

Initial Environmental Examination - Annexures

Project Number: 50174-001
November 2017

Zorlu Solar Power Project (Pakistan)

Prepared by Renewable Resources (Private) Limited.

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ANNEXURES



Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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ANNEXURE-I:



**ENVIRONMENTAL AND SOCIAL MANAGEMENT
PLAN (ESMP)**



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Land Use				
Activity Source	Mitigation Measures			
<i>Construction Phase</i> <ul style="list-style-type: none"> Clearing of Small Bushes and trees Civil Works 	<ul style="list-style-type: none"> Land uptake will be kept to minimum required for clearance or cutting of trees and bushes for civil works. 			
<i>Operation Phase</i>				
<ul style="list-style-type: none"> None 				
	Duration	Severity	Reversibility	Responsibility
Construction	Short Term		Reversible	EPC Contractor
Operation	Nil		Reversible	EPC Contractor
Monitoring Frequency			Daily during Construction Phase and quarterly during operation phase	



Air Emissions				
Activity Source	Mitigation Measures			
<i>Construction Phase</i> <ul style="list-style-type: none"> Construction, Equipment, Vehicle Movement 	<ul style="list-style-type: none"> Use vehicles in good running condition with emissions within the permissible limits as per National Environmental Quality Standards (NEQs) 			
<i>Operation Phase</i>				
<ul style="list-style-type: none"> None 				
	Duration	Severity	Reversibility	Responsibility
Construction	Short Term		Reversible	EPC Contractor
Operation	Nil		Reversible	EPC Contractor
Monitoring Frequency			Daily during Construction Phase and quarterly during operation phase	

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Dust Emission				
Activity Source	Mitigation Measures			
Construction Phase <ul style="list-style-type: none"> Movement of construction vehicles on un paved roads Soil excavation, soil and aggregates storage piles 	<ul style="list-style-type: none"> Water will be sprinkled daily or when there is obvious dust problem, on all exposed surface. 			
Operation Phase				
<ul style="list-style-type: none"> None 				
	Duration	Severity	Reversibility	Responsibility
Construction	Short Term		Reversible	EPC Contractor
Operation	Nil		Reversible	EPC Contractor
Monitoring Frequency			Daily during Construction Phase and quarterly during operation phase	

Noise				
Activity Source	Mitigation Measures			
Construction Phase <ul style="list-style-type: none"> Construction, Equipment, Vehicle Movement 	<ul style="list-style-type: none"> Proper design, maintenance and repair of construction machinery and equipment; Use of proper silencers, mufflers and personal protective equipment's; Nighttime traffic will be avoided near the communities 			
Operation Phase				
<ul style="list-style-type: none"> None 				
	Duration	Severity	Reversibility	Responsibility
Construction	Short Term		Reversible	EPC Contractor
Operation	Nil		Reversible	EPC Contractor
Monitoring Frequency			Twice a month during Construction Phase and quarterly during operation phase	

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Water Management				
Activity Source	Mitigation Measures			
<i>Construction Phase</i> <ul style="list-style-type: none"> Construction activities Construction camp operations Water sprinkling for dust minimization 	<ul style="list-style-type: none"> Water from the nearby facility will be used after getting approval from the concerned authority Water contamination during construction will avoided through proper waste disposal arrangement Proper drainage system and waste disposal system will be implemented for guard room for domestic use Excess water wastage will be avoided and monitored in routine. 			
<i>Operation Phase</i> <ul style="list-style-type: none"> Guard room/Camp domestic use Cleaning of Panels 				
	Duration	Severity	Reversibility	Responsibility
Construction	Long Term		Reversible	EPC Contractor
Operation	Nil		Reversible	EPC Contractor
Monitring Frequency			Daily during Construction Phase and monthly during operation phase	

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Waste Management				
Activity Source	Mitigation Measures			
<i>Construction Phase</i> <ul style="list-style-type: none"> Construction activities Construction camp operations Water sprinkling for dust minimization Visual observation of overflows leaks Odour 	<ul style="list-style-type: none"> Septic tanks and soak pits will be used Use of covered bins Use separate Bins for recyclable material and other type of solid waste Move waste from site on daily basis to avoid odour Approved contractors will be hired for the recyclable waste material. A separate waste area will be allocated for the project waste material as per the mentioned in the guidelines 			
<i>Operation Phase</i> <ul style="list-style-type: none"> Guard room/Camp domestic use Cleaning of Panels 				
	Duration	Severity	Reversibility	Responsibility
Construction	Long Term		Reversible	EPC Contractor
Operation	Nil		Reversible	EPC Contractor
Monitoring Frequency			Daily during Construction Phase and monthly during operation phase	

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Soil and Land Contamination					
Activity Source	Mitigation Measures				
<i>Construction Phase</i>	<ul style="list-style-type: none"> Debris, Waste generated from construction material will be properly stored during the construction phase and will be removed from the site, once the construction is completed Maintenance of vehicle and machinery will only be carried out at designated places to avoid any fuel spill 				
<ul style="list-style-type: none"> None of any chemical or hazardous substance is used in the construction phase therefore there is no chance of soil or land contamination 					
<i>Operation Phase</i>					
<ul style="list-style-type: none"> Guard room/Camp domestic use 		Duration	Severity	Reversibility	Responsibility
	Construction	Long Term		Reversible	Sponsor
	Operation	Nil		Reversible	Sponsor
	Monitoring Frequency			Daily during Construction Phase and monthly during operation phase	

