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AZERBAIJAN REPUBLIC

MINISTRY OF TRANSPORT

“AZERROADSERVICE” OPEN JOINT STOCK COMPANY

AZERBAIJAN MOTORWAY IMPROVEMENT AND DEVELOPMENT

Baku – Shamakhi Road Widening

Supplemental ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REPORT FOR BAKU-SHAMAKHI (KM 45-91)

August 2015

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Abbreviations

ARS		Azer Road Service
CSC	-	Construction Supervision Consultant
EA	-	Environmental Assessment
EA&MF	-	Environmental Assessment And Management Framework
EIA	-	Environmental Impact Assessment
EHS	-	Environment, Health and Safety
EMP	-	Environmental Management Plan
EP	-	Environmental Protection
ESS	-	Ecology and Safety Sector
HIV/AIDS	-	Human Immuno-Deficiency Virus/Acquired Immune Deficiency Syndrome
IBA	-	Important Bird Areas
IBRD	-	International Bank for Reconstruction and Development
IUCN	-	International Union For Conservation of Nature And Natural Resources
LACMA	-	Law on Administrative Control on Municipality Activity
MAC	-	Maximum Allowable Concentrations
MDG	-	Millennium Development Goal
MENR	-	Ministry of Ecology and Natural Resources
MOH	-	Ministry of Health
MOT	-	Ministry of Transport
NGO	-	Non-Government Organization
OP	-	Operational Policy
PIU	-	Project Implementation Unit
RER	-	Regional Environmental Review
ROW	-	Right-of- Way
RPF	-	Resettlement Policy Framework
ARS	-	Road Transport Service Department
SFF	-	State Forest Fund
STD	-	Sexually Transmitted Disease
UNDP	-	United Nations Development Programme
WB	-	World Bank

Units of Measurement

°C	-	degree Celsius
km	-	kilometer
km/h	-	km per hour
km^2	-	square kilometer
m	-	meter
m^3	-	cubic meter
mm	-	millimeter

EXECUTIVE SUMMARY AND CONCLUSION

Introduction / Project Scope

The Baku-Shamakhi Road (Km 45-91) will be reconstructed into a four-lane highway following a New Project Design which was different from the design when the EIA was drafted. For this reason a Supplemental Environmental Impact Assessment (EIA) for this segment has been drafted and submitted to ARS-PIU. This project will be funded by WB-IBRD and to be implemented by Azer Road Service (ARS) under the Ministry of Transport.

The objective of this supplemental environmental assessment (EA) is to present and assess the impacts of the New Project Design (primarily the change in the structural pavement design) which entails bringing new materials from previously identified quarries and borrow areas. The preparation of the Supplemental Environmental Assessment (EA) for Baku-Shamakhi Road Km 45-91 takes full cognizance of the IRD-EIA as the reference document.

Description of the Project

The project road of 45 km will be supportive of the objectives of the entire Baku-Shamakhi road which are as follow:

- Reduce road transport costs for road users
- Improve access and transit throughout the entire road
- Enhance safety within Azerbaijan's east-west corridor, through the implementation of a number of subprojects
- Better road quality and better safety through new alignments
- Lower travel costs and a shorter travel time.

In addition, as mentioned in the IRD-EIA, the other recognized objectives are as follows

- to boost the national and regional economy, supporting the swap of goods with neighbour countries and creating temporary and employment opportunities;
- to further the introduction of international standards in the transport sector of Azerbaijan and thus generally support the Country in westernizing process

The four-laning of the entire Baku-Shamakhi road is expected to result to economic growth for Azerbaijan is as a consequence of higher returns on investments through the marked growth of the traffic, increase in speed, and subsequent decrease in travel time with the better road infrastructure. In general, the enhanced east-west connections will foster economic integration and growth within the country, particularly the non-oil growth, leading to a degree of economic diversification.

From the existing two-lane Category II road, the segment km 45-91 of the Baku-Shamakhi highway shall be reconstructed into four lane to connect to the existing four-lane road at both ends. The four-laning will entail the following:

- Centered along the centerline will be a 3.00 meter median
- Four (4) traffic lanes: Both sides of 2 x 3.75m
- Paved strip from edge of median to pavement at both sides: 1x 1m
- Both side pavement extension: 1 x 0.75m
- Both side paved shoulder (double bituminous treatment): 1 x 3.00m

This modification of scope primarily entails revision on pavement design layers from original 4 layers (Wearing Course, Binder Course, Bituminous Base Course and Capping Layer) with a thickness of 74 cm to a new design of 6 layers (Wearing Course, Binder Course, Bituminous

Base Course, Crushed Base Layer, Granular Subbase and Capping Layer) with a total thickness of 166 cm. The revised design is envisioned to be tougher than the original design but will entail additional materials with the inclusion of new layers underneath the bituminous pavement.

Generally, the construction will be within the designated ROW. Indirect impact can extend even beyond the 60 ROW mainly due to social environmental characteristics of the project area. This has been considered in the IRD-EIA.

Supplementary Environmental Impacts and Mitigation Measures

In the previous IRD-EIA for the four-laning of the road segment, anticipated direct and/or indirect impacts were already sufficiently tackled and adequately addressed in the IRD's EMP. In this Supplemental EIA, the change of scope due to the revision in the pavement design is the only one item being considered. Primarily reconstruction work is only done on the existing pavement and firsthand work is to be done on the additional two lanes as part of the four-laning.

Impacts considered are those associated with scarifying and milling of the existing asphalt layers to be while the subs-structures should be reworked to conform to the new designs. The new two-lanes will conform to the new design, which will have relatively thicker sub-structure, thicker Bituminous Base Course but thinner Binder Course and Wearing Course.

In the four-laning work, the impacts will be expected along the road corridor as well as the material sources and processing plants. Hence, this Supplemental EIA will be mainly be on impacts and mitigation measures in connection with reworking of the existing two lanes and construction of two additional lanes.

Supplemental Environmental Management during Construction

The Supplemental Environmental Management Plan (EMP) identifies the mitigation measures, monitoring activities and institutional arrangements to be implemented to prevent, eliminate, or reduce to acceptable levels any adverse environmental and social impacts of the road rehabilitation project. The IRD-EIA is considered still relevant and applicable with the four-laning project works and may be used in the environmental management and monitoring works during the construction. In this supplemental EIA, a number of additional provisions are being included to improve the management and monitoring aspects of the four-laning construction activities to take into account the change in scope.

Capacity Building

The staff training for ESS/district ARS is recommended as part of the construction supervision contract by an international environmental specialist focusing on capability on the proper enforcement of the EMP. A typical ESS/ARS staff training will consist of lecture-type presentation of the general procedure and requirements for effective environmental monitoring followed by more detailed on-the-job and hands-on training at the construction site where the trainees will participate in the activities of the international environmental specialist/construction supervision staff in reviewing the Contractor's reports, periodic monitoring inspections, deliberation of environmental issues involving the Contractor and the project stakeholders, and finally the accomplishment of environmental reports.

