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## ENVIRONMENTAL AUDIT REPORT ENVIRONMENTAL COMPLIANCE MONITORING OF GOMAL ZAM MULTIPURPOSE DAM PROJECT

REPORT 01

May 2012

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## ENVIRONMENTAL AUDIT REPORT

### ENVIRONMENTAL COMPLIANCE MONITORING OF GOMAL ZAM MULTIPURPOSE DAM PROJECT

## REPORT 01

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## **Acronym**

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AEAI	Advanced Engineering Associates International, Inc
PD	Project Director
PM	Project Manager
EMMP	Environmental Management and Monitoring Program
HBP	Hagler Bailly Pakistan
HSE	Health Safety and Environment Officer
ID	Identification number or code
WAPDA	Water and Power Development Authority
GZDS	Gomal Zam Dam Site
NEQS	National Environmental Quality Standards
OHS	Occupational Health and Safety
USAID	United States Agency for International Development
XEN	Executive Engineer

## **Introduction**

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The Government of United States of America through U.S. Agency for International Development (USAID) is funding Gomal Zam Dam construction and operation work (the ‘Project’). Advanced Engineering Associates International, Inc. (AEAI) is providing monitoring and implementation support to USAID for the Project and, as part it, has acquired the services of Hagler Bailly Pakistan (HBP) to undertake environmental compliance monitoring of the Project.

The purpose of environmental compliance monitoring is to assess the performance of the implementation team of the Project at Gomal Zam Dam site (GZDS) against the Environmental Management and Monitoring Program (EMMP).

For this purpose, HBP undertook environmental audit at GZDS. The results of the audit are documented in this report.

### **Environmental Audit Activities**

The environmental audit was undertaken on May 9-10, 2012. The activities undertaken during this visit included:

- ▶ Opening Meeting with the Water and Power Development Authority (WAPDA) management which was attended by the following:
  - ▷ Mr Saleem Khan, Project Director (PD), WAPDA
  - ▷ Mr Syed Akhtar Shah, Project Manager (PM), WAPDA
  - ▷ Mr Abdullah, Executive Engineer (XEN), Coordinator, WAPDA
  - ▷ Mr Rab Nawaz, Environment Health, and Safety (EHS) Officer, WAPDA
- ▶ Walk through the GZDS to inspect different facilities and locations of the Project, specifically where the Project activities are undertaken. This included the following:
  - ▷ Dam site and spillway
  - ▷ Grouting sites
  - ▷ Switchyard and power house
  - ▷ Transmission lines
  - ▷ Campsite and workshop area
  - ▷ Access roads
- ▶ Closing meeting with WAPDA management to review the environmental issues and discuss the preliminary outcome of the audit.
- ▶ The Environment Mitigation and Monitoring Plan Matrix is shown (see **Appendix A** Table 6.2: Environmental Mitigation and Monitoring Plan, Gomal Zam Multipurpose Project Rapid Environmental Analysis and EMMP; Élan 2010)

## **Summary of the results**

During the audit observations were made and issues were shared with the WAPDA management. Most of the proposed corrective actions were agreed to be completed within one week, whereas for some identified issues target dates were agreed. The main observations and agreed corrective actions are presented on the following pages (see Register of Audit Observations).

## Register of Audit Observations

<i>Issue ID</i>	<i>Visit No.</i>	<i>Issue</i>	<i>Photographic ID</i>	<i>Date Raised</i>	<i>Proposed Corrective Action</i>	<i>Responsibility</i>	<i>Target date</i>	<i>Status</i>	<i>Verification</i>	<i>Comments</i>
1	1	No evidence was available that the vehicles used for the project were compliant with the national environmental quality standards (NEQS) (Ref: Appendix , , 2.4 B, 4.2 B)	—	May 10, 2012	The contractor will be asked to provide noise and emission testing results of the vehicles used for the project	EHS officer	Before next audit visit	In Progress	—	
2	1	Sewage system was not constructed for the project camps. The waste water of camp were drained directly in to the dam reservoir (Ref: Appendix 2.1 C, 2.1 B, 1.1 D).	1, 2	May 10, 2012	For the sewage, appropriate treatment and disposal system should be constructed having adequate capacity, in accordance with NEQS	EHS officer	June 10, 2012	In Progress		
3		Washrooms were constructed for worker at Dam site and the waste water of washroom was drain directly in Dam reservoir (Ref: Appendix 2.1 C, 2.1 B, 1.1 D).	3	May 10, 2012	The washrooms at Dam site shall be demolished to avoid water contamination	EHS officer	May 25, 2012	In progress		

Issue ID	Visit No.	Issue	Photographic ID	Date Raised	Proposed Corrective Action	Responsibility	Target date	Status	Verification	Comments
4	1	Waste, heap of empty plastic bottles was found scattered at various location especially at saddle Dam toward reservoir area (Ref: <b>Appendix 2.1 B 2.1 C</b> ).	4	May 10, 2012	The plastic bottles should be collected and properly disposed	EHS officer	May 15, 2012	In progress		
5		Huge quantity of empty cement bags at TF s were thrown in open along the reservoir area. (Ref: <b>Appendix 12.1 B 2.1 C</b> ).	5	May 10, 2012	The cement bags from the area should be collected and disposed in a manner that does not cause soil or water contamination	EHS officer	May 15, 2012	In progress		
6	1	Gloves, and safety shoes were not wore by any worker in site or in workshops (Ref <b>Appendix: 2.5C</b> )	6	May 10, 2012	Gloves, and safety shoes shall be used while handling carbon soot	EHS officer	May 18, 2012	In progress		
7	1	Used oily gloves, clothing and empty cement bags was thrown at different places (Ref: <b>Appendix 2.1B, 2.5 B, 3.4 B, 4.3B, 2.5 C</b> )	07, and 08	May 10, 2012	Awareness sessions should be held for the staff for proper disposal of waste. The workers should regularly remove waste from work area.	EHS officer	May 15, 2012	In Progress	—	—

