Between Km 46 and Km 53[8]

AA2 continues on the south side of the existing road, heading southwest. This route cuts across a hilly area of a very irregular terrain of steep slopes, ridges and gullies. (See Figure 5-6 – the route crosses the saddle in the background). Once the route has made a steep ascent to cross a high saddle on the ridge, it traverses a relatively high plateau. However, to join the road at km 53 there are two very deep, broad gullies to cross.

It is clear why an AA was considered for this stretch of road: to achieve the elevation the road takes two steep hairpin bends which pose a significant safety hazard for fast traffic. Nevertheless, the selected AA poses extreme environmental, geohazard and construction concerns and is significantly longer. Furthermore, the elevation is achieved over a short distance, which may well not be possible from an engineering point of view. This route is not recommended.

However, there is still a need to address the road safety concerns around km 51. The current Contractor has created a temporary road which is straight and runs more or less parallel to the existing road. It is recommended that this be looked at as a viable alternative; for both the 2 lane re-furbishment and 4-lane option.

[8] The consideration of this AA is beyond the Consultant's ToR, however, some comments are provided as this AA is a continuation of the AA between km 43 and km 46.

Figure 5-6: Topography Along the Proposed Route of Alternative Alignment 2

5.3 Potential Borrow Areas

Qozluchay I, Qozluchay II and Pirsaatchay were identified as the potential borrow areas by the Environmental Assessment for Baku – Shamakhi Road rehabilitation9 and the impacts were discussed by the above mentioned EA Report.

6 The Policy, Legal and Administrative Framework

The proposed widening project will have environmental and socio-economic impacts, such as relocation and land acquisition. Therefore, a review of the pertinent national legislation has been conducted in order that that the national legal requirements can be distilled into a single process/procedure. In the course of Project implementation the ARS will be responsible for ensuring the sub-projects meet national environmental requirements as well as World Bank Safeguard requirements.

National Environmental Legislation

The Constitution of the Republic of Azerbaijan defines principles for environmental protection, ownership of natural resources and regulations for their use.
The legislative framework relating to the environment consists of:

- Parliamentary legislation that establishes the State regulation of strictly protected natural areas, and the protection and use of the environment and biodiversity;
- Presidential Decrees and orders and the resolutions of the Cabinet of Ministers that ensure the implementation of the major provisions of the laws;

[9] KOCKS (2006) Environmental Assessment for Baku-Shamakhi Road Rehabilitation, Final Report

- By-laws of the executive authorities (Ministries and Committees) that specify the activities to implement the laws;
- International Agreements and Conventions to which Azerbaijan is a signatory.

The Law on Environmental Protection (EP) of 1999 governs environmental protection in Azerbaijan. The requirements of this law in relation to environmental impact assessment are described in more detail below.

Legislation on land use and development consists of the Land Code and other legislative acts. Laws on the protection and sustainable use of natural resources include: Law on Plant Protection (1996), Forestry Code (1997), Water Code (1997), Law on Fisheries (1998), Law on Fauna (1999) and Law on Protected Areas (2000). Furthermore, in 2007 he Presidential Decree on "Creation of Nature Reserve for Groups of Mud-volcanoes of Baku and Absheron Peninsula" was issued.

Laws regulating environmental pollutants include those relating to environmental protection (1999), atmospheric pollution (2001), pesticides and agrochemicals (1997), industrial and domestic waste (1998) and water supply and wastewater (1999).10

National EIA Policy, Legal and Regulatory Framework

The current EIA system in Azerbaijan follows the procedure of State Ecological Expertise (SEE) adopted by the former Soviet Union in the late 1980s. In line with the definitions of SEE in the Law on Environmental Protection, the core purpose of the SEE system lies in the formal verification by State authorities of all submitted developments for their possible environmental impacts, regardless of their scale, sector type or nature. In addition to an EIA, a Strategic Environmental Assessment (SEA), which deals with policies, plans and programmes, is another task that fall within the responsibilities of SEE administration. To date, however, SEA has not been carried out in the country.

The basic procedures for the conduct of an EIA are described in the 1996 Handbook on the EIA Process in Azerbaijan. Although these provisions are not technically legally binding, compliance with them is to all intents and purposes regarded as mandatory.

Various independent and comprehensive studies on the environmental policy of Azerbaijan and the related legal and regulatory framework have concluded that there is an urgent need for preparing a new national EIA legislation. A specific issue raised in this context was the requirement to streamline the EIA process with the provisions of various international environmental Conventions that Azerbaijan is a party to 11,12.

The legal acts and documents that form the basis for Azerbaijan's current EIA system are listed in the Table 3-1.

[10] Anon (2004) *Country Study on Biodiversity and First National Report*, Republic of Azerbaijan, June 2004
[11] *Technical Assistance Consultancy for Institutional Strengthening* (August / September 2004), which included a Legislative Gap Analysis and was conducted with support of the EU
[12] *Assessment of the Effectiveness of the EIA System in the South Caucasus States: Azerbaijan* (March 2004) Caucasus Environmental NGO Network (CENN) with support of the European Subsidy Programme for Environmental Co-Operation and the Netherlands Commission for Environmental Impact Assessment.

Table B-1: Legislative Basis of EIA System in Azerbaijan

Legislative Document	Year of Adoption	System Implied
EIA Handbook	1996	EIA
Law on Environmental Protection, Clause VIII: State Ecological Expertise (SEE)	1999	SEE
Decree on the Ratification of the Espoo Convention13	1999	EIA
Decree Accession to the Aarhus Convention14	2000	EIA

Law on Environmental Protection

The Law on Environmental Protection (EP) establishes the main environmental protection principles, and the rights and obligations of the State, public associations and citizens regarding environmental protection. The Law states that the State Ecological Expertise is the official EIA procedure in Azerbaijan. According to Article 54.2 of the Law, EIAs are subject to the SEE which means that the MENR is responsible for the review and approval of EIA reports submitted by developers. The Law on EP defines SEE as 'the identification of conformity of the environmental conditions with qualitative standards and ecological requirements in order to identify, prevent and forecast the possible negative impact of an economic activity on the environment and related consequences'.

The Law on EP establishes the basis for the SEE procedure, which can be seen as a stand-alone check of compliance of the proposed activity with the relevant environmental standards (e.g. for pollution levels and discharges, noise). In addition, the Law on EP determines that projects cannot be approved without a positive SEE resolution.

In its Articles 81 and 82, the Law specifically provides for the application of international agreements in case their provisions are different from those of the Azerbaijan legislation. This relates to the Espoo and Aarhus Conventions, which are directly applicable to the EIA process in Azerbaijan.

The EIA Handbook

The procedures for the conduct of EIA are explained in the Handbook for the EIA Process in Azerbaijan of 1996, which defines EIA as 'a process whereby the potential environmental consequences of development proposals are identified and evaluated from the point of view of the physical, biological, and socio-economic environment, and ways and means are developed by which negative impacts are either avoided or minimised to acceptable levels' (Paragraph 1.1). This definition encourages developers to design their engineering proposals in a way least harmful for the environment.

[13] UNECE *Convention on EIA in a Trans-boundary Context*
[14] UNECE *Convention on Access to Information, Public Participation and Decision Making and Access to Justice in Environmental Matters*

According to these procedures, the following phases can be distinguished in the EIA process in Azerbaijan:

(i) Submission of Application and Initial Examination
The developer submits to the MENR head office a formal application, the format and content of which must comply with an established format. An initial examination of the application of the proposed activity is made by the MENR within the first month of the EIA process and the expected impacts of the proposed activity are considered. This may include preliminary consultations with other agencies, non-Governmental organisations (NGOs), experts and initial public inquiries. On the condition that the activity is likely to cause only minor impacts on the environment, the application may be approved with some conditions. If the activity is assessed to result in significant impacts, a full EIA is required. A decision on processing charges is taken and a scoping meeting with representatives of the applicant, invited experts and invited members of the public is organized and chaired by the MENR. Based on the outcome of this meeting, the MENR will notify the developer of the required scope and depth of the investigation and public consultation during the EIA study.

(ii) Review of EIA Report through the MENR/the Environment Expert Review Group
Upon submission of the EIA report the MENR has three months to review the document. During this stage, an environment review expert group of 5-11 skilled and experienced members (e.g. members of the Academy of Science, university staff or officials from other ministries) is formed. There are no firm requirements on group composition, but the MENR has a roster of experts and composes each commission based on case-specific considerations. This environment review expert group is chaired by the MENR and carries out the public submissions, investigations and consultations. Finally, a written review of documentation together with recommendations is submitted by the environmental review expert group to the MENR.

(iii) Decision by the MENR
At this stage, the MENR decides on whether to refuse the application or to approve it, with or without conditions. Conditions for the approval that might be typically be considered in the present context mainly relate to the construction phase and may include site management; noise; dust, discharges to the air land, subsurface or water, solid waste management, fire risk, emergency contingency plans, etc. If the application is approved with conditions, either the activity starts or the developer decides to appeal against the conditions. If the application is accepted, the developer must provide a report to the MENR on progress within 12 months of the MENR decision.

During construction of the project, the developer must monitor parameters as indicated in the MENR's decision notice. If project designs change significantly from those studied in the feasibility phase EIA, additional reports on the impacts of the changes may be requested by the MENR. Controls are made by the MENR on the accuracy and the reliability of the developer's monitoring results. If it appears that there is a risk of the conditions being breached, the MENR will issue a warning on the developer. If the conditions are breached, the developer is obliged to stop whatever activity is causing the breach of the conditions. In such cases the MENR may reconsider the approval, possibly with the participation of the Environmental Review Expert Group, and the conditions of approval may be reviewed.

The procedures of the Handbook on EIA in Azerbaijan cover all major stages/components of the internationally recognized EIA process like screening, scoping, conduct of base-line studies, EA report preparation and review and post-EIA monitoring. The Handbook establishes the main principles and elements of the an international EIA process, notably (i) the sequence of events, roles and responsibilities of developers and Government institutions, charges; (ii) the purpose

and scope of the EIA report; (iii) public participation in the process; (iv) the environmental review and decision; (v) the process involves various stakeholders, considers public opinion and aims at environmentally conscious decision making.

A distinctive screening list with activities that are likely to cause significant environmental impact is not established either by the Law on EP nor by the EIA Handbook.

In relation to public participation, the Law on EP and the EIA Handbook do not contain clear regulations/procedures on public participation and the access for the public to the relevant information and thus do not meet international requirements for public participation at the present time.

Further information relating to the EIA process in Azerbaijan, including how its requirements will be taken into account in Project preparation and implementation, is presented in the Environmental Assessment and Management Framework (EA&MF).

National Laws and Regulations on Land Acquisition and Resettlement

Article 29 of the Constitution of Azerbaijan (12th of November 1995) establishes the right of citizens to possess property and the protection of their property rights. It also ascertains that no one is dispossessed of land without appropriate Court safeguards, and that alienation of property for State needs shall only be allowed upon fair reimbursement of the market value of the asset in question.

However, there is no specific national legislation in Azerbaijan on involuntary resettlement.

The following national regulatory instruments provide a basis for regulating and managing the acquisition of and compensation for land, property and productive assets:

- Land Code (25 June 1999).
- Civil Code (1 December 1998).
- Cabinet of Ministers Resolution No.42 (15 March 2000).
- Cabinet of Ministers Resolution No.110 (June 1999).
- Decree on application of the Road Law (2000).
- Decree on Additional Activities for Regulating the Use of Road Reserves (2004).

The Land Code:

- Provides compensation for the loss of land on the basis of valuations made in accordance with the Azerbaijan Standard Code No. 158, 1998;
- Allows recourse to justice through the Courts; and
- Provides the basis for a land-for-land compensation option.

The Civil Code and Land Code provide the basis for acquisition of land for projects of national interest and needs. The Cabinet of Ministers Resolution No. 42 outlines procedures for the acquisition. Collectively, these regulations consider two options for the land acquisition payable only to the legal landowners; notably, (i) land-for-land, and (ii) compensation based on market prices. Any dispute over compensation will be subject to resolution in the Courts. The Decree on the Application of the Road Law and the Decree on Additional Activities for Regulating the Use of Road Reserves designate the Cabinet of Ministers as the Agency to approve road reserves and the acquisition of affected properties.

The current legislation relating to the status and control of the road reserves has its foundations in the land laws of the Soviet era. Prohibition of activities in the road reserve is outlined in the 1989 Road Decree, which itself refers to an earlier legal instrument No. 228 of the 3rd of July 1976. Since independence, a Decree on the Application of the Road Law of 2000 and Decree No. 18 of February 2004 on additional activities aimed at regulating the use of the road reserve.

According to Azerbaijan Republic legislation, there are two possible scenarios of land acquisition:

- Land owner is provided with the equal size and quality of land.
- Land owner is compensated by proponents of the land acquisition on the basis of current market prices.
- Any dispute is the subject of Court consideration.

The real situation with land reserves excludes the first scenario. Local authorities either have no land reserves, or the quality of these lands is much lower than the land owned by people. Thus, the main scenario for smooth land acquisition is just valuation on basis of current market prices and timely compensation of these lands to their owners.

There is no specific national legislation in Azerbaijan on involuntary resettlement.

The Decree on the Application of the Road Law and the Decree on Additional Activities for Regulating the Use of Road Reserves designate the Cabinet of Ministers as the Agency to approve road reserves and the acquisition of affected properties.

Legislation Relating to the Status and Control of the Road Reserves

The current legislation relating to the status and control of the road reserves has its foundations in the land laws of the Soviet era. Prohibition of activities in the road reserve is outlined in the 1989 Road Decree, which itself refers to an earlier legal instrument Number 228 of the 3rd of July 1976. Since independence, a Decree on the Application of the Road Law of 2000 and Decree No. 18 of February 2004 on additional activities aimed at regulating the use of the road reserve. Summaries of instructions given in these and other decrees are given in the following sections.

1976 Road Decree

The 1976 Decree refers back to the Construction Norms and Rules, SNiP 467/74 that defined the requirements for a 60 metre wide road reserve15 for State and Republican Roads and a 25 metre wide road reserve for Local Roads. This decree gives legal standing to the width requirements for road reserves given in the construction standard.

1989 Road Decree No. 461

The 1989 decree again reinforces the road reserve width requirements given in the 1976 Decree. Article 7 outlines prohibited activities and constructions in the road reserve and assigns rights for the roads authority to evict illegal occupants on 15 days notice, at the conclusion of which, the roads authority may demolish the constructions without compensation and use the resultant materials in the construction of the road. This 1989 decree also formalised a procedure for the road authority to review and authorise applications for developments within 200 metres of each side of the road centreline in respect of aspects including maintenance of the road reserve and access provisions to the main road.

[15] The road reserve width is defined as being 30 metres wide on each side of the centre-line, totaling 60 metres.

2000 Decree on Application of the Road Law
One of the main purposes of this decree was to update the 1989 Decree, especially in regard to the designation of responsible agencies. Article 14 outlined that the width of road reserves will be confirmed by the Cabinet of Ministers. Processes for inclusion of new areas into the road reserve, and acquisition of affected properties, are described, and it is stated that those permitted to use lands within the road reserve must be notified of the conditions of this use upon agreement of use terms. Article 33 states that commercial enterprise may be undertaken with Roads Authority approval within the road reserve.

2004 Decree on Additional Activities Aimed at Regulating the Usage of Road Reserves in the Republic of Azerbaijan
This recent decree designates responsible agencies for various issues relating to the road reserve and adjacent land use, including the preparation of an inventory of national road reserves to identify illegal and legal occupiers and properties, and for ongoing maintenance and protection of the road reserve. These inventories indicating the legitimacy and value of all occupiers and properties were required to be submitted to the Cabinet of Ministers.