Waste Water					
Activity Source	Mitigation Measures				
<i>Construction Phase</i>	<ul style="list-style-type: none"> Conduct daily inspections at the construction site to ensure removal of construction debris. Provide an adequate treatment facility to treat the sewage generated from toilets before discharge. Store construction material containing fine particles in an enclosure so that sediment laden water does not drain into nearby water drains. 				
<ul style="list-style-type: none"> Construction camp effluent Water used in the construction material 					
<i>Operation Phase</i>					
<ul style="list-style-type: none"> Sanitary waste water from the guard room during domestic use 		Duration	Severity	Reversibility	Responsibility
	Construction	Short Term		Reversible	Sponsor
	Operation	Nil		Reversible	Sponsor
	Monitoring Frequency			Daily during Construction Phase and monthly during operation phase	



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Safety Hazards				
Activity Source	Mitigation Measures			
<i>Construction Phase</i>	<ul style="list-style-type: none"> International standard of EHS will be followed Personal Protective equipment will be provided during construction and operation phase to the workers First Aid kits will be provided on site Road Sign board will be fixed at appropriate places to reduce safety hazards associated with project related vehicular traffic Project drivers will be trained on defensive driving Strict code of conduct will be followed Also make safety precautions and display on the notice board of entry gate in both national and local language 			
<ul style="list-style-type: none"> Project related vehicular traffic Driving Injuries related with civil works and electrical works 				
<i>Operation Phase</i>				
<ul style="list-style-type: none"> Injuries during O & M Gender issues 				
	Duration	Severity	Reversibility	Responsibility
Construction	Short Term		Reversible	Sponsor
Operation	Nil		Reversible	Sponsor
Monitoring Frequency			Daily during Construction Phase and monthly during operation phase	

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Ecological Environment: Disturbance to Wild Life				
Activity Source	Mitigation Measures			
<i>Construction Phase</i> <ul style="list-style-type: none"> Habitat Loss Movement of personal and Vehicles Noise generated from project activities Hunting and Trapping 	<ul style="list-style-type: none"> Hunting, trapping or harassment of wild life will be strictly prohibited and monitored Personnel working during operational phase of the project will be strictly prohibited to hunting and trapping of wild life 			
<i>Operation Phase</i> <ul style="list-style-type: none"> Movement of personnel and vehicles Hunting and trapping 				
	Duration	Severity	Reversibility	Responsibility
Construction	Short Term		Reversible	Sponsor
Operation	Nil		Reversible	Sponsor
Monitoring Frequency			Daily during Construction Phase and once a week during operation phase	

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Socio Economic Environment				
Activity Source	Mitigation Measures			
<p><i>Construction Phase</i></p> <ul style="list-style-type: none"> Traffic load and vehicle movement Noise generated from project activities Labor requirement from the nearby area Occupational health & safety issue of working labour 	<ul style="list-style-type: none"> Plan temporary traffic arrangements during construction within the construction area. Review the plan periodically with respect to site conditions. Give special consideration to local traffic management for the safety of pedestrians, especially near villages. The project will create employment opportunities for the nearby areas. All the precautionary measures as required for the safety of workers are applicable Take adequate precautions to prevent danger from electrical equipment Provide a readily available first aid unit including an adequate supply of sterilized dressing material and appliances. Ensure workers exposed to loud noise wear Ear plugs/ear muffs. As there is no road facing the solar PV project, therefore reflection of PV panels will not be a problem for traffic The project will not only provide electricity to the area but also create awareness of local people to the solar PV technology. Workers accommodation complies with IFC standards Zorlu Solar Pakistan (Pvt) Ltd, its contractors and sub contractors comply with the national labor law <p>During Operation Phase:</p> <ul style="list-style-type: none"> Local workers in charge of O&M will be provided with decent sleeping amenities Zorlu Solar Pakistan (Pvt) Ltd, its contractors and sub contractors comply with the national labor law 			
<p><i>Operation Phase</i></p> <ul style="list-style-type: none"> Visual impact: reflection of solar PV panels Electricity supply to the area Awareness of local people to solar PV technology 				
	Duration	Severity	Reversibility	Responsibility
Construction	Short Term		Reversible	Sponsor
Operation	Nil		NA	Sponsor

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ANNEXURE-II

BUDGETARY ESTIMATES OF ESMP

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Budgetary Estimates for ESMP			
S.No	Budget Heads	Cost (PKR)	Description(PKR)
1	EHS Engineer	1,800,000	100,000 for the period of 18 months
2	Social and Environmental Expert (From Contractor side)	To be Paid by Contractor	
3	Environmental and Social Trainings during Construction and Operation	150,000	10 Trainings Sessions @ PKR 15,000 per training session
4	Miscellaneous	500,000	Environment and social issues
	plantation	500,000	As per Plantation Plan
5	Contingencies	295000	10% of the above cost
	Total	3,245,000	

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ANNEXURE-III

IEE/EIA GUIDELINES

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PAKISTAN ENVIRONMENTAL PROTECTION AGENCY (REVIEW OF IEE AND EIA) REGULATIONS, 2000

S.R.O. 339 (1)/2001. - In exercise of the powers referred by section 33 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), Pakistan Environmental Protection Agency, with the approval of the Federal Government is pleased to make the following Rules, namely : -

1. Short title and commencement

(1) These regulations may be called the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000.

(2) They shall come into force at once.

2. Definitions

(1) In these regulations, unless there is anything repugnant in the subject or context –

(a) “Act” means the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997);

(b) “Director-General” means the Director-General of the Federal Agency;

(c) “EIA” means an environmental impact assessment as defined in section 2(xi);

(d) “IEE” means an initial environmental examination as defined in section 2(xxiv); and

(e) “section” means a section of the Act.