Issue ID	Visit No.	Issue	Photographic ID	Date Raised	Proposed Corrective Action	Responsibility	Target date	Status	Verification	Comments
8	1	Oil drums were observed at different places and oil storage area was not demarcated	09 and 10	May 10, 2012	oil storage area shall be demarcated and floor should be constructed with concrete	EHS officer	May 25, 2012	In Progress	—	—
9	1	Most of the fire extinguishers were not in used condition and were not placed near the work area (Ref: Exhibit 1.2 D,)	11	April 16, 2012	All fire extinguishers should be proper functional and placed near to work area.	EHS officer	next May 25, 2012	In Progress	—	—
10		No evidence of firefighting training was available ( Ref: Appendix 1.2 D 2.5 B)		May 10, 2012	The camp staff should be provided firefighting training	EHS officer	Before next audit visit	In Progress	—	—
11	1	Road signage were not fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic (Ref: Appendix 1.4 B, 3.4 B, 1.4 C)		May 10, 2012	Road signage should be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic	EHS officer	May 28, 2012	In Progress	—	—

Issue ID	Visit No.	Issue	Photographic ID	Date Raised	Proposed Corrective Action	Responsibility	Target date	Status	Verification	Comments
12	1	Waste was not segregated in waste storage area. <b>Appendix 1.1 D, 10.2 A, 2.1 B).</b>	12	May 10, 2012	In the store yard all waste shall be properly marked and stored separately. No waste shall be stored within the passage way.	EHS officer	May 15, 2012	In Progress	—	—
13	1	Waste disposal plan was not available (Ref: <b>Appendix , 10.2 A, 2.1B)</b>		May 10, 2012	Proper waste disposal plan should be developed	EHS officer	Before next audit visit	In progress		
14	1	First aid kits were not available at work sites(Ref: <b>Appendix 2.2B, 2.6 B)</b>		May 10, 2012	The First aid kits should be available at work sites	EHS officer	May 12, 2012	In progress	—	—
15	1	Oil stains and oil leakage from vehicles were observed at different places (Ref: <b>Appendix 4.8B,, 2.1C, 4.8)</b>	13	May 10, 2012	Any spillage shall be removed immediately. For this purpose, spill control kits shall be made available near the work areas. The vehicles leakage should be regularly monitored; Waste oils should be collected in drums and sold to the recycling contractors in Tank/D. I. Khan.	EHS officer	May 20 2012	In Progress	—	—

Issue ID	Visit No.	Issue	Photographic ID	Date Raised	Proposed Corrective Action	Responsibility	Target date	Status	Verification	Comments
16	1	Soil contamination were observed at switchyard and Dam site <b>Appendix 1.1 D, 10.2 A, 2.1 B</b> ).	14	May 10, 2012	The contaminated soil should be collected and properly disposed	EHS officer	May 27 2012	In progress		
17	1	Water contamination (Oil, cement bags and waste) were observed at switchyard, powerhouse and spill way sites due to grouting activities, cause considerable death of fish fauna in these sites ( <b>Ref: Appendix 1.1 D, 10.2 A, 2.1 B</b> ).	15 and 16	May 10, 2012	Oil, cement bags and waste shall be collected and properly disposed to avoid water contamination to save the fish fauna in the downstream river	EHS officer	June 15, 2012	In progress		
18	1	Dumpers and project vehicles were observed working in water resources along the spill way of the Dam <b>Appendix 1.1 D, 10.2 A, 2.1 B</b> )	17	May 10, 2012	The drivers should be instructed to avoid to work in water resources to save the aquatic fauna	EHS officer	June 22, 2012	In progress		
19	1	Drinking water for labor was obtained from Dam reservoir, has odor		May 10, 2012	The drinking water for project staff should be analysis against the NEQS	EHS officer	Before next audit visit	In progress		

<i>Issue ID</i>	<i>Visit No.</i>	<i>Issue</i>	<i>Photographic ID</i>	<i>Date Raised</i>	<i>Proposed Corrective Action</i>	<i>Responsibility</i>	<i>Target date</i>	<i>Status</i>	<i>Verification</i>	<i>Comments</i>
20	1	No evidence was available of private agricultural land acquisition for installation of the transmission line ( <b>Ref: Appendix 5.1C</b> )		May 10, 2012	The private land should be acquired in accordance with the LAA procedures	EHS officer	Before next audit visit	In progress		
21	1	Vehicle repairing in the field was observed ( <b>Ref: Appendix 1.1 B, 3.1B, 4.8B</b> )		May 10, 2012	Vehicles will not be repaired in the field. If unavoidable, impervious sheathing should be used to avoid soil contamination	EHS officer	May, 20, 2012	In progress		