Other National Road Sector Laws and Regulations

Other laws and regulations relevant to the road sector in Azerbaijan are summarised in Table B-2:

Table B-2: National Road Sector Laws and Regulations

Reference	Description
Azeri Law on Automobile Roads (March 10, 2000) Section 39: Protection of the Environment	Spells out that any construction or reconstruction of roads requires the official approval of the Ecological Committee, that state of the art technology must be applied and that the chemicals that are used must be environmentally sound. The unit of the Ministry responsible for road environment must approve the proposed environmental, health and safety norms of the construction.
SNIP 2.05.02-85 Building Code & Regulations for Automobile Roads Ch. 3: Environmental Protection	Indicates the general need to minimize adverse environmental impacts in road design and provides, for instructions on the removal and re-use of top soil (no. 3.4); the need to provide buffer between the road and populated areas and to carry out noise reduction measures to assure compliance with the relevant sanitary norms (no. 3.9); on the dumping of excess materials (no. 3.12).
The Law of the Republic of Azerbaijan on Sanitary and Epidemiological Safety, 1993 Section III: Responsibilities of State Bodies, Agencies, Companies… on the Provision of Sanitary and Epidemiological Safety	General framework provisions on the requirement to provide healthy and safe conditions at workplaces and work camps (and many others) in compliance with the relevant sanitary hygiene, construction regulations and norms (particularly items 14, 15 and 16).
Safety Regulations for Construction, Rehabilitation and Maintenance of Roads 1978	Comprehensive compilation of safety rules to technical safety requirements of road construction equipment, operation and maintenance of asphalt plants, work in

Reference	Description
	borrow sites, loading and unloading operations, work with toxic substances, etc.
SNIP III-4-80 Norms of Construction Safety	Detailed regulations on construction worker's health and safety. Chapters 2 and 5 provide organisational procedures of construction and work sites and material transport. Annex 9 contains standards on maximum concentrations of toxic substances in the air of working zones; Annex 11 specifically claims that workers need to be informed and trained about sanitation and health care issues and the specific hazards of their work.
Guidelines for Road Construction, Management and Design, February 7, 2000 Part I: Planning of Automobile Roads	Addresses environmental issues in road design, construction and maintenance. Requires minimisation of impacts on the ecological, geological, hydro-geological and other ecological conditions, by implementing adequate protective measures.
Part II: Construction of Automobile Roads	Requires the consideration of appropriate protection measures, which shall contribute to the maintenance of stable ecological and geological conditions as well as the natural balance.
Part III: Protection of the Environment	Provides general overview on the requirements for environmental protection.
BCH 8-89 Regulations on Environmental Protection in Construction, Rehabilitation and Maintenance of Roads	Comprehensive provisions on environmental protection measures in road construction such as use of soils, protection of surface and groundwater resources, protection of flora and fauna, use, preparation and storage of road construction machinery and materials, servicing of construction machinery; provisional structures, provisional roads, fire protection, borrow pits and material transport, avoidance of dust, protection of soils from pollution, prevention of soil erosion etc. The appendices to this document also state standard for: maximum permitted concentrations of toxic substances; noise control measures; soil pollution through losses of oil and fuel from construction equipment; quality of surface water.
Sanitary Norms CH 2.2.4/2.1.8.562-96; 1997	Ambient noise quality standards for residential, commercial and industrial areas, hospitals and schools (day/night standards);
SNIP II-12-77, Chapter II: Norm of designing for noise protection	Identification of different noise sources, full list of maximal noise level for different areas (residential, hospitals, industrial etc.) in different daytime, technical description of different measures for noise level reduction etc are present in the document.
Reg. 514-1Q-98 Regulation on Industrial and Municipal Waste	This law includes requirements for industry and enterprises on the implementation of identified standards, norms and environmental protection for

Reference	Description
	waste when designing, constructing or reconstructing.
GOST 13508-74	Describes the requirements and standards for white lining for the various road categories.
Law of the Azerbaijan Republic on subsurface	This Law shall regulate relations in connection with the development (exploration, research), efficient use, protection and safety of works in the subsurface on the territory of the Azerbaijan Republic, including subsurface in the Azerbaijan Republic section of the Caspian Sea (Lake), provide for the protection of interests of the state, users of the subsurface and individuals in course of use of the subsurface.
Law of the Azerbaijan Republic on Fertility of Lands	This Law shall established legislative provisions related to reinstatement, increase and protection of fertility of state, municipal and private lands in the Azerbaijan Republic.
Rules of Issue of the Status of "Mountainous-Mining Allocation" To Subsurface Section For Extraction of Mineral Resources, Construction and Operation of Underground Facilities Not Associated with Extraction of Mineral Resources	These Rules shall establish procedures for the issue of the status of "Mountainous-Mining Allocation" to a subsurface section upon special permission (license) for extraction of mineral resources and construction and operation of underground facilities not associated with extraction of mineral resources on the territory of the Azerbaijan Republic.
Rules for Liquidation and Conservation of Enterprises Engaged into Extraction of Mineral Resources, Mountainous-Mining Excavations, Drilling Wells and Underground Facilities not associated with extraction of mineral resources	These Rules shall be compulsory for all subsurface users irrespective of the type of ownership engaged into exploration, extraction of mineral resources and construction and operation of underground facilities not associated with mineral resources in the territory of the Azerbaijan Republic and the Azerbaijan Republic section of the Caspian Sea (lake).
The law of the Azerbaijan Republic on ecological safety No 677-IG	This Law includes establishment of the legal framework for the purpose of protection of lives and health of individuals, the public, material and moral values thereof, the environment, including atmospheric air, cosmic space, water objects, subsurface, soils, natural landscapes, flora and fauna from hazards which may arise as a result of impact of natural and anthropogenic factors.
Presidential decree on "Creation of Nature Reserve for group of mud-volcanoes of Baku and Absheron peninsula" 15 August 2007	This decree is addition to the Law on Protected Areas (2000) and includes establishment of the legal framework for the purpose of protection of unique landscape forming by mud- volcanoes occurring on the area.
Rules for Use, Protection and Preservation of Trees and Bushes which are not included to the Forestry Fund of Azerbaijan Republic	This document includes detailed description of trees and shrubs that are not include to the forestry Fund and the way of their protection as well as the exclusions and the regulation in case of necessity of their cutting or

Reference	Description
(No 173; 19 of September, 2005)	replanting.

Source: Finnroad (2005) Tovuz Bypass Project with additions

Institutional Framework

Environment

The key environmental institution in Azerbaijan is the Ministry of Ecology and Natural Resources. The MENR, which was formed from the former State Committee for Ecology and Natural Resources Utilisation, was established by Presidential Decree in 2001. At that time, the MENR took over the functions of several other state bodies such as the departments of Hydrometeorology, Geology, Forestry and Fishery. The MENR's activities are sub-divided into the following main areas:

- Environmental policy development
- Environmental protection
- Water monitoring and management
- Protection of marine (Caspian Sea) bio-resources
- Forest management
- Bioresources and protected areas management

The MENR's State Ecological Expertise (SEE) department is responsible for the review and approval of environmental impact assessments (EIAs) submitted by developers.

The other Government institution involved in the preparation and implementation of the Project is the ARS (Azerroadservice), in particular the Highway II Project Implementation Unit and the Ecology and Safety Sector (ESS), a relatively new department established under the ARS's. ARS's ESS will have the responsibility for ensuring the implementation of the recommendations contained in the EA&MF and for ensuring compliance with national environmental standards.

There are over 60 ecological Non-Government Organisations (NGOs) in Azerbaijan.

Construction Permits

Prior to starting construction, permits from the following organisations will be required:

1. State Committee of Construction and Architecture
2. State Purchase and Sale Agency
3. Republic Ministry of Finance
4. State Road Transport Department
5. Republic Head Fire Safety Office
6. Republic Hygiene and Epidemiology Centre
7. Republic Seismological Centre
8. Republic Ministry of Communication
9. Republic Melioration and Water Industry Committee
10. Ministry of Ecology and National Resources
11. State Railway Department
12. Azerbaijan Republic State Oil Company
13. "Azerigaz" Joint-stock Gas Company
14. "Azerenerji" Joint-stock Electricity Company

15. "Azersu" Joint-stock Water Company
16. Local Executive Power
17. Research Division Centre (review, if project was done by another organisation)
18. Transport Project Department (review, if project was done by another organisation)
19. Review by AYS's Expertise Committee

Operation of a new borrow pit for extraction of aggregate requires a permit from MENR's Department of Geology. The application requires an Ecological Passport. The major environmental company in Azerbaijan which prepares the ecological passports is MENR's Ecological Centre. Details required include location of borrow pit and proposed volume and rate of extraction. MENR's Department of Geology will undertake a geological assessment of the site of the proposed borrow pit. Once approved, the site is registered by MENR's regional branch. MENR will undertake regular checks to confirm the volumes extracted do not exceed those in the permit.

Operation of a new asphalt or concrete batching plant requires a permit from the Ministry of Economic Development. Again the application requires an Ecological Permit which provides details of location, production and emission rates. Once approved, the site is registered by MENR's regional branch. MENR will undertake regular checks on sources of materials, appropriate use of technology and environmental impacts such as air quality and spillages.

Land Acquisition and Resettlement

The ARS's Road Protection Service (RPS) is responsible for control of the road reserve and vehicle overload control. The RPS has spearheaded the preparation of the inventories of properties within the road reserve, coordinating the local representatives of each of the authorities with designated responsibilities for the inventory. The RPS has a central office in Baku and several regional offices throughout the country.

The ARS (through its Traffic Regulation sector) is required to issue permits to build and operate developments within the road reserve. This requirement was first introduced in the 1989 Decree No. 461, however most of the owners of buildings within the road reserve either (i) did not apply to the ARS for this permission; or (ii) constructed buildings within the 60 metre wide road reserve, despite having received a permit from the ARS for construction outside the road reserve.

Protection of the road reserve and prevention of further encroachment is also the responsibility of the Ministry of Transport (designated to the RPS) with the Ministry of Internal Affairs and local Executive Authorities (local district governments).

The local Executive Powers and Municipalities have general powers for approving new building developments in respect of planning requirements, appearance, architectural style and construction standards. Local officers are required to instruct building owners to stop construction of illegal buildings in the road reserve16, and obliged to seek permission from the Ministry of Transport and the State Committee on Mapping and Land approval for any such developments. The February 2004 Decree also requires the Local Executive Powers and Municipalities to participate with the Ministry of Internal Affairs, Ministry of Economic

[16] As multiple permits are required for construction in the right of way, those from local executive authorities and municipalities are only part of this process. Gaining all required permits is the responsibility of the applicant, however the February 2004 decree law places new emphasis on the role of local agencies in ensuring that the Ministry of Transport approvals are in place before they grant local approval.

Development, Ministry of Finance and the State Committee of Construction and Architecture in preparing inventories of all structures in the road reserve, identifying their legitimacy and value. These inventories are required to be submitted to the Cabinet of Ministers who then directs appropriate action.

The Land Acquisition Department (LAD) is a relatively new department within the ARS. This department will be tasked with carrying out future resettlement procedures and will have that have responsibility for the coordination studies including their consultation and disclosure; liaison with the relevant ministries and agencies regarding approvals and clearances; and the practical implementation of related plans.

International Conventions

Azerbaijan is a signatory to most international agreements and conventions relating to the environment.

Table B-3: International Agreements and Conventions

International Convention	Year ratified
UNESCO Convention on Protection of World Cultural and Natural Heritage	1994
UN Framework on Climate Change	1995
UN Convention for the Protection of the Ozone Layer (Vienna Convention)	1996
Agreement on Mutual Cooperation of the Commonwealth of Independent States in the area of Hydrometeorology	1998
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), and Agreement on Protection of Sturgeons	1998
UN Convention to Combat Desertification	1998
UN Convention on Environmental Impact Assessment in the Trans-boundary Context (Espoo Convention)	1999
Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)	1999
UNECE Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention)	1999
UNESCO Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)	2000
UNECE Convention on the Protection and Use of Trans-boundary Watercourses and International Lakes (Helsinki Convention)	2000
UN Convention on Biological Diversity	2000
Food and Agriculture Organisation (FAO) Convention on Plant Protection	2000
Protocol on UN Framework Convention on Climate (Kyoto Protocol)	2000
Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol)	2000
European Agreement about Transportation of Dangerous Goods on International Routes	2000
UN Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention)	2001

UNECE Convention on Long-Range Trans-boundary Air Pollution	2002

Source: www.biodiv.org

Based on article 151 of the Azerbaijan Constitution, international Conventions over-ride national laws if there is any conflict. With regard to the context of the present 'Motorway Improvement and Development Project', the Law on EP specifically states that SEE is guided, inter alia, by international legal obligations.

Azerbaijan is a party to the UN Economic Commission for Europe (UNECE) Convention on EIA in a Trans-boundary Context (or Espoo Convention17), which stipulates the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. The Convention also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries.

The present Project will be physically restricted to the territory of Azerbaijan, so that issues of serious trans-boundary concern may not be expected.

The fact, however, that Azerbaijan ratified this Convention suggests that the general and internationally accepted principles that apply to the EIA process and that are laid down in this Convention are accepted. This becomes relevant with regard to the provisions of Appendix I, which contains a list of activities to which the Convention applies18, to Appendix II, which describes the minimum information to be provided in the EIA documentation and finally regarding the provisions of Annex III, which determines criteria to assist in the determination of the environmental significance of activities not listed in Appendix I of the Convention.

The objectives of the Convention on Wetlands of International Importance as Waterfowl Habitat ('Ramsar Convention') are to stem the progressive encroachment on and loss of wetlands now and in the future, recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific and recreational value; and to coordinate international efforts for this purpose. Signatories are obliged to: (i) specify at least one wetland on a List of Wetlands of International Importance; (ii) encourage the wise use of wetlands; (iii) establish wetland reserves, cooperate in the exchange of information and shared wetlands species.

The Convention on Biological Diversity seeks to ensure conservation of biological diversity and sustainable use of its components. The World Bank is one of the Implementing Agencies for channelling resources available from the Global Environment Facility (GEF) to viable biodiversity projects in developing countries and is engaged in project lending for environmentally sustainable development. The first national report on Azerbaijan's biodiversity was issued in April 200419.

The UNECE Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (also 'Aarhus Convention'20) establishes a number of rights of the public (citizens and their associations) with regard to the environment. Public

[17] ratification 01.02.1999

[18] point 7 of the List of Activities reads: (a) Construction of motorways, express roads 2/ and lines for long-distance railway traffic and of airports 3/ with a basic runway length of 2,100 metres or more; (b) Construction of a new road of four or more lanes, or realignment and/or widening of an existing road of two lanes or less so as to provide four or more lanes, where such new road, or realigned and/or widened section of road, will be 10 km or more in a continuous length.

[19] Anon (2004) *Country Study on Biodiversity and First National Report: Republic of Azerbaijan*

[20] ratification 09.11.1999

authorities (at national, regional or local level) are to contribute to allowing these rights to become effective. The Convention provides for:

- The right of everyone to receive environmental information that is held by public authorities ('access to environmental information'). This can include information on the state of the environment, but also on policies or measures taken, or on the state of human health and safety where this can be affected by the state of the environment. Citizens are entitled to obtain this information within one month of the request and without having to say why they require it. In addition, public authorities are obliged, under the Convention, to actively disseminate environmental information in their possession;
- The right to participate from an early stage in environmental decision-making. Arrangements are to be made by public authorities to enable citizens and environmental organisations to comment on, for example, proposals for projects affecting the environment, or plans and programmes relating to the environment, these comments to be taken into due account in decision-making, and information to be provided on the final decisions and the reasons for it ('public participation in environmental decision-making');
- The right to challenge, in a court of law, public decisions that have been made without respecting the two aforementioned rights or environmental law in general ('access to justice').

World Bank Safeguard Policies

The World Bank's environmental and social safeguard policies are regarded as a cornerstone of its support to sustainable poverty reduction. The objective of these policies is to prevent and mitigate undue harm to people and their environment in the development process. These policies provide guidelines for the World Bank and borrowers in the identification, preparation and implementation of programmes and projects.

Environmental Impact Assessment (EIA) is one of 10 environmental, social and legal safeguard policies of the World Bank. EIA is used in the World Bank to identify, avoid and/or mitigate the potential negative environmental impacts associated with lending operations. The purpose of EIA is to improve decision making, to ensure that project options under consideration are sound and sustainable, and that potentially affected people have been adequately consulted. The World Bank's environmental assessment policy and recommended processing are described in Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment. This policy is considered to be the 'umbrella' policy for the World Bank's environmental 'safeguard policies'. For the present Motorway Improvement and Development Project, the relevant safeguard policies to be considered at all stages of preparation and planning are:

- Involuntary Resettlement (World Bank OP/BP 4.12);
- Natural Habitats (World Bank OP/BP 4.04: Natural Habitats 2001);
- Forestry (World Bank OB/BP 4.36);
- Management of Cultural Property (World Bank OP 11.03).

The World Bank's requirements on Information Disclosure are detailed in The Disclosure Handbook 2002.

The World Bank OB/BP on **Involuntary Resettlement** requires WB-assisted projects to avoid or minimize involuntary land taking. If such cannot be avoided, displaced persons need to be meaningfully consulted, compensated for lost/damaged assets and assisted in restoring or

improving their living standards and livelihood. The policy requires that if involuntary land taking and resettlement become necessary, a clear plan for compensating and assisting displaced persons be prepared by the borrower by appraisal for the World Bank's review. Such a plan must be substantially completed prior to the commencement of civil works.

The World Bank OP/BP on Natural Habitats seeks to ensure that WB-supported infrastructure and other development projects take into account the conservation of biodiversity, as well as the numerous environmental services and products which natural habitats can provide to human society. The policy strictly limits the circumstances under which any WB-supported project can damage natural habitats, i.e. such land and water areas where most of the native plant and animal species are still present. Specifically, the policy prohibits the World Bank support for projects which will lead to significant loss or degradation of any Critical Natural Habitats, whose definition includes those natural habitats which are either:

- legally protected;
- officially proposed for protection;
- unprotected, but known of high conservation value.

In other (non-critical) natural habitats, the World Bank-supported projects can cause significant loss or degradation only when:

- there are no feasible alternatives to achieve the project's substantial overall net benefits; and
- acceptable mitigation measures, such as compensatory protected areas, are included within the project.