(2) All other words and expressions used in these regulations but not defined shall have the same meanings as are assigned to them in the Act.

3. Projects requiring an IEE

A proponent of a project falling in any category listed in Schedule I shall file an IEE with the Federal Agency, and the provisions of section 12 shall apply to such project.

4. Projects requiring an EIA

A proponent of a project falling in any category listed in Schedule II shall file an EIA with the Federal Agency, and the provisions of section 12 shall apply to such project.

5. Projects not requiring an IEE or EIA

- (1) A proponent of a project not falling in any category listed in Schedules I and II shall not be required to file an IEE or EIA:

Provided that the proponent shall file –

- (a) an EIA, if the project is likely to cause an adverse environmental effect;
- (b) for projects not listed in Schedules I and II in respect of which the Federal Agency has issued guidelines for construction and operation, an application for approval accompanied by an undertaking and an affidavit that the aforesaid guidelines shall be fully complied with.
- (2) Notwithstanding anything contained in sub-regulation (1), the Federal Agency may direct the proponent of a project, whether or not listed in Schedule I or II, to file an IEE or EIA, for reasons to be recorded in such direction:

Provided that no such direction shall be issued without the recommendation in writing of the Environmental Assessment Advisory Committee constituted under Regulation 23.

- (3) The provisions of section 12 shall apply to a project in respect of which an IEE or EIA is filed under sub-regulation (1) or (2).

6. Preparation of IEE and EIA

- (1) The Federal Agency may issue guidelines for preparation of an IEE or an EIA, including guidelines of general applicability, and sectoral guidelines indicating specific assessment requirements for planning, construction and operation of projects relating to particular sector.
- (2) Where guidelines have been issued under sub-regulation (1), an IEE or EIA shall be prepared, to the extent practicable, in accordance therewith and the proponent shall justify in the IEE or EIA any departure therefrom.

7. Review Fees

The proponent shall pay, at the time of submission of an IEE or EIA, a non-refundable Review Fee to the Federal Agency, as per rates shown in Schedule III.

8. Filing of IEE and EIA

- (1) Ten paper copies and two electronic copies of an IEE or EIA shall be filed with the Federal Agency.

- (2) Every IEE and EIA shall be accompanied by –
 - (a) an application, in the form prescribed in Schedule IV; and
 - (b) copy of receipt showing payment of the Review Fee.

9. Preliminary scrutiny

- (1) Within 10 working days of filing of the IEE or EIA, the Federal Agency shall –
 - (a) confirm that the IEE or EIA is complete for purposes of initiation of the review process; or
 - (b) require the proponent to submit such additional information as may be specified; or
 - (c) return the IEE or EIA to the proponent for revision, clearly listing the points requiring further study and discussion.
- (2) Nothing in sub-regulation (1) shall prohibit the Federal Agency from requiring the proponent to submit additional information at any stage during the review process.

10. Public participation

- (1) In the case of an EIA, the Federal Agency shall, simultaneously with issue of confirmation of completeness under clause (a) of sub-regulation (1) of Regulation 9, cause to be published in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project, a public notice mentioning the type of project, its exact location, the name and address of the proponent and the places at which the EIA of the project can, subject to the restrictions in sub-section (3) of section 12, be accessed.
- (2) The notice issued under sub-regulation (1) shall fix a date, time and place for public hearing of any comments on the project or its EIA.
- (3) The date fixed under sub-regulation (2) shall not be earlier than 30 days from the date of publication of the notice.
- (4) The Federal Agency shall also ensure the circulation of the EIA to the concerned Government Agencies and solicit their comments thereon.
- (5) All comments received by the Federal Agency from the public or any Government Agency shall be collated, tabulated and duly considered by it before decision on the EIA.

- (6) The Federal Agency may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement and participation in EIA assessment.

11. Review

- (1) The Federal Agency shall make every effort to carry out its review of the IEE within 45 days, and of the EIA within 90 days, of issue of confirmation of completeness under Regulation 9.
- (2) In reviewing the IEE or EIA, the Federal Agency shall consult such Committee of Experts as may be constituted for the purpose by the Director-General, and may also solicit views of the sectoral Advisory Committee, if any, constituted by the Federal Government under sub-section (6) of section 5.
- (3) The Director-General may, where he considers it necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified.
- (4) The review of the IEE or EIA by the Federal Agency shall be based on quantitative and qualitative assessment of the documents and data furnished by the proponent, comments from the public and Government Agencies received under Regulation 10, and views of the committees mentioned in sub-regulations (2) and (3) above.

12. Decision

On completion of the review, the decision of the Federal Agency shall be communicated to the proponent in the form prescribed in Schedule V in the case of an IEE, and in the form prescribed in Schedule VI in the case of an EIA.

13. Conditions of approval

- (1) Every approval of an IEE or EIA shall, in addition to such conditions as may be imposed by the Federal Agency, be subject to the condition that the project shall be designed and constructed, and mitigatory and other measures adopted, strictly in accordance with the IEE/EIA, unless any variation thereto have been specified in the approval by the Federal Agency.
- (2) Where the Federal Agency accords its approval subject to certain conditions, the proponent shall –
 - (a) before commencing construction of the project, acknowledge acceptance of the stipulated conditions by executing an undertaking in the form prescribed in Schedule VII;

- (b) before commencing operation of the project, obtain from the Federal Agency written confirmation that the conditions of approval, and the requirements in the IEE/EIA relating to design and construction, adoption of mitigatory and other measures and other relevant matters, have been duly complied with.