**Exhibit I: Non-Compliance Photographs of GZDS**



**Photograph 01:** Waste water of washroom drained directly in to the dam reservoir



**Photograph 02:** Waste water of washroom in open



**Photograph 03:** Washroom were constructed for worker at Dam site



**Photograph 04:** Empty plastic bottles were found scattered at various location



**Photograph 05:** Empty cement bags at TF s



**Photograph 06:** Gloves, and safety shoes were not wore by any worker



**Photograph 07:** Used cement bags thrown at different places



**Photograph 08:** Used oil gloves, clothing and cement bags



**Photograph 09:** Oil storage area was not demarcated



**Photograph 10:** Oil drums were observed at different places



**Photograph 11:** Fire extinguishers were not in used condition



**Photograph 12:** Waste was not segregated



**Photograph 13:** Oil stains and oil leakage from vehicles



**Photograph 14:** Soil contamination at switch yard



**Photograph 15:** Water contamination at switchyard, powerhouse



**Photograph 16:** Water contamination at switchyard, powerhouse. cause fish death



**Photograph 17:** Dumpers and project vehicles were working in water resources



**Photograph 18:** Vehicle repairing in the field and oil leakage

## **Appendix A: Environmental Mitigation and Monitoring Plan Matrix**

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See following pages

**Table A: Impacts Associated with Project Design and Site**

<i>No</i>	<i>Aspects/Impacts</i>	<i>Mitigation Action</i>	<i>Monitoring Action</i>	<i>Comments</i>
	<b>Positive Impacts</b>			
1	Reduction of floods frequency in Gomal River/Gomal Zam		The reservoir inlet and water release data from the dam to be recorded on a regular basis	Members of the local community reported that in 2011 water was released from the reservoir that caused flooding downstream of the dam; According to WAPDA, the flood was due to overflow of dam reservoir not due to any unplanned opening of spillway
2	Regulated supply of irrigation water from the reservoir, and hence increased cultivation in the command area.	Capacity building and awareness raising of farmers on efficient irrigation techniques; appropriate use of fertilizers and pesticides; promotion of organic farming and integrated pest management (IPM) practices; protection against water logging and soil salinity.		The responsible department plans to undertake capacity building and awareness raising campaigns once the operation phase starts
3	Electricity generation from the project	Availability of electricity to the local population. Spending a portion of the proceeds from the electricity generation on the area development.		Infrastructure for power supply is under construction. WAPDA plans to provide the power to the local population once the power house is commissioned
	<b>Negative Impacts</b>			
4	Landslides in reservoir area	Keep the water level in the reservoir lower than the left bank saddle (Ref: Section 2.1 of Annex D, EIA report of the Project) <sup>1</sup>	The landslides need to be monitored during the initial filling of the reservoir and afterwards.	Adequate information could not be gathered on this issue in this visit. It will covered in the next audit

<sup>1</sup> Preliminary EIA, Coyne et Bellier, 1995

<i>No</i>	<i>Aspects/Impacts</i>	<i>Mitigation Action</i>	<i>Monitoring Action</i>	<i>Comments</i>
5	Soil erosion and siltation in reservoir, thus reducing the reservoir capacity	Flushing sediments through the dam. Further studies to determine the extent of soil erosion in the catchment area, and to identify remedial measures; develop and implement watershed management and afforestation plan (structures such as check dams and gabions; terracing; bioengineering; plantation of trees, shrubs and grasses; controlled grazing; others.	Monitor the reservoir siltation and silt releases from the dam; Monitor the implementation and effectiveness of the watershed management plan.	Local community complained about the high silt levels in the water released from the dam; Silt level is not monitored; It is understood that further studies mentioned in the mitigation action are not yet complete
6	Erosion of riverbed downstream of dam (caused by release of silt-free water from reservoir)	Survey of river bed downstream of dam to identify potentially at-risk structures. Reinforcement of bridges, culverts, and other structures where needed	Monitor the river bed erosion, particularly near the bridges, culverts and other structures.	Adequate information could not be gathered on this issue in this visit. It will covered in the next audit
7	Decreased soil fertility because of decreased silt in irrigation water	Use of fertilizer by the growers. Encourage using organic farming and IPM techniques. Capacity building and awareness raising needed.	Monitor the soil fertility and fertilizer usage practice in the command area	The responsible department plans to undertake monitoring, capacity building and awareness raising campaigns once the operation phase starts
8.1	Increased soil salinity	Use appropriate cultivation practices such as over irrigation and pre-sowing flooding for non- or slightly-saline soils. Capacity building of growers.	Monitor soil salinity for different soil types; monitor cultivation practices	The responsible department plans to undertake monitoring, capacity building and awareness raising campaigns once the operation phase starts
8.2		Reclamation of coarse to medium textured saline soils.		Adequate information could not be gathered on this issue in this visit. It will covered in the next audit
8.3		Carry out further studies for saline, moderately fine to fine soils.		It is understood that these are not yet undertaken
9.1	Loss of natural vegetation in the project area	Compensation to be paid to the owners for cutting of trees on privately owned land.	Monitor the implementation and effectiveness of the replantation.	No record of cutting of trees if any and compensation of cutting of trees was available

<i>No</i>	<i>Aspects/Impacts</i>	<i>Mitigation Action</i>	<i>Monitoring Action</i>	<i>Comments</i>
9.2		Re-plantation with local species; use salt resistant species for the saline areas; prepare re-plantation plan		The re-plantation plan will be developed once the construction is completed
10.1	Habitat destruction	Conduct field investigations for key wildlife species including houbara bustard. 500 animals have died because of habitat destruction.		It is understood that the field investigation is not yet undertaken
10.2		Measures such as controlled hunting and appropriate waste disposal to be implemented to safeguard water foul in the reservoir area.		None of these mitigations measure have been carried out
10.3		Strengthen the health care facilities in the command area.		This mitigations measure has not been carried out
11.1	Conflicts caused by unavailability of irrigation water to some communities in the area	Agreements between different communities/tribes.		No evidence of agreement between different communities was available
11.2		Uniform development of the area.		No plans for implementation of the mitigation measure available
11.3		Local non-governmental organizations (NGOs) should be mobilized to facilitate dialog and agreements among the tribes, and to determine the development needs of the area.		No plans for implementation of the mitigation measure available
12	Influx of people in the area, potentially causing conflicts	Agreements between different communities/tribes.		None such agreements were available