Public Consultation Summary and Information Disclosure

In conformance with the Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment of the WB-IBRD, In conformity with the Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment of the WB-IBRD, public consultation for the Four-laning of 45-91 Section [*additional works for rehabilitation and strengthening of the existing road lanes and relocation of utility and communication lines not envisaged by the original road design]* was scheduled on 23 October 2015 at 10:00 am at Shamakhi Executive Power Office, part of Shamakhi Rayon. The PIU-ARS coordinated the holding of public consultation with the Local Executive Power of Shamakhi Rayon, wherein local residents, village officials/representatives, local NGOs, and other stakeholders were invited. This was attended by around of 40 participants and in which the Environmental Consultant elaborated the rehabilitation/construction works, project's environmental, social impacts, and land issues along with WB and GoA policies in minimizing and mitigating projected impacts. Comments were later solicited from the participants in an open forum and both by means of written documentation filled out by the participants themselves. Minutes of the Meeting have been separately documented and attached to the Report

Conclusions

This Supplemental EIA contains additional provisions in the mitigation and monitoring aspects to be performed during the implementation of the project in conformance with the change of scope (New Project Design). These shall be in addition to what were presented in the IRD EIA/EMP documents drafted for the project. These additional provision aims at improving the environmental management and monitoring aspect of the works.

1. INTRODUCTION

1.1 Project Background and Previous Studies

The project being considered in this is referred to as the Baku-Shamakhi Road (Km 45-91). This project will involve the upgrading of a road segment from two-lane Category II to a four-lane Category I Highway which starts at km 44+600 to km 91+000 as the actual chainage. This road segment is part of the upgrading of the entire Baku-Shamakhi Road (M4) starting from km 10 and km 91. Funding for this project is being provided as a load from WB-IBRD and to be implemented by Azer Road Service (ARS) under the Ministry of Transport.

The existing road segment has been rehabilitated into a Category II road as per the Former Soviet Union Standard (SNIP) 2.05.02-85. The construction works produced a road with a two lane carriageway with a paved width of 9.00 m and an unpaved shoulder width of 2 x 3.00 m.

The Baku-Shamakhi road is the shortest way from Baku to Georgia and to western Azerbaijan. The four-laning construction for the Baku-Shamakhi Road has been subdivided into several road segments with their respective EIAs. Originally, an EIA was drafted for km45-121[1], referred herewith as IRD-EIA. However, certain changes were adopted such that new designs are now being done for km 91-105. The four-laning of the section from km 45-91 remained the same aside from certain modification, which primarily consist of pavement layer redesign and resulting into slightly higher levels than the former pavement. This modification is not considered major departure from the former scope as the reconstruction is confined within the defined four-lane strip. Because of this reason, a new EIA is not necessary, and a Supplemental EIA is being drafted to capture the difference of scope, with the perceived impacts and required mitigation measures.

1.2 Brief Description of the Study Area

The Baku-Shamakhi highway is a segment of the Magistral Road, M4 (Baku to Yevlakh). The segment being considered starts at chainage km 44+600 and ends at km 91+000. The starting point of this approximate 46.4km road segment is part of Gobustan Rayon and ends about 9 km west from Maraza & Narimakand, which were both reconstituted to form Gobustan settlement. This particular road segment is linked with km 15-45 and km 91-105. The first segment is currently under construction into four-lane with some of the sub-segments already completed, while the km 91-105 is under detailed design finalization.

In the IRD-EIA, the road has been described into several sections, and this supplemental EIA takes cognizance of the first and second section only as follows (*from IRD-EIA*):

- The “First Section, whose initial part belongs to the Gobustan Rayon, is characterized by the absence of important villages. Rarely settlements and an agricultural sector (dry land) coupled with breeding farming can be found. In the following part, the house settlements of Dzheirankechmaz, consists of only a dozen of buildings on both side of the road.

- In the Second Section the area a few kilometres far from Dzhangi and 2 km far from the M4, is characterized by the agricultural village of Sixazirli and in the adjacent location by one of the famous “mud volcanoes”. The North side include the presence of agricultural

[1]Nov.2013. IRD. Azerbaijan Highway Project II-Additional Financing. IBRD Loan No. 7516 AZ. Upgrading of Baku-Shamakhi Road Section of Baku-Shamakhi-Yevlakh Road, preparation of Environmental Assessment and Environmental Management Plan

arable and fertile land. Moreover, the Section includes the settlements system of Narimankand-Maraza, two ancient agricultural villages currently connected by an internal road and by the M4. The two villages (nowadays formally administratively joined under the name of Gobustan) show clear urban development trends. Nevertheless due to the fact that they were joined recently, it has not been possible to develop a plan to coordinate the urban development of the area and the upgrading of the highway. Therefore as a consequence of the upgrade of the road, it is recommended Technical Assistance to the Municipalities in order to make them able to afford and tackle the opportunities coming from the reorganization of these new urban settlements together with the existing and new economic service activities. In other words, to develop a set of urban planning and architectural design to coordinate the upgrading of the M4 opportunity with the development of the village. Such kind of assistance can be provided in the next years, under a different project, when the full utilization of the new road will make clear the role plaid by the new road in the development of these settlements.

A map of the project road is shown in Figure 1 below.