14. Confirmation of compliance

(1) The request for confirmation of compliance under clause (b) of sub-regulation (2) of Regulation 13 shall be accompanied by an Environmental Management Plan indicating the measures and procedures proposed to be taken to manage or mitigate the environmental impacts for the life of the project, including provisions for monitoring, reporting and auditing.

(2) Where a request for confirmation of compliance is received from a proponent, the Federal Agency may carry out such inspection of the site and plant and machinery and seek such additional information from the proponent as it may deem fit:

Provided that every effort shall be made by the Federal Agency to provide the requisite confirmation or otherwise within 15 days of receipt of the request, with complete information, from the proponent.

(3) The Federal Agency may, while issuing the requisite confirmation of compliance, impose such other conditions as the Environmental Management Plan, and the operation, maintenance and monitoring of the project as it may deem fit, and such conditions shall be deemed to be included in the conditions to which approval of the project is subject.

15. Deemed approval

The four-month period for communication of decision stipulated in sub-section (4) of section 12 shall commence from the date of filing of an IEE or EIA in respect of which confirmation of completeness is issued by the Federal Agency under clause (a) of sub-regulation (1) of Regulation 9.

16. Extension in review period

Where the Federal Government in a particular case extends the four-month period for communication of approval prescribed in sub-section (5) of section 12, it shall, in consultation with the Federal Agency, indicate the various steps of the review process to be taken during the extended period, and the estimated time required for each step.

17. Validity period of approval

(1) The approval accorded by a Federal Agency under section 12 read with Regulation 12 shall be valid, for commencement of construction, for a period of three years from the date of issue.

(2) If construction is commenced during the initial three year validity period, the validity of the approval shall stand extended for a further period of three years from the date of issue.

(3) After issue of confirmation of compliance, the approval shall be valid for a period of three years from the date thereof.

(4) The proponent may apply to the Federal Agency for extension in the validity periods mentioned in sub-regulations (1), (2) and (3), which may be granted by the Federal Agency in its discretion for such period not exceeding three years at a time, if the conditions of the approval do not require significant change:

Provided that the Federal Agency may require the proponent to submit a fresh IEE or EIA, if in its opinion changes in location, design, construction and operation of the project so warrant.

18. Entry and inspection

(1) For purposes of verification of any matter relating to the review or to the conditions of approval of an IEE or EIA prior to, during or after commencement of construction or operation of a project, duly authorized staff of the Federal Agency shall be entitled to enter and inspect the project site, factory building and plant and equipment installed therein.

(2) The proponent shall ensure full cooperation of the project staff at site to facilitate the inspection, and shall provide such information as may be required by the Federal Agency for this purpose and pursuant thereto.

19. Monitoring

(1) After issue of approval, the proponent shall submit a report to the Federal Agency on completion of construction of the project.

(2) After issue of confirmation of compliance, the proponent shall submit an annual report summarizing operational performance of the project, with reference to the conditions of approval and maintenance and mitigatory measures adopted by the project.

(3) To enable the Federal Agency to effectively monitor compliance with the conditions of approval, the proponent shall furnish such additional information as the Federal Agency may require.

20. Cancellation of approval

(1) Notwithstanding anything contained in these Regulations, if, at any time, on the basis of information or report received or inspection carried out, the Federal Agency is of the opinion that the conditions of an approval have not been complied with, or that the information supplied by a proponent in the approved IEE or EIA is incorrect, it

shall issue notice to the proponent to show cause, within two weeks of receipt thereof, why the approval should not be cancelled.

(2) If no reply is received or if the reply is considered unsatisfactory, the Federal Agency may, after giving the proponent an opportunity of being heard:

(i) require the proponent to take such measures and to comply with such conditions within such period as it may specify, failing which the approval shall stand cancelled; or

(ii) cancel the approval.

(3) On cancellation of the approval, the proponent shall cease construction or operation of the project forthwith.

(4) Action taken under this Regulation shall be without prejudice to any other action that may be taken against the proponent under the Act or rules or regulations or any other law for the time being in force.

21. Registers of IEE and EIA projects

Separate Registers to be maintained by the Federal Agency for IEE and EIA projects under sub-section (7) of section 12 shall be in the form prescribed in Schedule VIII.

22. Environmentally sensitive areas

(1) The Federal Agency may, by notification in the official Gazette, designate an area to be an environmentally sensitive area.

(2) Notwithstanding anything contained in Regulations 3, 4 and 5, the proponent of a project situated in an environmentally sensitive area shall be required to file an EIA with the Federal Agency.

(3) The Federal Agency may from time to time issue guidelines to assist proponents and other persons involved in the environmental assessment process to plan and prepare projects located in environmentally sensitive areas.

(4) Where guidelines have been issued under sub-regulation (3), the projects shall be planned and prepared, to the extent practicable, in accordance therewith and any departure therefrom justified in the EIA pertaining to the project.

23. Environmental Assessment Advisory Committee

For purposes of rendering advice on all aspects of environmental assessment, including guidelines, procedures and categorization of projects, the Director-General shall constitute an Environmental Assessment Advisory Committee comprising –

(a) Director EIA, Federal Agency ... Chairman

- | | | | |
|-----|--|-----|---------|
| (b) | One representative each of the Provincial Agencies | ... | Members |
| (c) | One representative each of the Federal Planning Commission and the Provincial Planning and Development Departments | ... | Members |
| (d) | Representatives of industry and non-Governmental organizations, and legal and other experts | ... | Members |

24. Other approvals

Issue of an approval under section 12 read with Regulation 12 shall not absolve the proponent of the duty to obtain any other approval or consent that may be required under any law for the time being in force.