<i>No</i>	<i>Aspects/Impacts</i>	<i>Mitigation Action</i>	<i>Monitoring Action</i>	<i>Comments</i>
13	Loss of grazing area because of reservoir impounding	Payment of Qaumi commission; seeding for grasses as part of watershed management; increased fodder production in command area; rural development (social and physical infrastructure) in the area based upon the needs and p	Monitor the negative impacts on the local herders/others.	Compensation has not been made
14	Dam collapse	Preparation of Operational Manual including Emergency Response Plan; operation of dam according to Operational Manual; capacity building of O&M staff.	Compliance monitoring	Emergency response plan not yet developed
15.1	Modified water flow regime in Gomal River	Regular maintenance of drainage network; Conduct further studies to identify impacts of flow regime changes.	Monitoring of river flow at different locations (reservoir inlet, dam, barrage, canals, confluence with Indus River)	It is understood that these studies are not yet undertaken; monitoring data was not available
15.2		Install meteorological station at the dam site to record the key meteorological data including temperature, precipitation, humidity, and wind speed/ direction.		Meteorological station was not installed
15.3		Agreement with the Government of Afghanistan to ensure water availability for the Project		None such agreement was initiated or available
16.1	Reservoir induced seismicity	Conduct further studies for reservoir induced seismicity; Conduct seismic risk analysis		It is understood that these studies are not yet undertaken
16.2		Appropriate instruments to be installed to monitor the seismicity at the site.		Seismicity monitoring instruments not installed
17	Slope stabilization	Mitigation measures such as slope reinforcements, grouting, or bracing need to be designed and implemented after carrying out detailed investigations		Adequate information could not be gathered on this issue in this visit. It will covered in the next audit

<i>No</i>	<i>Aspects/Impacts</i>	<i>Mitigation Action</i>	<i>Monitoring Action</i>	<i>Comments</i>
18	Eutrophication of Reservoir	Large trees if present in the reservoir area need to be cut before impounding. Conduct detailed study to investigate this aspect in a greater depth. This aspect can also be covered under the watershed management studies, proposed earlier.		Information on tree removed from the reservoir area not available; It is understood that the detailed study is not yet undertaken
19.1	PCB in Transformer Oil	Ensure that new transformers are PCB free (Obtain certificates from manufacturers).	Compliance	Adequate information could not be gathered on this issue in this visit. It will covered in the next audit
19.2		Ensure that transformer oil brought to site is PCB free		Adequate information could not be gathered on this issue in this visit. It will covered in the next audit
20	Climate change	Conduct studies to address concerns related to climate change (such as increased frequency and intensity of extreme events), and to frame any mitigation or adaptation measures for the Project.	Compliance	It is understood that these studies are not yet undertaken

**Table B: Construction Phase Impacts – Remaining Works at Dam/Powerhouse**

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
1.1	<b>Contractor Demobilization</b>	Soil Erosion and Contamination	Vehicular traffic on unpaved roads will be avoided as far as possible.	
			Vehicles and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.	Vehicles repairing were observed in the field, and no impervious sheathing underneath were available to avoid soil and water contamination
1.2		Air Quality Deterioration	Construction machinery and vehicles will be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.	No proper arrangements were available
			Fugitive dust emissions will be minimized by appropriate methods, such as spraying water on soil, where required and appropriate.	No evidence of sprinkling of water on dust generate roads were available.
1.3		Noise	Vehicles will have exhaust mufflers (silencers) to minimize noise generation.	
			Nighttime traffic will be avoided near the communities. Local population will be taken in confidence if such work is unavoidable.	
			Vehicular traffic through the communities will be avoided as far as possible. Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities.	
1.4		Safety Hazards	Road signage will be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic	The road signage were not available at appropriate locations to reduce safety hazard
			Project drivers will be trained on defensive driving	Evidence of such trainings were not available

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
			Vehicle speeds near / within the communities will be kept low, to avoid safety hazard and dust emissions.	
			EHS plan will be strictly followed (The IFC's EHS Guidelines <sup>35</sup> can be used for this purpose).	No evidence was available that IFC's EHS Guidelines <sup>35</sup> was strictly followed
1.5		Damage to Infrastructure	All damaged infrastructure will be restored to original or better condition.	No infrastructure damage record if any was available
2.1	<b>Construction Camp Operation</b>	Soil Erosion/ Contamination; water contamination	Contractors will prepare a waste disposal plan and submit to MC/EHS Engineer for approval.	Waste disposal plan was not prepared by the contractor before or during the project activities.
			For the domestic sewage, appropriate treatment and disposal system will be constructed having adequate capacity, in accordance with NEQS (Table 2.1) <sup>2</sup> .	The domestic sewage system was open, all wastes were thrown to the dam catchment area
			Waste oils will be collected in drums and sold to the recycling contractors in Tank/D. I. Khan.	No evidence was available that waste oils were collected in drums and sold to the recycling contractors in Tank/D. I. Khan
			The inert recyclable waste from the site (such as card board, drums, broken/used parts, etc.) will be sold to recycling contractors in Tank/D. I. Khan. The hazardous waste will be kept separate and handled according to the nature of the waste.	No evidence was available that inert recyclable waste was collected in drums and sold to the recycling contractors in Tank/D. I. Khan, and also no evidence was available that the hazardous waste was kept separate and handled according to the nature of the waste.
			Domestic solid waste from the construction camp will be disposed in a manner that does not cause soil contamination.	All such waste was dispose off in open air in the project area