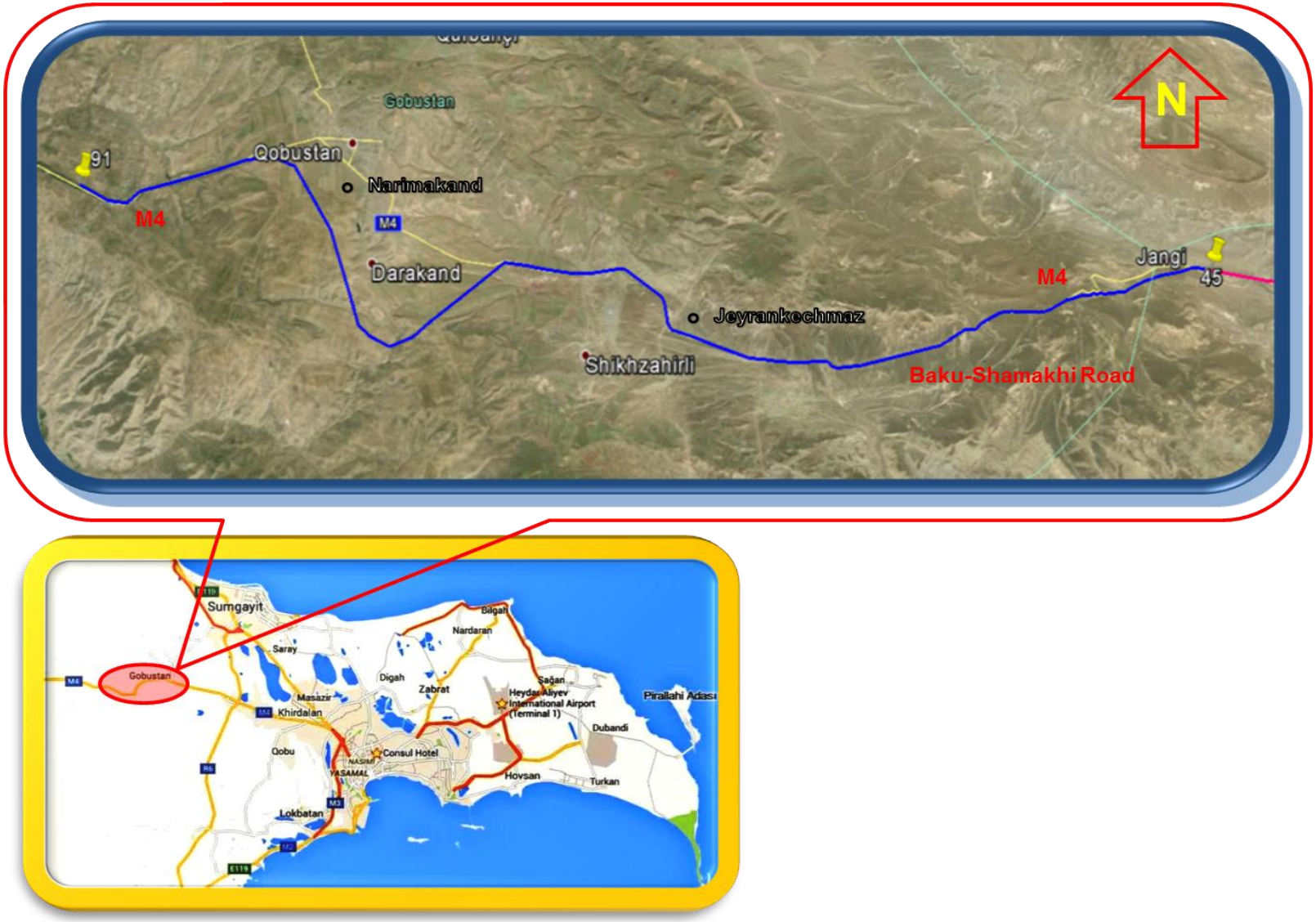

Figure 1: Map of the Project Road

1.3 Scope of Supplemental Environmental Assessment

The preparation of the Supplemental Environmental Assessment (EA) for Baku-Shamakhi Road Km 45-91 takes full cognizance of the IRD-EIA as the reference document. Based on the Terms of Reference on Consulting Services Small Assignments Lump-Sum Payments - Contract No AHP 3, IC 2 issued by Azeryolservis ASC, particularly Task 2, a modification of scope has been incorporated. This modification of scope primarily entails revision on pavement design layers from original 4 layers (Wearing Course, Binder Course, Bituminous Base Course and Capping Layer) with a thickness of 74 cm to a new design of 6 layers (Wearing Course, Binder Course, Bituminous Base Course, Crushed Base Layer, Granular Subbase and Capping Layer) with a total thickness of 116 cm. The revised design is envisioned to be tougher than the original design but will entail additional materials with the inclusion of new layers underneath the bituminous pavement.

This Supplemental EIA will focus on impacts that will result in the modification of the designs and assess the adequacy of the associated Environmental Management Plan. Previous environmental assessment results will be also be checked vis-à-vis the new design and recommendations shall be presented to conform to WB-IBRD's requirements and Azerbaijan legislations.

2. CURRENT EIA DOCUMENT

An EIA for the four-laning construction based on existing design was drafted by IRD dated November 2013. It consists primarily of the main EIA Report, EMP Report and Annexes, and Monitoring Plan Matrix. Due to the change of scope a Supplemental EIA has to be drafted to mainly incorporate in the environmental assessment process the additional/change of scope for the projected four-laning. The change of scope entailed new structural pavement design which will result to bringing in more materials from the material sources, processing them and hauling them to the road. The original reconstructed road pavement shall be reworked to conform to the New Project Design.

The IRD EIA was assessed against the New Project Design and found to still applicable and relevant. Additional provisions were included and presented in the Supplemental EMP.

3. PROJECT OBJECTIVES AND PROJECT SCOPE MODIFICATION

3.1 Objectives and purpose of the project

The project road of 45 km will be supportive of the objectives of the entire Baku-Shamakhi road which are as follow:

- Reduce road transport costs for road users
- Improve access and transit throughout the entire road
- Enhance safety within Azerbaijan's east-west corridor, through the implementation of a number of subprojects
- Better road quality and better safety through new alignments
- Lower travel costs and a shorter travel time.

In addition, as mentioned in the IRD-EIA, the other recognized objectives are as follows

- to boost the national and regional economy, supporting the swap of goods with neighbour countries and creating temporary and employment opportunities;

- to further the introduction of international standards in the transport sector of Azerbaijan and thus generally support the Country in westernizing process

The four-laning of the entire Baku-Shamakhi road is expected to result to economic growth for Azerbaijan is as a consequence of higher returns on investments through the marked growth of the traffic, increase in speed, and subsequent decrease in travel time with the better road infrastructure. In general, the enhanced east-west connections will foster economic integration and growth within the country, particularly the non-oil growth, leading to a degree of economic diversification.

3.2 Description of Project Modification

From the existing two-lane Category II road, the segment km 45-91 of the Baku-Shamakhi highway shall be reconstructed into four lanes to connect to the existing four lane road at both ends. The four-laning will entail the following:

- Centered along the centerline will be a 3.00 meter median
- Four (4) traffic lanes: Both sides of 2 x 3.75m
- Paved strip from edge of median to pavement at both sides: 1x 1m
- Both side pavement extension: 1 x 0.75m
- Both side paved shoulder (double bituminous treatment): 1 x 3.00m

The entire construction roadway from shoulder to shoulder will have a width of 27.00m. With provisions for drainage, the entire road will be around 30-35 m. The cross-sectional profile of the road is shown in the next Figure.

The road construction will also include drainage, cross-pipes and culverts along with relocation of underground and above ground utility lines.

Generally, the construction will be within the designated ROW. Indirect impact can extend even beyond the 60 ROW mainly due to social environmental characteristics of the project area. This has been considered in the IRD-EIA.

