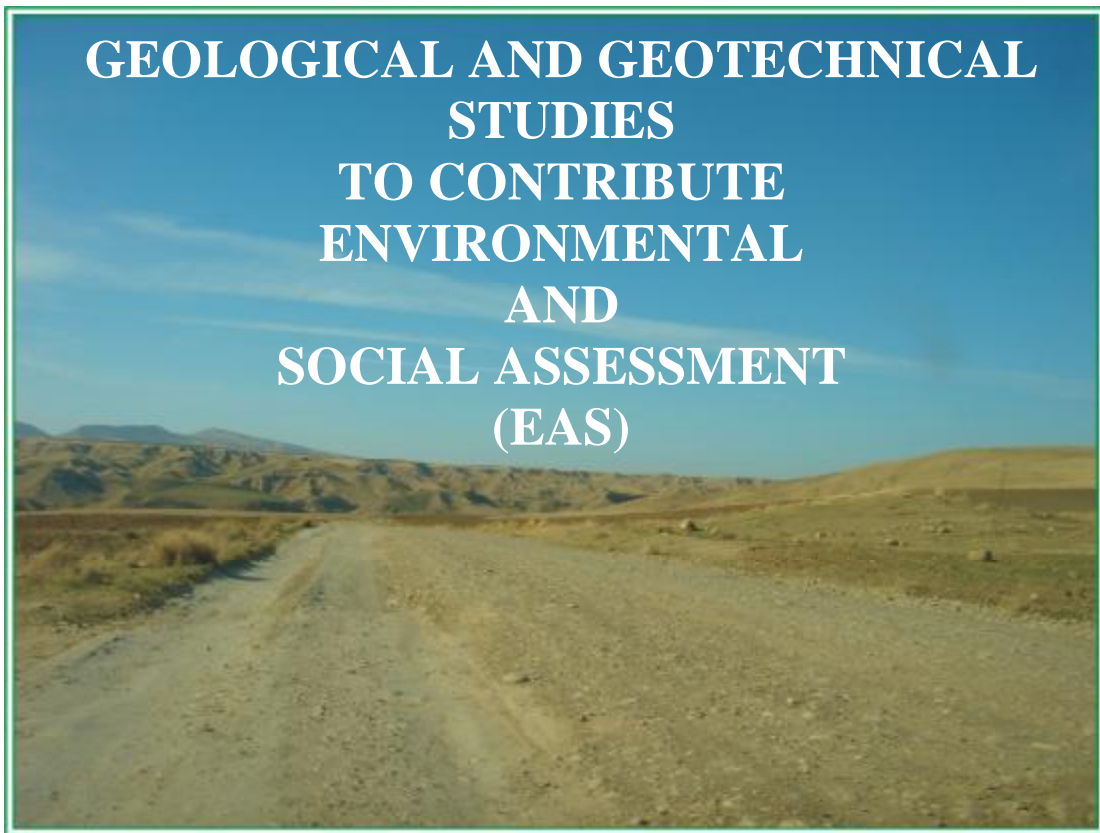


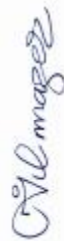


**THE ERBIL REGION  
THE DWIN -RAZGA DWIN -GRAW-BABAJISEK-  
RKAWA-AFRIYAN LOCAL ROAD  
(KM.0+000 – 29+000)**

**GEOLOGICAL AND GEOTECHNICAL  
STUDIES  
TO CONTRIBUTE  
ENVIRONMENTAL  
AND  
SOCIAL ASSESSMENT  
(EAS)**



**March 2008**

KRG MINISTRY OF CONSTRUCTION & HOUSING DIRECTORATE GENERAL OF ROADS & BRIDGES					
No	Revisions	Done by	Date		
<b>THE ERBIL REGION THE DWIN -RAZGA DWIN -GRAW-BABAJISEK-RKAWA- AFRIYAN LOCAL ROAD (KM.0+000 – 29+000)</b>					
<b>GEOLOGICAL AND GEOTECHNICAL STUDIES TO CONTRIBUTE ENVIRONMENTAL AND SOCIAL ASSESSMENT (EAS) AND ECONOMIC ANALYSIS</b>					
<b>DESIGNER</b>					
		<b>DANIŞMANLIK MÜHENDİSLİK BİLGİ İŞLEM İNŞAAT TURİZM SANAYİ TİCARET LTD. ŞTİ. CONSULTANTS ENGINEERING DESIGN &amp; CAD SERVICES LTD. YENİ HAL YOLU CAD. ÇAYIRYOLU SOK. BAY PLAZA, 5/13, İÇERENKÖY/KADIKÖY/İSTANBUL Tel: (0216) 469 87 77 ( 3 Lines) Fax: (0216) 469 8</b>			
<b>GEOLOGICAL AND GEOTECHNICAL SUBCONTRACTOR</b>					
		<b>YILMAZER EĞİTİM VE MÜHENDİSLİK LTD. EDUCATION &amp; ENGINEERING LTD. A. Öveçler, 8. Cad., 89. Sok., 9/8, 6460 Dikmen/ANKARA, Phone: +90 312 473 05 62, 64; Fax: +90 312 472 48 37; e-mail: yem98@ttnet.net.tr; www: yilmazermuhendislik.com.tr</b>			
Job	Position	Name and Surname	Sign	Date	
Done by	Civil Engineer	Özgür YILMAZER		March 2008	
	Geological engineer	(MSc. in geotechnics)			
	Geophysical Eng.	Coşkun BULUT (MSc. in geotechnics)		"	
	Geological Engs.	Evrin ULUADAM, Servet ARMAÇ (MSc. in geotechnics)		"	
	Geological Engs.	Alper GENÇCAN,		"	
Appr.by	Geological engineer	Prof.Dr. İlyas YILMAZER		"	
<b>CLIENT</b>		<b>POSITION</b>	<b>NAME &amp; SURNAME</b>	<b>SIGN.</b>	<b>DATE</b>
<b>DIRECTORATE GENERAL OF ROADS &amp; BRIDGES</b>		Controller			
		Chief Designer			
		Chief Engineer			
		General Director			
<b>DEPARTMENT OF TECHNICAL INVESTIGATION</b>		Site engineer			
		Geotechnical engineer			
		Head of the Department			

## **CONTENTS**

	<b>Pages</b>
<b>1 INTRODUCTION</b>	<b>1</b>
<b>1.1 Scope of the project</b>	<b>1</b>
<b>1.2 Objectives</b>	<b>8</b>
<b>2 ALIGNMENT SELECTION STUDY</b>	<b>9</b>
<b>3 SOCIAL AND ENVIRONMENTAL IMPACTS</b>	<b>16</b>
<b>3.1 Air Quality</b>	<b>17</b>
<b>3.2 Noise Pollution</b>	<b>17</b>
<b>3.3 Social and Environmental Policies of IRAQ</b>	<b>19</b>
<b>3.4 Description of the Proposed Project (Preliminary Design Report)</b>	<b>24</b>
<b>3.5 Social Baseline Conditions and Social Impacts of the Project</b>	<b>28</b>
<b>3.6 Records</b>	<b>29</b>
<b>3.7 Construction Material</b>	<b>30</b>
<b>3.8 Cultural Heritage</b>	<b>32</b>
<b>3.9 Specific Environmental and Social Conditions</b>	<b>32</b>
<b>3.10 Socio-Economic Impacts</b>	<b>33</b>
<b>3.11 Social Management Plan</b>	<b>34</b>
<b>3.12 Alternatives</b>	<b>34</b>
<b>3.13 Institutional Strengthening-Capacity Building</b>	<b>35</b>
<b>4 ECONOMIC ASSESSMENT</b>	<b>36</b>
<b>4.1 Economic Analysis via the RED Model</b>	<b>41</b>
<b>5 CONCLUSIONS AND RECOMMENDATIONS</b>	<b>48</b>
<b>References</b>	<b>50</b>

## **APPENDICES**

### **APPENDIX A**

<b>AI</b>	<b>EMP Summary Checklist</b>	<b>52</b>
<b>AII</b>	<b>Plan and Profile of the Emergency Road (<i>Included within the civil design report</i>)</b>	

### **APPENDIX B**

<b>BI</b>	<b>EMISSION LIMITS IN THE WHO GUIDELINES, USEPA STANDARDS, AND EC REGULATION</b>	<b>59</b>
<b>BII</b>	<b>BIODIVERSITY AND PROTECTED AREAS OF IRAQ</b>	

## **FIGURES**

<b>1.1</b>	<b>Generalized location map</b>	<b>2</b>
<b>1.2</b>	<b>Location and accessibility to the study area</b>	<b>3</b>
<b>1.3</b>	<b>Generalized route of the road under rehabilitation work</b>	<b>4</b>
<b>1.4</b>	<b>Generalized topographic map</b>	<b>5</b>
<b>1.5</b>	<b>The blocked out existing road during the wet period</b>	<b>7</b>
<b>1.6</b>	<b>Generalized topographic map</b>	<b>7</b>
<b>2.1</b>	<b>Generalized columnar section of the delineated area</b>	<b>12</b>
<b>2.2</b>	<b>The emergency road is blocked out occasionally in winter time</b>	<b>10</b>
<b>2.3</b>	<b>Pliocene deposits favor farm activities</b>	<b>13</b>
<b>2.4</b>	<b>An eroded basin of the dome shaped anticline</b>	<b>13</b>
<b>2.5</b>	<b>Conglomerate levels of the unit Mis</b>	<b>15</b>
<b>3.1</b>	<b>Forest of oak trees which is preserved naturally</b>	<b>20</b>
<b>3.2</b>	<b>The soil, water, and the climate favor to establish orchards</b>	<b>27</b>
<b>3.3</b>	<b>The rivers carry huge sediment influx from the mountains at north</b>	<b>31</b>

<b>4.1</b>	<b>Solution for the Emergency Road without project alternative</b>	<b>42</b>
<b>4.2</b>	<b>Net present value at a discount rate of 12% versus that of the economic agency costs of the Emergency Road without project alternative</b>	<b>43</b>
<b>4.3</b>	<b>Present value of the society costs versus that of agency costs of the Emergency Road without project alternative</b>	<b>44</b>
<b>4.4</b>	<b>Economic feasibility of the Emergency Road without project alternative</b>	<b>45</b>
<b>4.5</b>	<b>Sensitivity and risk multipliers of the Emergency Road without project alternative.</b>	<b>46</b>
<b>4.6</b>	<b>Cost and benefit results for the Emergency Road without project alternative</b>	<b>47</b>

## **TABLES**

<b>2.1</b>	<b>A sample executive summary of the technical assessment</b>	<b>10</b>
<b>3.1</b>	<b>Traffic values on the road under design</b>	<b>18</b>
<b>4.1</b>	<b>The assessment of the factors affecting the cost-benefit of the project</b>	<b>37</b>

## **APPENDICES (TABLES)**

<b>BI.1.</b>	<b>Emission Limits in the WHO Guidelines, USEPA Standards, and EC Regulation (Pollution Prevention and Abatement Handbook WORLD BANK GROUP Effective Since July 1998)</b>	<b>60</b>
<b>BI.2.</b>	<b>World Bank Maximum Allowable Standards for Noise</b>	<b>61</b>
<b>BI.3.</b>	<b>The Turkish Ambient Noise Standards (Turkish Noise Control Legislation).</b>	<b>61</b>
<b>BI.4.</b>	<b>World Bank Maximum Allowable Standards for Noise</b>	<b>62</b>
<b>BI.5.</b>	<b>The Turkish Ambient Noise Standards for Highways (Regulation on Assessment and Management of Environmental Noise).</b>	<b>62</b>

<b>BI.6. 50.000 landing and take-off per year (Regulation on Assessment &amp; Management of Environmental Noise).</b>	<b>63</b>
<b>BI.7. The Turkish Ambient Noise Standards for Construction Sites (Regulation on Assessment and Management of Environmental Noise).</b>	<b>63</b>
<b>BII.1 Biodiversity and Protected Areas of Iraq</b>	<b>64</b>

# **GEOLOGICAL AND GEOTECHNICAL STUDIES TO CONTRIBUTE ENVIRONMENTAL AND SOCIAL ASSESSMENT (EAS) AND ECONOMIC ANALYSIS**

## **OF THE DWIN -RAZGA DWIN -GRAW-BABAJISEK-RKAWA-AFRIYAN LOCAL ROAD (KM.0+000 – 29+000)**

### **1. INTRODUCTION**

#### **1.1. Scope of the project**

The proposed project is the rehabilitation of the existing local road situated between the villages;

- Dwin (KM.0+000)
- Razga Dwin (KM.4+200)
- Graw (KM.8+800)
- Babajisek (KM.10+800)
- Kani Khazal (KM.16+100)
- Kani Tawuk (KM.19+900)
- Afrain (KM.24+600), and
- Darband (KM.29+000).

The Emergency Road project takes place over a highly dissected mountainous area (**Figs. 1.1-1.4**). Hence it is vitally important for the villages particularly during the wet period when some parts turn into muddy and slippery situation. However, during the summer time, road born dusts pollute the environment noticeably.

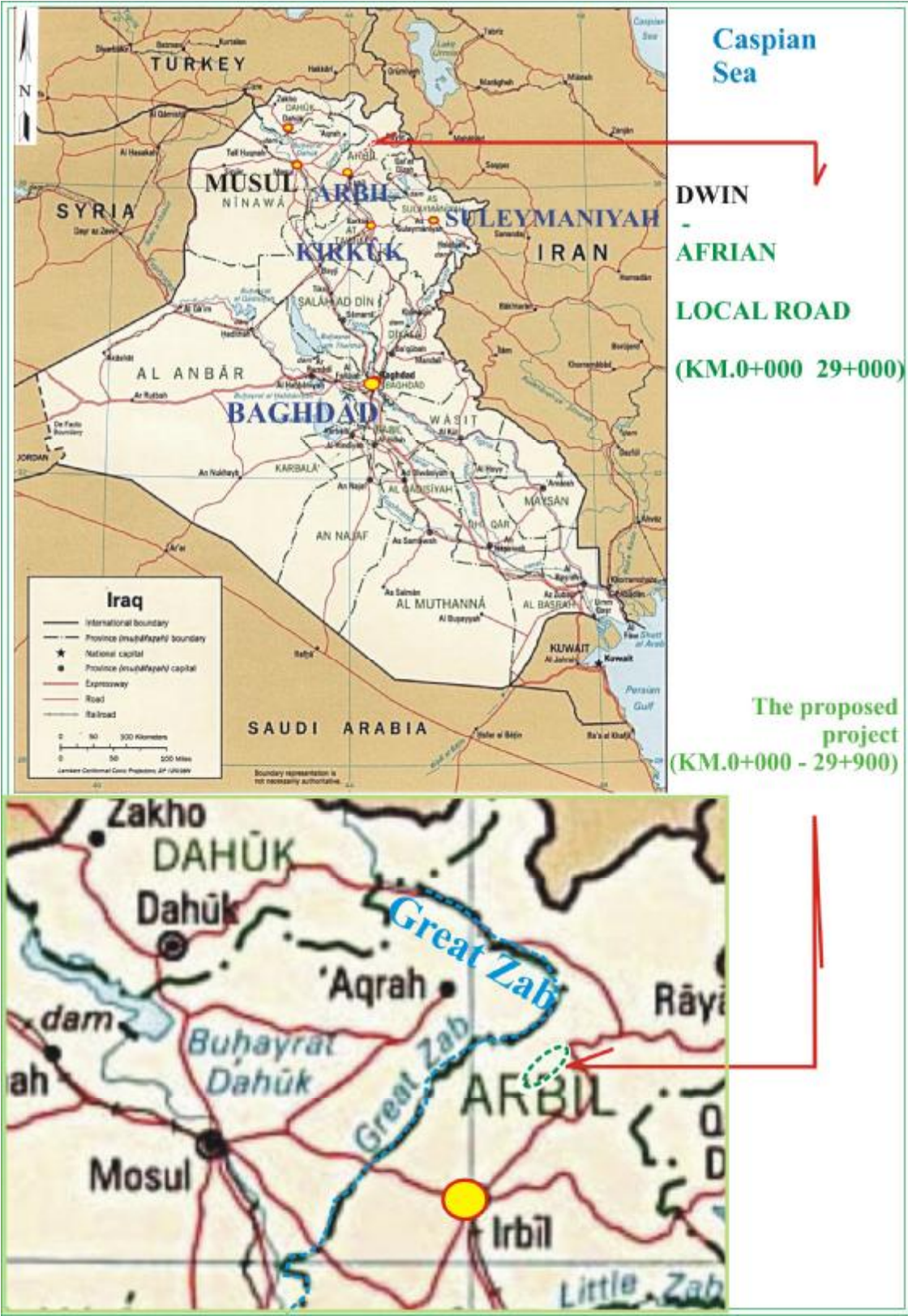


Figure 1.1. Generalized location map.