As mentioned earlier, Azerbaijan is a signatory to the Convention on Biological Diversity, which seeks to ensure conservation of biological diversity and sustainable use of its components. The World Bank is one of the Implementing Agencies for channelling resources available from the Global Environment Facility (GEF) to viable biodiversity projects in developing countries and is engaged in project lending for environmentally sustainable development. The World Bank may assist parties to meet their obligations under the convention, including the following:

- development and implementation of national strategies, plans or programmes for the conservation and sustainable use of natural resources;
- integration of conservation and sustainable use of natural resources into relevant sectoral and cross-sectoral plans, programmes and policies.

At the Project level, the World Bank seeks to ensure that its lending operations comply with international obligations to protect biodiversity. EIAs for the World Bank should take into account the impacts of proposed projects on a country's biodiversity.
The World Bank OP/BP on **Forestry** aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty and encourage economic development. The policy defines a forest as an area of land of not less than 1.0 ha with a tree crown cover (or equivalent stocking level) of more than 10% that has trees with the potential to meet a minimum height of 2 m in situ (in its original position). The World Bank does not finance projects that, in its opinion, will involve significant conversion or degradation of critical forest areas or related critical natural habitats. Critical forest areas are natural forest lands which are:

- existing protected areas and areas officially proposed by governments as protected areas, areas initially recognized as protected by traditional local communities, and sites that maintain conditions vital for the viability of these protected areas;

- sites identified by the World Bank or an authoritative source, such as areas with known high suitability for biodiversity conservation and areas that are critical for rare, vulnerable, migratory or endangered species.

The World Bank OP on **Cultural Property** is based on the acknowledgement of cultural resources as sources of valuable historical and scientific information, as assets for economic and social development, and as integral parts of a people's cultural identity and practices. The World Bank policy as stated in Operational Directive (OD) 4.50 is to: (a) assist in protecting and enhancing cultural property through specific project components and (b) decline to finance projects which significantly damage cultural property, and assist only those that are designed to prevent or minimize such damage.

The World Bank policy on **Public Consultation and Disclosure** follows specific procedures: EIA reports will be presented to both the Government of Azerbaijan and the World Bank Management and serve as a background document for approval by the competent authority. In accordance with OP/BP 4.01, the Borrower (i.e. the Government of Azerbaijan) will have to make the draft EIA Report and Land Acquisition Plan (LAP) available in Azerbaijan at a public place accessible to project-affected groups and local NGOs. The Borrower must also officially transmit the EIA report and LAP to the World Bank. Once the EIA report and LAP have been locally disclosed and officially received by the World Bank, the Bank will also make them available to the public through its Infoshop.21

As regards World Bank's internal EIA procedure, **Environmental Screening** is an important step at the stage of project preparation through which proposed projects are attributed to the appropriate extent and type of EIA. In practice, the significance of impacts, and the selection of screening category accordingly, depends on the type and scale of the project, the location and sensitivity of environmental issues, and the nature and magnitude of the potential impacts.

Projects are classified into **Category A** if they are 'likely to have significant adverse impacts that are sensitive, diverse, or unprecedented, or that affect an area broader than the sites or facilities subject to physical works.' Hence, the EIA for a Category A project examines a project's potential negative and positive environmental impacts, compares them with those of feasible alternatives (including the 'without project' situation), and recommends any measures needed to prevent, minimize, mitigate or compensate for adverse impacts and improve environmental performance. The EIA of a Category A project considers both the social and the physical environmental impacts. Socioeconomic environment includes themes such as land acquisition and resettlement; indigenous or traditional populations, cultural heritage, aesthetics and landscapes, noise and human health and safety. For Category A projects, the borrower should consult with project affected groups at least twice: firstly shortly after screening and before the TOR for the EIA are finalized; and secondly, once a draft EIA is prepared. In addition, the borrower consults with such groups throughout project implementation as necessary to address EIA related issues that affect them.

The impacts of **Category B** projects are 'site-specific in nature and do not significantly affect human populations or alter environmentally important areas, including wetlands, native forests, grasslands, and other major natural habitats. Few, if any, of the impacts are irreversible, and in most cases mitigation measures can be designed more readily than for Category A projects.'

[21] The World Bank (2002): *The Disclosure Handbook*. Operations Policy and Country Services. 2002.

For both the Category A and B projects, an Environmental Management Plan (EMP) needs to be established in accordance with the Bank's OP 4.0, which identifies EMPs as an essential feature of category A projects; for category B projects, the EIA may result in development of an EMP only, with no separate EIA report. The specific requirements relating to EMPs are set out in Annex C to the World Bank's procedure 4.01 (BP 4.01) – these are mandatory.

7 Environmental Baseline Conditions Km15 – Km45

7.1 Protected Areas

The only Nationally Designated protected area in the immediate highway environs is the Mud Volcano Areas at km 30.5 and km 31 (See Figures 7-1 and 7-2). The closest mud-volcano to the study corridor is Pirikushkul mud volcano located approximately 100 m from the roadside at approximately km 31 (see Figure 7-2). The location map of all mud volcanoes along the 15 to 45 km stretch of road is provided in Appendix C.

Figure 7-1: Volcano at km 30.5 (view from the existing road)

Figure 7-2: Volcano at km 31 (view from the existing road)

In accordance with the Presidential Decree of 15 August 2007 "Creation of Nature Reserve for group of mud-volcanoes of Baku and Absheron peninsula", there are a number of nationally protected mud volcanoes' areas along the study corridor. These include (from east to west) the mud-volcanoes Damlamaja, Uchtepe, Buransiz-Julga, Pirikushkul and Saridash-Boyanata (see Appendix C). These are strictly protected zones and no construction or agricultural activity is allowed here. Therefore, an appropriate road widening alternative will have to be established during the detailed design to ensure these protected areas remain intact.

However, as the RoW is 60m, it is not envisaged that there will be any immediate impact on the mud volcanoes themselves. The 60m working width will be strictly adhered to. There will be no egress or stockpiling of material in this area. Signs will be erected informing personnel that this area is legally protected.

7.2 Soils and Landscape

The characteristic landform in this area is arid, denuded, rolling foothills with deep, water incised gullies, climbing gently towards the Caucasus. The land is used as winter grazing grounds for sheep, cattle and goats. It is a highly eroded landscape, with soils that are friable, alkaline with high clay content.

The soil is highly erosive, especially once the vegetation layer has been removed. This could result in excessive mud and silty run off to surface water in adverse weather conditions. The ROW in this stretch will not be affected by landslips, but the Borrow pit access roads need to be assessed in this context.

Geotechnical surveys at the detailed design stage will identify any geohazard areas requiring permanent and temporary erosion control measures. The Contractor will identify the temporary erosion control measures that will be put in place, while Detailed Design will establish the most appropriate permanent erosion control structures that will be described in the Reinstatement Plan. Some benching on steep cuts may be required.

Although there is no well defined top soil, the top 15cm, containing organic material and seed bank, will be stripped during site preparation, reserved in a safe place and applied as final top dressing during reinstatement. Geojute, with seeding using local species, will be used to reinstate slopes.

7.3 Hydrology – Surface and Groundwater

There are no watercourses of any size that cross the highway on the 15km-45km stretch, although the slopes either side of the road (distant along this stretch) are deeply incised by seasonal streams. Main watercourses run high in the spring if they are carrying water from the Caucasus snowmelt.

There is only one watercourse within the study corridor – Sumgayitchay River. Densely meandered, this river flows in parallel with the road approximately from km 20 up to km 45, mainly in about two kilometers to the north. However in some sections (e.g. at km 22 and km 28) the loops of the river come nearer to the road side up to 500 m. The total length of the river is 198 km; the area is 1751 km^2; precipitation in the catchment area is 243 mm/ year and the average depth is about 15 mm. General volume of flow is about 63.5 millions m^3 with 80.2% composed by surface flow and only 19.8% by subterranean flow. Starting at high mountains of Greater Caucasus (higher 2500 m altitude) the flow of Sumgayitchay is strongly dependent on spring mountain snowmelt.

The domestic water supply is piped in the village of Gobustan and comes from springs in the village of Jangi. If the settlement and the water supply are located on opposite sides of the road, safe crossing points will be established.

The main characteristic feature of the study area is a virtual absence of groundwater and a small amount of rainfall (about 250 mm/ year). The absence of fitting geological structures allowed the formation and storage of no big aquifers. A brief description of the hydrogeological conditions along Baku Shamakhi road from km 15 to 45 is provided in Appendix C.

Therefore, it is not envisaged that construction activity along the ROW will impact on groundwater. The Borrow pit areas need assessment in this regard.

Surface water could be impacted if there is abstraction for water for dust suppression measures. Water abstraction necessary for construction phase will be assessed and quantified prior to start up and have prior approval.

There is a potential for siltation to surface water if erosion and site run off is not controlled. There is potential for hydrocarbon/chemical release into surface waters. Within the km 15 to km 45 stretch, these concerns are more applicable to Borrow pits and access roads rather than the ROW per se.

Run off and erosion will be prevented and contained.

All Best Practice precautions will be taken to prevent any pollution of ground or surface waters, such as careful siting of fuel/chemical storage, supervised refueling activities, and prohibiting washing vehicles or plant alongside surface water.

Construction will tank potable water to the camps to avoid exploitation of local resources.

Safe crossing points will be installed at locations where it is known people will be crossing to collect water.

7.4 Flora

The area between 15km-45km on the Baku-Shamakhi highway crosses dry steppe/semi-desert; characterized by Saltwort (*Salsola dendroides)* and Wormwood (*Artemisia hanseniania*) plant species. Generally biodiversity is high up to 600-729 plant species; evident mainly in spring. Saltwort vegetation is more widely distributed along this section of the road and plays a role in soil maintenance and erosion prevention. Between km 30 and 45 wermuth-saltwort semi-deserts can be found. In this section, wormwood formations are generally developed on the basis of ephemeral grass vegetation. *Artemisia hanseniania* has a key function in preventing soil erosion in this area. Shrub vegetation represents up to 1% of all plants and is composed mainly of tamarisk and juniper shrubs.

In the wet season species of ephemeral grasses, tulips (*Tulipa sp.*), irises (*Iris sp.*), feather grasses (*Stipa sp*.), some cereals (*Andropogon sp*.) and bushes (*Pirus sp., Amigdalus fenzliana, Crataegus orientalis* etc) can be observed. In the spring season numerous flower species can be found (*Euphorbia helioscopia, Veronica chamaedrys, Leontodon hispidus, Cirsium arvensis, Erodium cicutarium, Arnebia linearifolia, Sisymbrium officinadale, Ammi visnaga, Cicorium intibus, Calendula sp*. and *Papaver sp).* In the dry summer season the most common species are *Salsola sp., Eryngium planum* and *Echinops ritro.*

Thirteen the-Red-Book-of-Azerbaijan species[22] of plants (*Ferula persica, Cladocheta candissima, Anabasis brachiata, Astragalus bakuensis, Iris acutiloba, I.reticulata, Muscari elegantulum, Tulipa biebersteniana, Acantholimon schemachense, Avena ventricosa, Stipa pellita, Calligonum bakuense* and *Pyracanta coccinea)* occur at this section of Baku-Shamakhi highway in the desert and semi-desert landscape.

The land is intensively grazed by domestic stock; sheep, goats, cattle and donkeys, which reduces the opportunity for shrub development.

[22] The Red Data Book of Azerbaijan of 1989

The first year section of work does not impact significantly on any roadside trees/shrubs. As the RoW is restricted to 60m (30m either side of the existing road centre point) it is not envisaged that there will be a significant, long term impact on roadside vegetation. Dust generation from construction activities will result in 'soiling' (deposition of particulate matter) 100m or more from the source.

Traffic on the access roads to the site, for example, to and from Quarries/Borrow pits, will generate dust which will impact on the vegetation up to 100m from the road.

Construction activity will be strictly confined to the 60m RoW. Dust suppression measures, such as covering haulage lorries and spraying water, will be used.

Regular vegetation monitoring to record extent and severity of dust deposition will take place, using on transects perpendicular to the road.

Reinstatement will take place on all construction affected locations, including verges. All areas will be re-seeded using indigenous species of local provenance. Geojute will be used where there is the potential for soil loss through erosion.

A tree/shrub planting programme will be developed for the whole project, using native species with a local provenance. Central reservation will be planted with shrubs such as Tamarisk.

7.5 Fauna

The area harbours a number of faunal species, including threatened species of national and international importance. The following comments on the fauna along the study corridor are mainly based on the Red Data Book of Azerbaijan, IUCN Red Data List and publications of BirdLife International[23].

7.5.1.1 Mammals

According to the above named sources, the **common mammals** of the area are the Jackal (*Canis aureus*) and the Wolf (*Canis lupus*) which follow the sheep flocks to the winter pastures in the lowlands and the Red Fox (*Vulpes vulpes*), Badger (*Meles meles),* its big entrances to the burrows are usually locate in the slopes of river canyons*,* Wildcat (*Felis libyca)* and the hare (*Lepus europaeus*) which are the resident species of this area. Characteristic mammals are the Western Barbastelle bat (*Barbastella barbastella*[B]) and Blasius's Horseshoe Bat (*Rhinolophus blasii*[b]*). Barbastella barbastella*[B] categorised as a Vulnerable Species under the 2008 IUCN Red List Category, can be found in the study area throughout the year, except summers. These night active animals have shelters in surrounding structures during daytime. *Rhinolophus blasii*[b] is a Near Threatened Species under the 2008 IUCN Red List Category. It is found only in vicinity of Shamakhi in the forests in subterranean shelter[24]. Further characteristic mammals are *R. ferrumequinum*, *Pipstrellus pipistrellusd, P. kuhlii, Myotis blythii*. These bat species are mainly resident animals, breeding in numerous caves in vicinity hills and under the roofs of houses within the settlements and wintering mainly in subterranean shelters. Colonies of numerous rodents – House Mouse (*Mus musculus*), the Water Vole (*Arvicola terrestris),* the Red-tailed Sanderling (*Meriones lybicus*), *Allactaga williamsi* and the Social Vole (*Microtus socialis*) can be observed even at the embankments of the road but also at surrounded landscape predominately at the area with soft soils, in particular, on agricultural fields.

[23] Heath, M.F. and Evans, M.I., (2000) *Important Bird Areas in Europe: priority sites for conservation*, 2 vol., Cambridge, UK: BirdLife International (BirdLife Conservation series No 8), eds., 2000
[24] *World of Animals of Azerbaijan*, Senior Editor M A Musayev, Azerbaijan Academy of Sciences, Baku, 2000

Insectivore species are presented by very active Long-tailed White-toothed Shrew (*Crocidura guldenstaedti*) that never reach hibernation and can be found any time of the day and the night and hedgehogs- *Erinaceus concolor* – usually occurring in the gardens and parks with grass vegetation and *Hemiechinus auritus*–mainly occuring in open semi-desert and active during twilight and night time. These species hibernate from November to early April.

7.5.1.2 Avifauna

The **avifauna** is characterized by: Short-toed Eagle (*Circaetus gallicus*[a]) - *nesting*, Imperial Eagle (*Aquila heliaca*[c]), Pallid Harrier (*Circus macrourus*[b]) - *migratory*, Saker (*Falco cherrug*[a]) – wintering, Common Kestrel (*Falco tinnunculus*) – *resident*.

The wider area includes breeding areas for two species of falcons. Gargabazar rock (IUCN Important Bird Area), located approximately 10km from the study road is the only place within the country where nesting of the Lanner (*Falco biarmicus, breeding*) has been registered[25]. Appendix C provides a location map of this IUCN IBA 037.

The Lesser Kestrel (*Falco naumanni*[b]) – is an internationally protected species and a Vulnerable Species under the 2008 IUCN Red List Category[26] (See Figure 7-3). It is a common breeding bird in the study area. Small breeding colonies and even separate pairs usually nest on the piers under Bridges No. 2 and.3 and also under the roofs of abandoned houses and cowsheds. The biggest concentration of this species had been noted in the vicinity of the River and village of Jeyrankechmez.

Figure 7-3: Lesser Kestrel (*Falco naumanni*)

Large flocks of Little Bustard (*Tetrax tetrax*[c]) can be found during both migration and wintering seasons. Chukar (*Alectoris chukar),* Black-bellied Sandgrouse (*Pterocles orientalis*[a]), Rock Dove *(Columba livia),* Crested Lark (*Galerida cristata*), Isabelline Wheater (*Oenanthe isabellina*) and Chough *(Pyrrhocorax pyrrhocorax)* are typical resident species. Rooks (*Corvus frugilegus*),

[25] Heath, M.F. and Evans, M.I., (2000) *Important Bird Areas in Europe: priority sites for conservation*, 2 vol., Cambridge, UK: BirdLife International (BirdLife Conservation series No 8), eds., 2000
[26] Birdlife International (2008) 2008 IUCN Red List Category (as evaluated by Birdlife International. [www.birdlife.org/datazone/species/index.html?action=SpcHTMDetails.asp&sid=3589&m=0]

Jackdaws (*Corvus monedula*) Common Starlings (*Sturnus vulgaris*) and Tree Sparrows (*Passer montanus*) are densely occupied numerous agricultural fields. A large breeding colony (of about 600 pairs) of Rose-colored Starlings (*Sturnus roseus*) can be observed approximately 20-50 m from the roadside at Jeyrankechmez village from April until the end of July. Mixed breeding colonies of Common Bee-Eaters (*Merops apiaster*) and Rock Sparrows (*Petronia petronia*) are commonly observed on the slopes of the surrounding hills.