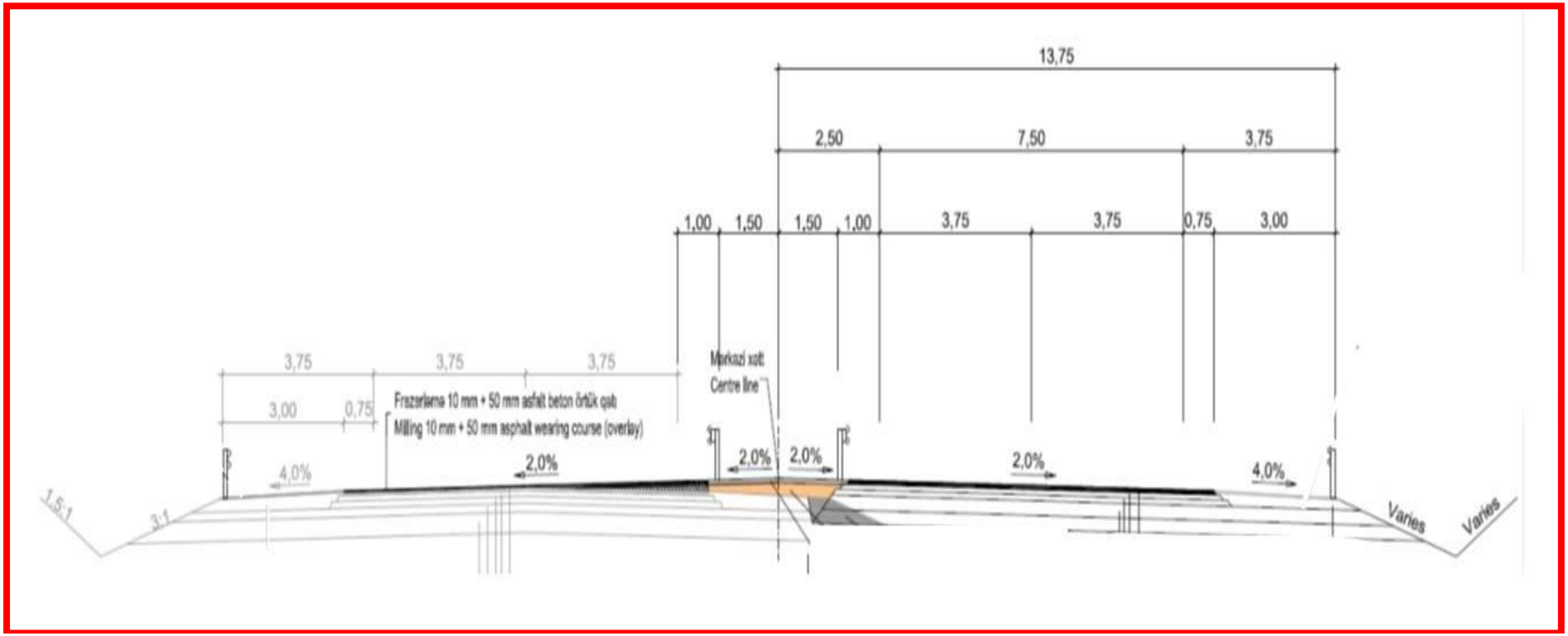

Figure 2: Road Cross-Section

The modification entails a new structural pavement design based on new parameters adopted to strengthen the road pavement in anticipation of heavier loadings. Because of this, the existing road pavement has also to be rebuilt to conform to the new design parameters. Aside from changes in thicknesses in the New Project Design, a Crushed Base Layer has been added between the Bituminous Base Course and Granular Subbase. In the construction, this will be done by scarifying the pavement structure up to embankment layer and onto which the new design project design. The design modification is shown on the table below and depicted on the subsequent schematics.

Table 1: Road Design Modification

No.	Pavement Component	Existing Road Design	New Project Design
1	Wearing Course	5 cm	4 cm
2	Binder Course	9 cm	6 cm
3	Bituminous Base Course	10 cm	19 cm
4	Crushed Base Layer	-	15 cm, CBR>80%
5	Granular Subbase	15 cm, CBR>15%	22 cm, CBR>30%
6	Capping Layer	35 cm, CBR>15%	50 cm, CBR>15%
	Total Thickness	**74 cm**	**116 cm**
7	Embankment	CBR> 3.5%	CBR> 8.0%

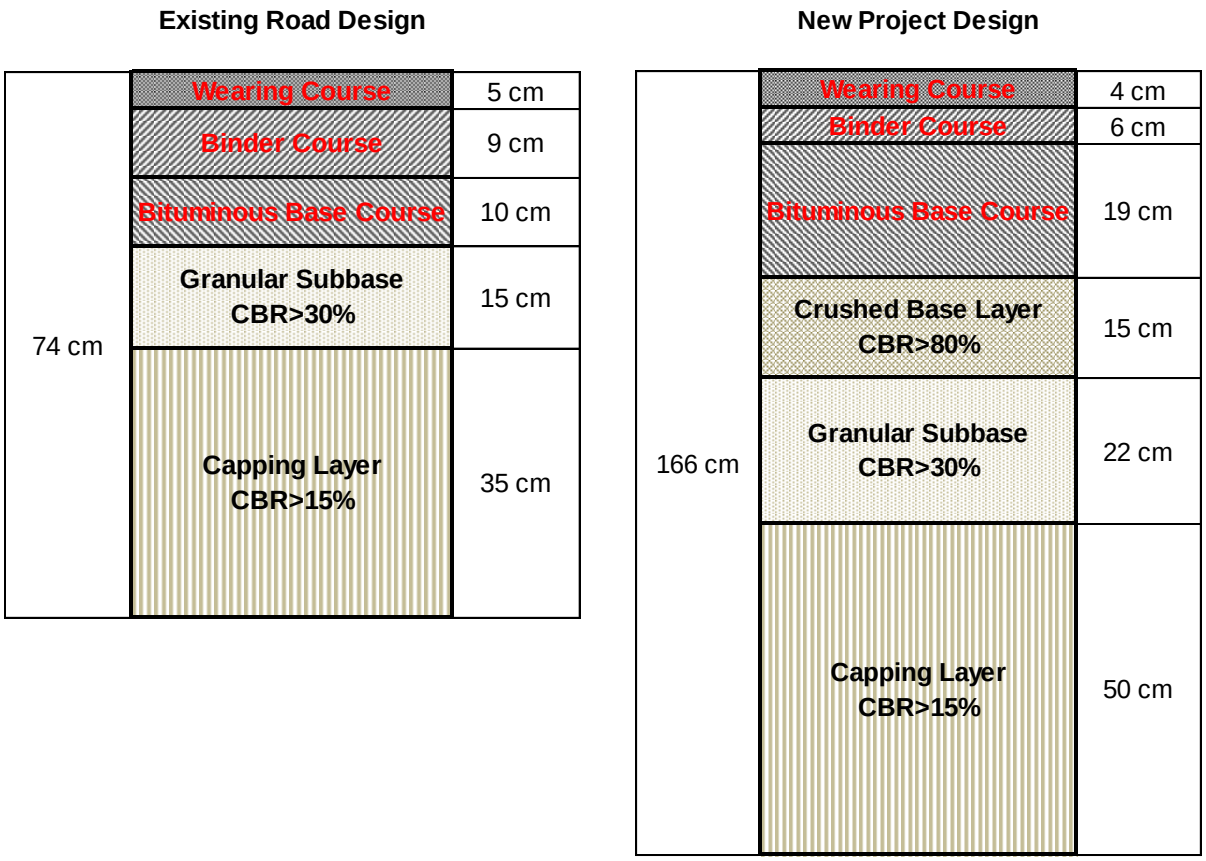

Figure 3: Road Design Modification Schematics

4. SUPPLEMENTAL ENVIRONMENT IMPACTS AND MITIGATION MEASURES

In the previous IRD-EIA for the four-laning of the road segment, anticipated direct and/or indirect impacts were already sufficiently tackled and adequately addressed in the IRD's EMP. In this Supplemental EIA, the change of scope due to the revision in the pavement design is the only one item being considered. Primarily reconstruction work is only done on the existing pavement and firsthand work is to be done on the additional two lanes as part of the four-laning.

For the existing pavement, the asphalt layers are to be scarified, milled and to be mixed with new asphalt mix at the plant, while the subs-structures should be reworked to conform to the new designs. The new two-lanes will conform to the new design, which will have relatively thicker sub-structure, thicker Bituminous Base Course but thinner Binder Course and Wearing Course. The existing road will likewise be reconstructed also in accordance with new design; thus, essentially all lanes will have identical road pavement structure and the same top elevations.