Figure 1.2. Location and accessibility to the study area.

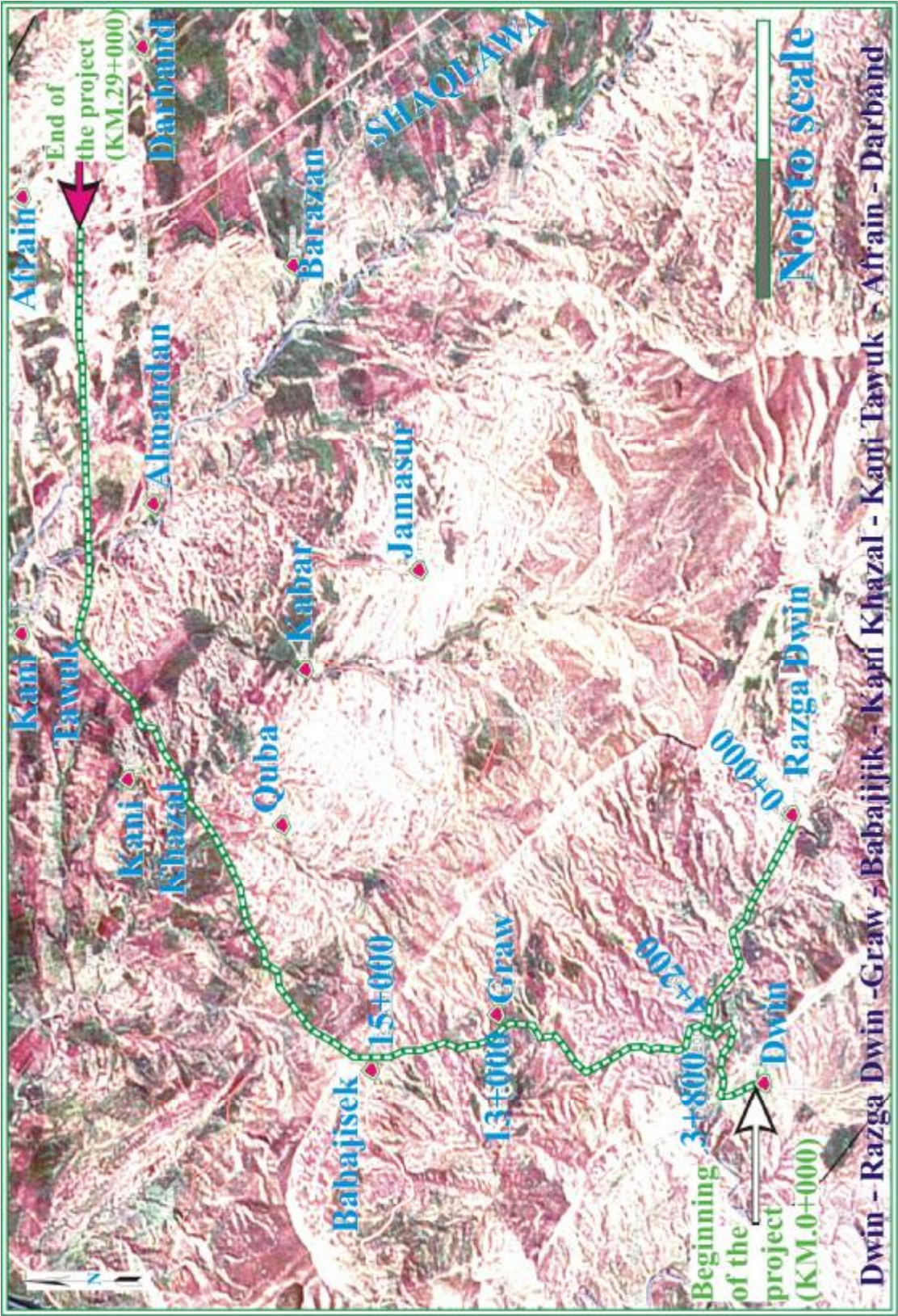


Figure 1.3. Generalized route of the road under rehabilitation work.

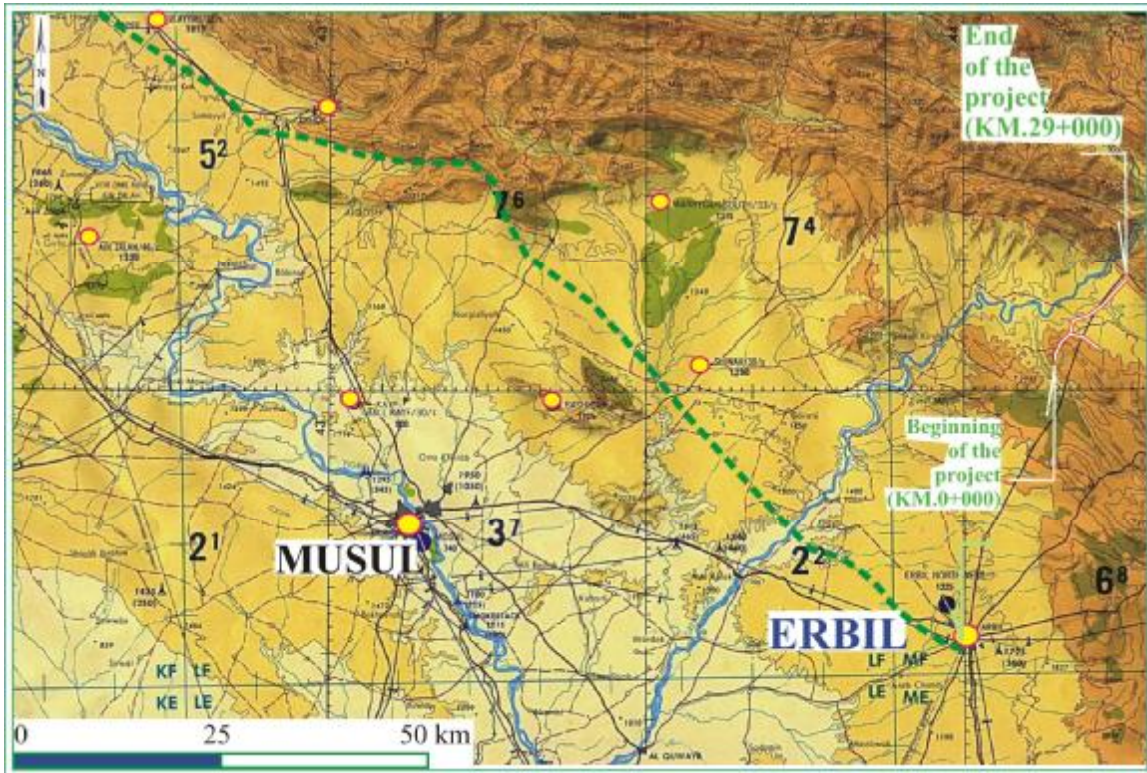


Figure 1.4. Generalized topographic map.

The region was utilized as a very fertile farm lands. Historical monuments including castles, settlements and graveyards are observable. Hot water springs, perennial streams, and groundwater seepages made the region attractive to settle.

The rehabilitation of the existing earthy road will enhance the living standards. The road luckily passes by the schools. The pupils are adversely affected from the muddy roads especially during the wet period.

As depicted in Fig. 1.2, the emergency road project consists of three sub sections namely:

**Section I:**

It takes place between the chainages KM.0+000 – 3+800. It crosses a mountain ridge at the middle section where an historical castle exists. The first middle part is quite stable whereas the second part goes over a hillside where thick slope wash deposits.

**Section II:**

It is situated between the chainages KM.0+000 (3+800) – 4+200 (8+000). The area is relatively stable.

**Section II:**

This is last section of the ERP and extends from the chainage KM.8+000 to the end of the project (KM.29+000).

The ERP will provide easy access to the adjacent provinces (see Figs. 1.1-1.4) and to the neighboring governorates Hewler – Selahaddin, Harir, and Akree.

By the way the volume of the cultivated lands will increase appreciably. In addition to those, the road will assist forestry works. Internal trades will be easier. Raising livestock will also be affected favorably.

The existing road does not work during the wet period and it has very low geometric standards. The area has appreciably high potential for the implementation of the technical farming activities (**Fig. 1.5**).



Figure 1.5. The blocked out existing road during the wet period.

There are large farm fields and pasture lands for grazing. All the flood plains of the streams, particularly perennial ones are appropriate to grow various crops. Therefore, the adverse affect of traffic on the road can be minimized in future by improving the standards of the existing local road. For the time being, most of the lands are barren or cultivated only to grow cereals. The traffic on the road is already above 1000 totally. They are suffered from the bad road condition. Since it has emergency and fast tract in character, the existing road is followed without relocation, but improving the driving comfort. Besides that, the emission rate will definitely be reduced noticeably.

## 1.2. Objectives

The environmental and social impacts of the proposed local road namely- **Dwin - Razga Dwin -Graw - Babajisek - Kani Khazal - Kani Tawuk - Afrain - Darband local road (KM.0+000 – 29+000)** are very small and they can be ignored. Moreover, the rehabilitation of the existing road without relocation will improve the prevailing social and environmental conditions obviously. After completing this emergency local road quickly and at low cost, it may serve the villages for a few decades. Then, it can be remedied if needed. The main objective of this study is to;

- ◆ lead the project in a better technical condition,
- ◆ maximize the benefit from the road, and
- ◆ minimize the social and environmental impacts in accordance with the specification coined by the World Bank (**App. I**).

The vertical geometry and horizontal geometry of the existing road are not bad. However, during the wet period it becomes slippery and/or muddy. Hence the road is likely to have minimal or no adverse social and environmental impacts after the practicing of the emergency road project (ERP). As sated in the Appraisal of the meeting with Protek Proje in Istanbul; such emergency local roads will be interpreted and assessed as a rural road. Hence, the ESA will be simplified. Air quality and noise measurements are not required. Furthermore, it was decided that the preparation of the App. I is enough for such an emergency road in the meeting between the Client and the World Bank Representatives. Majority of the necessary studies and related works are completed to mitigate social and environmental impacts. Public consultations have been executed at a level that the dwellers allowed who have been frightened in the previous ruling period. However, the situation is getting better.

## 2. ALIGNMENT SELECTION STUDY

In the emergency road project, the existing road is followed without any relocation because of its being emergent and fast tract in character. Rehabilitation is a must to mitigate social and environmental impacts of the existing local road. It is obvious that the improved road may reduce emission, driving time, land occupation, erosion, and ground instability problems appreciably and considerably (**Fig. 2.1**).



Figure 2.1. The emergency road is blocked out occasionally in winter time.

A tentative cost evaluation of the rehabilitation is done for the kind consideration of the third parties (**Tab. 2.1**). Local sources will be utilized to minimize the budget request from the World Bank. It will be quite beneficiary to complete the project during summer period and early autumn of 2008. Hence the local sources have already been reactivated.

Table 2.1. A sample executive summary of the technical assessment.

<b>No</b>	<b>Main tasks which will be performed</b>	<b>Construction cost, Million \$</b>	<b>Remarks</b>
<b>1</b>	<b>Earthworks</b>	0.25	Very limited cut and fill, Furthermore, the cut materials have very high CBR values (>30).
<b>2</b>	<b>Masonry</b>	0.15	Low height walls to protect the environment and increase the stability.
<b>3</b>	<b>Drainage</b>	0.2	The alignment crosses small gullies which enhance effective drainage via drain-flex and/or drain pipes. It will improve efficiency of the road, reduce erosion and protect the environment.
<b>4</b>	<b>Pavement</b>	1.5	A base course can effectively work.
<b>5</b>	<b>Land and property acquisition</b>	0.0	No relocation. The existing road, owned by the government will be followed.
<b>6</b>	<b>Others</b>	0.150	Accommodation, camping, etc.
<b>Total, million dollars</b>		2.250	



The social and environmental impacts of a road escalated mainly by geotechnical problems including;

- Landslides,
- Cut slope failure,
- Differential settlement,
- Rock fall,
- Mudflow, and
- Snowfall, and
- Avalanche.

Those problems can be avoided or mitigated in magnitude by implementing the effective principles of geotechnics and geoenvironment. Snow avalanche is very rare. However, windblown snow breakers will be formed by foresting at the predefined points, particularly at the middle section of the alignment. The region favors growth of oak trees which are widespread over the mountainous region where they are protected naturally.

The region is mountainous at the northern part whereas it becomes hummocky and then turns into gently sloping fertile farm lands northwards. The generalized columnar section for the region of the delineated area is prepared and presented in **Fig. 2.2**. The dominating units from old to young are; Melange, placed in Upper Cretaceous (Km) time, Upper Cretaceous sedimentary rocks (Ks), Miocene aged sedimentary rocks (Mis), Plio-Quaternary units, and recent deposits (Qr). These units are briefed below.

TIME	ERA	PERIOD	SUBPERIOD	LEGEND	LITHOLOGY	EXPLANATION	
PHANEROZOIC (pN)	GENEZOIC (Cz)	QUATERNARY (Q)	Holocene	Qm		Madeground ( <b>Qm</b> ). Generally road fills. Often dense to very dense. Loose solid waste dumps are also mapped as madeground.	
				Qr		Recent deposits ( <b>Qr</b> ): Undifferentiated Quaternary deposit (Qts: top soil; Qrs: residual soil; Qsw: slope wash deposits; Qa, Qc, and Qt). In general it is soft to stiff and loose to medium dense in character. In all cases it gets better with depth, particularly where they were derived from calcareous rocks of the Miocene aged sedimentary rock unit.	
				Qt		Talus ( <b>Qt</b> ): In general they form on the slope and toe of the slope of crystalline and/or strong sedimentary rock such as limestone. Angular to subangular grains constitute majority of the unit. Generally loose to dense and very dense where originated from limestones.	
				Qc		Clayey recent deposits ( <b>Qc</b> ). Slide masses are also mapped as Qc. The unit is widespread where the clayey units dip outslope.	
				Qa		Alluvium ( <b>Qa</b> ): The alluvial deposits accumulated within stream courses and flood plains. In general loose to dense and GW-SM in character. Alluvial fan deposits (Qaf) are also considered as Qa.	
		TERTIARY	Pliocene	Qtr	Pl-Qtr		Old river (terrace) deposits ( <b>Qtr</b> ): It is rare in the study area. However, towards the Great Zap River some characteristic features are observed ( <b>Fig. 2.3</b> ). They are, in general, dense to very dense. In places they behave as rock where their major constituents were derived from limestone and the other calcareous rocks.
					Miocene	Mis	
		MESOZOIC	CRETACEOUS	Upper	Ks		Upper Cretaceous sedimentary rock ( <b>Ks</b> ): A thick sedimentary sequence comprising the alternation of limestone, clayey limestone, and sandstone is the main unit in the region. Majority consists of moderately strong rocks. Bedding is the the dominating discontinuity.
				Middle to Upper	Kk		Basically the Upper Cretaceous mélangé ( <b>Km</b> ): It is characterized by Basically the Upper Cretaceous mélangé (Km): It is characterized by a thick chaotic accumulation of exotic lithologies. Medium to mega olistoliths are observable. They are in places embedded within tectono-sedimentary binding material. Serpentine and basic to ultrabasic rocks are the major constituents. Beddings are obscure. Discontinuities are rough to discontinuous and mostly irregular. It crops out at very far north. The major constituents of the alluvium in the Great Zap River were and and Khazir derived from this unit. Hence, alluvial deposits of these Rivers are the main source of crushed rock and aggregate.

Figure 2.2. Generalized columnar section of the delineated area.



Figure 2.3. Pliocene deposits favor farm activities.