SCHEDULE I
(See Regulation 3)

List of projects requiring an IEE

A. Agriculture, Livestock and Fisheries

1. Poultry, livestock, stud and fish farms with total cost more than Rs.10 million
2. Projects involving repacking, formulation or warehousing of agricultural products

B. Energy

1. Hydroelectric power generation less than 50 MW
2. Thermal power generation less than 200 KW
3. Transmission lines less than 11 KV, and large distribution projects
4. Oil and gas transmission systems
5. Oil and gas extraction projects including exploration, production, gathering systems, separation and storage
6. Waste-to-energy generation projects

C. Manufacturing and processing

1. Ceramics and glass units with total cost more than Rs.50 million
2. Food processing industries including sugar mills, beverages, milk and dairy products, with total cost less than Rs.100 million
3. Man-made fibers and resin projects with total cost less than Rs.100 million
4. Manufacturing of apparel, including dyeing and printing, with total cost more than Rs.25 million
5. Wood products with total cost more than Rs.25 million

D. Mining and mineral processing

1. Commercial extraction of sand, gravel, limestone, clay, sulphur and other minerals not included in Schedule II with total cost less than Rs.100 million
2. Crushing, grinding and separation processes

3. Smelting plants with total cost less than Rs.50 million

E. Transport

1. Federal or Provincial highways (except maintenance, rebuilding or reconstruction of existing metalled roads) with total cost less than Rs.50 million
2. Ports and harbor development for ships less than 500 gross tons

F. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume less than 50 million cubic meters of surface area less than 8 square kilometers
2. Irrigation and drainage projects serving less than 15,000 hectares
3. Small-scale irrigation systems with total cost less than Rs.50 million

G. Water supply and treatment

Water supply schemes and treatment plants with total cost less than Rs.25 million

H. Waste disposal

Waste disposal facility for domestic or industrial wastes, with annual capacity less than 10,000 cubic meters

I. Urban development and tourism

1. Housing schemes
2. Public facilities with significant off-site impacts (e.g. hospital wastes)
3. Urban development projects

J. Other projects

Any other project for which filing of an IEE is required by the Federal Agency under sub-regulation (2) of Regulation 5

SCHEDULE II
(See Regulation 4)

List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation over 50 MW
2. Thermal power generation over 200 MW
3. Transmission lines (11 KV and above) and grid stations
4. Nuclear power plans
5. Petroleum refineries

B. Manufacturing and processing

1. Cement plants
2. Chemicals projects
3. Fertilizer plants
4. Food processing industries including sugar mills, beverages, milk and dairy products, with total cost of Rs.100 million and above
5. Industrial estates (including export processing zones)
6. Man-made fibers and resin projects with total cost of Rs.100 M and above
7. Pesticides (manufacture or formulation)
8. Petrochemicals complex
9. Synthetic resins, plastics and man-made fibers, paper and paperboard, paper pulping, plastic products, textiles (except apparel), printing and publishing, paints and dyes, oils and fats and vegetable ghee projects, with total cost more than Rs.10 million
10. Tanning and leather finishing projects

C. Mining and mineral processing

1. Mining and processing of coal, gold, copper, sulphur and precious stones
2. Mining and processing of major non-ferrous metals, iron and steel rolling
3. Smelting plants with total cost of Rs.50 million and above

D. Transport

1. Airports
2. Federal or Provincial highways or major roads (except maintenance, rebuilding or reconstruction of existing roads) with total cost of Rs.50 million and above
3. Ports and harbor development for ships of 500 gross tons and above
4. Railway works

E. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of 50 million cubic meters and above or surface area of 8 square kilometers and above
2. Irrigation and drainage projects serving 15,000 hectares and above

F. Water supply and treatment

Water supply schemes and treatment plants with total cost of Rs.25 million and above

G. Waste Disposal

1. Waste disposal and/or storage of hazardous or toxic wastes (including landfill sites, incineration of hospital toxic waste)
2. Waste disposal facilities for domestic or industrial wastes, with annual capacity more than 10,000 cubic meters

H. Urban development and tourism

1. Land use studies and urban plans (large cities)
2. Large-scale tourism development projects with total cost more than Rs.50 million

I. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas

J. Other projects

1. Any other project for which filing of an EIA is required by the Federal Agency under sub-regulation (2) of Regulation 5.
2. Any other project likely to cause an adverse environmental effect

SCHEDULE III
(See Regulation 7)

IEE/EIA Review Fees

Total Project Cost	IEE	EIA
Upto Rs.5,000,000	NIL	NIL
Rs.5,000,001 to 10,000,000	Rs.10,000	Rs.15,000
Greater than Rs.10,000,000	Rs.15,000	Rs.30,000

SCHEDULE IV
[See Regulation 8(2)(a)]

Application Form

1.	Name and address of proponent		Phone: Fax: Telex:	
2.	Description of project			
3.	Location of project			
4.	Objectives of project			
5.	IEE/EIA attached?	IEE/EIA	:	Yes/No
6.	Have alternative sites been considered and reported in IEE/EIA?	Yes/No		
7.	Existing land use		Land requirement	
8.	Is basic site data available, or has it been measured?	(only tick yes if the data is reported in the IEE/EIA) Meteorology (including rainfall) Ambient air quality Ambient water quality Ground water quality	<u>Available</u> Yes/No Yes/No Yes/No Yes/No	<u>Measured</u> Yes/No Yes/No Yes/No Yes/No
9.	Have estimates of the following been reported?	Water balance Solid waste disposal Liquid waste treatment	<u>Estimated</u> Yes/No Yes/No Yes/No	<u>Reported</u> Yes/No Yes/No Yes/No
10.	Source of power		Power requirement	
11.	Labour force (number)	Construction: Operation:		

Verification. I do solemnly affirm and declare that the information given above and contained in the attached IEE/EIA is true and correct to the best of my knowledge and belief.