In the four-laning work, the impacts will be expected along the road corridor as well as the material sources and processing plants. What will be emphasized in this Supplemental EIA will be impacts and mitigation measures in connection with reworking of the existing two lanes and construction of two additional lanes. In general, the previous EMP can be supplemented according to this change of scope.

4.1 Roadway Earthworks

Since the road will be constructed on existing road and shoulder, impacts on major cut or fill have already been considered in the IRD EIA. The rework on the existing pavement will entail the following to conform to the new design:

(i) Scarifying and milling of the existing asphalt layers: Wearing Course, Binder Course and Bituminous Base Course
(ii) Excavation, removal and temporary stockpiling of the existing Granular Subbase
(iii) Adding 15 cm to the Capping Layer to conform to the new design of 50cm
(iv) Re-laying of thicker Granular Subbase from 15 cm to 22 cm, using stockpiled portion and additional materials from the material sources
(v) Installing a new 15 cm Crushed Base Layer
(vi) Re-laying of thicker Bituminous Base Course from 15 cm to 19 cm
(vii) Re-laying of thinner Binder Course from 9 cm to 6 cm
(viii) Re-laying of thinner Wearing Course from 5 cm to 4 cm

The new two-lane portion shall be constructed along new strips and will require the following scope of the New Project Design:

(i) Preparation of the road embankment layer
(ii) Installing 50 cm Capping Layer
(iii) Laying of 22 cm Granular Subbase
(iv) Laying of 15 cm Crushed Base Layer
(v) Laying of 19 cm Bituminous Base Course
(vi) Laying of 6 cm Binder Course
(vii) Laying of 4 cm Wearing Course

The reconstruction of the new pavement will entail short term disturbance at the site consisting of noise, dust, equipment emission, impairment of local community access. Noise can be

mitigated by proper scheduling the usage of equipment, installation of mufflers and regular equipment maintenance and provision of noise barriers when needed. Dust can be routinely minimized by watering of certain exposed areas and covering materials being hauled in trucks. Location for temporary material stockpile can pose some localized issues which the Contractor can resolve by proper planning.

In some areas, cut and fill for the new lanes to conform to the New Project Design may have to be done along with the construction of side ditches for drainage. Roadway cuts shall entail excavation, removal and reusing, when proved to be suitable, for embankment/filling work. Unsuitable soil materials shall be disposed in areas where it would be proven to be non-detrimental to adjacent community and the environment. The work scope also includes all excavation necessary for side ditches and relocation of underground utilities. Some excavation and filling will be done at the extension of water way crossings. The impacts of the cut and fill works will be minimized by proper planning and determining sites to obtain materials or deposit them when they are in excess. Re-cultivation of borrow areas should be done after their usage and deposited materials should be stabilized by proper grading to allow natural re-vegetation.

4.2 Borrow and Quarry Areas

The four-laning will entail usage of materials in the existing road and additional volumes for the new two lanes. After comparing the New Project Design with the Existing Road Design, it is obvious that even for the reconstruction of existing pavement, new materials would have to be imported from quarries. The volume of materials that will be used for the road substructure can be estimated by simplified computations base on the road geometry as shown below:

Table 2: Computation Table for Road Material Requirements

Pavement Layer	Designs (cm)			
	Existing Road	New Project	Difference	In (m)
(A)	(B)	(C)	(D)=(C)-(B)	(D)/100
Wearing Course	5	4	-1	Excess
Binder Course	9	6	-3	Excess
Bituminous Base Course	10	19	9	0.09
Crushed Base Course CBR>80%	0	15	15	0.15
Granular Subbase CBR>30%	15	22	7	0.07
Capping Layer CBR>15%	35	50	15	0.15

Assumed Ave Width of Pavement		30	meters
Assumed Ave Length of Pavement	46 km	46,000	meters

Pavement Layer	Volume (m3)	Est. 15m3 Truckloads
Bituminous Base Course	124,200	8,280
Crushed Base Course CBR>80%	207,000	13,800
Granular Subbase CBR>30%	96,600	6,440
Capping Layer CBR>15%	207,000	13,800
Total	**634,800**	**42,320**

The excess milled materials from the asphalt layers of the Existing Road can be used in the New Project Pavement layers, after verification in accordance with specified parameters. From the environmental point of view the recycling of old asphalt as raw materials in new asphalt mix proves to be beneficial. Savings in the bitumen can likewise be realized with the reuse of old asphalt pavement.

In the IRD-EIA, sources of aggregate for road pavement were mentioned and these are primarily the rivers near the project road. The following were among the potential sources of

materials for the as mentioned in the IRD-EIA - Annex 10 BORROW PIT MANAGEMENT PLAN (Km 45– Km 121) (EMP2):

1. **Pirsaat River**
   Location/Setting: 2.5 km east of the town of Shamakhi the M4 highway crosses the Pirsaat River. At the bridge, to the north of the highway, two private and governmental enterprises are extracting and processing material from the active river terrace. The material is sandy gravel with little fines and larger stones.
   Resource Volume: The available material quantity for a 1 km long stretch of the Pirsaat River with an assumed average width of the active river terrace of 100 m and an average excavation depth of 3.0 m can be estimated to 300,000 – 4,500,000 m3. The theoretically usable quantities of such a volume will be much smaller.
   Quantities Suitable for Use: Production of crushed aggregates for asphalt production, natural aggregate for concrete cement stabilized based course, Sub-base, natural sand and aggregate for concrete production, a combination of fine and coarse aggregates as general fill and natural granular material as drainage layer.

2. **Garajuzlu Borrow Area**
   Location/Setting: 2.5 km east of the town of Shamakhi the M4 highway crosses the Pirsaat River. At the bridge, to the north of the highway, two private and governmental enterprises are extracting and processing material from the active river terrace. The material is sandy gravel with little fines and larger stones.
   Resource Volume: The riverbed is estimated to have an average width of 50 meters and an area of 50 ha. The estimable mineable depth is 3 m and the estimated recoverable quantity for material > 40 mm is between 150,000 to 500,000 m^3.
   Quantities Suitable for Use: Production of crushed aggregates for asphalt production, natural aggregate for concrete cement stabilized based course, Sub-base, natural sand and aggregate for concrete production, a combination of fine and coarse aggregates as general fill and natural granular material as drainage layer.

3. **Hilmili Borrow Area**
   Location/Setting: Located 24 km north of Maraza, at the village of Hilmili. The borrow area can be accessed over a surfaced/gravel road.
   Resource Volume: The riverbed has an estimated width of 100 meters and has abundant deposits of gravel. Material will be extracted from the riverbed. The estimated recoverable quantity for material >40 mm is between 300,000 and 1,000,000 m^3.
   Quantities Suitable for Use: Production of crushed aggregates for asphalt production, natural aggregate for concrete cement stabilized based course, Sub-base, natural sand and aggregate for concrete production, a combination of fine and coarse aggregates as general fill and natural granular material as drainage layer. The Quantity of Borrow Materials used on the project shall be updated.