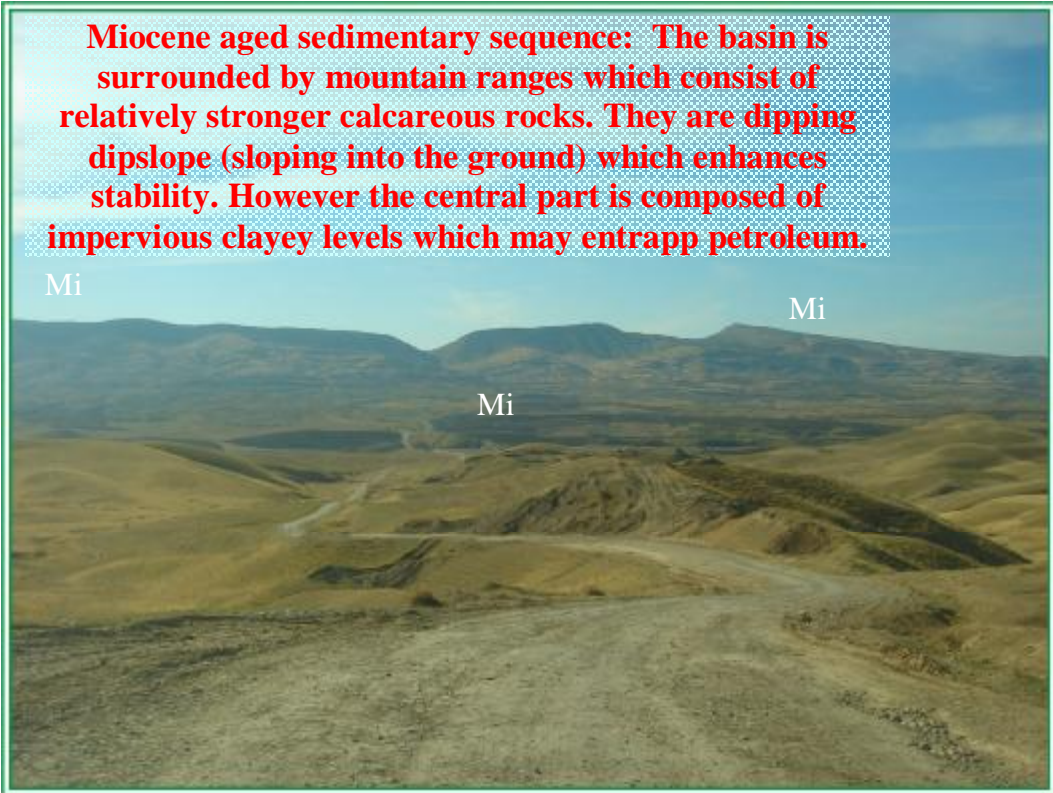


Figure 2.4. An eroded basin of the dome shaped anticline.

The geological units which are observable in the region are briefed below from older to the younger.

- a. **Cretaceous mélange (Km):** It is characterized by a thick chaotic accumulation of exotic lithologies. Ultrabasic rocks, radiolarite, limestone, and some other sedimentary rocks constitute the majority of the unit. Medium to mega olistoliths are observable. They are in places embedded within tectono-sedimentary binding material. Serpentinites are the major constituents of the ultrabasic rocks. Beddings are obscure where ultrabasics dominate. Discontinuities are rough to discontinuous and mostly irregular. It crops out at very far north. The major constituents of the alluvium in the Great Zap River were derived from this unit. Hence, the alluvium is the main source of crushed rock and aggregate in the region. They are being used by the local authorities and the State as well.
  
- b. **The Upper Cretaceous sedimentary rocks (Ks):** The essential constituents of which are sandstone, mudstone, claystone, calcareous mudstone, clayey limestone, and thinly bedded limestone. Limestone levels bear higher resistance to erosion. Hence, they form top of the high mountain chains, particularly where the bedding planes dip vertically and/or subvertically.
  
- c. **Miocene aged sedimentary rocks (Mis):** The main constituents of the unit are conglomerate, sandstone, mudstone, claystone, calcareous mudstone, clayey limestone, and limestone. Limestone levels constitute upper member of the unit Mis. Because of its higher resistance to erosion,

it forms top of the high mountain chains (see Fig. 2.4). They crop out at the southern and middle part of the delineated area. The conglomerate level is quite suitable for using drainage (free draining) material, subgrade, subbase (see Fig. 1.5, **Fig. 2.5**).

- d. **Plio-Quaternary deposits (Pl-Q):** comprising grainsupported weak sedimentary rocks. They will be used as a good subgrade and subbase material in the road construction. Hence, it is aimed to equalize the fill – cut quantity in the ERP.



Figure 2.5. Conglomerate levels of the unit Mis.

### **3. SOCIAL AND ENVIRONMENTAL IMPACTS**

The emergency road project (ERP) can be defined as the rehabilitation and/or improvement of the existing one. The road is likely to have minimal or no adverse social and environmental impacts. More than that, the rehabilitation work will improve its social and environmental states. In this study, all the items relevant to social and environmental impact assessment are taken into account. Public consultations were conducted under various constraints. However, the dwellers are becoming more open to such contemporary implementations.

The Environmental and Social Screening is executed indicatively within a period of 12 months by executing field trips and public consultation & administration. For the time being, it is difficult to impossible to record consultation activities, because of being frightened very much in the previous ruling period. However, it is getting better and improving noticeably. The emergency road project (**ERP**) will definitely escalate the process in this context too.

The international regulations, cited below, are accounted during the execution of the **SEA** (see App. I). These are;

- 6 June 2002 dated EIA Regulation,
- Air Quality Protection Regulation,
- Noise Control Regulation,
- Water Pollution Control Regulation,
- Solid Waste Control Regulation,
- Hazardous Waste Control Regulation,
- Soil Pollution Control Regulation

Furthermore, some international and national Environmental Laws and other applicable law and regulations for construction and operation of the road are also considered. Some of them are;

- General Public Health Law,
- Non-hygienic Establishments Regulation,
- Fisheries and Aquaculture Law,
- Law on Protection of Cultural and Natural Entities,
- Hazardous Chemicals Regulation, and
- Some others.

### **3.1. Air Quality**

The data relevant to the traffic are presented in **Tab. 3.1**. The traffic emission on this road, because of the very light traffic, is tolerable. However, the designed road will contribute plantation in the vicinity. Furthermore, the improved geometric standards will also help to lessen the traffic emission. Thus air quality problem is going to be mitigated appreciably by the rehabilitation of the local road.

### **3.2. Noise Pollution**

Noise Level on the existing road is very low (see Tab. 3.1). However, the design is being carried out to minimize the noise pollution as well.

Type and number of construction machines and equipments to be used during the construction activities will be excavator, loader, trucks, cylinder, and compaction goat pads.

Table 3.1. Traffic values on the road under design.

KRG MINISTRY OF CONSTRUCTION & HOUSING DIRECTORATE GENERAL OF ROADS & BRIDGES							
ERBIL			District Directory				
FLEXIBLE PAVEMENT DESIGN							
Name of the road		THE DWIN -RAZGA DWIN -GRAW-BABAJISEK-RKAWA-AFRIYAN LOCAL ROAD					
Stationing, KM.		0+000-29+000		District Directory ERBIL		DD : 1	
Class of the road	2	Reliability (%), R =	70	Lane number: i x j =	2	Economic life (t) =	
The last service capability (Pt)	2	Stan. Normal Deviation, Z <sub>R</sub> =	-0.524	Number of direction (i)=	2	20 years	
Factor of calculated lane (n)	1	Total Stan. Deviation, S <sub>0</sub> =	0.45	Number of the lanes in the same direction (j)=	1		
TRAFFIC GROUPS	Trailers	Trucks	Buses	Medium weight trucks and minibuses	Automobiles	Total	
Year of average annual daily traffic	2007	2	11	2	12	140	
Traffic increase constant (r), %		6	8	10	10	12	
The Initial Serviceability (Pi)	2008	2	12	2	13	157	
The Terminal Serviceability (Pt)	2028	7	55	15	89	1513	
Design traffic (Td)=0.4343*(Pt-Pi)/Log(Pt/Ti), t <sub>p</sub>		4	28	7	40	598	
Vehicle equivalence factor (VEF)		4.1	2.90	3.20	0.6000	0.0006	
Recurrence of standard daily axle load per lane (Wg)= T <sub>p</sub> /i*(VEF)*η		8	41	11	12	0	
ESALs Applications Over Design Period, (T8.2) = W <sub>g</sub> *365*t	<b>524,559</b>						
CLIMATIC FEATURES OF THE DISTRICT							
Annual precipitation, mm	420	Mean summer temp., °C	50	Depth to the WT below the base, m	>3		
Number of rainy days	24	Mean winter temp., °C	-2	Altitude, m	500		
Number frosty days	1	Max. wind veloc., m/sn	4	Frost Index, °C-gün	1200		
Maximum thickness of snow cover, cm	1	Dominant wind direction	NS	Max. depth of frost, cm	2		
<div style="display: flex; justify-content: space-between;"> <span>Single flexible pavement</span> <span>Double flexible pavement</span> </div>							
	Stationing	Subgrade		THICKNESS OF LAYERS		TYPE OF PAVEMENT	
		M <sub>R</sub> psi	CBR %	SUBBASE	BASE		
		0+000-29+000 <sup>1</sup>	10000	11.0	20	20	Double ligned sur. pav.
Done by	Ilyas YILMAZER		Signature	Date:	Mar.08		
Position	Professor			Project no:	ERBIL		



Noise of the construction machines will definitely be felt by the local people and the other habitants temporarily. They are going to be adversely affected. However, the improved standards will contribute to lessen the noise pollution forever. Furthermore, density of population is very low ( $P_d < 15$  persons/km<sup>2</sup>). Besides that, the existing road alignment bypasses the settlement places and their future development boundaries fortunately.

There are some small height trunk type cuts in the vicinity of settlement places and farm lands to minimize traffic noise on the road. This phenomenon is being accounted continuously in the design. Furthermore; acacia, gleditsia triacanthos waterside thicket, gladiolus, brushwood, and some other plants will be grown along the roadside where suitable to form a hedge.

### **3.3. Social and Environmental Policies of IRAQ**

KRG, Ministry of Construction & Housing, Directorate General of Roads & Bridges, adopt the criteria set up by the World Bank to assess the social and environmental impacts of the roads and bridges (see App. I). The results of the study, carried out in the field and public consultation are summarized below.

**Environmental Assessment:** The pros and cons of the project in regards with Environmental Impact Assessment are studied. A great effort is being spent to mitigate impacts of the project particularly by;

- Increasing the standards,
- Shortening the alignment,
- Reducing the volume of the earthworks,
- Reforesting,
- Providing an access to the farm lands,

- Implementing some more effective and practical management practices such as the use of drain – flex and masonry walls.

**Natural Habitats:** Erosion is very effective. Hence the barren lands dominate. However, all the barren lands can be terraced and forested and/or vegetated with fruits and vegetables. Flora is represented by the seasonal plants. Bushes are locally are observable. Oak trees with low height are dominant (**Fig. 3.1**). Poplar and willows are rarely seen in alluvial plains and where wet ground conditions prevail. Moles, rats, mouse, reptiles, rabbit, fox, and domestic animals- mainly of cattle, sheep, goat, donkey, horse, poultry, fish, and wild birds are the dominating fauna.



Figure 3.1. Forest of oak trees which is preserved naturally.

**Forestry:** There is not any distinct forest. However, the region has great potential for plantation and made forest (see Fig. 3.1). The dwellers and the local knowledge tell that there were dense forest and thickly wooded lands about several centuries ago. There are still some juniper trees preserved where is inaccessible.

**Pest Management:** Presently pesticides (insecticides, herbicides, fungicides) are not used. Therefore, the valleys and the alluvial lands have great potential for organic farming. The rehabilitation of the existing road may enhance such activities. Raising livestock is common in the region. Hence, organic fertilizers are abundant. There is no need to use artificial fertilizers.

**Safety of Dams:** There is not any dam in the vicinity. Furthermore, there is not any dam project under plan and/or design. As a designer, we recommend subsurface dam instead of surface dam. The geological and hydrogeological characteristic of the region is proper and favorable for the construction of environment friendly artificial dyke system. However, this is the beyond of the interest of this study presently.

**Projects involving international waters:** The alignment takes place between the river namely- the Great Zap River and its tributary which are flow into the Gulf of the Basra in Iraq. There is not any international interest. There is no problem in term of Projects involving international waters.

**Local People:** The Local People are villagers. Sources of their income are basically domestic animals and cereals (**Tab. 3.2**).

Table 3.2. Generalized data about the villages which benefit from the ERP.

#	Village	No. of Houses	No. of users	Schools		No. of Pupil	Clinics	Existing vehicles		Future expected No. of Vehicles	Animals		Agricultural Land		Remarks
				Primary	Secondary			Agri-Machines	Cars		Sheep and Goat	Cows	Wheat and Barley	Orchards	
1	Dwin	35	300	1	×	40	×	2	7	20	1000	60	1500	2	
2	Razga Dwin	45	300	1	×	60	×	1	10	20	500	12	250	300	
3	Graw	50	320	1	×	70	×	5	20	50	2500	30	800	12	
4	Babajisek	31	170	1	×	35	×	×	10	25	700	110	500	30	
5	Rkawa	30	180	1	×	46	×	1	12	22	800	80	700	2	
6	Nawin	16	70	×	×	20	×	×	4	10	200	80	200	10	
7	Almandan	30	300	1	×	60	×	7	14	25	2500	70	1500	3	
8	Kany tawuk	13	70	1	×	19	×	1	12	15	100	20	500	30	
9	Kany Khzal	10	50	1	×	15	×	1	3	10	200	22	1000		
10	Quba	100	497	1	×	162	×	3	20	40	500	410	2500	40	
11	Harash	80	550	1	×	130	×	7	18	80	3500	130	3000	12	
12	Faqeyan	12	35	1	×	15	×	1	2	5	3500	15	1100	15	
	<b>SUM</b>		<b>452</b>	<b>2842</b>	<b>11</b>	<b>672</b>		<b>29</b>	<b>132</b>	<b>322</b>	<b>16000</b>	<b>1039</b>	<b>13550</b>	<b>456</b>	
	<b>MAXIMUM</b>		<b>100</b>	<b>550</b>	<b>1</b>	<b>0</b>	<b>162</b>	<b>0</b>	<b>7</b>	<b>20</b>	<b>80</b>	<b>3500</b>	<b>410</b>	<b>3000</b>	<b>300</b>
	<b>AVERAGE</b>		<b>38</b>	<b>237</b>	<b>1</b>	<b>56</b>		<b>3</b>	<b>11</b>	<b>27</b>	<b>1333</b>	<b>87</b>	<b>1129</b>	<b>41</b>	
	<b>MINIMUM</b>		<b>10</b>	<b>35</b>	<b>1</b>	<b>0</b>	<b>15</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>5</b>	<b>100</b>	<b>12</b>	<b>200</b>	<b>2</b>

**Cultural Property:** The region in which the alignment is located has been dwelled since several thousand years. Particularly the perennial stream and the presence of the alluvial lands attracted people to settle in the vicinity. Furthermore the abundance of fresh and hot-spring water together with the immensely wide farm lands attracted dwellers. However, majority of the people migrated to the cities during the 1980s to 1990s. The rehabilitated road may attract old villagers to come back and raise livestock together with cereal and orchards.

**Involuntary Resettlement:** The alignment will be kept as it is. Hence, there would not be any relocation of the existing settlement places.

**Projects in Disputed Areas:** There is not any disputed area. The existing alignment is followed. The project is going to be executed in accordance with the principles of an environment friendly project.

**The Applicable Safeguard Policies:** The project safeguards the natural and social environments. This is one of the main tasks of the designer too and contractor.

**Social Management Tables:** Several management practices will be implemented to alleviate social impacts created by the road. Most important than those, the project should assist Local people's education and social activities between the nearby villages and towns and to raise the value of what they are growing and breeding. Simply, the project will serve to fatten the pockets of developers by saving the environment at an appreciably high level.

**Policy, Legal, and Administrative Framework:** This project is being executed for *KRG, Ministry of Construction & Housing, Directorate General of Roads & Bridges*. All the regulations set up by the state were followed. Chiefs of the villages and dwellers are being informed at every phase of the project. Significance of plantation, construction of the new irrigation system, high technological farming, renewable energy, and last but the most importantly the establishment of the Regional Education Centers is being told to dwellers through public consultation and administration. The engineers of the client

worked together with the teams who conduct investigation, design, and Social & Environmental Assessment. The Emergency Road Project will assist dwellers appreciably. There would not be problem in this sense.

**Mission of each ministry:** The responsible ministries through the client were informed officially about the outline of the possible intelligent and environment friendly projects which are positively affected from the Emergency Road Project.

**Sector-specific Environmental Laws and Regulations:** There are not such Sector-specific environmental laws and regulations. However, the standards set up by the World Bank for this ERP were adopted in this project (see App. I).

**Ambient air quality standards:** The standards set up by the World Bank for this ERP were adopted in this project. Improvement of the standards of the existing road will naturally reduce the level of the exhaust problem.

**Noise guidelines in different zones:** The standards set up by the World Bank for this ERP were adopted in this project.