7.5.1.3 Amphibians

Study area is characterized by very dry climate, especially in the eastern part of the corridor, thus **amphibians** are not very common animals in the area. Characteristic **amphibian** species are the Green Toad (*Bufo viridis*) and the Common Frog (*Rana ridibunda*), which are found in vicinity of rivers and ponds and even temporary puddles. A much rarer Spade-footed Toad *(Pelobates syriacus,* [A]), which is in Red Data Book of Azerbaijan, can be observed only along the banks of springs and fresh water streams. Common Toad (*Bufo bufo*[A]) usually occurs in overgrows of bushes, gardens and parks of western part of the corridor in warm seasons of the year.

7.5.1.4 Reptile Fauna

The **reptile fauna** of the area is composed of a number of species which include the Viper Lebetina (*Vipera lebetina),* the Caucasian Agama *(Agama caucasica),* the Greek Tortoise *(Testudo graeca,*[C]), the European Pond Turtle (*Emys Orbicularis*[B])and the Caspian Turtle (*Mauremys caspica).*

The Greek Tortoise is one of the most typical reptile species in the area and characteristic of semi-desert dry lands. Although this is both locally and internationally protected animal, the species has quite a big number (up to 16 individuals for 1 km of route), but usually has bigger concentration at the sites with extensive vegetation. Therefore, Greek Tortoises roam in search of forage. In dry summers they can be observed along the rivers.

The European Pond Turtle (Near Threatened Species under the IUCN 2008 Red List[27]) as well as the Caspian Turtle can be found only in vicinity of permanent water bodies and in particular along the banks of the rivers.

Many other common species occur in this landscape type – lizards (*Stellio caucasicus, Ablepharus pannonicus, Eremias arguta, Eumeces scheideri, Cyrtopodion caspius* etc.) and snakes (*Elaphe quatourlineata, Eirenis collaris, Malpolon monspessulanus, Vipera lebetina* etc.). Grass-snake (*Natrix tessellata*) can also occur in some water-bodies.

Most reptile species from the order *Sauria* and *Criptodira* occur from beginning of March up to October-November (depending on temperature conditions). Species from the order *Serpentes* usually occur from end of March/April up to October. The exception is V*ipera lebetina*, which may not reach hibernation (this species can be observed throughout the year). Representatives of *Amphibia* may also be found during the whole year (in suitable weather conditions), but their period of activity is mostly continuous from March up to November. During hottest month of summer (August) reptiles can reach short term hibernation.

[27] IUCN/SSC (2008) Tortoise and Freshwater Turtle Specialist Group. 2008 IUCN Red List for Testudines. [www.iucn-tftsg.org/red-list/]

7.5.1.5 Fish

Common **fish** species that occur in the area are Caucasian Chub (*Leuciscus cephalus orientalis)*, Kura's Barbel (*Barbus curi)*, Caucasian Bleak (*Alburnus charusini),* Bitterling (*Rhodeus sricous),* Sazan (*Cyprinus carpa),* Kura's Loach (*Nemachilus brandti).* No threatened fish species are found in the rivers and streams of this region.

7.5.1.6 Insects

Characteristic and rare **insects** that may be encountered include beetles – *Carabus scabrosus* and *Calosoma sycophanta*[A]; and butterflies Apollo (*Parnassius apollo*[C]), *Colias aurorina*[A] *and Manduca atropos*[A]*.*

Tarantula (*Lycosa*), Phalanges (*Galeodes araneoides*), Scorpions (*Buthus eupeus*) and tick (*Ornithodorus*) are the most common arthropods in the study area. Insects present include Darkling Beetles (Blaps), locust species (*Dociostaurus maroccanus* is especially common), mantis, small mosquito (Phlebotomus) occurs in the burrows of sanderlings in dry areas and many different gnats occurs on wetlands. Some rare species from the Azerbaijan Red Data Book can be observed in the vicinity of the study corridor. These include beetles – *Carabus scabrosus*[A], *Calosoma sycophanta*[A], *Megacephalus euphraticus*[A], and the Alpine Swift (*Apus melba*)[28].

It is not envisaged that Construction will have a significant impact on mammals, fish or insects. Birds are potentially at risk once they have established nests. Reptiles and Amphibians, however, are in danger from construction activity and traffic movements.

The most effective mitigation measure for the protection of wildlife is to have a permanent on-site specialist for the duration of the construction phase of the project.
A bird specialist will have a watching brief during the nesting season, i.e. 4 months from April to July.

A wildlife officer will be present on site at all times. The species of most concern is the Greek Tortoise; in summer this animal could stray onto the site, in winter they could be hibernating in undisturbed soil. In winter the wildlife officer will check all earth moving activities. Al tortoises will be moved to a safe location. The Viper poses a safety hazard to people, thus, the Contractor's staff so the Wildlife Officer will have a watching brief for all wildlife on site.

Deaths of wildlife from construction activity will be reported and recorded in the Incident Reporting format.

Detailed design will include dedicated wildlife underpasses (ie not drainage channels), placed every 5km, and measuring 1.5m square, to facilitate wildlife road crossing. The road shoulder will be as steep as possible to deter tortoises from climbing onto the road.

8 Cultural Heritage and Archaeology Protection

At present there are no known sites of cultural or archaeological importance near the 15km-45km stretch of road. However, as this is an ancient corridor with a long history of people and

[28] As above

goods travelling between the Caspian and the Caucasus, the chance of stray archaeological finds detached from settlement sites is high.

As the construction activity will be restricted to 60 m it is not envisaged that there will be much movement of previously undisturbed soil, and therefore little chance of an impact on culturally important issues.

Absence of any known sites will be confirmed by the contractor. If such occur they will be recorded on the Sensitive Location Register. Any archaeological finds will be reported to the ARS immediately.

9 Socio-Economic Baseline Conditions Km15 – Km45

The thirty kilometer section of the Baku-Shamakhi road (from km 15 to 45) passes through administrative rayon of Absheron, in particular, from east to west, Ashagi-Gusdak and Pirakeshkul-Gobustan municipalities. The settlements in the project area are Pirakeshkul (Military Camp) and Gobustan. This Section provides information on the communities and business in the study area.

Table 9-1: Key Statistics of Absheron rayon

	Area, sq km	Population, prs	Rural population	Urban Population
Absheron Rayon	1546	105806	83.01%	16.99%

Absheron rayon comprises 1 city of Khirdalan, 8 settlements and 6 villages. The settlements of Ashagi Guzdak and Gobustan village are in the study area.

Forty four large and medium sized enterprises are in operation in Absheron. The Absheron region was formed in 1963 and over the past years has established a high-level control over collective and state farms of Baku and Sumgait and their provinces. Absheron has an agricultural and poultry industry, as well the industrial centres which supply agricultural products. Scientific-research institutes and laboratories are also present.

9.1 Socio-Demographic Data of the Settlements within the Study Area

General Socio-demographic data for the settlements located in the study area are provided in Tables 9-3 and 9-4 below.

Approximately 2937 people live within 1 km of the study area. Approximately, 29% of the population lives in the village of Gobuststan, 32% lives in the new roadside village of Ashagi Guzdak and 39% lives in the Military Camp of Pirikushkul.

There are totally 666 Households (HH) in the roadside settlements. Average HH size for the entire section is 4.4 person/HH.

The proposed road widening will occur near the borders of the affected settlements, but away from their municipal centres.

All three settlements that are located along the road have schools, but they are not adjacent to the road. Table 9-2 provides the data on school children.

Table 9-2: Schoolchildren Statistics

Settlement	School	No of Students Attending School
Ashagi Guzdak	One Eleven-Year Secondary School	555
Military Camp Pirikushkul	One Eleven-Year Secondary School	230
Gobustan	One Nine-Year Secondary School	200

Table 9-3: General information about roadside settlements

Settlement	Municipality	Km along the Road	Distance from a settlement to the road	Number of Households	Population
New settlement of Ashagi Guzdak	Ashagi Guzdak	16	Adjacent to the road	206	927
Military Camp Pirikushkul	Pirikushkul- Gobustan	17	Adjacent to the road	256	1150
Gobustan	Pirikushkul- Gobustan	27	100 m	204	860

Table 9-4: Some information on the district (rayon) level

Male		Female		Under Age 18		Over Age 65	
Number	%	Number	%	Number	%	Number	%
51869	49	53987	51	34403	32.5	17572	16.6

9.2 Business and Employment

The main economic activity in the project area is agricultural production, in particular, animal husbandry. The agricultural produce is for in-house consumption; however, some products are sold. There are some auto related businesses (mostly car repair workshops) in Ashagi Guzdak.

There are several industrial activities in Pirikushkul-Gobustan municipality area like brickworks, gravel workshop and gas stations. Five brickworks are located in Ashagi Guzdak. However, none are situated on the roadside.

A military camp is situated between Km 17+050 and Km 17+680. 256 HHs live inside of fenced military camp area. The number of households and population in Pirikushkul military camp is 256 and 1150 respectively. There is a school, kindergarten and medical center inside of the area that is fenced off.

Table 9-5 provides information on sources of income.

Table 9-5: Source of the income of population for Absheron region

Category	%
Percentage of male in total	**45.1**
hired work in public sector	9.3
hired work in private sector	2.6
hired work in agriculture	0.1
incomes of business, commerce, craft	0.9
work in personal ancillary	0.6
free professional activity	10.9
work at the private person	5.5
pensions	3.4
study grants	0.4
social grants	0.3
dependent	10.9
from outside of the country	0.1
other	-

Percentage of female in total	**54.9**
hired work in public sector	7.9
hired work in private sector	3.0
hired work in agriculture	0.0
incomes of business, commerce, craft	0.6
work in personal ancillary	0.4
free professional activity	0.5
work at the private person	4.1
pensions	9.7
study grants	1.2
social grants	1.9
dependent	25.4
from outside of the country	0.1
targeted social aid	-
other	-

Source: State Statistical Committee, 2007

10 Impacts – additional or amplified due to Road Widening between Km15 to Km45

An environmental assessment (EA) was undertaken to identify the specific characteristics of the project and of the environmental and social features likely to be affected by it. The Impact Register, provided in Appendix D to the Environmental Management Plan, is to be read in conjunction with this Section. The Impact Register lists the identified impacts that will occur during construction and operation. It is based on the current knowledge of the project and visual assessments of the project site completed in February and March 2009.

At the time of the preparation of the EA, the proposed widening of the Baku–Shamakhi road has been classified as a Category A project under the provisions of World Bank's OP 4.12. An EA conducted by Kocks GMBH was approved for the Baku-Shamakhi road rehabilitation project works, involving civil works on the existing two lane road. This EA has subsequently been expanded to include the additional or amplified impacts due to road widening.

A lack of pre construction (baseline) field information from ecological, hydrological and geotechnical studies makes a detailed assessment of impacts difficult. However, it is possible to assess which aspects will have an increased impact due to the extra work and materials involved in road widening. These will vary slightly in intensity and duration according to the preferred options of the Contractor, e.g. whether twice the number of men work for half the time. However, the increased work will lead to an increased risk of pollution incidents, non-compliance, landscape degradation and wildlife mortality.

The table below describes these increased impacts.

Table 10-1: Increased Impacts

Aspect	Impact	Comment
Land Acquisition	Land-take and increased project footprint. Increased chance of impinge on sites of cultural heritage, more chance of archaeological disturbance. Social grievance due to resettlement.	It has been stated at Public consultations that there will be no resettlement for the two-lane refurbishment. For four-lane this is not the case. Two roadside restaurants are incompatible with road widening. Although a wider road will be nearer the boundary fences of the occasional settlements, they will not impinge unduly.
Borrow pits and their access roads	For refurbishment KOCKS estimated 1.17m m^3 of road building material. This will double, which has massive potential for increased impacts and visual scaring. Bigger quarries and borrow pits have a greater potential to impact on surface and groundwaters. Increased haulage lorries on small, local roads have a significant impact on infrastructure and a risk to local communities and wildlife.	Specific Environmental and Social assessment to be carried out on accurately identified locations and access roads. Access roads to be included in Traffic Management Plan and Reinstatement Plan. Strict monitoring of mitigation measures put in place for use of Borrow pits and access roads.
Ambient Air Quality	Increased (double) the quantity of Emissions: • Dust. • Noise/Vibrations. • Substances which can be toxic and have a global warming potential (NO_x, SO_x, CO_2, CO,	There is a need to carry out surveys of existing conditions with regard to ambient air quality. Road widening will double the emissions, whether from using more machinery and plant or using fewer number over a longer duration.

	VOCs).	
Pollution	Increased (double) the quantity of Discharges and a greater potential for accidental loss of containment from: • Sewage. • Oil/Diesel. • Chemicals. • Siltation.	Pollution Prevention and control Plan to be developed as part of the Contractor's suite of site documentation.
Resource Use	Doubling the size of the road, with the attendant increase in man hours, traffic and work time will double the use of resources, such as water, fuel/oil, materials, energy. Water use, potable and for dust suppression, may cause issues locally.	An accurate assessment is required of the project in terms of resource use. Hydrological studies of surface and groundwater are needed; abstraction rates agreed and adhered to; and regular monitoring required.
Disturbance	Disturbance, through increased intensity, duration and geographical extent will increase and impact on Wildlife and the Local population.	Considerate and careful management of inevitable disturbances are to be specified in the Contractor's Environmental Management Plan. Good reinstatement, using the original top soil and reseeding with local plant species will alleviate the permanent effects of ground disturbance.
Worker Camps	Construction worker camps may be larger, or more numerous, or be in place for longer. This increases the specified impacts described in the Impacts Register.	A Camp Management Plan will assess the individual impacts and apply appropriate mitigation measures.
Waste	Waste production will increase, and the attendant problems of adequate segregation, storage and disposal.	The need for a waste minimisation policy is even more critical for the larger project. This will be described in the Contractor's Waste Minimisation and Management Plan. Waste Recycling opportunities should be thoroughly explored.

Traffic	Traffic will increase; not only on the RoW but with an increase in site deliveries of fuel, waste collection, water delivery etc. Haulage lorries to and from Borrow pits will create a significant increase in impact intensity. This will lead to an increase in emissions and dust and road degradation. Safety issues will become more severe.	Traffic Management Plan will provide a description of the necessary mitigation and control measures. Well maintained vehicle sand plant will reduce the emissions. Regular inspections will help to enforce compliance

11 Overall Mitigation and Offsets and Monitoring

Although these impacts have the potential to be severe they are temporary and, with good management and implementation of appropriate mitigation measures, they should have no long term deleterious effect. The Impact Register, provided in Appendix D to the Environmental Management Plan, is to be read in conjunction with this Section.

The control and mitigation measures are detailed in an outline EMP as well as the environmental and social protection staffing requirements for the Contractor. Besides, tenderers will be required to submit detailed technical method statements to show how they will comply with specified environmental mitigation measures and any related constraints on methods of construction.

During the construction period, the Construction Supervision Engineer will control the environmental impacts of the works. This will be done through checking and approval of method statements[29] submitted by the Contractor prior to any part of the manufacture, construction or installation of the works being undertaken. Among other issues, an assessment whether the environmental mitigation measures are adequate and in accordance with the contract will be made. If not, the Contractor will be instructed to make revisions to the approach. The works can start only once the method statement has been approved. Furthermore, the Construction Supervision Engineer will control the environmental impacts through the regular monitoring. Therefore, it is recommended that an environmental manager is appointed to the Engineer's supervision team. The environmental manager would monitor the implementation of environmental mitigation measures outlined in the Environmental Management Plan (EMP), reporting regularly to the Engineer.

[29] Technical method statements describe the materials, type of plant, labour requirements, prerequisite conditions, details and order of activities for each technical operation. They cover safety measures as well. Section method statements describe the coordination of activities on sections and provide further information on all activities, e.g. setting out; the source of materials; particular plant to be used; staff, labour and sub–contractors; sequencing and duration of activities; traffic management, environmental and social impact mitigation measures; access; terrain, geotechnical and drainage features; and any special features which will affect the execution of the work. Where the Contractor intends to change the design or alignment, the alternative design will be included in the relevant method statement.

The ARS and its regional branches will be responsible for proper implementation of the Highway II Additional Funding EMPs. During the construction phase the ARS' ESS, with assistance from Construction Supervision Engineer, will carry out regular and spot-check inspections of the works carried out by the Contractor and check that the EMP is being followed properly.[30] The ARS' ESS will be responsible for checking that all necessary environmental approvals and permits that are required under Azeri legislation are obtained by the Contractor. They will also be responsible for providing feedback to the Contractor, Engineer and the ARS PIU on issues arising from their monitoring activities.