Comparing the required volume for the four-laning against potential available materials, it can be easily seen that the far sufficient materials available. Obtaining these materials from any of these sources will result in very minimal decrease in available resources.

What needs to be given more consideration is the manner of quarrying. Proper planning should be done to minimize effect on the topography as well as the natural hydrology of the river. Mitigation measures to minimize or avoid bank erosion and/or localized scouring should be undertaken. When all materials are obtained, the quarries used should be reinstated to better or improved conditions.

5. SUPPLEMENTAL ENVIRONMENTAL MANAGEMENT PLAN

The Supplemental Environmental Management Plan (EMP) identifies the mitigation measures, monitoring activities and institutional arrangements to be implemented to prevent, eliminate, or reduce to acceptable levels any adverse environmental and social impacts of the road rehabilitation project. The ERD EIA consists of the EIA Report document and EMPs as follow:

- Flora, Fauna and Reforestation Plan – EMP1
- Borrow Pit Management Plan – EMP2
- Water Supply Management Plan – EMP3
- Noise Suppression Plan – EMP4
- Construction Traffic & Access Management Plan – EMP5
- Material Management & Erosion Control Plan – EMP7
- Emergency Response Plan – EMP8
- Waste Management Plan – EMP9
- Location and Campsite Management Plan – EMP10

In addition, Annex 6 in the IRD EIA includes Management Plan Forms and Monitoring Plan Forms. These forms are considered still relevant and applicable with the four-laning project works and may be used in the environmental management and monitoring works during the construction.

In this supplemental EIA, a number of additional provisions are being included to improve the management and monitoring aspects of the four-laning construction activities to take into account the change in scope. These additional items are found in the Annexes of this Supplementary EIA Report.

5.1 Environmental Mitigation and Monitoring Program

The Supplemental environmental mitigation and monitoring programs summarized in Annexes A and B have been devised to ensure proper response with the identified project impacts, which may arise during the construction phase of the project road. Prior to the construction, the ESS with the assistance of the Construction Supervision Consultant will do the following for the Baku-Shamakhi Road (Km 45-91):

- Establish baseline information on the existing environmental conditions and parameters for the specific road project;

- Develop an environmental auditing protocol for the construction period as well as a detailed monitoring and management plan;

- Provide guidance and formulate a report outline that will be used by the contractor as a guide in the preparation of monthly environmental progress reports; and

- Undertake regular and periodic monitoring of contractor’s implementation of the mitigation measures during the construction stage, consistent with the monitoring program, and submit to PIU-ARS quarterly monitoring reports. Special separate reports should be prepared in the event a significant environment related incident will arise.

- The PIU will provide the WB a summary of the monitoring results on a quarterly basis.

In addition, environmental management activities should form part of the Internal Monitoring System. The purpose of such system is to track progress of as well as changes in civil work activities as well as monitor effects and impact of the road construction and rehabilitation on the households and communities along the road. The ARS OJSC will be responsible for the establishment of the monitoring system with the assistance of the Supervision Consultant and the Civil Works Contractor, whose scope will be specified in the terms of reference for the work contract.

5.2 Institutional Arrangements and Reporting

To ensure that the proposed mitigation measures will be implemented by the Contractor/s during the construction stage, the detailed engineering consultant will undertake the following:

- Clearly define in the tender and contract documents the Contractor's obligation to undertake and implement environmental mitigation measures as specified in the IRD EIA EMPs and Supplemental Environmental Mitigation Measures outlined in **Annex A.** The same shall be appended in Contract Specifications;

- The cost for the recommended environmental mitigation measures will, where possible, be itemized as cost items in the Bill of Quantities. Such allocation of a cost item to specific environmental mitigation measure will be crucial to assure their actual implementation. During procurement or bidding, the bidders will be specifically instructed to include these cost items as line items in the Bill of Quantities to form part of their financial bids; and

- Explicitly require the Contractor to recruit an environmental, health and safety (EHS) personnel who will be specifically responsible in handling environmental issues of the project.

The Contractor will be responsible for the implementation of environmental mitigation measures during construction and shall employ EHS personnel who will supervise implementation of the Contractor's environmental responsibilities as stipulated in the contract and liaise with the ESS and the district ARS on such matters. Likewise, the EHS personnel will also be responsible for health and safety aspects of work sites and shall submit monthly reports to ESS on the status of implementation of mitigation measures, including complaints received and actions taken as well as other environmental issues relating to the project. The Contractor, in coordination with the construction supervision consultant, shall set-up a grievance redress committee that will deal with any complaints during project implementation.

Also, during project implementation, the ESS with the assistance of the CSC shall monitor the compliance of the Contractor in accordance with the EMP provisions. The ESS shall submit quarterly reports to ARS and the MENR describing the status of implementation of environmental mitigation measures by the contractors. Included in the reports are additional mitigation measures that may need to be implemented, incidents of non-compliance with applicable environmental permits, complaints received from local residents, NGOs, etc. and ways and means by which, they were addressed or settled.

It is advisable that the CSC shall employ an expatriate environment specialist (with civil engineering/environmental management background) to assist the ESS in the monitoring the progress of the construction on its environmental aspect. The CSC, through its environment specialist, shall provide hands-on training to the ESS throughout various stages of the construction. The CSC shall also assist the ESS in preparing monitoring reports regarding the performance of the contractors in terms of compliance with the relevant national environmental regulations, quality standards and the implementation of environmental specifications in

accordance with the contract provisions. The Terms of Reference (ToR) for the environmental specialist shall be drawn-up by the detailed engineering consultants for the road project. During project implementation, the ARS (through the PIU) will report to the World Bank-IBRD every three (3) months on the progress of the project based on the monitoring reports submitted by the ESS/CSC and the Contractor.

Upon project completion and subsequent acceptance by the ARS, the same will be responsible on the operation and maintenance of the Project Road. Routine and random environmental monitoring will be undertaken by ARS district offices as scheduled in the monitoring plan (**Annex B**). Parallel to this the MENR will conduct random monitoring of the project to assess compliance with the required mitigation measures and applicable environmental laws and regulations. Should the ARS plan for full public participation activities, a detailed action plan should be devised with adequate funding from Azerbaijan government.

The following Table summarizes the various institutional responsibilities for the implementation of the environmental management plan at various stages of the Project Road rehabilitation.

Table 3: Responsibilities for Implementing the Supplemental EMP

Project Stage	Responsible Organization	Responsibilities
Detailed Design	ARS with the detailed engineering consultant	Incorporate mitigation measures into engineering design and technical specification
	ARS and MENR	Review and approve environmental mitigation and management measures
	Investment Department of ARS	Allocate appropriate budget to undertake environmental monitoring and capacity building for ESS
Construction	Contractor (with the through its EHS Manager)	Implement required environmental measures and submit monthly reports to ESS regarding status of such implementation. Set-up a grievance redress committee in coordination with the CSC.
	ESS with the assistance of CSC	Supervise contractor's implementation of environmental measures on a daily basis. Enforce contractual requirements
	ESS and CSC	Audit construction phase through environmental inspections and collect monitoring data. Submit quarterly reports to ARS and MENR.
	CSC	Assist the Contractor in the formulation of a grievance redress committee. Provide awareness/training to workers and technology transfer to the Contractor.
	ESS and CSC	Ensure compliance with Government legal requirements during construction. Review complicated issues arising from the Project.
	ARS	Submit quarterly progress reports to WB
	MENR and MOH	Undertake periodic monitoring of the project
Operation	ESS / District Maintenance Unit	Undertake routine environmental monitoring and prepare corresponding reports.