<sup>2</sup> Gomal Zam Multipurpose Project Rapid Environmental Analysis and EMMP; Élan 2010

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
			The camp sites will be completely restored after the completion of the construction works. All temporary structures will be demolished, land leveled and re-contoured to the original condition or better. All debris and any other material will be removed from the site. The photographs if taken prior to the camp establishment will be used to restore the area.	
2.2		Air Quality Deterioration	Generators and vehicles will be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.	
			Fugitive dust emissions will be minimized by appropriate methods, such as spraying water on soil, where required and appropriate. Waste water from kitchen and washing area of the construction camp may be used for water spraying.	No record or evidence of sprinkling of water on dust generated road was available. The waste water from kitchen and washing areas were drained in open area
2.3		Loss of Vegetation	The construction crew will be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood will not be allowed.	The construction crew was using fuel wood for cooking purposes
2.4		Noise	Generators and vehicles will have exhaust mufflers (silencers) to minimize noise generation. Compliance with NEQS will be ensured.	No evidence was available that the generators and vehicles used for the transportation of project equipment were compliant with the national environmental quality standards (NEQS).
2.5		Safety Hazards	Protective fencing to be installed around the Camp to avoid any accidents.	Protective fencing at labor, and army and FC camps were not available
			Firefighting equipment will be made available at the camps.	About 95 % firefighting equipment were out of order
			The camp staff will be provided firefighting training	No evidence was available that firefighting training was provide to the camp staff

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
			All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.	No safety precautions were followed
			EHS Plan to be followed.	No evidence EHS plan was available
2.6		Public Health	The construction camps and site offices will have first-aid kits.	First-aid kits were not available at most of project sites
			The construction crew will be provided awareness for the transmissible diseases (such as HIV/AIDS, hepatitis B and C).	Training or awareness for occupational health and safety has not been provided
2.7		Social and Gender Issues	Employment to locals will be maximized.	Maximum employment were provided to locals
			No child labor will be employed.	No child labor was observed
3.1	<b>Transportation of Equipment and Construction Materials</b>	Soil Erosion and Contamination	Vehicular traffic on unpaved roads will be avoided as far as possible.	
			Vehicles and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.	Vehicles repairing were observed in the field, and no impervious sheathing underneath were available to avoid soil and water contamination
3.2		Air Quality Deterioration	Vehicular traffic on unpaved roads will be avoided as far as possible. Operation of vehicles and machinery close to the water channels, water reservoir will be minimized.	
			Vehicles will be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.	
3.3		Noise	Vehicles will have exhaust mufflers (silencers) to minimize noise generation.	

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
			Nighttime traffic will be avoided near the communities. Local population will be taken in confidence if such work is unavoidable.	
3.4		Safety Hazards	Road signage will be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic.	The road signage were not available at appropriate locations to reduce safety hazard
			Project drivers will be trained on defensive driving.	No evidence of training of drivers were available
			Vehicle speeds near / within the communities will be kept low, to avoid safety hazard and dust emissions.	
			EHS Plan to be strictly followed	No evidence was available that EHS plan was strictly followed
3.5		Damage to Infrastructure	All damaged infrastructure will be restored to original or better condition.	No infrastructure damage record was available
4.1	<b>Construction works</b>	Blocked Access	A bypass route should be constructed at the project site to divert the through traffic, thus avoiding the public traffic passing through the site.	
4.2		Noise and Vibration	Construction machinery will be appropriate noise muffling arrangement. NEQS will be followed.	No evidence was available that the construction machinery used for the project were compliant with the national environmental quality standards (NEQS)
4.3		Safety Hazards	The construction sites will have protective fencing to avoid any unauthorized entry.	Protective fencing at labor, and Army and FC camps were not available
			The EHS plan will be strictly followed.	No evidence was available that EHS plan was strictly followed
4.4		Damage to Infrastructure	All damaged infrastructure will be restored to original or better condition	No infrastructure damage record was available

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
4.5		Social Issues	Employment to locals will be maximized.	Maximum employment were given to locals
			No child labor will be employed.	No child labor was observed
4.6		Sites of Historical, Cultural, Archeological or Religious Significance	In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, the work will be stopped at that site.	
			The provincial and federal archeological departments will be notified immediately, and their advice will be sought before resumption of the construction activities at such sites.	
4.7		Soil Erosion	After the completion of the construction works, campsites and other construction sites will be completely restored. No debris, surplus construction material or any garbage will be left behind.	
			Photographic record if maintained for pre-project conditions will be used to restore the area.	Non photographic record of pre-project activities were available
4.8		Soil Contamination	Vehicles and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.	Vehicles repairing were observed in the field, and no impervious sheathing underneath were available to avoid soil and water contamination
			Waste oils will be collected in drums and sold to the recycling contractors.	No evidence was available that waste oils was collected in drums and sold to the recycling contractors

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
			The inert recyclable waste from the site (such as card board, drums, broken/used parts, etc.) will be sold to recycling contractors. The hazardous waste will be kept separate and handled according to the nature of the waste.	No evidence was available that inert recyclable waste was collected in drums and sold to the recycling contractors, and also no evidence was available that hazardous waste was kept separate and handled according to the nature of the waste.
			Leaked oil collection arrangement (such as a channel and a drain pit below the transformers) will be incorporated in the design of the transformer foundations at the powerhouse and switchyard.	
4.9		Air Quality Deterioration	Construction machinery, generators and vehicles will be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.	No evidence were available that construction machinery, generators and vehicles used for the project equipment were compliant with the national environmental quality standards (NEQS)
			Fugitive dust emissions will be minimized by appropriate methods, such as spraying water on soil, where required and appropriate.	No evidence of sprinkling of water on dusted road was available
4.10		Loss of natural vegetation/ Aesthetic Value	Tree plantation will be carried out at the site.	No tree plantation were carry out at site, it is expected that tree plantation will be done after completion of construction work