It is recommended that a brief summary of the environment related issues be provided to the WB on a quarterly basis, which will include:

- status of environmental permits required by the project during construction phase;
- details of any reported incidents of non-compliance with applicable environmental permits including any fines imposed;
- details of any public complaints, coverage in the media or interaction with environmental groups.

The capacity building programmes were delivered to the ARS ESS to enhance their ability to manage and monitor the environmental aspects of internationally funded road development projects through the World Bank and Asian Development Bank funds. These involved classroom and on-site training sessions covering topics such as road construction, International Federation of Consulting Engineers (FIDIC) contracts, labour standards and environmental good practice as well as basic environmental management techniques. Guidance notes on a wide range of practical topics were developed such as good practice on site for construction noise, dust, smoke and odours, water management, oils and chemicals, borrow pit/quarry management, waste management. Basic monitoring equipment was also procured. Therefore, the capacity within the ARS ESS is adequate to complement the MENR's routine monitoring. In addition, an environmental manager, whose appointment to the Engineer's supervision team is recommended, would provide additional advice, consultations and hands-on training to the ARS ESS.

11.1 Mitigation and Monitoring Plans

A matrix of potential environmental impacts and proposed mitigation strategies associated with the proposed road improvement works is provided in Appendix D to an Outline Environmental Management Plan.

Appendix F to this Environmental Assessment Report contains an outline monitoring plan that will be developed into a detailed monitoring and reporting programme linked directly to the nature, location and timing of specific activities of the first year programme.

[30] These activities are intended to complement the routine environmental monitoring activities of MENR.

11.2 Cost Estimates

The Table below provides some estimated costs specifically for implementing mitigation and measures and monitoring

Table 11-1: Environmental Mitigation and Monitoring Costs

Environmental Management, Monitoring and Technical Advice Costs during Construction (included in construction supervision costs

It is assumed that the mobilisation and construction period is for the first year programme is 12 months

Remuneration & out-of-pocket expenses	**Unit**	**Q-ty**	**Unit Cost, USD**	**Total, USD**
International Environment Specialist	MM	3	20000	60000
Per diems	days	90	150	13500
International Travel	Rtn trips	4	2000	8000
Car hire & driver	lump sum	1	4500	4500
Production of reports	lump sum	1	2000	2000
Sub Total				**88000**

Environmental Mitigation Costs (included in Contractor's Civil Works Package)

Remuneration & out-of-pocket expenses	**Unit**	**Q-ty**	**Unit Cost, USD**	**Total, USD**
Environmental (HSE) Manager	MM	12	3000	36000
Wildlife Officer	MM	12	3000	36000
Community Liaison Officer	MM	12	3000	36000
Seminars				
Public hearings and seminars to workers	no	4	1500	6000
Mitigation Measures				
Setting Out, Site Clearance and Site Preparation	misc	DD	DD	DD
including topsoil removal & storage; leveling of terrain	m2	DD	5 AZN	DD
Treatment of Embankment Sploes	misc	DD	DD	DD
Culverts & Drainage	misc	DD	DD	DD
Underpasses	misc	DD	DD	DD
Landscaping	misc	DD	DD	DD

Reinstatement of sites	misc	DD	DD	DD
Dust Suppression (water spraying)	m2	DD	0,25 AZN	DD
Tree Planting	pcs	DD	150 AZN	DD
Noise Baffling Facilities	m2	DD	250 AZN	DD

12 Public Consultation

At this stage, given the degree of uncertainty on route selection, the timing of project implementation, consultation took the form of an initial round of discussions with local officials and relevant village representatives in March 2009 as well as random interviews with the residents of the potentially affected villages. The records of the public consultations and lists of participants are provided in Appendix D as well as the notes of the interviews.

The purpose of the discussions was to:

- introduce and disseminate basic information about the project,
- promote discussion about the potential positive and negative impacts of the proposed project;
- to collect statistical and anecdotal information about the environment, social and economic characteristics of each of the concerned districts.

All the comments were thoroughly recorded in order to bring them to the attention of decision-makers within the ARS, the World Bank and other organisations interested in the planning and implementation of the proposed road improvement programme.

The comments have been taken into account during the development of the EA Environmental and Social Impact and Mitigation Measures. The Impact Register, provided in Appendix D to the Environmental Management Plan, is to be read in conjunction with this Section.

13 Recommendations

Some of the key EA findings and recommendations are summarized in Table 13-1.

Table 13-1: Environmental Assessment Findings and Recommendations

Nature of the Issue	Issue	Considerations/ Recommendations
Design	Four main design options are proposed	The two lane Baku – Shamakhi Road is

	for the widening of the road between Baku and Shamakhi: (i) Construction of the additional carriageway to one side, either the right hand side (RHS) or left hand side (LHS) of the existing carriageway (see Figure 5.1) with a total width of 27.5m; (ii) Widening of the existing carriageway on both sides, either by: (c) Widening at both sides with a reduced median and shoulder, total width 22.5m (see Figure 5.2); or (d) Widening at both sides without median and reduced lane width and shoulder, total width 17.5m (see Figure 5.3). (iii) Widening in sections with climbing lane, total width 20.5m (see Figure 5.4).	classified as Category II road with a right-of-way (ROW) of 60 metres; i.e., 30 m on each side from the existing road centre-line. Generally, this provides enough room for road widening for the identified alternatives. However, at certain sections of the road, the ROW is significantly reduced. Therefore, the implementation of the above alternatives would involve land acquisition as well as additional land acquisition to allow for embankments, the construction of interchanges and local connector roads, and possible bypasses and realignments. Other design issues include underpass structures to enable the safe crossing of domestic animals and wildlife. There should be dedicated wildlife underpasses (ie not drainage channels), placed every 5km, and measuring 1.5m square, to facilitate wildlife road crossing. The road shoulder will be as steep as possible to deter tortoises from climbing onto the road These features will be accurately described in the Detailed Design.
Design	In addition to the main design options, alternative alignments (AA) were proposed by Kocks Consult GmbH for three stretches of road between km 15 and km 45	These routes were drafted onto existing topographical maps only and have not been the subject of field assessment and detailed investigations. The engineering investigations will have to be undertaken at the detailed design stage.
Design	AA1: Between km 26 and km 34 This proposed realignment to the south of the existing route is approximately 13km in length and will cross an area of irregular topography which features a number of hills, ridges and deep gullies. The road will first run south through a flat plain for approximately 2km; then turn north-west and rise and up a hill to cross a succession of very deep gullies (see Figure 5-5), before running alongside the hillside above the gully incisions. The route continues across a plateau with occasional broad, deep gullies before	It is not clear why such an extensive re-route was selected; it is approximately twice the distance of the existing route and the fairly wide hairpin bend in the existing road could be opened out within the proposed RoW. The AA would have significant environmental implications due to its larger footprint and will actually create geohazards by excessive excavation in this very friable clay soil. The construction implications are significant as many gullies will have to be traversed and benching techniques will have to be implemented as the route traverses the cross steep slope of

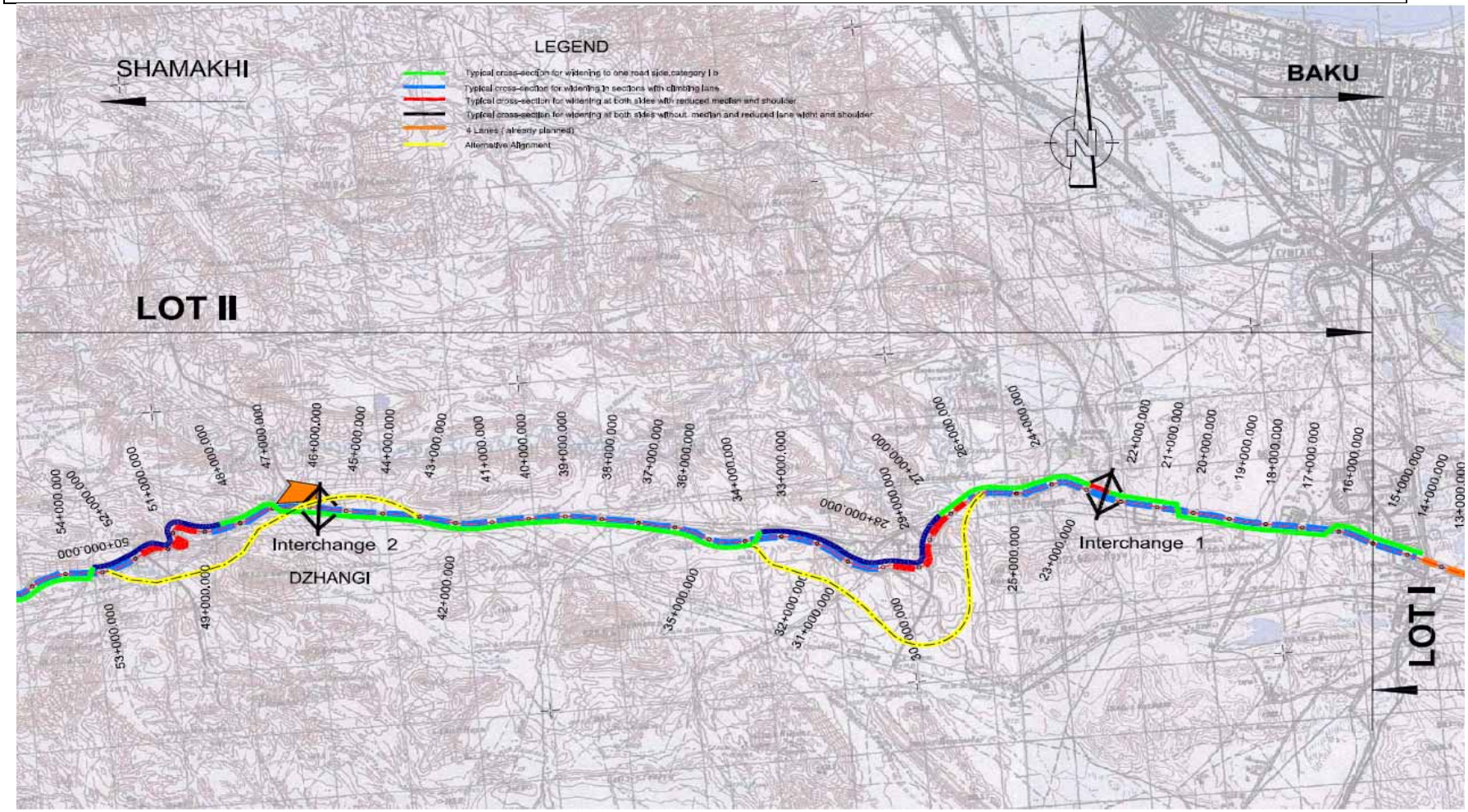
	joining the existing road.	the hillside. This AA is not recommended.
Design	AA2: Between km 43 and km 46 This proposed realignment turns north from the road across flat terrain to cross a ridge (approx 30-40m high) which runs parallel to the road. The AA then takes a course for approximately 3km parallel to the existing road but the other side of the ridge; it then turns south-west to cross the ridge again to emerge behind the village of Jangi. The AA bisects the village to join the road to the south of the village.	As the existing road on this stretch is straight, more or less level and with plenty of level ground on each side, it is not clear why an alternative was deemed necessary. The AA is longer, would require technical challenges to cut through a ridge; would create erosion and land stability problems and would pose social problems as it bisects the village of Jangi (at present the village is intact and lies just to the north of the existing road). This AA is not recommended.
Design Social	AA2x: Between Km 46 and Km 53 AA2 continues on the south side of the existing road, heading southwest. This route cuts across a hilly area of a very irregular terrain of steep slopes, ridges and gullies. (see Figure 5-6 – the route crosses the saddle in the background). Once the route has made a steep ascent to cross a high saddle on the ridge, it traverses a relatively high plateau. However, to join the road at km 53 there are two very deep, broad gullies to cross.	It is clear why an AA was considered for this stretch of road: to achieve the elevation the road takes two steep hairpin bends which, pose a significant safety hazard for fast traffic. Nevertheless, the selected AA poses extreme environmental, geohazard and construction concerns and is significantly longer. Furthermore, the elevation is achieved over a short distance, which may well not be possible from an engineering point of view. This route is not recommended. However, there is still a need to address the road safety concerns around km 51. The current Contractor has created a temporary road which is straight and runs more or less parallel to the existing road. It is recommended that this be looked at as a viable alternative; for both the 2 lane re-furbishment and 4-lane option
Environmental, Protected Areas	The only Nationally Designated protected area in the immediate highway environs is the Mud Volcano Areas at km 30.5 and km 31 (See Figures 9-1 and 9-2). Furthermore, there are several mud	These are strictly protected zones and no construction activity is allowed here. However, as the RoW is 60m, it is not envisaged that there will be any immediate impact on the mud volcanoes themselves.

	volcanoes within the study corridor.	The 60m working width will be strictly adhered to. There will be no egress or stockpiling of material in this area. Signs will be erected informing personnel that this area is legally protected. If any other widening alternatives are considered at the detailed design stage, it should be ensured by the ARS and MENR that the protected areas remain intact.
Environmental Soils	The soil in study corridor is highly erosive, especially once the vegetation layer has been removed. This could result in excessive mud and silty run off to surface water in adverse weather conditions.	The ROW in 15 to 45 km stretch will not be affected by landslips, but the Borrow pit access roads need to be assessed in this context.
Environmental Geo-hazards	Geotechnical input at the detailed design stage will identify any geo-hazard areas requiring permanent and temporary erosion control measures.	It is recommended that the Contractor should identify the temporary erosion control measures that will be put in place, while Detailed Design should establish the most appropriate permanent erosion control structures, if required, that will be described in the Reinstatement Plan.
Environmental Hydrology	There are no watercourses of any size that cross the highway on the 15km-45km stretch.	It is not envisaged that construction activity along the ROW will impact on surface water. However, the Borrow pit areas need assessment in this regard. Furthermore, Surface water could be impacted if there is abstraction for water for dust suppression measures.
Environmental Hydrogeology	The main characteristic feature of the study area is a virtual absence of groundwater and a small amount of rainfall (about 250 mm/ year). The absence of fitting geological structures allowed the formation and storage of no big aquifers.	It is not envisaged that construction activity along the ROW will impact on groundwater. However, the Borrow pit areas need assessment in this regard
Social		Safe crossing points will be installed at locations where it is known people will be crossing to collect water.

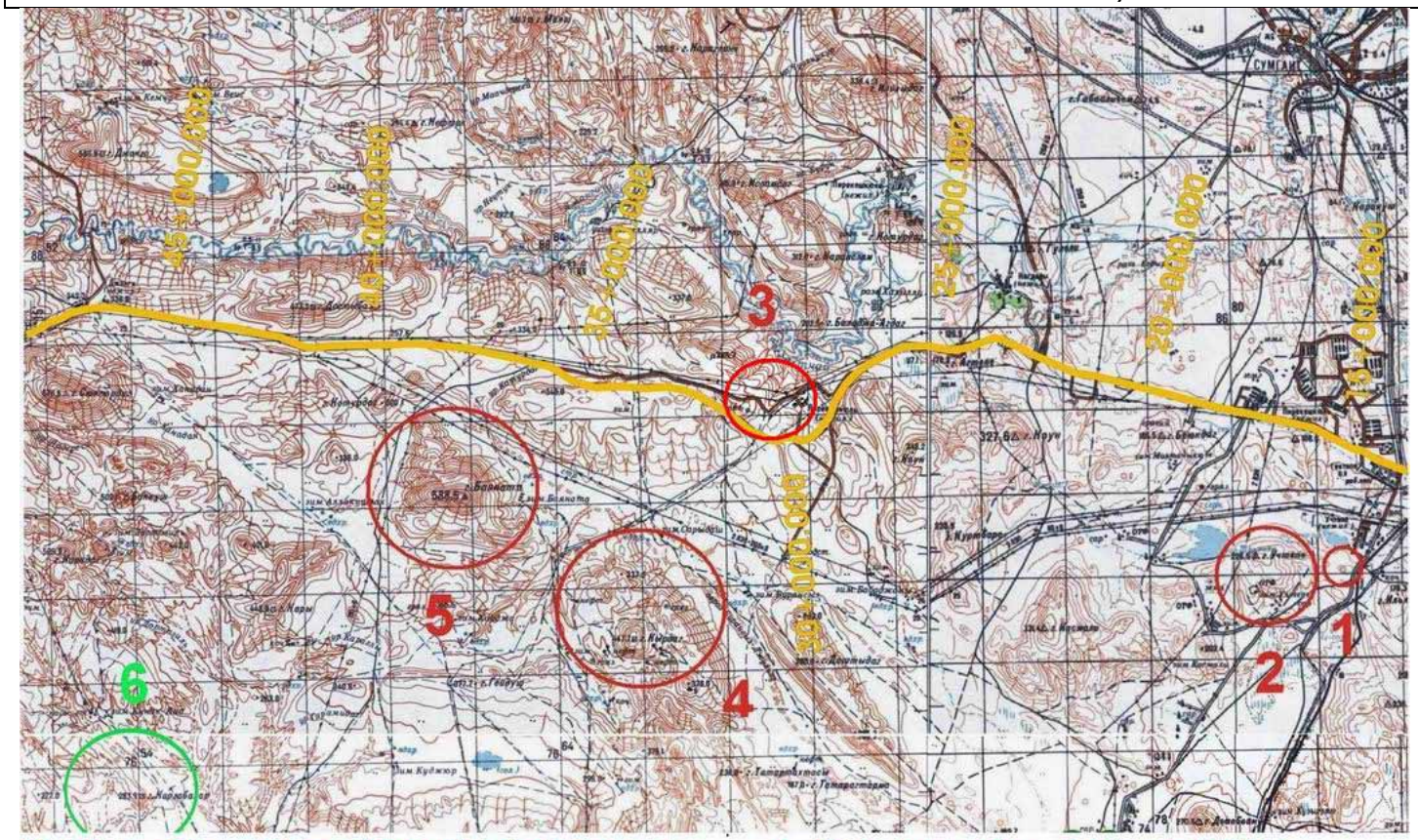
Environmental Flora	Roadside vegetation	As the RoW is restricted to 60m (30m either side of the existing road centre point) it is not envisaged that there will be a significant, long term impact on roadside vegetation. Construction activity will be strictly confined to the 60m RoW. Dust suppression measures, such as covering haulage lorries and spraying water will be used Reinstatement will take place on all construction affected locations, including verges.
Environmental Fauna	Fauna	It is not envisaged that Construction will have a significant impact on mammals, fish or insects. Birds are potentially at risk once they have established nests. Reptiles and Amphibians, however, are in danger from construction activity and traffic movements. The most effective mitigation measure for the protection of wildlife is to have a permanent on-site specialist for the duration of the construction phase of the project. A wildlife officer will be present on site at all times. The species of most concern is the Greek Tortoise; in summer this animal could stray onto the site, in winter they could be hibernating in undisturbed soil. In winter the wildlife officer will check all earth moving activities. Al tortoises will be moved to a safe location. The Viper poses a safety hazard to people, thus, the Contractor's staff so the Wildlife Officer will have a watching brief for all wildlife on site. Deaths of wildlife from construction activity will be reported and recorded in the Incident Reporting format. Detailed design will include dedicated wildlife underpasses (ie not drainage channels), placed every 5km, and