5.3 Cost Estimate

The estimated cost for a period assumed as thirty (30) months (equivalent to 2.5 years of construction) in implementing the mitigation measures and monitoring plan necessary in the Baku-Shamakhi Road (Km 45-91) four-laning project is provided in the Table below. The costs during construction shall be part of Contractor's civil works package, while the costs associated in assisting the ESS in the implementation of the EMP and conducting relevant environmental training shall be included in the construction supervision cost.

Table 4: Estimated Environmental Monitoring and Mitigation Cost

	Item	Unit	Qty	Unit Cost	Total
Environmental Costs - Civil Works (included in contractor's civil work package)[a]					
	Dust suppression measures	day	450	125	56,250
	Planting of trees[b]	km	20	4,000	80,000
	Grass revegetation	m^2	20,000	2	40,000
	Provision of biodiversity crossings	units	0	5,000	0
	Land management measures at dumping sites for excess material	m^3	30,000	1	30,000
	Stripping of top soil (0-200 mm) and storage for reuse[c]	m^3	30,000	3	90,000
	Rehabilitation (Landscaping) of borrow areas	No	3	25,000	75,000
	Provision of EHS Manager	MM	30	3,000	90,000
	Conduct of seminar/orientation on HIV, AIDS and STD awareness among workers and nearby communities, condom supply, coordination with HIV monitoring centers and basic supply provision	lump sum	4	5,000	20,000
				Total	**481,250**
Environmental Management, Monitoring and Training Costs during Construction (Included in construction supervision cost)					
	Remuneration and per diems				
	International Environment Specialist	MM	5	20,000	100,000
	Local Environmental Specialist	MM	10	6,000	60,000
	Travel				
	Intl. Travel	trip	5	2,500	12,500
	Domestic Travel	lump sum	1	10,000	10,000
	Training materials and logistics	lump sum	1	5,000	5,000
	Periodic construction site water quality, air quality and noise monitoring	M	10	1,500	15,000
				Total	**202,500**
Environmental Mitigation during Operation - ARS Budget					
	Purchase of water truck for maintenance of roadside vegetation	unit	4	35,000	140,000

[a] estimated cost during the construction period (4 months)
[b] total length of tree/shrub plantations to be provided in some designated places by ARS.
[c] including seeding or other means of protection during stockpiling to preserve fertility

5.4 Implementation Schedule

The environmental measures are determined during the detailed design phase when the environmental assessment is undertaken. These measures will then form part of work items for the project. In addition, the other environmental activities related to road rehabilitation are presented in the succeeding Table below:

Table 5: Implementation Schedule

Project Phase	Issue	Schedule
Prior to commencement of construction activities	ESS (with assistance from CSC) to review and approve Contractor's method statements	once
Upon mobilization of the CSC	Training for ARS'S ESS and district offices (hands-on training will also be provided by the CSC during monitoring of the performance of Contractors)	once
During construction	Monitoring	Refer to Annex B
During construction	Reporting: • Contractor to ESS • ESS to ARS/MENR • ARS (through PIU) to WB	 monthly quarterly quarterly
During Operation	Monitoring	Refer to Annex B

5.5 Institutional Strengthening

In the implementation of projects, often one major issue is the incorporation of the requirements for environmental mitigation and monitoring in the contract documents even though the EMP was adequately prepared. Accordingly, it becomes difficult to enforce the needed environmental mitigating measures in projects, particularly due to lack of reference of these items in the project contract. It is important that this item be adequately emphasized on the part of ESS for compliance by the Contractor. Furthermore, the level of expertise of ESS to undertake environmental management and monitoring should also be upgraded.

In the past some training had been formulated and implemented in line with institutional building and capacity building of staff from various agencies dealing with environmental regulations and control, especially the ESS-ARS OJSC. The topics elaborated in the training covered a range of environmental management and related issues relevant to the road construction sector in Azerbaijan such as Introduction to Construction Noise, Ecology, Environmental Good Practice, Waste Management; Good Practice on site – Dust, Ecology, Noise, Smoke & Odours, Trees, Water Management, Map Reading, Borrow Pit/Quarry, Oils & Chemicals; and Traffic Impacts on Air Quality.

To respond to the requirements of the environmental monitoring activities, the gaps in the previous training should be assessed. Accordingly, based on these identified gaps, it is proposed that additional measures be provided to address these gaps, as guide to good practices in ensuring compliance by Contractors to the environmental regulatory measures.
On this note the assistance of an international environmental specialist will be useful. The matter of capability and capacity building on the part of the ESS should form part of the

proposed Terms of Reference of the international environment specialist who will conduct the ESS/district ARS training and orientation for contractors. The following are the basic scope of the international environment specialist among others:

- Assess the capacity of the ESS and district ARS and determine the specific additional training needs to respond to the requirements in conducting environmental monitoring and implementation of mitigation measures of road projects;

- Prepare a short-term staff training prospectus and associated materials to meet immediate needs;

- Undertake training workshops that will include the following topics:

    - Establishment of baseline data at the start of the project for reckoning project environmental impacts.

    - Preparation of EMPs and incorporation of the mitigating measures in contract documents and specifications for Consulting Services and Works contracts;

    - Procedures for monitoring the implementation of mitigating measures including target parameters, frequency, responsibilities and means of monitoring;

    - Health and safety procedures in project implementation.

- Conduct orientation/workshop for contractors on construction-related environmental issues on road projects, implementation of mitigation measures and monitoring, and preparation of monitoring reports;

- Evaluate the effectiveness of the training measuring improvements in attitudes and skills achieved through a combination of feedback questionnaires and performance evaluation; and

- Prepare outline proposals for the longer-term organizational and capability development of ESS and district ARS.

A typical ESS/ARS staff training will consist of lecture-type presentation of the general procedure and requirements for effective environmental monitoring. This will be followed by a more detailed on-the-job and hands-on training at the construction site where the trainees will participate in the activities of the international environmental specialist/construction supervision staff in reviewing the contractor's reports, periodic monitoring inspections, and deliberation of environmental issues involving the contractor and the project stakeholders, and finally the accomplishment of environmental reports. The field trainings should coincide with peak work activity at the site to provide a first-hand observation of the following environmental issues:

- Erosion and slope stability issues;
- Discharges to water bodies;
- Disturbance on biodiversity;
- Dust suppression;
- Exhaust emissions;
- Noise abatement measures;
- Protection against oil spillage;
- Quarry, borrow pits and asphalt plant operations;
- Site health and safety, sanitary facilities, etc.;

- Public safety, traffic management, child safety, etc.
- Documentation in dealing with public complaints and conflict resolution.