**Table C: Construction of Transmission Line Phase Impacts**

	<i>Project Activities</i>	<i>Impact</i>	Action	<i>Comments</i>
1.1	<b>Contractor Mobilization and Demobilization</b>	Soil Erosion and Contamination	Vehicular traffic on unpaved roads will be avoided as far as possible.	
			Vehicles and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.	Vehicles repairing were observed in the field, and no impervious sheathing underneath were available to avoid soil and water contamination
1.2		Air Quality Deterioration	Construction machinery and vehicles will be kept in good working condition and properly tuned in order to minimize the exhaust emissions.	No evidence were available that construction machinery, and vehicles used for the project were compliant with the national environmental quality standards (NEQS)
			Fugitive dust emissions will be minimized by appropriate methods, such as spraying water on soil, where required and appropriate.	No evidence of sprinkling of water on dust generated road was available
1.3		Noise	Vehicles will have exhaust mufflers (silencers) to minimize noise generation.	
			Nighttime traffic will be avoided near the communities. Local population will be taken in confidence if such work is unavoidable.	
			Vehicular traffic through the communities will be avoided as far as possible. Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities.	
1.4		Safety Hazards	Road signage will be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic.	The road signage were not available at appropriate locations to reduce safety hazard
			Project drivers will be trained on defensive driving.	No evidence of driver training was provided

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
			Vehicle speeds near / within the communities will be kept low, to avoid safety hazard and dust emissions.	
			EHS plan will be strictly followed (The IFC's EHS Guidelines can be used for this purpose).	No evidence was available that EHS plan was strictly followed according to IFC's EHS Guidelines
1.5		Damage to Infrastructure	All damaged infrastructure will be restored to original or better condition.	infrastructure damage record if any was not available
2.1	<b>Construction Camp Operation</b>	Soil Erosion/ Contamination ; water contamination	Contractors will prepare a waste disposal plan and submit to MC/EHS Engineer for approval.	Waste disposal plan was not available with contractor
			For the domestic sewage, appropriate treatment and disposal system will be constructed having adequate capacity, in accordance with NEQS (Table 2.1) <sup>3</sup> .	No domestic sewage, treatment and disposal system was constructed, in accordance with NEQS
			Waste oils will be collected in drums and sold to the recycling contractors in Tank/D. I. Khan. o The inert recyclable waste from the site (such as card board, drums, broken/used parts, etc.) will be sold to recycling contractors in Tank/D. I. Khan. The hazardous waste will be kept separate and handled according to the nature of the waste.	No evidence was available that waste oils were collected in drums and sold to the recycling contractors in Tank/D. I. Khan
			Domestic solid waste from the construction camp will be disposed in a manner that does not cause soil contamination.	Domestic solid waste from the construction camp was disposed off in open air
			The camp sites will be completely restored after the completion of the construction works. All temporary structures will be demolished, land leveled and re-contoured to the original condition or better. All debris and any other material will be removed from the site. The photographs if taken prior to the camp establishment will be used to restore the area.	

<sup>3</sup> Gomal Zam Multipurpose Project Rapid Environmental Analysis and EMMP Élan 2010

	<i>Project Activities</i>	<i>Impact</i>	Action	<i>Comments</i>
2.2		Air Quality Deterioration	Generators and vehicles will be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.	No evidence was available that generator and vehicles used for project were compliant with the national environmental quality standards (NEQS)
			Fugitive dust emissions will be minimized by appropriate methods, such as spraying water on soil, where required and appropriate. Waste water from kitchen and washing area of the construction camp may be used for water spraying.	No record or evidence of sprinkling of water on dust generated road was available. The waste water from kitchen and washing areas were drained in open
2.3		Loss of Vegetation	The construction crew will be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood will not be allowed.	The construction crew were use fuel wood for cooking
2.4		Noise	Generators and vehicles will have exhaust mufflers (silencers) to minimize noise generation. Compliance with NEQS will be ensured.	No evidence was available that the generators and vehicles used for of project equipment were compliant with the national environmental quality standards (NEQS)
2.5		Safety Hazards	Protective fencing to be installed around the Camp to avoid any accidents.	Army, FC and labor camp were not protected by protective fencing
			Firefighting equipment will be made available at the camps.	About 95 % firefighting equipment were out of order
			The camp staff will be provided firefighting training.	No evidence was available that firefighting training was provided to the camp staff
			All safety precautions will be taken to work, transport, handle and store hazardous substances, such as fuel.	
			EHS Plan to be followed.	No evidence or record was available that EHS Plan was followed