**Water and soil quality standards:** The standards set up by the World Bank for this ERP were adopted in this project.

### **3.4. Description of the Proposed Project (Preliminary Design Report)**

**Maps, profiles, and Sections of the road:** Complete maps, profiles, and cross-sections for every subsection were prepared.

**Funding and implementing agencies:** The project is being funded by the World Bank and executed by the Republic of Kurdish Government.

**Identification and brief description of villages, towns, and natural areas stretching along the road:** There are 12 villages directly affected by the road project. However, 7 more villages will indirectly benefit. A brief about these villages are presented in Tab. 3.2. The length of the road is about 29 km. The middle part (*The village Graw: the suffix “aw” means water*) with an area of 200 hectares is proper to establish an education centre where the students, teachers, workers, and authorized visitors can live in the same campus. Improvement of the existing road may provide easy access to such social, educational and farm lands.

The demonstration gardens, renewable energy installations, computer centre, gymnasium saloons, complexes for sports and for other social activities and arts, etc. could be established following the completion of the rehabilitation of the existing road.

The District Institute will serve about 19 villages in the region. Communication with the universities, research centers, and some other relevant institution will be maintained through internet. A road with better standards may enhance decision makers to improve social activities in the region as well.

**Land use surveys of areas surrounding the road (at least 1 km away along both sides of the road):** Presently very limited lands are being cultivated and some spots of small gardens are observable where wet ground conditions

prevail. However, the region has an appreciable potential for high-tech farming and the other activities (**Fig. 3.2**). The Emergency Road Project may activate the use of such lands for agricultural activities and plantation in future. Hence the rehabilitation of the existing road assists the development of the region.

**Identification of areas to be expropriated, if applicable:** The alignment is kept as it is without any relocation.

**Design of the various road components:** Design of the road components with plans and sections are completed.

**Nature and duration of construction and operation activities:** The investigation and final design completed by the end of the early spring of 2007 and tendered as soon as the ESA report is approved. There is not any large structure including viaduct or tunnel in the project. Hence, the construction is going to be completed and the road will be opened to traffic within a few months construction.

**Nature, Quantities, and Source of Materials needed during the Construction Phase:** Alluvium in the main stream courses will be utilized as aggregate source. There are several plants under operation in the region operated for the State road constructions. So the material can be borrowed from the existing plants. The volumes of the materials from cuts and fills were equalized. Furthermore, conglomerate levels of the Mis are proper as subgrade and subbase material.





Figure 3.2. The soil, water, and the climate favor to establish orchards.

**Schedule and Description of Construction Activities:** The schedule and description of construction activities are presented in civil design.

**Staffing and Support:** The staffing and support are detailed out in the civil design.

**Facilities and Services:** The facilities and services on the road are detailed out in the civil design.

**Operation and maintenance activities:** The operation and maintenance activities are presented in the civil design.

**Financial requirements for the implementation of the project:** The financial requirements for the implementation of the project will be provided and supported by the World Bank. The cost will be around \$2.25 million USA. Since the project is vitally important for the villagers, in addition to the World Bank credit, the local sources are also going to be used to fulfill all the requirements.

### **3.5. Social Baseline Conditions and Social Impacts of the Project**

**The Social Assessment Report and Management Plan:** The ERP consists basically of the rehabilitation of the existing local road.

**The Resettlement and Land Acquisition Framework and Resettlement and**

**Land Acquisition Action Plan(s):** There is no resettlement and no land acquisition since the project is rehabilitation of the existing road.

### **3.6. Records**

Under the supervision of the client RKG, meetings with responsible authorities and institutions were conducted. They are being informed about the reactivation of the natural resources within the route of the existing road subjected to rehabilitation.

**Records of Interagency Meetings:** The interagency consultation was one with the valuable contribution of the Client.

**Records of Public Meetings and list of participants:** Public meetings and consultations were conducted in the villages in late 2007 and very early 2008. All of them have already been informed about the alignment and its pros and cons.

**Public Consultation and Disclosure Plan for the Implementation Period:** The public consultation and disclosure plan for the implementation period were prepared and executed in early 2008 and late 2008.

**Archaeological and Historical Sites Surveys:** Archaeological and historical Sites surveys are completed. There are not any of archaeological and historical sites which will be affected from the emergency road.

**Archaeological Chance Find Procedures:** There are not any of archaeological and historical sites within the route as stated above and there could not be found any area which might have concealed archeological heritages.

**Resettlement and Land Acquisition Policy Framework:** The existing road will be followed and improved upon the World Bank approval of the required fund. There is no resettlement and/or acquisition.

**Resettlement and Land Acquisition Plan:** The existing road is followed to avoid any land acquisition and resettlement.

**Copies of Clearances from Concerned Authorities:** The Client is the only responsible and concerned authority. There is no other authority affected from the Emergency Road Project. However, all the authorities have been informed by the Client.

### **3.7. Construction Material**

Source of construction material are widespread in the vicinity. However, it is recommended to borrow from the existing and operating pit and quarries within the courses of the Khazir river and the Great Zap river (**Figure 3.3**). In this sense there is no problem from social and environmental point of view. The volume of excavation is equalized to the volume of fill.



Figure 3.3. The rivers carry huge sediment influx from the mountains at north.

Subbase and base material can also be obtained from the main stream (*Great Zap River*) and its tributaries which are already under operation by the State to provide material for the highways in the region. However, the conglomerate levels of the unit Mis which intersect the emergency road are good sources of subgrade, free draining material, and subbase.

### **3.8. Cultural Heritage**

**Assessment of cultural heritage impacts:** The road under design aligns over the area which does not include any cultural heritage. There is no problem in this sense.

**Definition of cultural areas and evaluation of the potential impacts on such areas:** As aforementioned, the road under design aligns over the area which will not bear any potential for resettlement and farming.

### **3.9. Specific Environmental and Social Conditions**

**Baseline socio-economic characteristics:** Population, planned development activities, community structure, employment, distribution of income, goods and services, recreation, public health, cultural properties, customs, aspirations, and attitudes are studied by field survey and public consultation. The baseline data on the relevant environmental characteristics of the study area including the physical, biological, cultural property, and socio-economic conditions are evaluated, assembled, and presented in App. I. Any changes anticipated before the implementation of the design shall be identified and the Local people will be informed thorough the consultation and disclosure process.

### **3.10. Socio-Economic Impacts**

**Induced secondary development during construction in the surrounding areas:** The roads will connect the villages and more than that it will provide easy access to the main roads from the project area to Akree, Duhok, Shaqlawa, Hariri, Selahaddin, and Hewler.

**Induced secondary development during construction in the surrounding areas:** The great development induced by this project may consist of establishment of a District Education Centre, construction of renewable energy systems and adaptation of the dripping irrigation methods.

**Potential damage or loss of agricultural land as well as crop damage by emissions deposition:** The high-tech agricultural activities and practical management principles can be implemented. Torricelli - pipeline system and subsurface reservoir by artificial dyke can easily be adapted to the perennial stream and its main tributaries. The ERP does not have any adverse affect on farmlands.

**Population perception of risk in residential areas close to the road:** The existing road is going to be followed. It bypasses the residential areas. Furthermore, the hedges of trees may mitigate the adverse affects of the road.

**An assessment of changes to demography:** Presently population density in the region is less than 20 persons per squared kilometer. However, the rehabilitated high standard road may attract people to resettle around. This can be prevented

by providing proper resettlement areas for the people migrating back. There is not any distinct infrastructure. Even the energy is provided by engine driven generators. Hence, appropriate land use and land use plans, improvement of water resources, increasing the added value to economy, and rehabilitating the cultural resources may assist to mitigate adverse affect of the road and will make the road more functional and efficient.

### **3.11. Social Management Plan**

**Actions to mitigate social issues:** Establishment of a District Education Centre will improve the social and economic properties of the dwellers. The ERP will improve the social issues too.

**Resettlement and Land Acquisition Plan:** The existing road is going to be followed to avoid resettlement and land acquisition. There is not any problem in this sense.

### **3.12. Alternatives**

**Identification of other alternatives:** The possible alternatives are assessed in terms of social, environmental, and economic points of view. Villagers, engineers of client, and designers worked together to mitigate the environmental and social impacts of the Emergency Road Project. Ultimately it was decided to rehabilitate the existing road rather than to construct partially or completely a new one.



### **3.13. Institutional Strengthening-Capacity Building**

Review of the authority and capability of institutions at local, provincial, regional, and national levels and recommend steps to strengthen or expand them so that the management and monitoring plans in the ESA can be implemented.

#### 4. ECONOMIC ASSESSMENT

The proposed project is the rehabilitation of the existing local road situated between the villages;

- Dwin (KM.0+000)
- Razga Dwin (KM.4+200)
- Graw (KM.13+000)
- Babajisek (KM.15+000)
- Kani Khazal (KM.21+300)
- Kani Tawuk (KM.24+100)
- Afrain (KM.28+800), and
- Darband (KM.29+000).

The Emergency Road project takes place over a highly dissected mountainous area. Hence it is vitally important for the villages particularly during the wet period when some parts turn into muddy and slippery situation. However, during the summer time, road born dusts pollute the environment noticeably.

The region takes place over the mountainous area. The ERP road will be a backbone of the development of the delineated area. The close communication between the relevant agencies and local-central government organizations contributes to the further development of the region and assists to the implementation of the effective engineering practices to mitigate social and environmental impacts of the project.

The main settlements which will benefit from the project are given in Tab. 3.1. Furthermore, any factors affecting the cost-benefit relationships are assessed in **TabS. 4.1**. The length of the emergency road is about 29 km.

Table 4.1. The assessment of the factors affecting the cost-benefit of the project.

<b>Project Related Issues</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
1. Will the project involve land expropriation or demolition of existing structure?		+	No expenditure
2. Will the project require that populations be resettled or compensation for resettlement provided?		+	All are going to be preserved
3. Will the project involve widespread land disturbance or site clearance?		+	No extra expenditure.
4. Will tire project generate large amounts of residual wastes and wasted construction materials or eroded soil?		+	Earth works are compensated.
5. Will the project require the setting up of ancillary production facilities?		+	It will improve land use works.
6. Will the project affect land use zoning and planning or conflict with prevalent land use patterns?		+	
7. Will the project land be encroached upon by urbanized or industrialized areas or areas intended for urbanization or industrialization?		+	Since the project is rehabilitation of the existing road, it will minimize the impacts of the traffic to the environment.
8. Will the Project result in potential soil contamination or ground and surface water contamination, e.g., from oil, grease and fuel equipment yards, from herbicides for vegetation control and from Chemical (e.g., calcium chloride) for dust control?		+	
9. Will the project lead to an increase in suspended sediments in streams affected by road cut erosion, decline in water quality and increased sedimentation downstream?		+	Blasting and/or chemicals are not necessary. There would not be any expenditure.
10. Will the project involve the use of chemicals or solvents?		+	
11. Will the project require blasting?		+	

Table 4.1. (Cont'd).

<b>Project Related Issues</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
12. Will the project make significant demands on utilities and services and require significant levels of accommodation or service amenities to support the workforce during construction?		+	Rehabilitation of the existing road will definitely mitigate pollution pertinent to car traffic
13. Will the project increase the levels of harmful air emissions?		+	
14. Will the project increase ambient noise levels?		+	
15. Will the project involve the disturbance or modification of existing drainage channels (rivers, canals) surface water bodies (Lakes, lagoons)?		+	
16. Will the project lead to the disruption / destruction or damage of terrestrial wildlife habitats, biological resources or ecosystems through interruption of migratory routes, disturbance of wildlife habitats, and noise related problems?		+	Naturally stabilized existing road will be followed. No realignment and no deep cut and/or high fill. No tunnel and viaduct.
17. Will the project induce marred landscape (e.g., scars from road cuts) and lead to landslides, slumps, slips, and other mass movements in road cuts?		+	
18. Will the project lead to long-term or semi-permanent destruction of soils in cleared areas not studied for agriculture?		+	
19. Will the project lead to the destruction of vegetation and soil in the right-of-way, borrow pits, waste dumps, and equipment yards?		+	
20. Will the project lead to environmental and social disturbance by construction camps?		+	

Table 4.1. (Cont'd).

<b>Project Related Issues</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
21. Will the project lead to the creation of stagnant water bodies in borrow pits, quarries, etc., suited for mosquito breeding and other disease vector?		+	The alignment goes over a sloping ground
22. Will the project lead to health hazards and interference of plant growth adjacent to road by dust raised and blown by vehicles?		+	
23. Will the project lead to erosions of lands below the roadbed receiving concentrated outflow carried by covered or open drains?		+	Gullies are frequent. Existing structures will be remedied.
24. Will the project lead to unplanned use of the infrastructure being developed?		+	
25. Will the project lead to the illegal invasion of homelands and indigenous people by squatters and poachers causing serious social and economic disruption?		+	
26. Will the project be equally profitable to all beneficiaries in the region?		+	
27. Will the project be equally accessible by all beneficiaries in the region?		+	
28. Is the project located in an area with designated natural reserves?		+	Almost all are barren owned by the State
29. Is the project located in an area with unique natural features?		+	
30. Is the project located in an area with endangered or conservation-worthy ecosystems, fauna or flora?		+	
31. Is the project located in an area falling within 500 meters of national forests, protected areas, wilderness areas, wetlands, biodiversity, critical habitats, or sites of historical or cultural importance?		+	

Table 4.1. (Cont'd).

<b>Project Related Issues</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
32. Is the project located in an area such that it would create a barrier for the movement of conservation-worthy wildlife or livestock?		+	Gullies are frequent. But no need for new structures.
33. Is the project located close to subterranean water sources, surface water bodies, watercourses or wetlands?		+	
34. Is the project located in an area with designated historic or cultural resources?		+	The existing situation will get better with the completion of the ERP
35. Is the project located in a polluted or contaminated area?		+	
36. Is the project located in an area of high visual and landscape quality?		+	
37. Is the project located in an area susceptible to landslides or erosion?		+	
38. Is the project located in an area of seismic faults?		+	
39. Is the project located in a densely populated area?		+	
40. Is the project located in prime agricultural?		+	
41. Is the project located in an area of tourist importance?		+	
<b>C. Comments and Recommendations</b>			
Included in the text			

Signed by Environment Specialist  
Name: Evrim ATALAS  
Title: Environmental Engineer and Civil Engineer  
Date: 6.3.2007

Signed by Project Manager  
Name: Ilyas YILMAZER  
Title: Professor in Geotechnics,  
Geohydrology, and Geoenvironment  
Date: 9.2.2008

#### **4.1. Economic Analysis via the RED Model**

The RED model was funded by the Africa Road Management Initiative (RMI), which was launched under the auspices of the Sub-Saharan Africa Transport Policy Program (SSATP), which is a collaborative framework set up to improve transport policies and strengthen institutional capacity in the Africa region. The model was developed by Rodrigo Archondo-Callao, Technical Specialist, World Bank. The model development supervisor was Pedro Geraldes, Principal Transport Economist, World Bank, and the work was carried out at the World Bank's Transport Unit, Infrastructure Group. The current manager of RMI is Stephen Brushett, Sr. Operations Officer, World Bank. The model was kindly made public by the respective section of the WB. Hence, the model is downloaded and the data in hand are processed to reach results presented in **Figs. 4.1 – 4.6**.

**Figures 4.1 – 4.3:** The present value of economic society costs is about 17.26 million dollars where as that of financial investment costs and the present value of economic agency costs are orderly 5.0 and 4.08 million dollars.

**Figure 4.4:** The net economic benefit only from the road safety starts at a value of \$161,000.00 in the first year of operation and rises up to \$283,000.00 towards the end of the economic life of the ER without alternative project.