6. PUBLIC CONSULTATIONS

6.1 Stakeholder Consultations

In conformity with the Operational Policy (OP)/Bank Procedure (BP) 4.01: Environmental Assessment of the WB-IBRD, public consultation for the Four-laning of the Baku-Shamakhi km 45-91 Section *additional works for rehabilitation and strengthening of the existing road lanes and relocation of utility and communication lines not envisaged by the original road design* was scheduled on 23 October 2015 at 10:00 am at Shamakhi Executive Power Office, part of Shamakhi Rayon. The PIU-ARS coordinated the holding of public consultation with the Local Executive Power of Shamakhi Rayon, wherein local residents, village officials/representatives, local NGOs, and other stakeholders were invited.

Around of 40 participants attended the public consultation in Shamakhi. The Consultant elaborated the rehabilitation/construction works, project's environmental, social impacts, and land issues along with WB and GoA policies in minimizing and mitigating projected impacts in a slide presentation (PowerPoint), maps, graphics, and handouts. Comments were later solicited from the participants in an open forum and both by means of written documentation filled out by the participants themselves. Comments, responses and recommendations, photos and list of participants have been separately documented.

Annex A:

Annex A. SUPPLEMENTAL MITIGATION MEASURES DURING DESIGN, CONSTRUCTION/REHABILITATION AND OPERATION				
Activity	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
CONSTRUCTION PHASE				
Operation of borrow areas	Disfigurement of landscape and damage to access roads	Secure MENR's approval for the operation of the borrow areas. Prior to operation of borrow areas, submit a plan to ESS indicating the location of the proposed extraction site as well as rehabilitation measures and implementation schedule for the borrow areas and access roads. Undertake rehabilitation of borrow areas and access roads upon project completion.	Contractor	ESS/CSC
	Increased dust emission	Prior to operation of borrow areas, submit a dust management plan which shall include schedule for spraying on access road and details of the equipment to be used. Spray water on all unpaved access roads particularly in sections where critical receptors, such as settlements, schools and the like, are located.		
	Siltation and obstruction of watercourses	Wet aggregates and/or provide cover on haul trucks to minimize dust emission and material spillage. Locate stockpiles away from watercourses.		
Operation of asphalt plant	Odor emission and safety risks	Asphalt plants shall be 500 m downwind from settlements. Provide spill and fire protection equipment and submit an Emergency Response Plan (in case of spills, accidents, fires and the like) to the ESS prior to operation of the plant. Secure approval from the MENR for installation and operation of asphalt plants.	Contractor	ESS/CSC
	Water pollution due to spilled bitumen	Bitumen will not be allowed to enter either running or dry streambeds and nor can be disposed of in ditches or small waste disposal sites prepared by the contractor. Bitumen storage and mixing areas must be protected against spills and all contaminated soil must be properly handled according to MENR requirements. Such storage areas must be contained so that any spills can be immediately contained and cleaned up.		
Earthworks and various construction activities	Loss of topsoil	Topsoil shall be stripped and reused to cover areas where excess materials will be dumped and along road sections where roadside vegetation will be provided. Long-term stockpiles of topsoil will be immediately provided with a grass cover and protected to prevent erosion or loss of fertility.	Contractor	ESS/CSC

Annex A. SUPPLEMENTAL MITIGATION MEASURES DURING DESIGN, CONSTRUCTION/REHABILITATION AND OPERATION				
Activity	**Potential Impact**	**Mitigation measures**	**Institutional Responsibility**	
			Implement	Monitor
		Submit to ESS a soil management plan detailing measures to be undertaken to minimize effects of wind and water erosion on stockpiles, measures to minimize loss of fertility of top soil, timeframes, haul routes, and disposal sites.		
	Dust emission along routes to and from final disposal sites	Regularly spray water on haul roads to suppress dust, especially along sections that will pass close to settlements and sensitive receptors.	Contractor	ESS/CSC
	Air pollution due to exhaust emission from the operation of construction machinery	Maintain construction equipment to good running condition and avoidance, as much as possible, idling of engines. Banning of the use of machinery or equipment that cause excessive pollution (e.g., visible smoke).	Contractor	ESS/CSC
Earthworks and various construction activities	Disturbance of adjacent settlements due to elevated noise levels	Restrict work between 0600 to 2100 hours within 500m of the settlements. In addition, a limit of 70 dBA will be set in the vicinity of the construction site and strictly followed. Machinery to be used for the construction should be equipped with mufflers to minimize the generation of noise; Whenever possible the local population should be advised of occurrence of elevated noise levels to enable them to take the necessary preparatory measures.	Contractor	ESS/CSC
	Social grievance	Formulation of a grievance redress committee in association with affected population before starting the civil works.	Contractor	ESS/CSC
OPERATION PHASE				
Increased traffic flow	Elevated levels of gaseous and noise emissions due to increased traffic	Along sections of the road with sensitive receptors such as settlements, school, hospitals, etc., provision of roadside vegetation using densely leafed shrubs and trees should provide some attenuation. The ESS of ARS recommended planting of local and indigenous species such as Pine, Cypress, Loester, Tamarisk, and Olive which are suitable for the area, particularly near settlements along km 45-91. The Detailed plans should be produced by Contractor and CSC (the Engineer), in consultation with the local people/officials		

Prior to construction works, the following method statements/plans shall be submitted by the Contractor to the ESS for approval:

- A plan indicating the location of the proposed extraction site as well as rehabilitation measures to be implemented for the borrow areas and access roads upon project completion

A plan (Grievance Redress Mechanism) detailing the means by which local people can raise grievances arising from the construction process and how these will be addressed (e.g., through dialogues, consultations, etc.).

Annex B:

b

Annex B. SUPPLEMENTAL ENVIRONMENTAL MONITORING PLAN					
Aspect	**Parameters to be monitored**	**Location**	**Methodology**	**Timing and Frequency**	**Institutional Responsibility for Monitoring**
Borrow areas and access roads	Watercourses in the vicinity (obstruction, siltation, etc.) Dust emission along access roads, particularly near settlements.	At site and access roads	Inspections, observations, consultation with nearby communities	Unannounced inspections during construction and after complaint. At least twice a week	ESS/CSC
Asphalt plant	Exhaust fumes	At asphalt plant site	Inspections, observations, consultation with nearby communities	Unannounced inspections during construction and after complaint. At least twice a week	ESS/CSC
Worker's Safety	Provision and use of appropriate personnel safety equipment	Job site	Inspections; observations and interviews	Unannounced inspections during construction. At least once a week	ESS/CSC
Air Quality	The following parameters shall be measured by the Contractor: TSP, Sulphur Dioxide (SO2), Nitrogen Dioxide (NO2) and Carbon Monoxide (CO). Other parameters maybe warranted as and when requested by the Engineer.	Vicinity of populated settlements of project road. Asphalt plant	Obtain air samples from the field and analysis in laboratory for air quality measurement	Monitoring to be undertaken monthly	ESS/CSC
Noise	The Contractor shall ensure that routine noise monitoring is undertaken throughout the construction period. Parameters to be monitored to establish a baseline include: Laeq 1h (dBA) Average Daily Noise level	Vicinity of populated settlements of project road. Asphalt plant	Noise meter gadget	Monthly throughout construction.	ESS/CSC

ANNEX C: PUBLIC CONSULTATION PHOTOS

Azer Road Service, Min. of Transport, Gov't of Azerbaijan

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