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
2.6		Public Health	The construction camps and site offices will have first-aid kits.	Most of the sites offices were without any first-aid kits.
			The construction crew will be provided awareness for the transmissible diseases (such as HIV/AIDS, hepatitis B and C).	Training or awareness for occupational health and safety has not been provided
2.7		Social and Gender Issues	Employment to locals will be maximized.	Maximum employment were provided to locals
			No child labor will be employed.	No child labor was observed
3.1	<b>Transportation of Equipment and Construction Materials</b>	Soil Erosion and Contamination	Vehicular traffic on unpaved roads will be avoided as far as possible.	
			Vehicles and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to	Vehicles repairing were observed in the field, and no impervious sheathing underneath were available to avoid soil and water contamination
3.2		Air Quality Deterioration	Vehicular traffic on unpaved roads will be avoided as far as possible. Operation of vehicles and machinery close to the water channels, water reservoir will be minimized.	
			Vehicles will be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.	No evidence was available that vehicles used for the transportation of project equipment were compliant with the national environmental quality standards (NEQS)
3.3		Noise	Vehicles will have exhaust mufflers (silencers) to minimize noise generation.	
			Nighttime traffic will be avoided near the communities. Local population will be taken in confidence if such work is unavoidable	

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
3.4		Safety Hazards	Road signage will be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic.	The road signage were not available at appropriate locations to reduce safety hazard
			Project drivers will be trained on defensive driving.	No evidence was available of drivers training
			Vehicle speeds near / within the communities will be kept low, to avoid safety hazard and dust emissions.	
			EHS Plan to be strictly followed.	No evidence or record was available that EHS plan was strictly followed
3.5		Damage to Infrastructure	All damaged infrastructure will be restored to original or better condition.	infrastructure damage if any record was not available
4.1	<b>Route selection</b>	Damage to agriculture, safety hazards for local population	Alternate routes will be identified; the one with least environmental and social issues will be preferred.	
			The route will be selected avoiding cultivation fields and settlements as far as possible.	
			The archeological sites mentioned in Section 4.3.5 will be avoided. <sup>4</sup>	
5.1	<b>Construction of Transmission Line</b>	Loss of Agriculture	Temporary RoW will be used along the proposed transmission lines, and for access routes to the transmission line corridor.	
			Cultivation fields will be avoided as far as possible.	

<sup>4</sup> Gomal Zam Multipurpose Project Rapid Environmental Analysis and EMMP Élan 2010

	<i>Project Activities</i>	<i>Impact</i>	Action	<i>Comments</i>
			Compensation will be paid for any crops damaged as a result of the construction activities. The compensation will be paid to the cultivator, and absence of the land title will not be a bar to receiving the compensation.	No evidence or record was available that crops damages were compensated during construction activities.
			Complete record will be maintained for the determination and payment of the compensation.	No evidence or record was available for the determination of compensation
			It will be ensured that the land under the 132-KV transmission line tower remains available for cultivation.	The land under the 132 KV was not available for cultivation
			In case the above is not possible, the land under the tower will be acquired in accordance with the LAA procedures (Section 17.4 of the LAA will not be used)	No evidence was available that the land under the tower was acquired in accordance with the LAA procedures
			Operation of project vehicles and construction machinery outside the RoW will be avoided. Attempts will be made to use existing tracks/roads to access the transmission line corridor/tower locations. In case new access routes are necessary, the cultivated land will be avoided as far as possible. Damage to crops will be compensated.	
			Grievance redressal mechanism will be put in place to address the community complaints.	
5.2		Damage to irrigation network	Operation of construction machinery or project vehicles near the existing water courses/canals will be avoided.	
			All damages to the water courses or canals caused by the project activities will be completely repaired.	No damage record was available
5.3		Blocked Access	In case of the blockage of the existing routes, alternate routes will be identified in consultation with affected communities.	
5.4		Noise and Vibration	Vehicular traffic through the communities will be avoided as far as possible. Project routes will be authorized by MC.	

	<i>Project Activities</i>	<i>Impact</i>	Action	<i>Comments</i>
			Vehicle speeds will be kept low, and horns will not be used while passing through or near the communities.	
			Vehicles will have exhaust silencers to minimize noise generation.	
			Nighttime traffic will be avoided near the communities. Movement of all project vehicles and personnel will be restricted to within work areas, to avoid noise disturbance.	
			Working hours for construction activities within the communities will be limited to between 8 am and 6 pm.	
5.5		Safety Hazards	The communities near the transmission line routes will be informed about the construction activities. Protective fencing will be installed where required.	
			Before commencing the testing commissioning of the system, the nearby communities will be informed. Protective fencing will be used where appropriate/possible.	
			EHS Plan will be strictly followed. IFC's EHS Guidelines can be used to develop the Plan.	No evidence was available that the EHS Plan was strictly followed, according to IFC's EHS Guidelines
5.6		Damage to Infrastructure	All damaged infrastructure will be restored to original or better condition	No infrastructure damage record was available
5.7		Gender Issues	Bypass routes to be identified, if required, especially along routes frequented by women, such as route to the local well or water source	
5.8		Social Issues	Construction crew will avoid entering villages and settlements	
			Employment of locals will be maximized.	Maximum local person were hired for the project
			No child labor will be employed at the project sites.	No child labor war observed

	<i>Project Activities</i>	<i>Impact</i>	Action	<i>Comments</i>
5.9		Sites of Historical, Cultural, Archeological or Religious Significance	Extreme care will be employed while working through the graveyards that may exist on the transmission line routes. No graves will be damaged. Construction activities will be carried out after consultation with the nearby/relevant community.	
			The archeological sites mentioned in Section 4.3.5 will be avoided during the construction works. <sup>5</sup>	
			In case of discovery of any sites or artifacts of historical, cultural, archeological or religious significance, the work will be stopped at that site. The provincial and federal archeological departments will be notified immediately, and their advice will be sought before resumption of the construction activities at such sites.	
5.10		Soil Erosion	Embankments and excavated slopes will not be left untreated/unattended for long durations.	According to local, burrows pit for road and transmission line are left unattended
			Vehicular traffic on unpaved roads will be avoided as far as possible. Operation of vehicles and machinery close to the water bodies will be minimized.	
			After the completion of the construction works, the transmission line routes and other construction sites will be completely restored. No debris, surplus construction material or any garbage will be left behind.	
			Photographic record will be maintained for pre-project, during construction and post-construction condition of the sites.	Photographic record of pre-project activities was not available
5.11		Soil Contamination	Vehicles and equipment will not be repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination.	Vehicles repairing were observed in the field, and no impervious sheathing underneath was available to avoid soil and water contamination