Date _____

Signature, name and _____
designation of proponent
(with official stamp/seal)

SCHEDULE V
[See Regulation 12]

Decision on IEE

1. Name and address of proponent _____

2. Description of project _____
3. Location of project _____
4. Date of filing of IEE _____

5. After careful review of the IEE, the Federation Agency has decided –

(a) to accord its approval, subject to the following conditions:

or (b) that the proponent should submit an EIA of the project, for the following reasons –

[Delete (a) or (b), whichever is inapplicable]

Dated _____

Tracking no. ____

Director-General
Federal Agency
(with official stamp/seal)

SCHEDULE VI
[See Regulation 12]

Decision on EIA

1. Name and address of proponent _____

2. Description of project _____
3. Location of project _____
4. Date of filing of EIA _____
5. After careful review of the EIA, and all comments thereon, the Federation Agency has decided –
 - (a) to accord its approval, subject to the following conditions:

 - or (b) that the proponent should submit an EIA with the following modifications-

 - or (c) to reject the project, being contrary to environmental objectives, for the following reasons:

[Delete (a)/(b)/(c), whichever is inapplicable]

Dated _____

Tracking no.____

Director-General
Federal Agency
(with official stamp/seal)

SCHEDULE VII
[See Regulation 13(2)]

Undertaking

I, (full name and address) as proponent for (name, description and location of project) do hereby solemnly affirm and declare that I fully understand and accept the conditions contained in the approval accorded by the Federal Agency bearing tracking no. _____ dated _____, and undertake to design, construct and operate the project strictly in accordance with the said conditions and the IEE/EIA.

Date _____

Signature, name and _____
designation of proponent
(with official stamp/seal)

Witnesses
(full names and addresses)

(1) _____

(2) _____

SCHEDULE VIII
(See Regulation 21)
Form of Registers for IEE and EIA projects

S. No.	Description	Relevant Provisions
1	2	3
1.	Tracking number	
2.	Category type (as per Schedules I and II)	
3.	Name of proponent	
4.	Name and designation of contact person	
5.	Name of consultant	
6.	Description of project	
7.	Location of project	
8.	Project capital cost	
9.	Date of receipt of IEE/EIA	
10.	Date of confirmation of completeness	
11.	Approval granted (Yes/No)	
12.	Date of approval granted or refused	
13.	Conditions of approval/reasons for refusal	
14.	Date of Undertaking	
15.	Date of extension of approval validity	
16.	Period of extension	
17.	Date of commencement of construction	
18.	Date of issue of confirmation of compliance	
19.	Date of commencement of operations	
20.	Dates of filing of monitoring reports	
21.	Date of cancellation, if applicable	

The Gazette of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY

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ISLAMABAD, SATURDAY, DECEMBER 6, 1997

PART I

Acts, Ordinances, President's Orders and Regulations

SENATE SECRETARIAT

Islamabad, the 6th December, 1997

No. F. 9(46)/97-Legis.- The following Acts of Majlis-e-Shoora (Parliament) received the assent of the Acting President on 3rd December, 1997 are hereby published for general information :-

Act No. XXXIV OF 1997

An Act to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development

WHEREAS it is expedient to provide for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution, promotion of sustainable development, and for matters connected therewith and incidental thereto;

1. Short title, extent and commencement.---(1) This Act, shall be called the Pakistan Environmental Protection Act, 1997

(2) It extends to the whole of Pakistan.

(3) It shall come into force at once.

2. Definitions.—In this Act, unless there is anything repugnant in the subject or context,—

(i) "adverse environmental effect" means impairment of, or damage to, the environment and includes—

(a) impairment of, or damage to, human health and safety or to biodiversity or property;

(b) pollution; and

(c) any adverse environmental effect as may be specified in the regulations;

(ii) "agricultural waste" means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry residues from the use of fertilizers, pesticides and other farm . chemicals;

(iii) "air pollutant" means any substance that causes pollution of air and includes soot, smoke, dust particles, odour, light, electro-magnetic, radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances;

(iv) "biodiversity" or "biological diversity" means the variability among living organisms from all sources, including inter alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, including diversity within species, between species and of ecosystems;

(v) "Council" means the Pakistan Environmental Protection Council established under section 3;

(vi) "discharge" includes spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping;

(vii) "ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit;

(viii) "effluent" means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;

(ix) "emission standards" means the permissible standards established by the Federal Agency or a Provincial Agency for emission of air pollutants and noise and for discharge of effluent and waste;

(x) "environment" means—

(a) air, water and land;

(b) all layers of the atmosphere;

(c) all organic and inorganic matter and living organisms;

(d) the ecosystem and ecological relationships;

(e) buildings, structures, roads, facilities and works;

(f) all social and economic conditions affecting community life; and

(g) the inter-relationships between any of the factors specified in sub-clauses (a) to (f);

(xi) "environmental impact assessment" means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed;

(xii) "Environmental Magistrate" means the Magistrate of the First Class appointed under Section 24 ;

(xiii) "Environmental Tribunal" means the Environmental Tribunal constituted under section 20 ;

(xiv) "Exclusive Economic Zone" shall have the same meaning as in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xv) "factory" means any premises in which industrial activity is being undertaken;

(xvi) "Federal Agency" means the Pakistan Environmental Protection Agency established under section 5, or any Government Agency, local council or local authority exercising the powers and functions of the Federal Agency;

(xvii) "Government Agency" includes—

(a) a division, department, attached department, bureau, section, commission, board, office or unit of the Federal Government or a Provincial Government;

(b) a developmental or a local authority, company or corporation established or controlled by the Federal Government or Provincial Government; and

(c) a Provincial Environmental Protection Agency. ; and

(d) any other body defined and listed in the Rules of Business of the Federal Government or a Provincial Government.