		measuring 1.5m square, to facilitate wildlife road crossing. The road shoulder will be as steep as possible to deter tortoises from climbing onto the road
Environmental Archaeology	At present there are no known sites of cultural or archaeological importance near the 15km-45km stretch of road. However, as this is an ancient corridor with a long history of people and goods travelling between the Caspian and the Caucasus, the chance of stray archaeological finds detached from settlement sites is high.	As the construction activity will be restricted to 60 m it is not envisaged that there will be much movement of previously undisturbed soil, and therefore little chance of an impact on culturally important issues. Any archaeological finds will be reported to the ARS immediately

APPENDIX A: PROPOSED WIDENING OPTIONS ALONG THE ROAD, KM 15 to KM 45



APPENDIX B: MUD VOLCANOES' PROTECTED AREAS, KM 15 to KM 45



1 Damlamaja Mud Volcano
2 Uchtepe MV
3 Pirikushlul MV
4 Buransiz-Julga MV
5 Saridash-Boyanata MV
6 Gargabazar IBA

APPENDIX C: BRIEF HYDROGEOLOGICAL DESCRIPTION OF THE STUDY AREA, KM 15 to KM 45

The study territory composes a part of the southeast depression of Greater Caucasus, namely the area of Shemakhi-Kobustan synclinorium. This synclinorium was formed during the Tertiary period followed by accumulation of the sediments stratum that increases in the eastern direction from km 2 of Shemakhi zone to 5-6km within eastern Kobustan and Absheron peninsula. Mud volcanism phenomena and breccia covers are widely spread in this place. The geological section consists of the sediments from the present day to the chalk system inclusive, with significant instability of layers in the plan and profile. They are predominantly represented by clayey, rarely clay-sandy rocks with subcontent of limestones and marls. The surface of the section is made of loams with significant content of pebble stones and sand. Separate spots of clay breccias of mud volcanoes are observed in the western part of the region.

The characteristic feature of the territory under review is its water-shortness, actual lack of surface watercourses and basins and low rainfall (about 250 mm annually). The lack of favorable conditions assuming facilities like appropriate structures and collectors in the geological section hindered generation of ground waters in natural conditions in the regional plan. They were tracked in small local areas, sporadically watered zones in all stratigraphic systems. Water-bearing modern alluvial-proluvial sediments of the quaternary stratum are observed in Pirsaatchay valley where water discharge varies between 0.1 to 1.0 l/hour, with salinity up to 2.0 g/l. Ground waters are revealed here in rare wells in eluvial-dealluvial sediments with salinity up to 1.0 g/l and sulphate-hydrocarbonate sodium waters, and water discharge of the confined springs makes about 0,1-0,6l/hour. Water content of Caspian sediments is poor, discharge of some wells makes 0,2-0,5 l/hour, salinity does not exceed 3,0 l/hour. Water content of Absheron sediments is not high either, water is confined to limestones, discharge of the springs makes about 1,0 l/hour. Water content of Akchagyl sediments occur in limestones, sandstones and sand. Discharge of the springs varies within the range of 0,03-0,5 l/hour, salinity varies between 0,4 to 9,0 g/l. Water content of mud volcano covers depends on water supply from gryphons of highly mineralized waters.

It should be noted that over the last years (beginning from 1990) an intensive urbanization of adjacent sections of the road has been tracked within the discussed territory, particularly in Sulutepe area up to Garadag microdistrict and Military town. As a result of outflow from water-supply pipelines and lack of sewerage systems, the used waters infiltrate into the soil and develop technogeneous ground water-bearing horizons in loamy and sandy-loam soils. By further developing of the territory, the areas of sporadic distribution of ground waters consecutively decrease. At present within the urbanized areas of the study territory an extensive spreading of ground waters is observed with developed groundwater flow, the slopes and directions of which are appropriate to the local topography. Special prospecting works are required to assess today's hydrogeological conditions and characteristics of the study territory.

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APPENDIX D: LAND OWNERSHIP ALONG THE ROAD BETWEEN KM 15 TO KM 45 AND ALONG THE ALTERNATIVE ALIGNMENTS

Rayon	Road section		Land Ownership according to proposed alternative	Length	Commentary
	From Km	To Km			
Absheron	15+000	16+100	Municipal (Ashagi Guzdak)	1.1 km	Pasture land
	16+100	16+800	State (ROW of the road)	0.7 km	ROW is free
	16+800	20+300	State Land Fund	3.5 km	ROW is free
	20+300	21+000	State (ROW of the road)	0.7 km	ROW is free
	21+000	27+300	Municipal (Pirakeshkul-Gobustan)	6.3 km	There is a fence approximately 250 m long between Km22+600 and Km22+850 on the right hand side. It is recommended that the temporary road (situated on the left hand side) is used to create the additional two lanes.
	27+300	33+600	State (ROW of the road)	6.3 km	
	33+600	45+000	State Land Fund	11.4 km	

Sections	Land Ownership
26+300-33+900	State Land Fund -48 ha Municipal-18 ha
43+000-52+800	State Land Fund – 31.8 ha State Forest Fund - 18 ha

APPENDIX E: RECORDS OF PUBLIC CONSULTATIONS

Highway II Additional Financing Project
Regional Environmental Review/
Environmental Assessment and Management Plan
CONSULTATION

Minutes of Public Conultation held on the widening of Baku-Shamakhi Road

Held on: 12 March 2009

Venue: Khirdalan, Rayon Executive Power

Purpose:

- ***To introduce the Highway II Additional Financing Project***
- ***To introduce the Consultant's ToR for the Regional Environmental Review studies***
- ***To introduce the Consultant's ToR for the Environmental Assessment and Management Plan***
- ***To inform public about the 'widening-of-Baku-Shamakhi' Road***
- ***To learn local people's opinons on the proposed project***

Attended by:

Representatives of Rayon Agencies and Municipalities

Deputy Head of Absheron district Executive Power	Mirzabala Aslanov
Head of Architecture and Construction Department of EP	Akif Aliyev
Chief Consultant of EP	Fariz Aliyev
Head of District Civil Defence Headquarter of MES	Tahir Huseynov
Chief Consultant of district Land Office	Abulfaz Asadov
Head of District Statistical Department	Gurshad Mamadov
Head of District GEM office	Maharram Abdulov
Chief Consultant of District Ecology and Natural Resources Office	Teyfur Mammadov
Head of Xirdalan Electricity Network	Vidadi Abbasov
Head of Mushfigabad Electricity Network	Farhad Israfilov
Chief Engineer of Absheron Gas Operation Office	Mirafgan Agalarov
Head of District Water-Sewerage Systems Operation Office	Qorxmaz Abbasov
Head of Aztelekom District Network Office	Elmar Humbataliyev
Head of Main Cable Transit Unit	Agamirza Agamirzayev
Deputy Head of Absheron Office SCMSP	Ashraf Mammadov
Representative of District EP for Xirdalan town	Fikrat Orujov
Head of Xirdalan municipality	Eldar Ahmedov
Head of District Flat Communal Maintenance Unit	Ilham Mursalov

Head of Flat Communal Maintenance Unit No:5	Tale Mustafayev
Representative of District EP for Hokmali settlement	Yaver Huseynov
Head of Hokmali municipality	Mirnemat Miradiyev
Representative of District EP for Ashagi Guzdak settlement	Fikrat Babayev
Head of Ashagi-Guzdak municipality	Bayaga Abbasov
Representative of District EP for Pirakeshkul-Gobustan settlement	Jahan Ismayilov
Head of Pirakeshkul-Qobvustan municipality	Qandab Orujova

Consultant's Team

Scott Wilson project coordinator:	Tanya Romanenko
Scott Wilson project land acquisition specialist:	Arastun Guliyev
Scott Wilson project social/resettlement specialist:	Elshan Rustamov

Purpose:

- *To introduce the Highway II Additional Financing Project that would cover the widening of Baku Shamakhi Road*
- *To discuss the findings of the draft Regional Environmental Review studies, including environmnetal and socio-economic impacts of the ptoposed project*
- *To learn local people's opinions on the proposed project*

Mr. Mirzabala Aslanov, Deputy Head of Absheron rayon Executive Power, opened the meeting. He informed the meeting that by the special order of Mr. Zakir Farajov, Head of Absheron Rayon Executive Power a Commission comprising the above named representatives of rayon agencies and municipalities had been established with regard to the implementation of the instructions given in Letter # 15/5-45, dated February 12, 2009, by Mr. Abid Sharifov, Deputy Prime Minister. This Commission had been assigned to examine the issues related to the widening of Baku – Shamakhi road to support the activities of the Consulting Firm engaged to prepare the environmental documentation.

Ms. Tanya Romanenko, Scott Wilson Project Coordinator gave an overview of the proposed project explaining that the widening of the road was classified as Category A project by the World Bank[31]. The scope of the Consultant's ToR was discussed – (i) an update of Regional Environmental Review Report to cover an entire length of Baku Shamakhi road, and (ii) an environmental assessment and management plan for the first year construction programme that is envisaged to cover a 30 km section of the road from km 15 to 45. Ms. Tanya Romanenko touched upon a time frame for the development of the above mentioned report and said that any data and information as well as any other inputs of the Commission would be welcomed.

Mr Elshan Rustamov explained a need for general social-economic profile of the affected rayons and affected villages and settlements.

[31] A brief explanation of Category was provided

Mr Arastun Orujov noted a need for cadastre maps of the villages which the road crosses in order to obtain information about the land ownership on the both sides of the road.

Mr. Aslanov instructed that a senior consultant of rayon Land Department assist the Consultant's Team to establish a land ownership baseline based on existing land use maps. Furthermore, all the officials of different agencies attending the meeting were assigned to submit all information related to Baku – Shamakhi main road, to the Executive Power, in the form of reference, by March 14, 2009.

After the formal part of the meeting was finished additional issues were raised:

Question: Vidadi Abbasov (Director of Khirdalan Electricity Network): Who will cover the expenses for the relocation of electricity transmission lines which might be affected by the project?

Answer: M. Aslanov *(Deputy Head of Excom)*: The detailed design (DD) for four laning has not yet been developed; therefore, the question will have to be raised at the DD stage.

Question: Mirafgan Aghalarov (Senior Engineer of Gas Management Unit): We worked closely with the Contractor for two laning, i.e. Todini Company. We could render similar support for four laning as well. Do you have any design sketches (draughts)? If you have them we can give you more precise information.

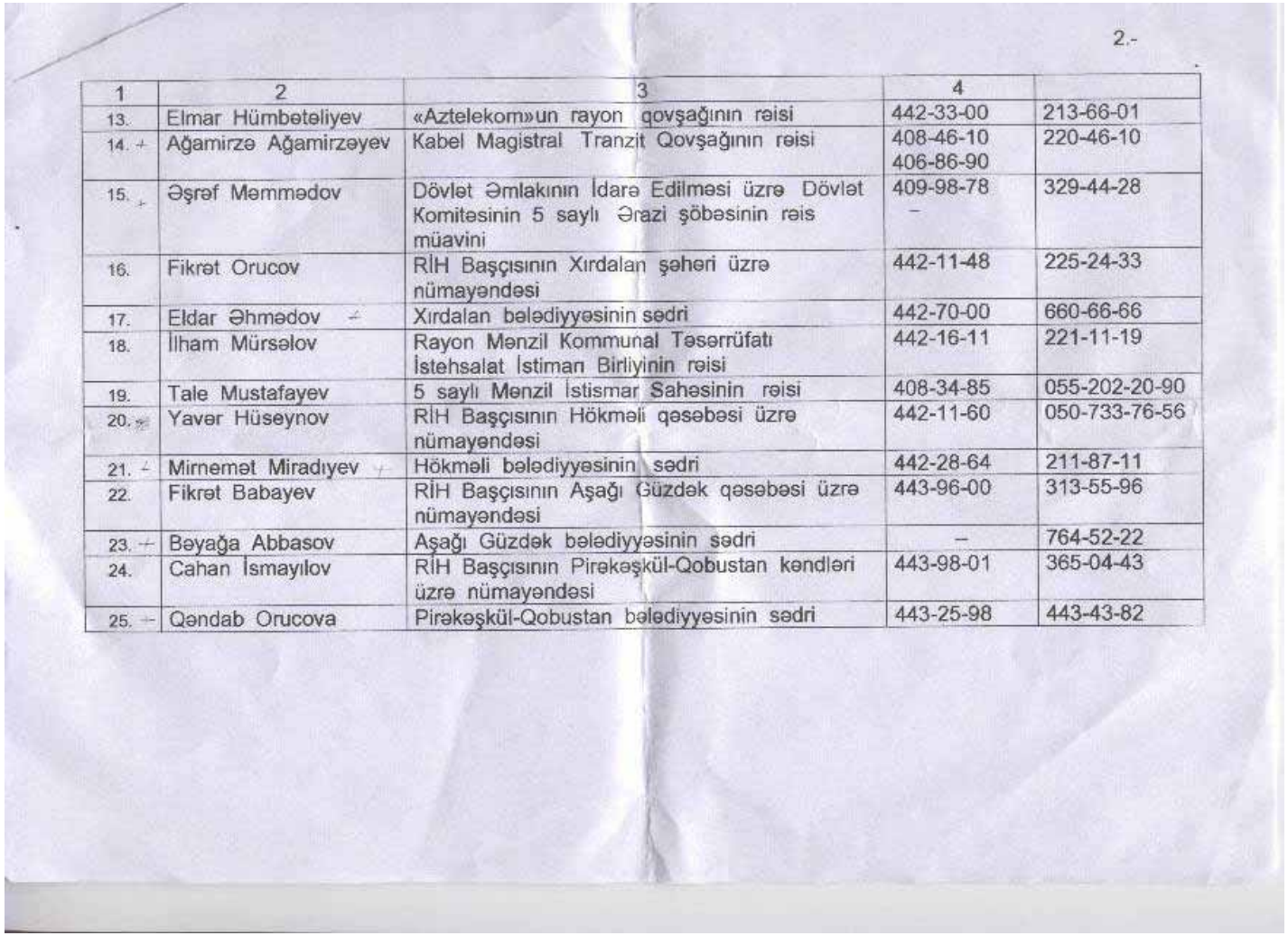
Answer: M. Aslanov *(Deputy Head of Excom)*: Include all data on gas infrastructure that is adjacent to the existing road. You should not require project DD for this.