**Figure 4.5:** All the sensitivity and risk multipliers were set into 1 to obtain the original base scenario.

**Figure 4.6:** Presents cost/benefit calculations and relevant data.

KRG, Ministry of Construction & Housing, Directorate General of Roads & Bridges  
Preliminary Environmental and Social Screening the **Dwin – Graw – BabaJisek - Rkawa** local road

<u>Project-Alternatives Solution</u>				
		Country IRAQ Project Emergency Road Project Road DWIN – RAZGA – GRAW – BABAGISEK - RKAWA		
	Without Project Alternative	Possible Project Alternatives		
	Alternative 0	Alternative 1	Alternative 2	Alternative 3
	Gradings Every 60 Days	0	0	0
Net Present Value (million \$) at 12% Discount Rate	0.000	#N/A	#N/A	#N/A
Internal Rate of Return (%)	#N/A	#N/A	#N/A	#N/A
Equivalent Annual Net Benefits (\$/km) at 12% Discount Rate	0	#N/A	#N/A	#N/A
Modified Rate of Return at 12% Reinvestment Rate (%)	#N/A	#N/A	#N/A	#N/A
Net Present Value per Financial Investment Costs (ratio)	0.00	#N/A	#N/A	#N/A
Net Present Value per PV of Economic Agency Costs (ratio)	0.00	#N/A	#N/A	#N/A
First-Year Benefits per Economic Investment Cost (ratio)	0.00	#N/A	#N/A	#N/A
Financial Investment Costs (million \$)	5.00	0.00	0.00	0.00
PV of Economic Agency Costs (million \$)	4.08	#N/A	#N/A	#N/A
PV of Economic Normal Traffic User Costs (million \$)	12.54	#N/A	#N/A	#N/A
PV of Economic Generated Traffic User Costs (million \$)	0.64	#N/A	#N/A	#N/A
PV of Economic Society Costs (million \$)	17.26	#N/A	#N/A	#N/A
Number of Fatalities per km-year After Investment	0.0665	#DIV/0!	#DIV/0!	#DIV/0!
Investment per Population Served (\$/person)	1759.324419	0	0	0
Population Served per Investment (persons/1000\$)	0.6	0.0	0.0	0.0

Figure 4.1. Solution for the Emergency Road without project alternative.



## Net Present Value

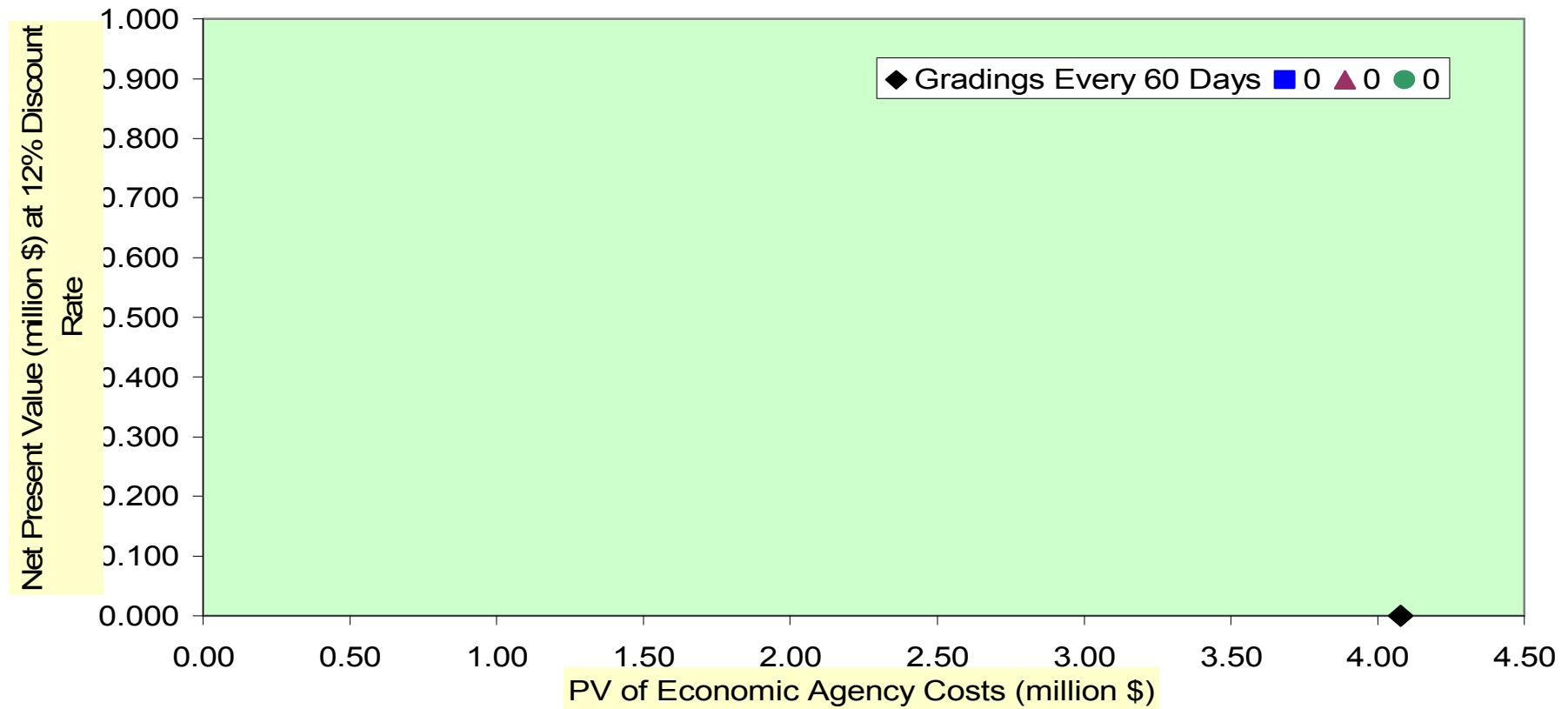


Figure 4.2. Net present value at a discount rate of 12% versus that of the economic agency costs of the Emergency Road without project alternative.

### Present Value of Society Costs

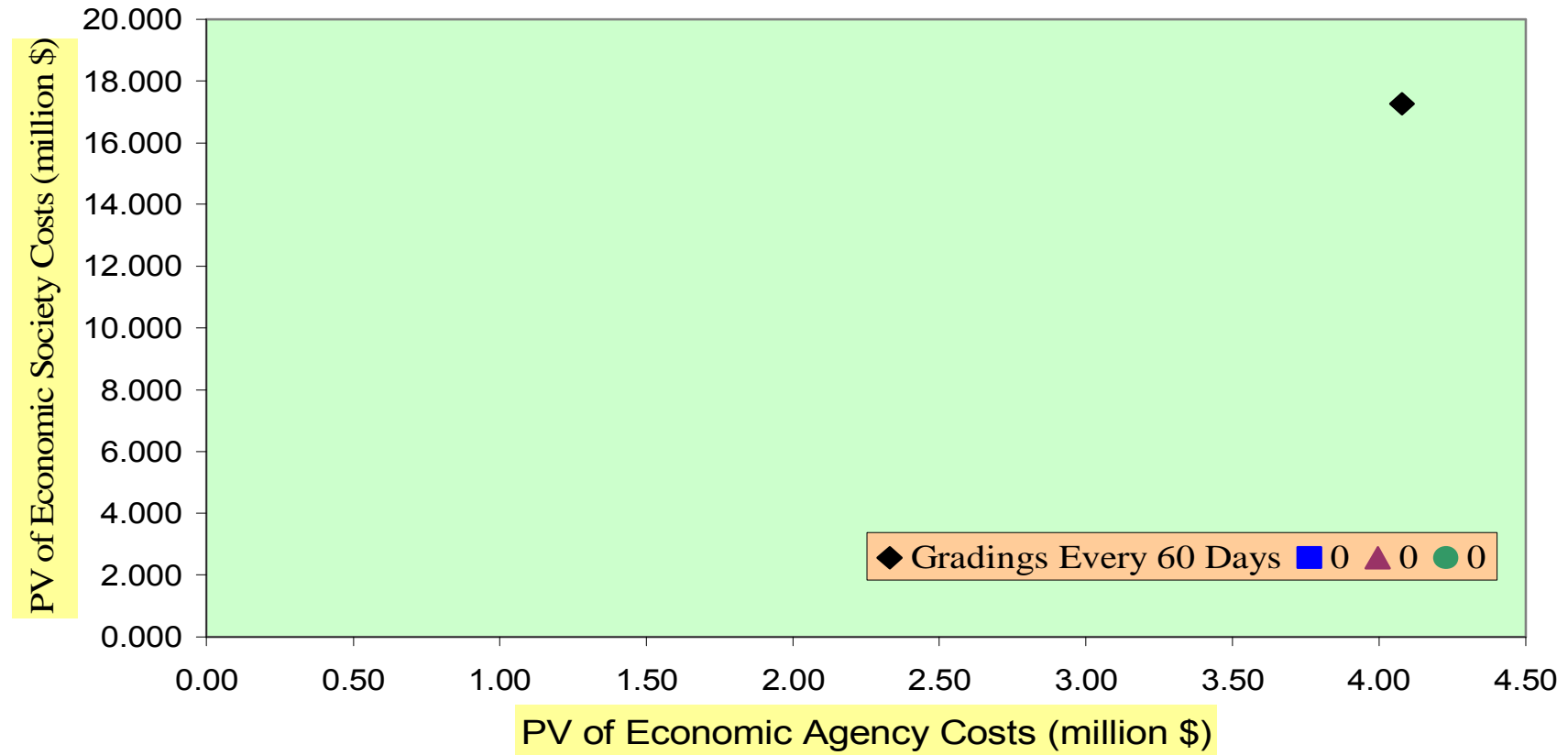


Figure 4.3. Present value of the society costs versus that of agency costs of the Emergency Road without project alternative.

KRG, Ministry of Construction & Housing, Directorate General of Roads & Bridges  
Preliminary Environmental and Social Screening the **Dwin – Graw – BabaJisek - Rkawa** local road

Economic Feasibility: 0

Country	IRAQ	Project	Emergency Road Project	FEBRUARY 200											
Road	DWIN – RAZGA – GRAW – BABAGISEK - RKAWA	Alternative	0												
Alternatives	Description	Terrain Type	Road Type	Wet Season Duration (days/year)											
Without Project	Gradings Every 60 Days	B: Rolling	X: Paved	80											
Project	0	#N/A	#N/A												
Alternatives	Dry Season		Wet Season		Car Medium	Goods Vehicle	Bus Light	Bus Medium	0	Truck Light	Truck Medium	0	0		
	Length (km)	Roughness (IRI)	Length (km)	Roughness (IRI)	Average Speeds (km/hr)										
Without Project	25.0	25.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Project	0.0	335544.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Alternatives	Eco. Investment (years)				E. Maintenance ('000\$/km/year)		Accidents (#/m veh-km)		Traffic Composition in 2008 (%)						
	76%		21%		1%		1%		0%		1%		0%		
Without Project	1		170.00		3.40		4.00		Average Travel Time (hours)						
	0		0.00		0.00		0.00		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Project	0		0.00		0.00		0.00		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Year	Annual Normal Daily Traffic (veh/day)	Annual Generated Daily Traffic (veh/day)	Annual Induced Daily Traffic (veh/day)	Net Economic Benefits								Sensitivity Analysis				
				Agency Benefits		User Benefits				Road Safety	Other Benefits	Total	A Agency *	B User *	A & B	
				Investment Costs	Maintenance Costs	Normal Traffic		Generated Traffic								
				(M\$/year)	(M\$/year)	(M\$/year)	(M\$/year)	(M\$/year)	(M\$/year)	(M\$/year)	(M\$/year)					
2008	566	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.161	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2009	583	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.166	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2010	601	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.171	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2011	619	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.176	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2012	637	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.182	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2013	656	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.187	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2014	676	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.193	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2015	696	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.198	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2016	717	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.204	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2017	739	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.211	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2018	761	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.217	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2019	784	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.223	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2020	807	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.230	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2021	831	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.237	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2022	856	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.244	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2023	882	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.251	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2024	908	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.259	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2025	936	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.267	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2026	964	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.275	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
2027	993	#N/A	0	0.000	#N/A	#N/A	#N/A	#N/A	#N/A	0.283	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
	3.0% Growth				Net Present Value (million \$) at 12% Discount Rate								#N/A	#N/A	#N/A	
		Evaluation Period (years)			Internal Rate of Return (%)								#N/A	#N/A	#N/A	
		20			Equivalent Annual Net Benefits (\$/km) at 12% Discount Rate								#N/A	#N/A	#N/A	
					Modified Rate of Return at 12% Reinvestment Rate (%)								#N/A	#N/A	#N/A	
					Net Present Value per Financial Investment Costs (ratio)								#N/A	#N/A	#N/A	
					First-Year Benefits per Economic Investment Cost (ratio)								#N/A	#N/A	#N/A	

Figure 4.4. Economic feasibility of the Emergency Road without project alternative.

### Sensitivity & Risk Multipliers

Normal Traffic (vpd)	1			
Normal Traffic Growth Rate (%)	1			
Generated Traffic (vpd)	1			
Induced Traffic (vpd)	1			
Passenger Time Costs (\$/hr)	1			
Cargo Time Costs (\$/hr)	1			
Wet Season Duration (days)	1			
Without Project Dry Season Length (km)	1			
Without Project Dry Season Roughness (IRI)	1			
Without Project Wet Season Length (km)	1			
Without Project Wet Season Roughness (IRI)	1			
Without Project Accidents Rate (#/m veh-km)	1			
Without Project Investment Costs (000\$/km)	1			
Without Project Maintenance Costs (000/km/yr)	1			
		Alt 1	Alt 2	Alt 3
Project Dry Season Road Length (km)	1	1	1	1
Project Dry Season Roughness (IRI)	1	1	1	1
Project Wet Season Road Length (km)	1	1	1	1
Project Wet Season Roughness (IRI)	1	1	1	1
Project Accidents Rate (#/m veh-km)	1	1	1	1
Project Investment Costs (000\$/km)	1	1	1	1
Project Maintenance Costs (000/km/yr)	1	1	1	1
Traffic Growth Rate 1	1			
Traffic Growth Rate 2	1			
Traffic Growth Rate 3	1			
Traffic Growth Rate 4	1			
Investment Economic Costs Multiplier Alternative 0	1			
Investment Economic Costs Multiplier Alternative 1	1			
Investment Economic Costs Multiplier Alternative 2	1			
Investment Economic Costs Multiplier Alternative 3	1			

#### Notes:

- The multipliers multiply each input on all RED formulas.
- All these multipliers should be set to 1 to obtain the original base scenario.
- You **can not** move this range, otherwise, the risk analysis module will not work properly.
- These risk multipliers can be used to perform a risk analysis with any commercial risk analysis program.
- The Investment Economic Cost Multipliers are not used on the risk, sensitivity and switching values analyses, but can be used to evaluate cases when different project-alternatives have different economic to financial costs ratios.

Figure 4.5. Sensitivity and risk multipliers of the Emergency Road without project alternative.

Calculation of Costs/Benefits for Alternative 0

Country	IRAQ									
Project	Emergency Road Project									
Road	DWIN – RAZGA – GRAW – BABAGISEK - RKAWA									
Option	Gradings Every 60 Days									
Wet Season Days (days)									80	
Terrain Type (A/B/C)									B	Rolling
Road Type (X/Y/Z)									X	Paved
Dry Length (km)									25	
Dry Roughness (IRI)									25	
Wet Length (km)									0	
Wet Roughness (IRI)									0	Ac. Costs
Accidents Rate (number per million veh-km)									4.0	10000
Percent with Fatality									10	50000
Percent with Injury									20	10000
Percent Damage Only									70	2000
Construction Duration (years)									1	
Percent of Construction Costs in Year 1									100	
Percent of Construction Costs in Year 2									0	
Percent of Construction Costs in Year 3									0	
Economic Construction Costs (000\$/km)									170	
Fixed Economic Maintenance Costs (000\$/km/year)									3.4	
Variable Economic Maintenance Costs (000\$/km/year/ADT)									0.00255	
Annual Weighted Length (km)									19.52055	
Vehicle Data										
	Vehicle 1	Vehicle 2	Vehicle 3	Vehicle 4	Vehicle 5	Vehicle 6	Vehicle 7	Vehicle 8	Vehicle 9	
	BX1	BX2	BX3	BX4	BX5	BX6	BX7	BX8	BX9	
VOC a0	0.115706	0.128717	0.135702	0.15842	0.22684	0.16421	0.25787	0.39211	0.558249	
VOC a1	-0.00044	0.001136	0.003585	0.0075	0.00847	0.00755	0.01016	0.012589	0.021989	
VOC a2	0.000359	0.000413	0.000204	0.00027	0.00054	0.00034	0.00051	0.000787	0.001	
VOC a3	-6.8E-06	-8.8E-06	-3.8E-06	-5.9E-06	-1E-05	-8E-06	-1E-05	-1.49E-05	-2E-05	
Speed a0	102.7161	98.33671	86.92025	82.7193	84.316	77.2912	79.2	86.05489	76.40598	
Speed a1	-2.37268	-1.92143	-0.84021	-0.39035	-0.6513	0.03628	0.1938	-0.882639	-0.82188	
Speed a2	-0.23258	-0.24819	-0.26591	-0.27801	-0.2999	-0.2786	-0.3083	-0.2907	-0.25435	
Speed a3	0.00833	0.008482	0.00815	0.00817	0.00926	0.00784	0.00867	0.009155	0.008046	
Passengers	4	1	10	20	0	1	1	0	0	
Time	1.00	0.50	0.50	0.50	0.00	0.50	0.50	0.00	0.00	
Cargo	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	
Dry Normal ADT	550.00	150.00	10.00	5.00	0.00	5.00	5.00	0.00	0.00	
Growth 1	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
Growth 2	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
Growth 3	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
Growth 4	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
Generated % of Normal	33.00	7.50	0.50	0.25	0.00	0.25	0.20	0.00	0.00	
Generated Elasticity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Generated ADT	33.00	7.50	0.50	0.25	0.00	0.25	0.20	0.00	0.00	
Wet Normal ADT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Growth 1	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
Growth 2	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
Growth 3	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
Growth 4	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
Generated % of Normal	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Generated Elasticity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Generated ADT	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

Figure 4.6. Cost and benefit results for the Emergency Road without project alternative.