<sup>5</sup> Gomal Zam Multipurpose Project Rapid Environmental Analysis and EMMP Élan 2010

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
5.12		Air Quality Deterioration	Construction machinery, generators and vehicles will be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.	No evidence was available that construction machinery, generators and vehicles used for the project equipment were compliant with the national environmental quality standards (NEQS)
			Fugitive dust emissions will be minimized by appropriate methods, such as spraying water on soil, where required and appropriate.	No record or evidence of sprinkling of water on dust generated road was available.
			Project vehicles will avoid passing through the communities and cultivation fields as far as possible. If unavoidable, speed will be reduced to 15 km/h to avoid excessive dust emissions	
			While working within the communities for works such as transmission line laying, coordination with the communities will be maintained to minimize any detrimental impacts on the crops and settlements.	
5.13		Loss of Natural Vegetation	Clearing of natural vegetation will be minimized as far as possible during the transmission line works.	No vegetation clearing record was available
			Herbicides will not be used to clear vegetation along the transmission line route (or at other project locations).	
			For each transmission line route, a tree cutting plan will be prepared and submitted to WAPDA for approval. A complete record will be maintained for any tree cutting or trimming. The record will include: the number, species, type, size, age, condition and photograph of the trees to be cut/trimmed.	No cutting of tree plan has been prepared. No tree cutting record was maintained for compensation or replantation purposes
			Tree plantation will be carried out to compensate the tree cutting mentioned above.	No tree plantation plan has been prepared

	<i>Project Activities</i>	<i>Impact</i>	<i>Action</i>	<i>Comments</i>
			The construction crew will be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood will not be allowed.	The construction crew using fuel wood for cooking
5.14		Damage to Wildlife	Garbage will not be left in the open. The project staff will not be allowed to indulge in any hunting or trapping activities.	All garbage was left in open and some of project staff was also involved in trapping of game birds

**Table D: O&M Activities Construction of Transmission Line**

5.14	<i>Project Activities</i>	<i>Impact</i>	Action	<i>Comments</i>
1.1	<b>Operation and maintenance of Project Facilities</b>	Soil and water contamination	For the domestic sewage, appropriate treatment and disposal system will be constructed having adequate capacity, in accordance with NEQS (Table 2.1) <sup>6</sup> .	No domestic sewage, treatment and disposal system was constructed in accordance with NEQS
			Waste oils will be collected in drums and sold to the recycling contractors in Tank/D. I. Khan.	No evidence was available that oil waste was collected in drums and sold to the recycling contractors in Tank/D. I. Khan
			The inert recyclable waste from the site (such as card board, drums, broken/used parts, etc.) will be sold to recycling contractors in Tank/D. I. Khan. The hazardous waste will be kept separate and handled according to the nature of the waste.	No evidence was available that inert recyclable waste was collected in drums and sold to the recycling contractors in Tank/D. I. Khan, also no evidence was available that the hazardous waste was kept separate and handled according to the nature of the waste.
			Domestic solid waste from the site facilities will be disposed in a manner that does not cause soil contamination.	All solid waste were disposed in open in project area
1.2			Safety hazards	The dam safety risk assessment will be carried out (if not already done) by an independent panel of experts.
		The standard operating procedures (SOPs) for dam and powerhouse O&M will be prepared and strictly implemented.		
		The standard EHS Guidelines will be made part of the SOPs mentioned above, and will be strictly followed.		
		The Emergency Response Plan (ERP) will be made available at the Project sites. Its salient points will be displayed at prominent places. The O&M staff will be given training on the ERP.		

<sup>6</sup> Gomal Zam Multipurpose Project Rapid Environmental Analysis and EMMP Élan 2010

5.14	<i>Project Activities</i>	<i>Impact</i>	Action	<i>Comments</i>
			The O&M staff will be provided essential protective gears and equipment.	
			The O&M staff will be provided safety training. Refresher courses will be arranged on regular basis	
			The Project sites will have protective fencing to avoid any unauthorized entry.	
			The project drivers will be trained for defensive driving skills. Vehicular speeds near/within communities will be kept low to minimize safety hazards.	
			Firefighting equipment will be made available at the site; fire extinguishers will be provided in the project vehicles. The powerhouse staff will be provided safety training, including firefighting.	About 95 % firefighting equipment were out of order. No evidence of training was available
			All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.	
			Liaison with the community will be maintained for the transmission line maintenance works, where necessary. The communities near the grid stations and transmission lines will be educated on the risk of electrocution, and how to avoid accidents.	No liaison with the community was maintain for the transmission line maintenance works, where necessary, and also the communities near the grid stations and transmission lines were not educated on the risk of electrocution, and how to avoid accidents.
			The trees under the transmission lines will be regularly trimmed in order to maintain 8 m clearance.	No tree trimmed record was available
1.3		Loss of agriculture	The crop damage will be minimized during the O&M activities of the transmission line.	No record of damage was maintained
			Community liaison will be maintained during such operations.	community liaison was not maintained during construction
			Compensation will be paid to the grower for damage to crops or any other asset.	No crop damage record if any and compensation was maintained

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