(xviii) "hazardous substance" means—

(a) a substance or mixture of substances, other than a pesticide as defined in the Agricultural Pesticides Ordinance, 1971 (II of 1971), which, by reason of its chemical activity or toxic, explosive, flammable, corrosive, radioactive or other characteristics,

causes, or is likely to cause, directly or in combination with other matters an adverse environmental effect; and

(b) any substance which may be prescribed as a hazardous substance;

(xix) "hazardous waste" means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste and includes hospital waste and nuclear waste;

(xx) "historic waters" means such limits of the waters adjacent to the land territory of Pakistan as may be specified by notification under section 7 of the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xxi) "hospital waste" includes waste medical supplies and materials of all kinds, and waste blood, tissue, organs and other parts of the human and animal bodies, from hospitals, clinics and laboratories;

(xxii) "industrial activity" means any operation or process for manufacturing, making, formulating, synthesising, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purpose;

(xxiii) "industrial waste" means waste resulting from an industrial activity;

(xxiv) "initial environmental examination" means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an adverse environmental effect for requiring preparation of an environmental impact assessment;

(xxv) "local authority" means any agency set up or designated by the Federal Government or a Provincial Government, by notification in the official Gazette, to be a local authority for the purposes of this Ordinance;

(xxvi) "local council" means a local council constituted or established under a law relating to local government;

(xxvii) "motor vehicle" means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails;

(xxviii) "municipal waste" includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like;

(xxix) "National Environmental Quality Standards" means standards established by the Federal Agency under clause (e) of sub-section (1) of section 6 and approved by the Council under clause (c) of sub-section (1) of section 4;

(xxx) "noise" means the intensity, duration and character of sounds from all sources, and includes vibration;

(xxxii) "nuclear waste" means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive;

(xxxiii) "person" means any natural person or legal entity and includes an individual, firm, association, partnership, society, group, company, corporation, co-operative society, Government Agency, non-governmental organization, community-based organization, village organization, local council or local authority and, in the case of a vessel, the master or other person having for the time being the charge or control of the vessel;

(xxxiiii) "pollution" means the contamination of air, land or water by the discharge or emission of effluent or wastes or air pollutants or noise or other matter which either directly or indirectly or in combination with other discharges or substances alters unfavourably the chemical, physical, biological, radiational, thermal or radiological or aesthetic properties of the air, land or water or which may, or is likely to make the air, land or water unclean, noxious or impure or injurious, disagreeable or detrimental to the health, safety, welfare or property of persons or harmful to biodiversity;

(xxxv) "prescribed" means prescribed by rules made under this Act;

(xxxvi) "project" means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes—

(a) construction or use of buildings or other works;

(b) construction or use of roads or other transport systems;

(c) construction or operation of factories or other installations;

(d) mineral prospecting, mining, quarrying, stone-crushing, drilling and the like;

(e) any change of land use or water use; and

(f) alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems, factories or other installations;

(xxxvii) "proponent" means the person who proposes or intends to undertake a project;

(xxxviii) "Provincial Agency" means a Provincial Environmental Protection Agency established under section 8;

(xxxviii) "regulations" means regulations made under this Act;

(xix) "rules" means rules made under this Act;

(xl) "sewage" means liquid or semi-solid wastes and sludge from sanitary conveniences, kitchens, laundries, washing and similar activities and from any sewerage system or sewage disposal works;

(xli) "standards" means qualitative and quantitative standards for discharge of effluent and wastes and for emission of air pollutants and noise either for general applicability or for a particular area, or from a particular production process, or for a particular product, and includes the National Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulations;

(xlii) "sustainable development" means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs;

(xliii) "territorial waters" shall have the same meaning as in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

(xliv) "vessel" includes anything made for the conveyance by water of human beings or of goods; and

(xlv) "waste" means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.

3. Establishment of the Pakistan Environmental Protection Council.— (1) The Federal Government shall, by notification in the official Gazette, establish a Council to be known as the Pakistan Environmental Protection Council consisting of—

- | | |
|--|------------------|
| (i) Prime Minister or such other person as the Prime Minister may nominate in this behalf. | Chairperson |
| (ii) Minister incharge of the Ministry or Division dealing with the subject of environment. | Vice Chairperson |
| (iii) Chief Ministers of the Provinces. | Members |
| (iii) Ministers Incharge of the subject of environment in the Provinces. | Members |
| (iv) Such other persons not exceeding thirty-five as the federal Government may appoint, of which at least | Members |

twenty shall be non-officials including five representatives of the Chambers of Commerce and Industry and industrial associations and one or more representatives of the Chambers of Agriculture, the medical and legal professions, trade unions, and non-governmental organizations concerned with the environment and development, and scientists, technical experts and educationists

(v) Secretary to the Government of Pakistan, incharge of the Ministry or Division dealing with the subject of environment Member/
Secretary

(2) The Members of the Council, other than ex-officio members, shall be appointed in accordance with the prescribed procedure and shall hold office for a term of two years.