## **5. CONCLUSIONS AND RECOMMENDATIONS**

In the emergency road project in the Erbil region, the principles of geotechnics, hydrology, hydrogeology, environmental engineering are implemented in the project to conduct a convenient and reliable design in regards with Social and Environmental Impacts.

The most important issue is that a rehabilitated road would form a base to mitigate the problems inherited to traffic on the existing road. The ERP will not have any adverse affect in terms of social and environment. Furthermore, all the barren lands in the vicinity can be planted and/or cultivated by establishing terrace system over the sloping grounds.

The area takes place between two major rivers namely- the Great Zap River and its tributary. Hence, the delineated area has potential sources of both groundwater and surface water. Renewable energy and irrigation systems can easily be established within the route of the ERP. The road will be a backbone of the development the delineated area. The close communication between the relevant agencies and local-central government organizations contributes to the further development of the region and assists to the implementation of the effective engineering practices to alleviate social and environmental impacts of the project.

Conclusively, the emergency road project (ERP) is vitally important for the local people and as well as for the people who were forced to migrate to the city centers in 1980s.

The villagers in the region, where the Emergency Road Project will be conducted, will benefit at a considerable rate. Farming activities, education opportunities, health services, and social relationships will be affected in an appreciable manner. The local authorities are enthusiastic to improve the living standards and they promise implement effective engineering practices to alleviate numerous problems inherited from the old time ruling system. As a conclusion, the ERP will assist considerably in these subsidiary works.

The Emergency Road Project will lead the implementation of new technologies such as production of renewable energy. It will contribute to form terraces and then forestation of the barren hillsides. Besides the effective use of the existing and/or abandoned farm fields and establishment of the new gardens and farm fields will be managed properly and effectively.

Conclusively and concisely, the road is quite beneficial and crucial for the region of the **Dwin – Razga – Graw – Babajisek - Rkawa**. It is viable to commence the rehabilitation works by early spring time to be able to finish within the year of 2008.

## REFERENCES

- BOTAS (Corporation of Petroleum Pipelines), 2001. Geohazard area crossings of the Bakü-Tbilisi-Ceyhan Crude Oil Pipeline (I. Yilmazer: Geotechnical consultant). pp.44, archives of BOTAS, Ankara-Turkey.
- Edward, B.N., Richard, J.P., & Paul H.M., 1993. The Citizen's guide to geologic hazards. American Institute of Professional Geologists, 134 pp.
- Yilmazer, I., 1995. Significance of discontinuity survey in motorway alignment selection. *Engineering Geology*, 40, pp. 41-48.
- Pournelle, J.R., Phil, C., & Tuna, N., 2001. Great Silk Road Survey along the Bakü-Tbilisi-Ceyhan crude oil pipeline. First International Plenary Report (unpublished), 21 pp, Middle East Technical University, 1-4 June 2001, Ankara-Turkey.
- Vincent-Genod, J., 1984. Fundamentals of pipeline engineering. Editions Technip, Paris, 196 pp.
- Yalcin, G. and Yilmazer, I., 1998. Natural disasters in Turkey: effects on roads. Proceedings of the International seminar on Natural Disaster Reduction for Roads in Mediterranean Countries, pp. 241-248, 14-16 October, Istanbul-Turkey.
- Yilmazer, I., 1990. Route location study and significance of engineering geology (*in Turkish*). *Bulletin of Engineering Geology*, No: 36, pp. 37-45, Chamber of Turkish Geological Engineers.
- Yilmazer, I., 1992. The role of engineering geology in Turkish motorway projects and its relationships between other disciplines. *Bulletin of Engineering Geology*, No: 40, 46-49, Chamber of Turkish Geological Engineers.
- Yilmazer, I., Akduman L., Leventeli Y., & Ö., Yilmazer, 2001a. Cost comparison of two extreme engineering approaches in a motorway project: Taurid Mountain crossing of Çukurova Motorway. Proceedings of the Fourth International Turkish Geology Symposium, September 24-28 '01, Adana-Turkey, p. 143.
- Yilmazer, İ. and Çongar, B., 1994. Significance of discontinuity survey and physiographical study in engineering works. Proceedings of the 7th congress of the International Association of Engineering Geology Organizing Committee, 1105-1111, 5-9 September 1994, Lisbon-Portugal.
- Yilmazer, I., & Yilmazer, Ö., 1998. Geotechnical design of the Sivas-Kayseri natural gas pipeline. Unpublished report, pp.74, archives of Yilmazer Education & Engineering Ltd., Ankara-Turkey.
- Yilmazer, I., & Yilmazer, Ö., 1999. Special design of the North Anatolian Fault crossings at Ladik and Suluova sections. Blue Stream Natural Gas Pipeline Project, unpublished report, pp. 21, archives of Yilmazer Education & Engineering Ltd., Ankara-Turkey.
- Yilmazer, I., & Yilmazer, Ö., 2000. Special design of the North Anatolian Fault crossing at Kocaeli section. Branch line of the natural gas pipeline to Ford Factory, unpublished report, pp. 14, archives of Yilmazer Education & Engineering Ltd., Ankara-Turkey.
- Yilmazer, I., & Yilmazer, Ö., 2001. An earthquake in turkey is not a natural disaster. Proceedings of the 4<sup>th</sup> International Symposium on Eastern Mediterranean Region Geology, May 21 –25 '01, Isparta-Turkey, p. 164.
- Yilmazer, I., Yilmazer, Ö., Akduman L., & Leventeli Y., 2001a. A radical solution to mitigate earthquake catastrophe in Turkey. Abstracts of the Fourth International Turkish Geology Symposium, September 24-28 '01, Adana-Turkey, p. 139.
- Yilmazer, İ., Yilmazer, Ö., Bulut, C., & Karaman, S., 2001b. Transportation Problems between Ankara and Istanbul and the radical solutions (*in Turkish*). Proceedings of the 3<sup>rd</sup> Symposium on the Turkish Energy, UTECH-Chamber of Electrical Engineers, December 5-7 '01, pp. 119-127.
- Yilmazer, I., Yilmazer, Ö., & Gökçekuş, H., 1999. Practical engineering approaches to mitigate earthquake disasters. Proceedings of the International Conference on Earthquake Hazard and Risk in the Mediterranean Region, by Near East University, Nicosia, North Cyprus, October 18-22 '99, pp. 409-416.
- Yilmazer, I., Yilmazer, O., and Dogan, U., 1997. Significance of water-discontinuity-clay (WDC). Proceedings of the International Symposium on Engineering Geology and the Environment, sponsored by International Assoc. of Engineering Geology, Athens-Greece, June 23-27 '97, 457-462.



# **APPENDIX A**

## **Appendix AI. EMP Summary Checklist.**

## **Appendix AII. Plan and Profile of the Emergency Road *(Included within the civil design report)***

March, 2008

<b>Appendix AI. EMP Summary Checklist.</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
<b>A. Project Related Issues (It is cited here as a repetition to emphasize the principles of the project)</b>			
1. Will the project involve land expropriation or demolition of existing structure?		+	
2. Will the project require that populations be resettled or compensation for resettlement provided?		+	
3. Will the project involve widespread land disturbance or site clearance?		+	
4. Will the project generate large amounts of residual wastes and wasted construction materials or eroded soil?		+	
5. Will the project require the setting up of ancillary production facilities?		+	
6. Will the project affect land use zoning and planning or conflict with prevalent land use patterns?		+	
7. Will the project land be encroached upon by urbanized or industrialized areas or areas intended for urbanization or industrialization?		+	
8. Will the Project result in potential soil contamination or ground and surface water contamination, e.g., from oil, grease and fuel equipment yards, from herbicides for vegetation control and from Chemical (e.g., calcium chloride) for dust control?		+	
9. Will the project lead to an increase in suspended sediments in streams affected by road cut erosion, decline in water quality and increased sedimentation downstream?		+	
10. Will the project involve the use of chemicals or solvents?		+	
11. Will the project require blasting?		+	
12. Will the project make significant demands on utilities and services and require significant levels of accommodation or service amenities to support the workforce during construction?		+	Rehabilitation of the existing road will definitely mitigate pollution pertinent to car traffic
13. Will the project increase the levels of harmful air emissions?		+	
14. Will the project increase ambient noise levels?		+	
15. Will the project involve the disturbance or modification of existing drainage channels (rivers, canals) surface water bodies (Lakes, lagoons)?		+	

<b>Appendix A1. EMP Summary Checklist (Cont'd).</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
<b>A. Project Related Issues</b>			
16. Will the project lead to the disruption / destruction or damage of terrestrial wildlife habitats, biological resources or ecosystems through interruption of migratory routes, disturbance of wildlife habitats, and noise related problems?		+	Naturally stabilized existing road will be followed. No realignment and no deep cut and/or high fill. No tunnel and viaduct.
17. Will the project induce marred landscape (e.g., scars from road cuts) and lead to landslides, slumps, slips, and other mass movements in road cuts?		+	
18. Will the project lead to long-term or semi-permanent destruction of soils in cleared areas not studied for agriculture?		+	
19. Will the project lead to the destruction of vegetation and soil in the right-of-way, borrow pits, waste dumps, and equipment yards?		+	
20. Will the project lead to environmental and social disturbance by construction camps?		+	
21. Will the project lead to the creation of stagnant water bodies in borrow pits, quarries, etc., suited for mosquito breeding and other disease vector?		+	The alignment goes over a sloping ground
22. Will the project lead to health hazards and interference of plant growth adjacent to road by dust raised and blown by vehicles?		+	
23. Will the project lead to erosions of lands below the roadbed receiving concentrated outflow carried by covered or open drains?		+	Gullies are frequent. Existing structures will be remedied.
24. Will the project lead to unplanned use of the infrastructure being developed?		+	
25. Will the project lead to the illegal invasion of homelands and indigenous people by squatters and poachers causing serious social and economic disruption?		+	
26. Will the project be equally profitable to all beneficiaries in the region?		+	
27. Will the project be equally accessible by all beneficiaries in the region?		+	

<b>Appendix A1. EMP Summary Checklist (cont'd).</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
<b>B. Project Related Issues</b>			
1. Is the project located in an area with designated natural reserves?		+	Almost all are barren owned by the State
2. Is the project located in an area with unique natural features?		+	
3. Is the project located in an area with endangered or conservation-worthy ecosystems, fauna or flora?		+	
4. Is the project located in an area falling within 500 meters of national forests, protected areas, wilderness areas, wetlands, biodiversity, critical habitats, or sites of historical or cultural importance?		+	
5. Is the project located in an area such that it would create a barrier for the movement of conservation-worthy wildlife or livestock?		+	Gullies are frequent. But no need for new structures.
6. Is the project located close to subterranean water sources, surface water bodies, watercourses or wetlands?		+	
7. Is the project located in an area with designated historic or cultural resources?		+	The existing situation will get better with the completion of the ERP
8. Is the project located in a polluted or contaminated area?		+	
9. Is the project located in an area of high visual and landscape quality?		+	
10. Is the project located in an area susceptible to landslides or erosion?		+	
11. Is the project located in an area of seismic faults?		+	
12. Is the project located in a densely populated area?		+	
13. Is the project located in prime agricultural?		+	
14. Is the project located in an area of tourist importance?		+	
<b>C. Comments and Recommendations</b>			
Included in the text			

Signed by Environment Specialist

Name: Evrim ATALAS

Title: Environmental Engineer and Civil Engineer

Date: March, 2008

Signed by Project Manager

Name: Ilyas YILMAZER

Title: Professor in Geotechnics, Geohydrology, and Geoenvironment

Date: March, 2008



Emergency Road Rehabilitation Project - ERRP  
ENVIRONMENTAL MANAGEMENT PLAN

**Name of Governorate:** ERBIL (HEWLER)

**Road Name:** **Dwin – Razga – Graw – Babagisek - Rkawa Local Road**

**Length:** KM.0+000 – KM.29+000

1. Project Description (*Please include Map*)

See the text.

2. Description of the Environment (*Describe the physical, biological, and socio-economic environment*)

See the text.

3. Environmental Impacts (*Identify the positive and negative impacts likely to result from the project*)

See the text.

**During Operation**

Potential impacts	There has not been any potential impact. The existing alignment will be followed without any deep cut and high embankment.
Generic mitigation measures	Impacts to flora, fauna, farms, dwellers, etc. are tolerable. As stated above, the existing alignment will be followed without any deep cut and high embankment.
Implementation period	In a few months after getting the approval of the World Bank Credit.
Responsibility for implementing the measures	Construction company commissioned and charged by the KRG MINISTRY OF CONSTRUCTION & HOUSING DIRECTORATE GENERAL OF ROADS & BRIDGES
Responsibility for supervising implementation of the measures	Construction company commissioned and charged by the KRG MINISTRY OF CONSTRUCTION & HOUSING DIRECTORATE GENERAL OF ROADS & BRIDGES
Monitoring indicators	Public concerns and the implementation will be recorded and supervised by site engineers charged by the Client.
Type and frequency of monitoring and reporting	Daily visual inspection and monthly reporting will be conducted.
Budget in U.S. dollars	2.25 million

Emergency Road Rehabilitation Project - ERRP  
SOCIAL INFORMATION NOTE

**Name of Governorate:** ERBIL (HEWLER)  
**Road Name:** **Dwin – Razga – Graw – Babagisek - Rkawa Local Road**  
**Length:** KM.0+000 – KM.29+000

1. Total beneficiary population of the road: Direct: 2850      Indirect: 4000
2. Transport services available for local people
  - a Buses                        Number of times daily:    12
  - b. Shared taxis              Estimated number daily:    120
  - c. AWD vehicles             Estimated number daily:    25
  - d. Carts                        Number of times daily:    50
  - e. Donkey trips:             Number of times daily:    200
  
3. Number of girls registered in school: 282
4. Number of boys registered in school: 390
5. Average time required (number of hours) for people to reach the health service: 2
6. Average time required (number of hours) to reach the main market: 2
7. Economic activities of the men in the area
  - (a) Cereals crops:    40%
  - (b) Fruit:                5%
  - (c) Vegetables:        5%
  - (d) Livestock:          40%
  - (e) Trade:                5%
  - (f) Other:                5%
  
8. Economic activities of the women in the area
  - (a) Crafts:                 10%
  - (b) Processing of agricultural products (fruits, vegetables, etc.): 50%
  - (c) Egg/poultry production: 30%
  - (d) Production of honey: 0%
  - (e) Other:                   10%
  
9. Benefits linked to road improvement
  - (a) Incentive to improve social infrastructure: 20%
  - (b) Development of public transport: 30%
  - (c) Increased marketing of local products: 20%
  - (d) Tapping of natural resources and modernization of agriculture: 20%
  - (e) Other:                   10%

# **APPENDIX B**

## **APPENDIX BI**

### **EMISSION LIMITS IN THE WHO GUIDELINES, USEPA STANDARDS, AND EC REGULATION**

## **APPENDIX BII**

### **BIODIVERSITY AND PROTECTED AREAS OF IRAQ**

March, 2008



## **APPENDX BI**

### **EMISSION LIMITS IN THE WHO GUIDELINES, USEPA STANDARDS, AND EC REGULATION**

Emission Limits in the WHO Guidelines, USEPA Standards, and EC Regulation (Pollution Prevention and Abatement Handbook WORLD BANK GROUP Effective Since July 1998) is presented in **Tab. BI.1**.

Table BI.1. Emission Limits in the WHO Guidelines, USEPA Standards, and EC Regulation (Pollution Prevention and Abatement Handbook WORLD BANK GROUP Effective Since July 1998).