Azərbaycan Respublikası Baş Nazirinin müavini cənab Abid Şərifovun 12 fevral 2009-cu il tarixli, 15/5-45 saylı məktubunun icrası ilə əlaqədar RİH-də keçiriləcək müşavirəyə dəvət olunanların

S İ Y A H I S I

12 mart 2009-cu il
Saat 10 ^{00}

S/№	Adı, soyadı	Vəzifəsi	Telefonlar	
			İş	Mobil
1	2	3	4	5
1.	Mirzəbala Aslanov	RİH Başçısının müavini	409-96-92	458-06-09
2.	Akif Əliyev	RİH-nin Memarlıq və Tikinti şöbəsinin müdiri	442-11-14	212-22-31
3.	Fariz Əliyev	RİH-in aparıcı məsləhətçisi	442-11-16	332-47-77
4.	Tahir Hüseynov	Rayon Mülki Müdafiə Qərargahının rəisi	442-11-19	055-758-21-50
5.	Mübariz Vəliyev	Dövlət Torpaq və Xəritəçəkmə Komitəsinin rayon şöbəsinin müdiri	442-25-49	201-41-46
6.	Gürşad Məmmədov	Rayon Statistika idarəsinin rəisi	442-10-50	055-709-45-96
7.	Məhərrəm Abdulov	Rayon GEM-in direktoru	442-09-40	310-69-07
8.	Firdovsi Həsənov	4 saylı Ərazi Ekologiya və Təbii Sərvətlər Şöbəsinin rəisi	442-18-19	055-211-96-56
9.	Vidadi Abbasov	Xırdalan Elektrik Şəbəkə rayonunun rəisi	442-00-66	250-28-25
10.	Fərhad İsrailov	Müşfiqabad Elektrik Şəbəkə sahəsinin rəisi	410-50-65	250-28-13
11.	Mirəfqan Ağalarov	Abşeron Qaz İstismar İdarəsinin baş mühəndisi	442-64-35	215-67-18
12.	Qorxmaz Abbasov	Rayon Su-kanalizasiya İstismarı İdarəsinin rəisi	442-31-11	221-86-74



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1	2	3	4	
13.	Elmar Hümbətəliyev	«Aztelekom»un rayon qovşağının rəisi	442-33-00	213-66-01
14.	Ağamirzə Ağamirzəyev	Kabel Magistral Tranzit Qovşağının rəisi	408-46-10 406-86-90	220-46-10
15.	Əşrəf Məmmədov	Dövlət Əmlakının İdarə Edilməsi üzrə Dövlət Komitəsinin 5 saylı Ərazi şöbəsinin rəis müavini	409-98-78	329-44-28
16.	Fikrət Orucov	RİH Başçısının Xırdalan şəhəri üzrə nümayəndəsi	442-11-48	225-24-33
17.	Eldar Əhmədov	Xırdalan bələdiyyəsinin sədri	442-70-00	660-66-66
18.	İlham Mürsəlov	Rayon Mənzil Kommunal Təsərrüfatı İstehsalat İstiman Birliyinin rəisi	442-16-11	221-11-19
19.	Tale Mustafayev	5 saylı Mənzil İstismar Sahəsinin rəisi	408-34-85	055-202-20-90
20.	Yavər Hüseynov	RİH Başçısının Hökməli qəsəbəsi üzrə nümayəndəsi	442-11-60	050-733-76-56
21.	Mirnemət Miradıyev	Hökməli bələdiyyəsinin sədri	442-28-64	211-87-11
22.	Fikrət Babayev	RİH Başçısının Aşağı Güzdək qəsəbəsi üzrə nümayəndəsi	443-96-00	313-55-96
23.	Bəyağa Abbasov	Aşağı Güzdək bələdiyyəsinin sədri	–	764-52-22
24.	Cahan İsmayılov	RİH Başçısının Pirəkəşkül-Qobustan kəndləri üzrə nümayəndəsi	443-98-01	365-04-43
25.	Qəndab Orucova	Pirəkəşkül-Qobustan bələdiyyəsinin sədri	443-25-98	443-43-82

Notes on interview with citizens of roadside villages:

Gobustan village – km 27- 6 peoples interviewed (main raised issues):

1) We need animal crossings at the beginning and at the end of the village. Our pasture area is situated at the other side of the road. In summer and spring there are a lot of cars going from Baku to Shamakhi, especially on Saturdays and Sundays. So, it is impossible to cross the road. We need both pedestrian and animal crossings.
2) Height of two bridges which are situated near the village are not sufficient. When flood comes in spring water damages bridges. They should be high.
3) Current drainage culvert and tubes are not enough to carry away the water which comes from the mountains. We need more culverts.
4) Access road from the village to the new 4 lane Highway should be constructed.
5) Bus stop should be constructed for the village citizens.
6) Speed limit should be put near the village.
7) If these issues are implemented, we are favour of the road construction.

Pirakeshkul –Km 17- Military Camp – 9 people interviewed (main raised issues):

1) We need pedestrian crossings.
2) Bus stop should be constructed at the both side of the road.
3) Speed limit should be put near the village.
4) Pedestrian crossing should be constructed here. A lot of road accidents happen here because of lack of pedestrian crossings.
5) We need roadside lightening. Some accidents may happen because of the dark populated area.
6) We need road interchange. It will make easier access to the road.

Ashagi Guzdak – Km 16- 2 people interviewed:

According to two men there are no negative impacts of the road for the people. 4 lane road would be good for the community.

APPENDIX F: OUTLINE MONITORING PLAN

ACTIVITY/ SOURCE	Construction	Operation	POTENTIAL IMPACT	RECEPTOR						PREVENTION, CONTROL AND MITIGATION MEASURES	RESIDUAL IMPACT AND RISK	RECEPTOR						LEGAL AND OTHER STANDARDS SECTION OF EMP
				Air	Water	Land	Wildlife	Resources	Community			Air	Water	Land	Wildlife	Resources	Community	
Camp Site Occupation	Y		Occupation of site for work and residence creates a disturbance to surrounding environment. It is a source of noise and light. Potential for accidental fires increase Potential for uncontrolled waste increases Potential for pollution/loss of containment incidents increases Potential for adverse impact on local community Potential for financial benefits to local community Recreational use of surrounding area leads to wildlife disturbance, opportunities for illegal hunting and fishing, erosion of well used paths. Increase in noise, emissions if motorbikes etc used.	C 1	C 1	C 3	C 4	C 1	E 2	<u>Design and Pre-Condition</u> Consider full range of environmental impacts from presence; include recreational use of area, in design. Assess location. <u>Hardware</u> Lights shielded to prevent glow into wider environment and sky. Noise baffling erected to reduce effect outwith site boundary Provision of approved recreational facilities, pathways etc <u>Management</u> Provision of detailed Camp Management Plan which itemises the issues and sets Camp Rules Control of Sub Contractors. <u>Behaviour</u> Strict adherence to Camp Rules and awareness of wildlife sensitivities, especially during critical phases – nesting/ hibernating, and local sensitivities.. <u>Offsets</u> Explore potential for habitat creation and compensatory planting schemes.	Negligible lasting impact after demobilisation	C 1	C 1	C 2	C 2	C 1	B 1	Sub-Contractor Management Traffic Management Plan Pollution Prevention and Control Plan Waste Management Plan Wildlife Protection Construction Worker Camps
Camp Drainage System	Y		Poorly designed drain age system allows contaminated run off from hardstandings, equipment cleaning and washdown areas, tanks etc to enter surface waters. Especially problematic if chemicals mix in water and cannot be extracted. Regulatory fines and compensation payments are likely.	0	D 3	D 1	D 3	D 3	D 2	<u>Design and Pre-Condition</u> Design drainage system to ensure drains are constructed to prevent erosion and pollution to surface and ground waters. Capture all run off from hardstandings, bunds, contaminated run off, washdown areas, and take this to a holding tank where hydrocarbons can be skimmed off. <u>Hardware</u> Construct drains so that erosion is controlled. Insert controls to hold water that has the potential to carry harmful substances, eg bunds, storm tanks and settling lagoons. Insert oil/water separators in system as required. Build hardstandings and bunds with kerbs and gutters. <u>Management</u> Comprehensive monitoring to ensure minimal impact to surface waters. Regular visual inspection. <u>Behaviour</u> Understanding of controls in place <u>Offsets</u> Habitat creation on reinstatement	Negligible impact if controlled. Possibility of pumped groundwater (clean, but a different chemical composition) discharged to surface waters.	0	C 1	C 1	C 1	C 1	0	Sub-Contractor Management Pollution Prevention and Control Plan
Camp Demobilisation	Y		Production of large quantities of waste in a short time span. 'Discovery' of areas of contaminated soil. Break down of site infrastructure which may compromise pollution control, waste segregation	C 1	C 2	C 3	C 2	B 1	B 1	<u>Design and Pre-Condition</u> Awareness of this phase from the outset <u>Hardware</u> Sufficient skips and containers for waste. Location for contaminated soil <u>Management</u> Comprehensive demobilisation plan <u>Behaviour</u> 'End of job' mentality addressed with extra training <u>Offsets</u> Site Restoration	Extra waste	C 1	C 1	C 1	C 2	C 2	0	Sub-Contractor Management Pollution Prevention and Control Plan Waste Management Plan Reinstatement Plan

ACTIVITY/ SOURCE	Construction	Operation	POTENTIAL IMPACT	RECEPTOR						PREVENTION, CONTROL AND MITIGATION MEASURES	RESIDUAL IMPACT AND RISK	RECEPTOR						LEGAL AND OTHER STANDARDS SECTION OF EMP
				Air	Water	Land	Wildlife	Resources	Community			Air	Water	Land	Wildlife	Resources	Community	
Asphalt plants, Crushing and Screening plant	Y		Poor siting of plant has the potential for excessive dust, emissions and odours to impact on local communities. (H_2S, Benzene, Formaldehyde, PM) Poor plant maintenance and operation produces excessive dust, emissions and odours. Traffic congestion if not controlled Excessive noise as plant may have to operate continuously, therefore outwith normal working hours Heavy use of access roads	E 3	E 2	E 2	E 2	E 2	E 3	Design and Pre-Condition Considered decision of siting of asphalt, crushing and screening plants; i.e.: away from sensitive locations and downwind of working areas. Hardware Modern plant with temperature control and backventing Well maintained plant Plant operated according to best practice technical control Management Comprehensive monitoring to ensure minimal impact to surrounding receptors. Regular visual inspection. Traffic management Behaviour Understanding of controls in place Offsets Site and access route restoration and roadside planting	Dust and odour Increased traffic Noise and vibration	E 2	E 1	E 1	E 1	E 2	E 1	Sub-Contractor Management Traffic Management Plan Pollution Prevention and Control Plan
Bund /Slab Construction on site and at Cement batching plant	Y		Potential for release of Toxic substances detrimental to all life and soils. Potential for cement dust to blow in wind, slurry released to land or watercourses, poor quality bunds, cement mixers washed out next to a watercourse, resulting in the release of a toxic substance to the environment. This will kill aquatic life, soil microorganisms and smaller animals, and is detrimental to all life.	C 1	C 3	C 3	C 2	C 2	0	Design and Pre-Condition Appropriate siting of cement works. As much precast, or pre-mixed cement, as possible Hardware Lined lagoons to receive slurry Adequate supplies of clean up material and sand bags to be held next to working area. Management Procedures detailing use of cement and cleaning of plant and equipment. Cement piles and haulage lorries to be covered. Slurry to be kept in lined lagoons and disposed of as a hazardous waste. No use of cement near a watercourse, and no cleaning of tools and mixers in a watercourse Regular inspection Behaviour Implementation of procedures Offsets None	Use of cement	B 1	B 1	B 1	0	C 1	0	Sub-Contractor Management Traffic Management Plan Pollution Prevention and Control Plan
Coating and Paint work	Y		Potential for Spills, leaks and inappropriate disposal of containers and clean up material resulting in contamination from a release of toxic substances that are detrimental to all life and soils. These lead to mortality, reduced breeding success, and can be mutagenic and bioaccumulate	C 1	C 2	C 2	C 2	C 2	0	Design and Pre-Condition Alternatives considered at Design stage Hardware Secondary containment used Provision in waste area to receive this type of waste Management MSDS held for all substances, and instructions for use, storage and disposal followed. Do not wash down drains. Disposal in labelled, covered container Behaviour Implementation of procedures. Offsets None	Use and storage of solvents. Hazardous substances on site	B 1	B 1	B 1	0	B 1	0	Sub-Contractor Management Pollution Prevention and Control Plan Waste Management Plan

ACTIVITY/ SOURCE	Construction	Operation	POTENTIAL IMPACT	RECEPTOR						PREVENTION, CONTROL AND MITIGATION MEASURES	RESIDUAL IMPACT AND RISK	RECEPTOR						LEGAL AND OTHER STANDARDS SECTION OF EMP
				Air	Water	Land	Wildlife	Resources	Community			Air	Water	Land	Wildlife	Resources	Community	
Welding	Y		Uncontrolled waste on site, detrimental to animals, possibly toxic to plants and soil. Failure of Duty of Care	0	C 1	C 1	C 1	0	0	Design and Pre-Condition Identify requirement Hardware Provision in waste area to receive this type of waste Management All waste to be brought back to yard and disposed of in appropriate skips. Number of welding rods used recorded Behaviour Implementation of procedures. Offsets None	Waste produced Fugitive emissions	0	0	0	0	0	0	Sub-Contractor Management Waste Management Plan
Construction activity – Traffic/ Plant movement and operations	Y		Proximity of public to a construction site; causing disturbance and safety hazards to people, their animals and wildlife. Habitat fragmentation and 'island' effect, short and long term. Excessive landtake with a potential impact on wildlife, cultural heritage, bird nesting and the public. Increase reinstatement costs. Excessive mud generation, resulting in dirty, dangerous roads and run off from disturbed ground causing siltation in surface waters. Excessive dust generation from land disturbance and uncovered haulage lorries; air quality degradation leading to mortality, morbidity and reduced breeding success in animals. Safety hazard for people. Soiling by airborne particulate matter takes place up to 100m from source. Excessive noise, vibrations, and emissions. Excessive fuel use and production of substances with GWP contribute to climatic disruption. Poor vehicle maintenance and inappropriate handling of vehicles, eg unsupervised reversing, exacerbates impact and general disturbance.	E 3	D 3	D 3	E 3	E 2	E 3	Design and Pre-Condition Detailed initial surveys to designate practical routes, access roads, lay by areas etc for Construction RoW and wider site access and quarry routes. Design temporary drainage for Construction phase. Establish limits for emissions Hardware Use of low sulphur fuel Signage specifying speed limits, routes etc Drainage to control run off Noise baffle boards along sensitive locations Dust suppression vehicles Management Plant Maintenance System which involves frequent Vehicle and plant checks/maintenance Plans and Rules in place specifying speed limits, working hours, sensitive locations etc Speedy reinstatement of roads and verges Plant Maintenance Programme adhered to. Supervision and Traffic Control for maneuvering plant/lorries Dust suppression using water sprays Traffic Management Plan Control of Sub-Contractors WO and CLO site presence Behaviour Strict compliance with Traffic Rules and Plan Awareness of sensitive locations Offsets Improvement to verges. Central reservation and roadside tree/bush planting scheme.	Increase of traffic to roads. Disturbance from Construction activity Fuel use and emissions of noxious gases (NO_x,SO_x,CO_2,CO) affecting air quality, with Global Warming Potential (GWP) and acidification. production of substances Noise, Dust, Vibration generation Potential for spills and leaks	E 2	D 1	D 1	E 1	E 2	E 2	Sub-Contractor Management Traffic Management Plan Pollution Prevention and Control Plan Waste Management Plan Wildlife and Landscape Protection Reinstatement Plan
Power generation	Y		Production of substances with GWP and acidification potential. Poor air quality and acidification means effects are widespread from source	E 4	E 3	E 3	E 3	E 3	0	Design and Pre-Condition Use of well designed engines/plant Hardware Use of suitable fuel, low sulphur diesel Management Plant Maintenance system of regular checks (rather than fixing when broken)	Production of substances with GWP (NO_x,SO_x,CO_2,CO, VOCs) Acidification	E 2	E 2	E 2	E 1	E 2	0	Sub-Contractor Management Pollution Prevention and Control Plan

ACTIVITY/ SOURCE	Construction	Operation	POTENTIAL IMPACT	RECEPTOR						PREVENTION, CONTROL AND MITIGATION MEASURES	RESIDUAL IMPACT AND RISK	RECEPTOR						LEGAL AND OTHER STANDARDS SECTION OF EMP
				Air	Water	Land	Wildlife	Resources	Community			Air	Water	Land	Wildlife	Resources	Community	
										Regular monitoring to check compliance with air emission standards. Behaviour Awareness of issues, observation of procedures Offsets Roadside Tree planting								
Delivery of fuel and other hazardous substances	Y		Spills and leaks to the wider environment with little chance of containment. Ground and Water contamination from toxic substances, leading to significant wildlife mortality. Danger to road users, leading to further accidents.	C 2	C 3	C 4	C 2	C 1	C 1	Design and Pre-Condition In depth assessment of available options. Routed as far away as possible from sensitive locations, eg: watercourses, schools, settlements. Use of convoys with accompanying support Delivered to prepared location. Hardware Adequate supply of spill kits and granules always present – at offloading locations and on the haulage lorries. Also fire fighting equipment and any specific items cited in the MSDS. Management Plan written and relayed to all contractors. Full training and Emergency Response dummy run Behaviour Supervision by competent person Strict adherence to relevant Plans. Offsets None	Hazardous substances on public highways. Handling of hazardous substances offloaded at site	0	C 1	C 1	C 1	C 1	0	Sub-Contractor Management Traffic Management Plan Pollution Prevention and Control Plan
Fuel and Oil Storage	Y		Uncontained spills and leaks leading to ground and water contamination from toxic substances results in wildlife mortality. Waste products not collected and stored appropriately leading to widespread contamination.	D 2	D 4	D 4	D 3	D 1	D 1	Design and Pre-Condition Design to consider location and access to these designated areas. Hardware Stored in safe, designated areas, located away from watercourses and drains Tanks bunded (110% capacity). Secondary containment used at all times. Adequate supply of spill kits and granules. Locks on fuel tanks Protective barrier erected Management Plans and Procedures with training and awareness. Designated and trained personnel. Behaviour Awareness and adherence Offsets None	Hazardous materials on site Fugitive emissions Tank cleaning produces oil based sludge	C 1	C 1	C 1	C 1	C 1	O	Sub-Contractor Management Pollution Prevention and Control Plan