Standard/ Guideline		Turkish AQPR Standardsa	World Bank Classificationb	WHO Guidelinesc	USEPA Standardsd	EU Limits				
SO <sub>2</sub>	LT	60 (target value)	100 (poor airshed)	50	80	SO <sub>2</sub>	80e	120e	80e	120e
		150 (general)	80 (moderate airshed)			Associated Particulate Levels*	>40f	<40f	>150g	<150g
	ST	250 (industrial)	150 (poor airshed)	125	SO <sub>2</sub>	250h	350h	250h	350h	
			150 (moderate airshed)		Associated Particulate Levels	>150f	<150f	>350f	<350f	
NO <sub>x</sub>	LT	200 (as NO)	100 as NO <sub>2</sub>	40 as NO <sub>2</sub>	100 as NO <sub>2</sub>	200i as NO <sub>2</sub>				
	ST	600 (as NO)	150 (poor airshed) 150 (moderate airshed) as NO <sub>2</sub>							
PM <sub>10</sub>	LT	60 (target value) 150 (general) 200 (industrial)		50						
	ST	300 (general) 400 (industrial)		125j						
CO	LT	10000								
	ST	30000		10000 (8 hrs)						

### 1.1 Regulatory Noise Levels

Baseline noise measurement results, results of construction noise level calculations and results of INM were compared with the World Bank standards and EXIM Environmental Guidelines (Table 28) & Turkish Noise Control Legislation (**Tab. BI.2**).

Table BI.2. World Bank Maximum Allowable Standards for Noise.

Receptor	L <sub>eq</sub> (dBA)			
	World Bank Maximum Allowable		EXIM Environmental Guidelines	
	Daytime 07.00-22.00	Night time 22.00-07.00	Daytime	Night time
Residential; Institutional; Educational	55	45	60	55
Industrial	70	70	75	75
Commercial	70	70	65	60

According to the World Bank, noise abatement handbook an operating facility should achieve either the levels specified in the above table or if the baseline noise levels are already above those limits in the above table a maximum increase in the ambient noise level of 3 dBA is acceptable (**Tab. BI.3**).

Table BI.3. The Turkish Ambient Noise Standards (Turkish Noise Control Legislation).

Noise Source	L <sub>eq</sub> (dBA)	
	Day (06.00-22.00)	Night (22.00-06.00)
Construction Site Noise		
Building Construction (continuous)	70	-
Road Construction (temporary)	75	-
Impact Noise	100 (L <sub>max</sub> )	-
Airport Noise	70	60

When noise levels exceed the accepted levels given above, adequate mitigation measures must be taken to reduce the noise levels to acceptable levels.

Baseline noise measurement results, results of construction noise level calculations and results of INM were compared with the World Bank standards and EXIM Environmental Guidelines (Table 27) & Turkish Noise Control Legislation (**Tabs. BI.4-I.7**).

Table BI.4. World Bank Maximum Allowable Standards for Noise.

Receptor	L <sub>eq</sub> (dBA)			
	World Bank Maximum Allowable		EXIM Environmental Guidelines	
	Daytime 07.00-22.00	Night time 22.00-07.00	Daytime	Night time
Residential; Institutional; Educational	55	45	60	55
Industrial	70	70	75	75
Commercial	70	70	65	60

According to the World Bank, noise abatement handbook an operating facility should achieve either the levels specified in the above table or if the baseline noise levels are already exceeding the limit values in the table a maximum increase in the ambient noise level of 3 dBA is acceptable.

Table BI.5. The Turkish Ambient Noise Standards for Highways (Regulation on Assessment and Management of Environmental Noise).

Areas	L <sub>eq</sub> (dBA)	
	Day (07.00-19.00)	Night (23.00-07.00)
Rural Areas	55	45
Areas sensitive to noise (educational, cultural and health), summer places, camp areas	60	50
Residential Areas	63	53
Mixed (Work places, Residential Areas, Industrial Areas)	65	55
Industrial Areas	67	57

Table BI.6. The Turkish Ambient Noise Standards for Airports with less than 50.000 landing and take-off per year (Regulation on Assessment & Management of Environmental Noise).

Areas	L <sub>eq</sub> (dBA)	
	Day (07.00-19.00)	Night (23.00-07.00)
Areas sensitive to noise (educational, cultural and health), summer places, camp areas, hotels	63	53
Residential Areas	65	55
Mixed (Work places, Residential Areas, Industrial Areas)	67	57
Industrial Areas	70	60

Table BI.7. The Turkish Ambient Noise Standards for Construction Sites (Regulation on Assessment and Management of Environmental Noise).

Activity	L <sub>eq</sub> (dBA)
Building	70
Road	75
Others	70

When noise levels exceed the levels given in Table 29 and 30, adequate mitigation measures must be taken to reduce the noise levels to acceptable levels.

## APPENDX BII.

### BIODIVERSITY AND PROTECTED AREAS OF THE IRAQ

Table BII.1. Biodiversity and Protected Areas of Iraq.

	<b>Middle East &amp; North</b>		
	<b>Iraq</b>	<b>Africa</b>	<b>World</b>
Total Land Area (000 ha)	43,832	1,256,964	13,328,979
<b>Protected Areas</b>			
Extent of Protected Areas by IUCN Category (000 ha), 2003:			
Nature Reserves, Wilderness Areas, and National Parks (categories I and II)	X	18,165	438,448
Natural Monuments, Species Management Areas, and Protected Landscapes and Seascapes (categories III, IV, and V)	1	18,063	326,503
Areas Managed for Sustainable Use and Unclassified Areas (category VI and "other")	X	82,569	692,723

Table BII.1. (Cont'd).

Total Area Protected (all categories)	1	118,797	1,457,674
Marine and Littoral Protected Areas {a}	X	9,580	417,970
Protected Areas as a Percent of Total Land Area, 2003 {b}	0.0%	10.2%	10.8%
Number of Protected Areas, 2003	8	1,090	98,400
Number of Areas >100,000 ha, 2003	X	56	2,091
Number of Areas > 1 million ha, 2003	X	X	243
Wetlands of International Importance (Ramsar Sites), 2002:			
Number of Sites	X	X	1,179
Total Area (000 ha)	X	X	102,283
Biosphere Reserves, 2002			
Number of Sites	X	22	408
Total Area (000 ha)	X	X	

Table BII.1. (Cont'd).

	<b>Middle East &amp; North</b>		
	<b>Iraq</b>	<b>Africa</b>	<b>World</b>
<b>Number and Status of Species</b>			
Higher Plants			
Total known species (number), 1992-2002	X	X	X
Number of threatened species, 2002	X	X	5,714
Mammals			
Total known species (number), 1992-2002	81	X	X
Number of threatened species, 2002	11	X	1,137
Breeding Birds			
Total known species (number), 1992-2002	140	X	X
Number of threatened species, 2002	11	X	1,192



Table BII.1. (Cont'd).

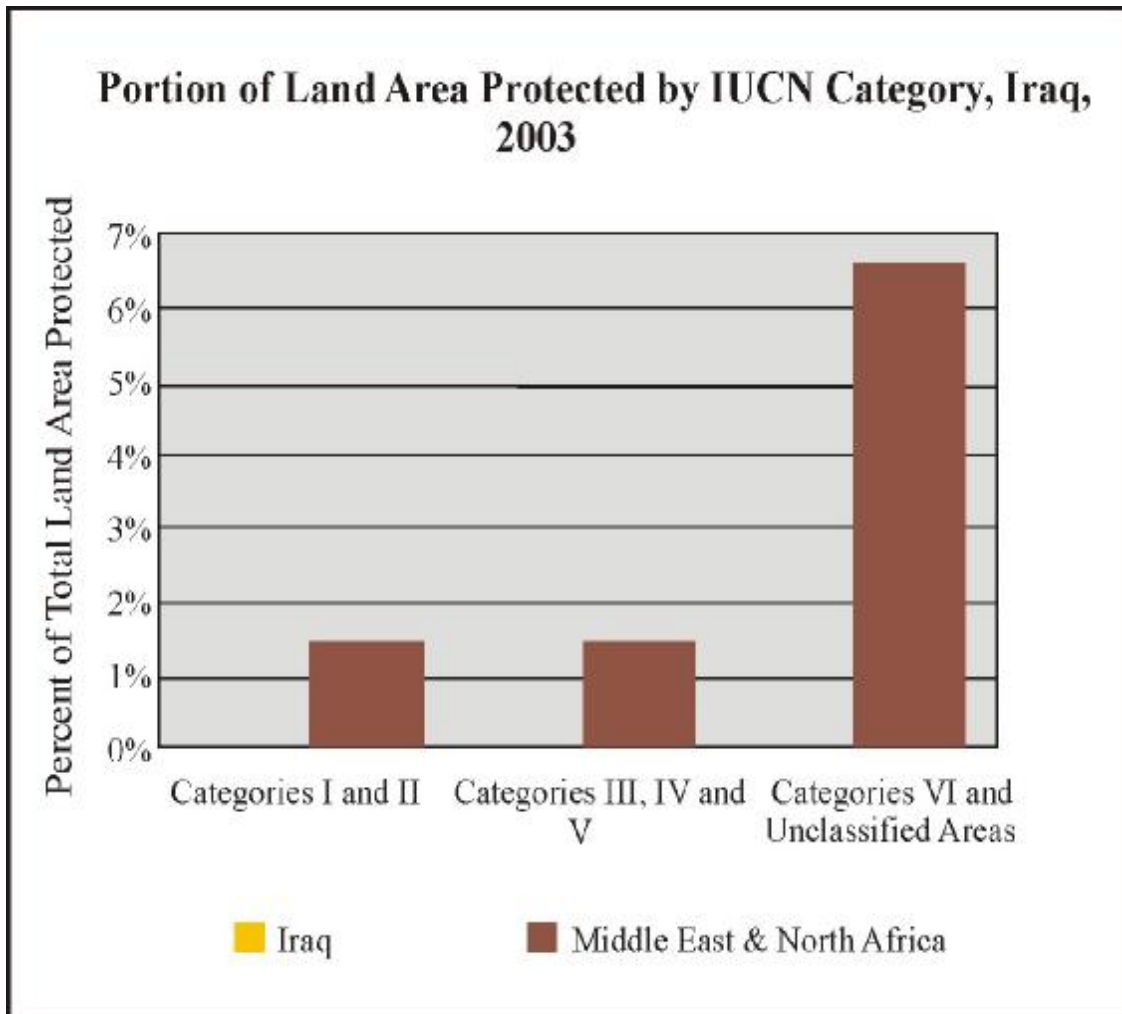
	<b>Middle East &amp; North</b>		
	<b>Iraq</b>	<b>Africa</b>	<b>World</b>
<b>Number and Status of Species, continued</b>			
Reptiles			
Number of Total Known Species, 1992-2003	99	X	X
Number of threatened species, 2002	2	X	293
Amphibians			
Number of Total Known Species, 1992-2003	11	X	X
Number of threatened species, 2002	X	X	Fish
Number of Total Known Species, 1992-2003	170	X	X
Number of threatened species, 1992-2002	2	X	742

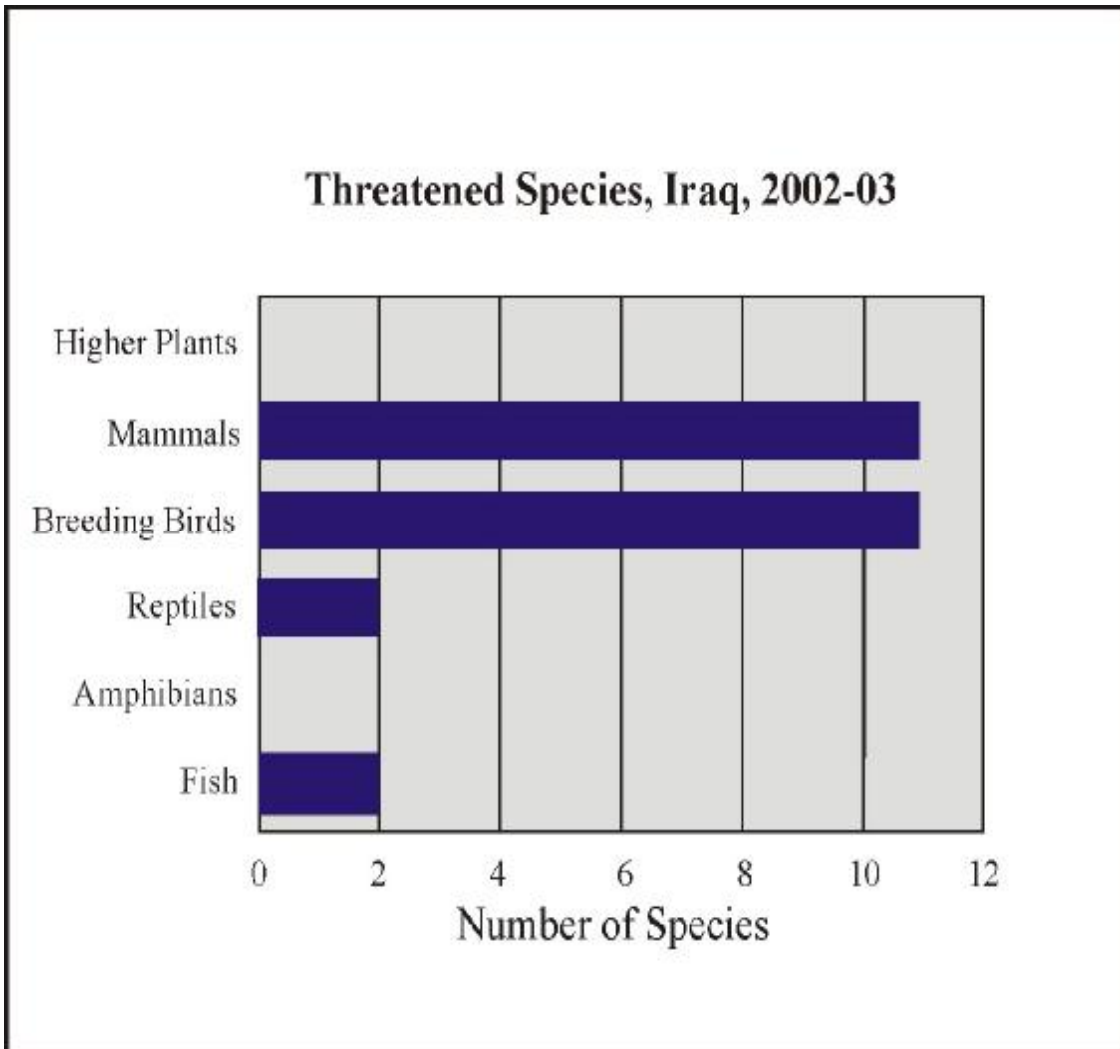
Table BII.1. (Cont'd).

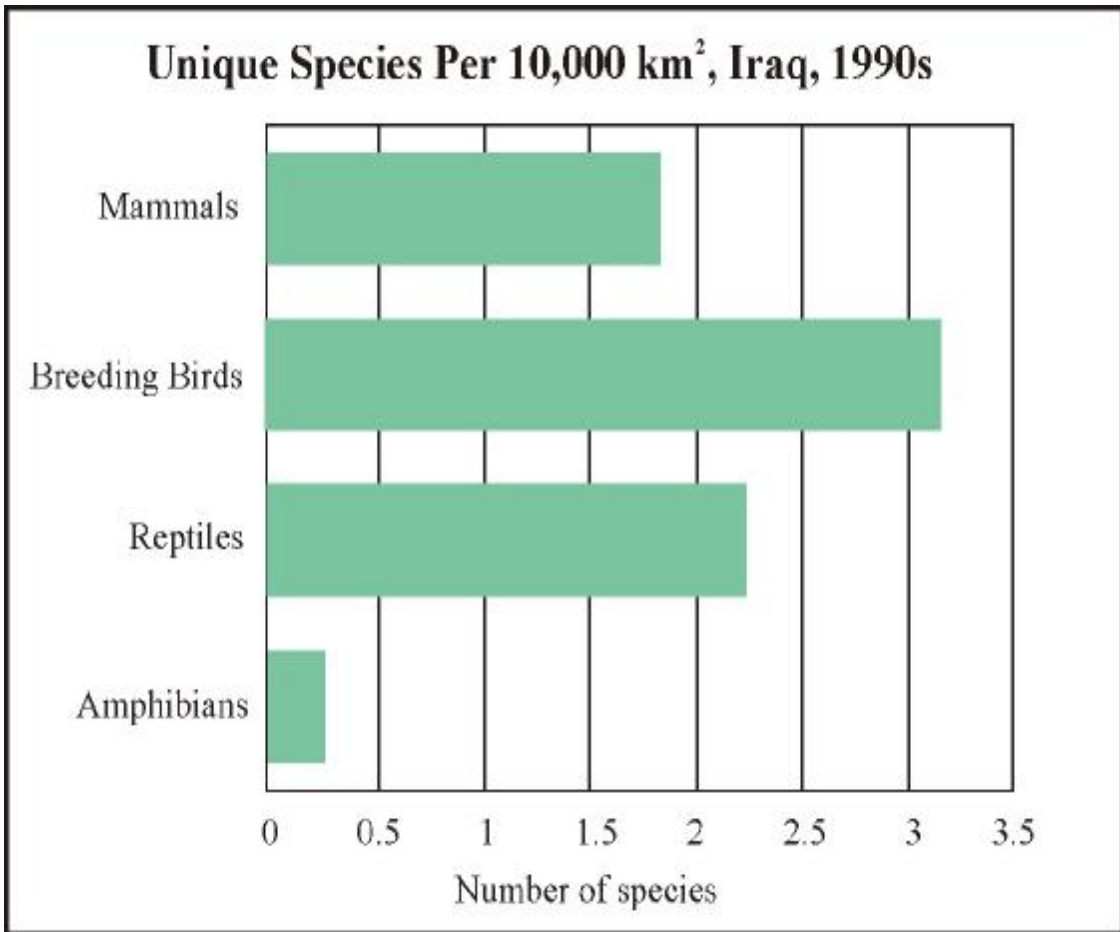
	<b>Middle East &amp; North</b>		
	<b>Iraq</b>	<b>Africa</b>	<b>World</b>
<b>Legal Trade in Selected Wildlife and CITES {c} Status</b>			
Year CITES Ratified	X		
Net International Legal Trade Reported by CITES, 2000 (number) {d}			
Live Lizards	X	1,547	
Live Snakes	X	846	
Live Primates	X	-296	
Live Parrots	X	50,330	
Lizard Skins	X	1,499	
Snake Skins	X	843	
Crocodile Skins	X	80	
Wild Cat Skins	X	6	

**Footnotes:**

- a. Marine and littoral protected areas are not included in the "Total Area Protected" above.
- b. Includes IUCN categories I-V. Marine and littoral protected areas are excluded from these totals.
- c. CITES is an acronym for the Convention on International Trade in Endangered Species of Wild Fauna and Flora.
- d. Positive numbers represent net imports; negative numbers represent net exports. Regional figures are the sum of country-level trade statistics, therefore, these numbers include trade between countries in the same region.







## **Biodiversity and Protected Areas—Sources and Definitions**

### **Protected Areas**

**Total Land Area** is reported by the Food and Agriculture Organization of the United Nations (FAO). The area of inland water bodies is included in the total.

### *Extent of Protected Areas by IUCN Category*

View full technical notes on-line at

[http://earthtrends.wri.org/pdf\\_library/data\\_tables/Bio2\\_2003.pdf](http://earthtrends.wri.org/pdf_library/data_tables/Bio2_2003.pdf)

An IUCN Management Protected Area is defined by IUCN as “an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.” As of Summer 2003 a World Database on

Protected Areas (WDPA) consortium has been working to produce an improved and updated database available in the public domain. Summary information presented in the WDPA, of which UNEP-WCMC is the custodian, includes the legal designation, name, IUCN Management Category, size in hectares, location (latitude and longitude), and the year of establishment for over 100,000 sites. IUCN categorizes protected areas by management objective.

All calculations for the analyses were performed by WRI using the WDPA GIS point file containing all nationally-designated protected areas, joined with a corresponding table showing area in hectares (provided by UNEP-WCMC). Due to variations in consistency and methodology of collection, data on protected areas are highly variable among countries. Some countries update their information with greater regularity; others may have more accurate data on extent of coverage. Many countries have an underreported number and/or extent of protected areas within their borders.

**Nature Reserves, Wilderness, Areas, and National Parks (categories I and II)** include all land area protected in the following IUCN categories:

### **Category Ia**

Strict nature reserve: A protected area managed mainly for scientific research and monitoring; an area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species.

### **Category Ib**

Wilderness area: A protected area managed mainly for wilderness protection; a large area of unmodified or slightly modified land and/or sea



retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.

## **Category II**

National park: A protected area managed mainly for ecosystem protection and recreation; a natural area of land and/or sea designated to:

- (a) protect the ecological integrity of one or more ecosystems for present and future generations;
- (b) exclude exploitation or occupation inimical to the purposes of designation of the area; and
- (c) provide a foundation for spiritual, scientific, educational, recreational, and visitor opportunities, all of which must be environmentally and culturally compatible.

**Natural Monuments, Species Management Areas, and Protected Landscapes and Seascapes (categories III, IV, and V)** include all land area protected in the following IUCN categories:

## **Category III**

Natural monument: A protected area managed mainly for conservation of specific natural features; an area containing one or more specific natural or

natural/cultural features that is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities, or cultural significance.

#### **Category IV**

Habitat/species management area: A protected area managed mainly for conservation through management intervention; an area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.

Category V. Protected landscape/seascape: A protected area managed mainly for landscape/seascape conservation and recreation; an area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological, and/or cultural value, and often with high biological diversity.

**Areas Managed for Sustainable Use and Unclassified Areas (category VI and "other" )** include some protected areas not classified by IUCN and:

**Category VI.** Managed mainly for the sustainable use of natural ecosystems. These areas contain predominantly unmodified natural systems, managed to ensure long-term protection and maintenance of biological

diversity, while also providing a sustainable flow of natural products and services to meet community needs.

**Marine and Littoral Protected Areas** (MPAs) include marine protected areas, littoral protected areas, and protected areas with both marine and littoral components. All are assigned an IUCN category (I-VI), although MPAs are excluded from the totals listed above. IUCN defines a Marine Protected Area as:

"any area of intertidal or subtidal terrain, together with its overlying water and associated flora and fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment." These marine protected areas include areas that are fully marine and areas that have only a small percentage of intertidal land. Many MPAs have large terrestrial areas. The extent of the marine portion of most protected areas is rarely documented. The degree of protection varies from one country to another, and may bear little relationship to the legal status of any site. "Littoral" is defined as any site which is known to incorporate at least some intertidal area.

**Protected Areas as a % of Total Land Area** is calculated by dividing the total land area protected under IUCN Categories I-V by the total land area in a country (see above for complete definitions). Marine and Littoral protected areas are excluded from this calculation.

Data for the **Number of Protected Areas, Number of Areas >100,000 ha,** and **Number of Areas > 1,000,000 ha** include areas classified in IUCN categories I-V. Marine and littoral protected areas are not included here.

**Number and Area of Wetlands of International Importance**, or Ramsar Sites, are defined under the Wetlands Convention, signed in Ramsar, Iran, in 1971. The Convention on Wetlands is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. In order to qualify as a Ramsar site, an area must have "international significance in terms of ecology, botany, zoology, limnology or hydrology." See [http://www.ramsar.org/key\\_criteria.htm](http://www.ramsar.org/key_criteria.htm) for a full listing of the selection criteria.

View full technical notes on-line at

[http://earthtrends.wri.org/searchable\\_db/variablenotes\\_static.cfm?varid=174  
&theme=7](http://earthtrends.wri.org/searchable_db/variablenotes_static.cfm?varid=174&theme=7)

**Number and Area of Biosphere Reserves** are terrestrial and coastal/marine environments that have been internationally recognized under the Man and the Biosphere Programme of the United Nations Educational, Scientific, and Cultural Organization (UNESCO). These sites have been selected for their value to

conservation and are intended to foster the scientific knowledge and skills necessary for promoting sustainable development. Each reserve must contain a diverse, natural ecosystem large enough to be an effective conservation

unit. Some Biosphere Reserves are shared by two or more countries, but the land area presented here corresponds to the portion of the shared Biosphere Reserve in that country only.

View full technical notes on-line at

[http://earthtrends.wri.org/searchable\\_db/variablenotes\\_static.cfm?varid=437  
&theme=7](http://earthtrends.wri.org/searchable_db/variablenotes_static.cfm?varid=437&theme=7)

### **Sources**

United Nations Environment Programme - World Conservation Monitoring Centre (UNEP-WCMC). World Database on Protected Areas (WDPA) Version 6.

Compiled by the World Database on Protected Areas Consortium. Cambridge, U.K., August, 2003.

United Nations Educational, Scientific, and Cultural Organization (UNESCO). 2002. Man and the Biosphere Reserves Directory. Paris: UNESCO. Available on line at: <http://www.unesco.org/mab/wnbr.htm>.

The Ramsar Bureau. 2002. *List of Wetlands of International Importance*. Gland: The Ramsar Bureau. Available online at: <http://ramsar.org/sitelist.pdf>.

## **Number and Status of Species**

### ***Known Species***

The **Number of Known Species** refers to the total number of known, described, and recorded species in a given country. Total numbers for all species groups include both endemic and non-endemic species (a species that is found in a particular region and nowhere else is said to be endemic to that region).

Numbers may also include introduced species. Figures are not necessarily comparable among countries because taxonomic concepts and the extent of knowledge about actual species numbers vary. Country totals of species are underestimates of actual species numbers.

The number of **Known Plants** include vascular plant species (flowering plants, conifers, cycads and fern species), but do not include mosses. **Known Mammals** exclude marine mammals. **Known Birds** include only birds that breed in that country, not those that migrate or winter there. The number of **Known Fish** include both freshwater and marine species.

Data are collected by the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) from a variety of sources, including, but not limited to: national reports from the convention on biodiversity, other national documents, independent studies, and other texts. Data are updated on a continual basis as they become available; however, updates vary widely by country. While some countries (UNEP-WCMC estimates about 12) have data that were updated in the last 6 months, other

species estimates have not changed since the data were first collected in 1992.

The complete UNEP-WCMC dataset from which **Known Species of Mammals, Birds, Plants, Reptiles, and Amphibians** were extracted represents only about 2% of the total species of the world. As a result, the numbers reported here are vast underestimates of the actual species worldwide. Mammals and birds are better known and represented than other taxonomic groups. Invertebrates in the kingdom *Animalia*, the kingdom *Protista*, and the kingdom *Monera* are not included in these country profiles. Data on **Known Species of Mammals, Birds, Plants, Reptiles, and Amphibians** are based on a compilation of available data from a large variety of sources. They are not based on species checklists. Data have been collected over the last decade without a consistent approach to taxonomy. Additionally, while the number of species in each country does change, not all countries are updated systematically, and some data may not reflect recent trends.

### **Threatened Species**

The **Number of Threatened Species** for include "all full species categorized at the global level as Critically Endangered, Endangered or Vulnerable." Subspecies, introduced species, species whose status is insufficiently known, and species whose status has not been assessed are excluded.

**Threatened species are classified in one of 3 categories:**

- 1. Critically Endangered:** includes species facing an extremely high risk of extinction in the wild in the immediate future.
- 2. Endangered:** includes species that are not "Critically Endangered" but are facing a very high risk of extinction in the wild in the near future
- 3. Vulnerable:** includes species facing a high risk of extinction in the wild in the medium-term future.

For each threat category, five criteria A-E are used to classify species in one of the three categories mentioned above:

A- Declining population

B- Small population and decline or fluctuation

C- Small population size and decline

D- Very small population/very restricted distribution

E- Quantitative analysis (e.g. Population Viability Analysis)

Data on threatened species are compiled and maintained by the IUCN in their Red List of Threatened Animals and the World List of Threatened Trees.

Generally, the information presented in the current IUCN Red List represents an accumulation of knowledge derived from previously published Red Lists. In some cases, assessments are the product of group discussion, but often they represent the judgement of individual Specialist Group members. In order to ensure greater accuracy and transparency in the listing



process, a peer review system of Red List Evaluators was initiated. Designated Red List Authorities are responsible for ensuring that all species they are responsible for are documented and re-assessed at regular intervals. For more detailed information please refer to the original source at: [http://www.redlist.org/info/categories\\_criteria2001.html](http://www.redlist.org/info/categories_criteria2001.html).

Data on **threatened species of mammals, birds, plants, reptiles, and amphibians** underestimate the total number of threatened species in these groups worldwide. To date, threatened species assessments have been undertaken for 100% of described birds and mammals, for less than 15% of described reptiles and amphibians, and for less than 10% of described fish. For plants, threatened species assessments have been undertaken for less than 1% of described mosses, less than 72% of Gymnosperms, less than 5% of Dicotyledons, and less than 2% of Monocotyledons. Beyond the group of described species, there are many species that have yet to be described and whose status is yet unknown. Data on threatened species is better represented for mammals and birds than for other taxonomic groups. Far-ranging species, such as some marine species, may not be well-documented in the country data.

### Sources

United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). 2002-2003. *UNEP-WCMC Species Database*. Cambridge, U.K.: UNEP-WCMC. Web site: <http://www.unep-wcmc.org>.

International Union for Conservation of Nature and Natural Resources (IUCN). 2002. *2002 IUCN Red List of Threatened Species*. IUCN: Gland, Switzerland.

Available on-line at: <http://www.redlist.org/info/tables/table5.html>;  
<http://www.redlist.org/info/tables/table1.html>.

### **Legal Trade in Selected Wildlife and CITES Status**

**Year CITES ratified** indicates the year that a country has either *signed* or *ratified* The Convention on International Trade in Endangered Species of Wild Fauna and Flora. By signing the treaty, a state recognizes the authentic text, intends to complete the procedures for becoming legally bound by it, and is committed not to act against the treaty's objectives before ratification. Ratification (or its equivalents of acceptance, approval, or accession) binds the state to observe the treaty. Depending on a country's system of governance, signing the treaty may be simply an executive decision while ratification requires legislative approval. CITES is an international agreement to ensure that the survival of wild animals and plants is not threatened by international trade. It has been in force for almost 30 years; today, it accords varying degrees of protection to more than 30,000 species of animals and plants, whether they are traded as live specimens, fur coats, or dried herbs. CITES is legally binding on countries that have joined the Convention, and provides a framework to be respected by each Party, which has to adopt its own domestic legislation to make sure that CITES is

implemented at the national level. More information is available at <http://www.cites.org>.

**View full technical notes on-line at**

[http://earthtrends.wri.org/searchable\\_db/variablenotes\\_static.cfm?varid=632  
&theme=7](http://earthtrends.wri.org/searchable_db/variablenotes_static.cfm?varid=632&theme=7)

**Net International Legal Trade Reported by CITES** is the balance of imports minus exports of selected wildlife and wildlife products from the spectrum of wildlife and wildlife products for which export, re-export, and import permits are issued. Net exports are shown as negative, and all figures are for trade reported for the year 2000. Data on net exports and net imports as reported by CITES correspond to legal international trade and are based on permits issued, not actual items traded. Figures may be overestimates if not all permits are used that year. In addition, some permits issued in one year are used at a later date. For these reasons, numbers of exports and imports may not match exactly for any given year. Regional values represent the sum of intra-regional and inter-regional trade for all countries in a given region, and is not limited to the sum of exports into and out of a region. World totals show the total number of exports, since calculating the balance of trade for the world would have canceled all figures. About 25,000 species of plants and 5,000 species of animals are listed under CITES; many species groups are not listed.

**Live Lizards** include the net number of import, export, and re-export permits issued in the year 2000 for individuals from all *Sauria* and *Rhynchocephalia* species listed under the CITES treaty, while **Lizard Skins** represent the net number of permits issued for whole skins for these groups of species. **Live Snakes** include the net number of permits issued in the year 2000 for individuals from all *Serpentes* species listed under the CITES treaty, while **Snake Skins** represent the net number of permits issued for whole skins for these groups of species. **Live Primates** include the net number of permits issued in the year 2000 for individuals of all monkeys, apes, and prosimians listed under the CITES treaty. **Live Parrots** include the net number of permits issued in the year 2000 for individuals of all *Psittaciformes* species listed under the CITES treaty. Crocodylian skins represent the number of permits issued in the year 2000 for whole skins belonging to individuals of *Crocodylia* species that are listed under the CITES treaty. Cat skins represent the number of permits issued in the year 2000 for whole skins belonging to individuals of *Felidae* species that are listed under the CITES treaty.

### Sources

Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) Secretariat. *List of Contracting Parties*. Available on-line at: <http://www.cites.org/eng/parties/alphabet.shtml> (United Nations Environment Program, Nairobi, Kenya, May 2002).

KRG, Ministry of Construction & Housing, Directorate General of Roads & Bridges  
Preliminary Environmental and Social Screening the **Dwin – Graw – BabaJisek - Rkawa** local road

United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC). Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) annual report data, WCMC CITES Trade Database (UNEP-WCMC, Cambridge, U.K., July 2002).