ACTIVITY/ SOURCE	Construction	Operation	POTENTIAL IMPACT	RECEPTOR						PREVENTION, CONTROL AND MITIGATION MEASURES	RESIDUAL IMPACT AND RISK	RECEPTOR						LEGAL AND OTHER STANDARDS SECTION OF EMP
				Air	Water	Land	Wildlife	Resources	Community			Air	Water	Land	Wildlife	Resources	Community	
Refuelling	Y		Uncontained spills leading to ground and water contamination from toxic substances resulting in wildlife mortality. Waste products not collected and stored appropriately leading to widespread contamination. Fuel theft with spills.	D 2	D 3	D 3	D 3	D 1	D 1	<u>Design and Pre-Condition</u> Allocate dedicated refueling area <u>Hardware</u> All fuel bowsers to carry adequate spill kit and granules, and funnels. <u>Management</u> Procedures, with training Refuelling only to be carried out by designated and trained personnel. Leave plant empty at end of day. <u>Behaviour</u> Strict adherence to Procedures. Refuel as much as is practical in the yard. 2 people to be present at refuelling Refuelling not to take place within 30m of a watercourse. <u>Offsets</u> None	Fugitive emissions	C 1	C 1	C 1	0	0	0	Sub-Contractor Management Pollution Prevention and Control Plan
Plant Maintenance	Y		Uncontained spills leading to ground and water contamination from toxic substances resulting in wildlife mortality. Waste products not collected and stored appropriately leading to widespread contamination.	E 1	E 2	E 2	E 2	E 1	E 1	<u>Design and Pre-Condition</u> Designated location <u>Hardware</u> Carry out Plant maintenance in yard with a concrete hard standing and adequate bunding. Use of vegetable hydraulic oils in sensitive areas. <u>Management</u> Designated and trained personnel. Plant Maintenance system of regular checks (rather than fixing when broken) Waste Management Plan, and recycling options Regular Inspection <u>Behaviour</u> Implementation <u>Offsets</u> None	Use of, and draining off, diesel and oils on site. Disposal of used engine oils Disposal of used parts	0	0	0	0	E 1	0	Sub-Contractor Management Pollution Prevention and Control Plan Waste Management Plan
Waste Production and Collection	Y		Uncontrolled waste on site, detrimental to animals, possibly toxic to plants and soil. Food waste attracts scavengers and can promote disease in stock and wildlife. High scavenger populations impact badly on small mammals and birds. Failure of Duty of Care	0	E 2	E 2	E 2	E 2	0	<u>Design and Pre-Condition</u> Waste minimisation and recycling philosophy a part of design. <u>Hardware</u> Licensed and appropriate vehicles etc <u>Management</u> Appropriate procedures and plans. Training and awareness programmes Segregation and regular Waste collection. <u>Behaviour</u> All waste to be segregated on site into separate polythene sacks and brought back to the appropriate waste containers in the yard. <u>Offsets</u> Sustainable Development of recycling opportunities	Waste generation, necessity to store and transport waste materials (some hazardous).	0	0	0	0	E 1	0	Sub-Contractor Management Pollution Prevention and Control Plan Waste Management Plan

ACTIVITY/ SOURCE	Construction	Operation	POTENTIAL IMPACT	RECEPTOR						PREVENTION, CONTROL AND MITIGATION MEASURES	RESIDUAL IMPACT AND RISK	RECEPTOR						LEGAL AND OTHER STANDARDS SECTION OF EMP
				Air	Water	Land	Wildlife	Resources	Community			Air	Water	Land	Wildlife	Resources	Community	
Waste Storage and Disposal	Y		Uncontrolled waste on site, detrimental to animals, possibly toxic to plants and soil. Open skips, especially kitchen waste, promotes Scavengers, which impact on small mammals and birds. Scavengers promote disease. Lack of segregation leads to extra costs as waste is classified into the highest Hazard category. Lack of containment of Hazardous wastes, including Medical waste, leads to leakages and widespread contamination. Failure of Duty of Care	0	E 2	E 3	E 3	E 4	E 1	<u>Design and Pre-Condition</u> Waste minimisation and recycling philosophy a part of design. Waste areas well designed and fit for purpose (not an afterthought on site), and located away from sensitive areas. <u>Hardware</u> Install Tyre shredders, can crushers etc to reduce volume Clearly labelled and covered skips in designated areas. Hazardous Waste segregation. <u>Management</u> Appropriate procedures. Training and awareness programme Waste Recycling options preferred Regular Waste disposal. Comprehensive waste transfer documentation. <u>Behaviour</u> Adhere to waste management strategy. Waste minimisation procedure to be followed. Segregate waste All waste to be placed in the appropriate waste containers/areas. Site tidiness <u>Offsets</u> Recycling opportunities developed in the communities	Storage of hazardous substances. Use of finite landfill space Attracts scavengers	0	0	0	E 2	E 2	0	Sub-Contractor Management Pollution Prevention and Control Plan Waste Management Plan
Creation of Landfill/Waste Disposal Site	Y		Seepage of contaminants into aquifers and surface waters. Toxic residues permeate groundwater. Incompatible waste is mixed. Scavenger population increases, to detriment of small mammals and birds. Traffic disturbance to wildlife and residents.	C 1	C 5	C 4	C 4	C 3	C 3	<u>Design and Pre-Condition</u> Good geohydrological surveys prior to site selection. <u>Hardware</u> Properly constructed, lined waste cells. Landscaping and visual barriers erected <u>Management</u> Manned site and comprehensive documentation Haulage within agreed working hours <u>Behaviour</u> No fly tipping Adherence to procedures <u>Offsets</u> Use of waste disposal facilities by local community Landscape planting	Landtake Landscape and Visual impact. Increased traffic	C 1	A 4	C 2	C 2	C 2	C 2	Sub-Contractor Management Pollution Prevention and Control Plan Waste Management Plan

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				Air	Water	Land	Wildlife	Resources	Community			Air	Water	Land	Wildlife	Resources	Community	
Sewage and Grey water Treatment	Y		Uncontrolled discharge changes existing surface water ecology and hydrology. Effluent discharge results in eutrophication of surface waters and changes in hydrological regime leading to habitat degradation. Vehicle wash contains hydrocarbons and is heavily silt laden, both resulting in contamination of receiving waters	0	D 4	D 3	D 4	D 1	0	<u>Design and Pre-Condition</u> Design of sewage treatment facilities fit for purpose Design in contingency arrangements <u>Hardware</u> Adequate sewage treatment facilities installed in camp and operated to specifications. Sufficient storage as a contingency measure if treatment fails. Site portaloos emptied on a regular basis at sewage treatment facilities. If a treatment plant is used it will be such that discharged water is landscape quality as it enters surface waters eg oil/water separator, Phosphate and synthetic surfactant extraction. <u>Management</u> Operate sewage and waste water treatment facilities to specifications. Monitor discharge <u>Behaviour</u> Implement monitoring and react if malfunctioning <u>Offsets</u> None	Production of effluent with significant N content Production of effluent with high phosphate and synthetic surfactant content	0	E 2	B 1	B 1	B 1	0	Sub-Contractor Management Pollution Prevention and Control Plan Waste Management Plan
Chemical Storage	Y		Loss of containment from spills or inadequate disposal. Chemicals spill or leak to the environment with toxic effects, resulting in habitat degradation and wildlife mortality and/or reduced reproductive success. Some chemicals mutagenic. Some chemicals are, or contain, substances which bioaccumulate. Potential for explosion in confined space, with detrimental effect on wildlife and people.,	C 1	C 3	C 3	C 2	0	0	<u>Design and Pre-Condition</u> Minimise chemicals held, reuse where possible Select chemicals with least environmental impact where possible. <u>Hardware</u> All containers labelled. Secondary containment for all chemicals. <u>Management</u> Procedures for all phases of use MSDS held for every chemical on site On site Training for all personnel handling chemicals. Emergency/Fire Fighting Response teams to train for such an event. <u>Behaviour</u> Strict adherence to procedures and MSDS for appropriate storage, handling and disposal. <u>Offsets</u> None	Hazardous materials on site and disposal requirement	B 1	B 1	B 1	B 1	0	0	Sub-Contractor Management Pollution Prevention and Control Plan Waste Management Plan

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				Air	Water	Land	Wildlife	Resources	Community			Air	Water	Land	Wildlife	Resources	Community	
Water Well Offtake	Y		Excessive offtake results in depletion of groundwater with long term changes to hydrogeology.	0	E 4	E 2	0	E 4	E 2	<u>Design and Pre-Condition</u> Detailed hydrological surveys to ascertain well locations and sustainable offtake. Recycling water where possible, eg rain water for fire pond. <u>Hardware</u> Monitoring equipment to measure offtake <u>Management</u> Monitoring level of groundwater regularly. <u>Behaviour</u> Sensible water usage. <u>Offsets</u> Installation of new wells in villages		0	A 4	0	0	E 2	0	Sub-Contractor Management Monitoring and Measuring
Power generation	Y		Production of substances with GWP and acidification potential. Poor air quality and acidification means effects are widespread from source	E 4	E 3	E 3	E 3	E 3	0	<u>Design and Pre-Condition</u> Use of well designed engines/plant <u>Hardware</u> Use of suitable fuel, low sulphur diesel <u>Management</u> Plant Maintenance system of regular checks (rather than fixing when broken) Regular monitoring to check compliance with air emission standards. <u>Behaviour</u> Awareness of issues, observation of procedures <u>Offsets</u> Roadside Tree planting	Production of substances with GWP (NO_x,SO_x,CO_2,CO, VOCs) Acidification	E 2	E 2	E 2	E 1	E 2	0	Sub-Contractor Management Pollution Prevention and Control Plan
Quarries and Borrow Pits, incl. Access roads	Y		Potential for excessive and uncontrolled landtake and use of geological resource. Uncontrolled use of borrow pit leading to visual scaring of landscape. River siltation and degradation of aquatic life Increased and uncontrolled traffic on roads over a wide area. Leading to air quality degradation from dust and emissions and production of substances with GWP (NO_x,SO_x,CO_2,CO, VOCs) Soiling from airborne particulate matter over a wide area Project mitigation measures to protect wildlife and people not extended to cover wider impact distant from RoW Degradation of roads and verges due to increased traffic and haulage lorries	E 3	E 1	E 4	E 3	E 4	E 3	<u>Design and Pre-Condition</u> All quarries and Borrow pits identified before construction. Quantities of material required for project accurately assessed Road network to and from Site identified and included in TMP Route pre-condition recorded <u>Hardware</u> Well maintained haulage lorries, covered Dust suppression on roads <u>Management</u> Traffic Management Plan Sub contractor management rigorous. Regular inspections of borrow pits and traffic Reinstatement of all roads and verges to former condition Reinstatement of borrow pits and quarries <u>Behaviour</u> Implementation of procedures. <u>Offsets</u> Roadside tree planting. Planting as screening for borrow pits and quarries. Habitat creation oportunities	Permanent land take and use of geological resource. Production of substances with GWP (NO_x,SO_x,CO_2,CO, VOCs) Use of roads, although reinstatement to former condition will mean no long term effect.	E 2	E 1	E 2	E 1	E 2	E 1	Sub-Contractor Management Traffic Management Plan Borrow Pit and access road Plan Pollution Prevention and Control Plan Wildlife and Landscape Protection Reinstatement Plan Monitoring Plan

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				Air	Water	Land	Wildlife	Resources	Community			Air	Water	Land	Wildlife	Resources	Community	
			Incidents go unreported as they are not 'on site'															
Earthquake	Y	Y	Potential for causing loss of containment leading to pollution of land and watercourses. Potential for severe erosion	B 4	B 4	B 4	B 4	B 4	B 4	Design and Pre-Condition Design to withstand earthquake according to established standards Hardware Drainage design to contain and control after loss of containment. Management Oil Spill Response and Emergency/Fire Fighting Response teams to train for such an event. Behaviour Implementation of procedures. Offsets None	Rupture of road	B 1	B 2	B 2	B 2	B 2	B 2	
Landslip	Y	Y	Road blockage with mud and rock causing hazardous conditions. Flooding Road destruction so communication links broken	0	C 1	C 3	C 1	C 1	C 3	Design and Pre-Condition Areas with potential for landslips identified. Geotechnical survey and design recommendations eg gabion slope stabilization, drainage Temporary erosion prevention works during Construction followed by permanent installation Hardware Signage to warn of potential for landslips Drainage on hillside Management Sub contractor management rigorous. Regular inspections erosion measures Reinstatement of all roads and verges to design Behaviour Implementation of procedures. Offsets Planting to promote slope stabilisation	With appropriate slope reinforcement the likelihood of landslips become negligible	0	B 1	B 1	B 1	0	B 1	
Road Drainage		Y	Poor and inadequate road drainage leads to waterlogging either side of the road and with a potential for road flooding and dangerous conditions. Waterlooging has adverse effects distant from the road, eg agricultural fields and structures. Waterlogging and flooding lead to fast road deterioration and excessive maintenance costs	0	E 3	E 3	E 1	0	E 4	Design and Pre-Condition Geohydrological survey to establish water quantity and flow Permanent and adequate drainage part of design Hardware Drainage, culverts etc Management Correct installation according to procedure Behaviour Implementation of procedures. Offsets Roadside planting to promote better air quality	A good drainage design will achieve desired results.	0	0	0	0	0	0	

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				Air	Water	Land	Wildlife	Resources	Community			Air	Water	Land	Wildlife	Resources	Community	
Traffic and Driving		Y	Road improvement and widening creates potential for greater volume of traffic and excessive speed. Increased accident and fatality rates for road users, local communities and wildlife. Deterioration of air quality with a local and global impact Production of substances with GWP (NO_x,SO_x,CO_2,CO, VOCs, PM) Acidification	E 4	E 2	E 2	E 3	E 4	E 4	<u>Design and Pre-Condition</u> Road design to include safety aspects Viable Transport alternatives assessed <u>Hardware</u> Signage Road markings Speed reduction measures near settlements <u>Management</u> National Road Safety Awareness schemes <u>Behaviour</u> Compliance with road safety, road signs, driving according to road conditions. Speed consistent with optimal reduction in emissions <u>Offsets</u> Roadside planting to promote better air quality	Road Transport has inherent impacts that are difficult to significantly reduce. An increase in traffic and speed exacerbates the impacts.	E 3	E 2	E 2	E 2	E 4		National Road Safety Awareness schemes
Road Crossing	Y	Y	Unregulated and uncontrolled crossing of a 4 lane highway has the potential for greatly increasing mortality rates for people, stock and wildlife. Wide road has the potential for significant habitat fragmentation and an impact on animal territorial boundaries	0	0	0	E 4	0	E 4	<u>Design and Pre-Condition</u> Surveys of road crossing behavior and reasons Surveys of wildlife crossing road and mortality Identification of location of wells/springs and pasture resource in relation to settlement Identification of location of schools and facilities in relation to residence Design in crossing structures and speed reduction measures Design crossing prevention for wildlife <u>Hardware</u> Over/under passes suitable for people, stock and wildlife Speed reduction installation Signage and road markings <u>Management</u> Local Road Safety Awareness education schemes <u>Behaviour</u> Implementation of procedures. <u>Offsets</u> Roadside planting to promote better air quality	Adequate safe crossing points and a Road Safety Awareness educational programme should minimize potential impacts on people and stock. Wildlife mitigation measures are not so effective.	0	0	0	E 2	0	0	National Road Safety Awareness schemes
Waste generation		Y	Waste production increase as traffic increases; and there is the potential for domestic waste to be thrown from cars into the surrounding environment. This creates general environmental degradation and is hazardous to stock and wildlife.	0	E 2	E 3	E 3	E 2	E 3	<u>Design and Pre-Condition</u> Design Rest stops with waste containment facilities <u>Hardware</u> Waste containers Signage <u>Management</u> Waste awareness education programme Regular collection of waste <u>Behaviour</u> Implementation of waste disposal procedure. <u>Offsets</u> Roadside planting to promote better air quality	With adequate education and enforcement, waste management can be controlled.	0	0	0	0	E 2	0	