(3) The Council shall frame its own rules of procedure.

(4) The Council shall hold meetings, as and when necessary, but not less than two meetings, shall be held in a year.

(5) The Council may constitute committees of its members and entrust them with such functions as it may deem fit, and the recommendations of the committees shall be submitted to the Council for approval.

(6) The Council, or any of its committees, may invite any technical expert or representative of any Government Agency or non-governmental organization or other person possessing specialized knowledge of any subject for assistance in performance of its functions.

4. Functions and powers of the Council.—(1) The Council shall—

(a) co-ordinate and supervise enforcement of the provisions of this Act; and

(b) approve comprehensive national environmental policies and ensure their implementation within the framework of a national conservation strategy as may be approved by the Federal Government from time to time;

(c) approve the National Environmental Quality Standards;

(d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources.

(e) co-ordinate integration of the principles and concerns of sustainable development into national development plans and policies;

(f) consider the National Environment Report and give appropriate directions thereon;

(2) The Council may, either itself or on the request of any person or organization, direct the Federal Agency or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources or to undertake research in any aspect of environment.

5. Establishment of the Pakistan Environmental Protection Agency.----(1) The Federal Government shall, by notification in the official Gazette, establish the Pakistan Environmental Protection Agency to exercise the powers and perform the functions assigned to it under this Act and the rules and regulations made thereunder.

(2) The Federal Agency shall be headed by a Director-General who shall be appointed by the Federal Government on such terms and conditions as it may determine.

(3) The Federal Agency shall have such administrative, technical and legal staff, as the Federal Government may specify, to be appointed in accordance with such procedure as may be prescribed.

(4) The powers and functions of the Federal Agency shall be exercised and performed by the Director-General.

(5) The Director-General may, by general or special order, delegate any of the powers and functions to staff appointed under sub-section (3).

(6) For assisting the Federal Agency in the discharge of its functions the Federal Government shall establish Advisory Committees for various sectors and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

6. Functions of the Federal Agency.—(1) The Federal Agency shall—

(a) administer and implement this Act and the rules and regulations made;

(b) prepare, in co-ordination with the appropriate Government Agency and in consultation with the concerned sectoral Advisory Committees, national environmental policies for approval by the Council;

(c) take all necessary measures for the implementation of the national environmental policies approved by the Council;

(d) prepare and publish an annual National Environment Report on the state of the environment;

(e) prepare, establish and revise the National Environmental Quality Standards with approval of the Council:

Provided that before seeking approval of the Council, the Federal Agency shall publish the proposed National Environmental Quality Standards for public opinion in accordance with the prescribed procedure; and

(f) ensure enforcement of the National Environmental Quality Standards;

(g) establish standards for the quality of the ambient air, water and land, by notification in the official Gazette in consultation with the Provincial Agency concerned:

Provided that—

(i) different standards for discharge or emission from different sources and for different areas and conditions may be specified;

(ii) where standards are less stringent than the National Environmental Quality Standards prior approval of the Council shall be obtained;

(iii) certain areas, with the approval of the Council, may exclude from carrying out specific activities, projects from the application of such standards;

(h) co-ordinate environmental policies and programmes nationally and internationally;

(i) establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors;

(j) take measures to promote research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development;

(k) certify one or more laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation for the purposes of this Act.

(l) identify the needs for and initiate legislation in various sectors of the environment;

(m) render advice and assistance in environmental matters including such information and data available with it as may be required for carrying out the purposes of this Act:

Provided that the disclosure of such information shall be subject to the restrictions contained in the proviso to sub-section (3) of section 12;

(n) assist the local councils, local authorities, Government Agencies and other persons to implement schemes for the proper disposal of wastes so as to ensure compliance with the standards established by it;

(o) provide information and guidance to the public on environmental matters;

(p) recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;

(q) promote public education and awareness of environmental issues through mass media and other means including seminars and workshops;

(r) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned person in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;

(s) encourage the formation and working of non-governmental organizations, community organizations and village organizations to prevent and control pollution and promote sustainable development;

(t) take or cause to be taken all necessary measures for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development; and

(u) perform any function which the Council may assign to it.

(2) The Federal Agency may—

(a) undertake inquiries or investigation into environmental issues, either of its own accord or upon complaint from any person or organization;

(b) request any person to furnish any information or data relevant to its functions;

(c) initiate with the approval of the Federal Government, requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material or information and participate in international seminars or meetings;

(d) recommend to the Federal Government the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including—

(i) incentives, prizes awards, subsidies, tax exemptions, rebates and depreciation allowances; and

(ii) taxes, duties, cesses and other levies;

(e) establish and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for establishment of similar laboratories in the private sector; and

(f) provide or arrange, in accordance with such procedure as may be prescribed, financial assistance for projects designed to facilitate the discharge of its functions.

7. Powers of the Federal Agency.—Subject to the provisions of this Act, the Federal Agency may—

(a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both moveable and immovable;

(b) sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;

(c) fix and realize fees, rates and charges for rendering any service or providing any facility, information or data under this Act or the rules and regulations;

(d) enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;

(e) appoint with the approval of the Federal Government and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit;

(f) summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue;

(g) enter and inspect and under the authority of a search warrant issued by the Environmental Court or Environmental Magistrate, search at any reasonable time, any land, building, premises, vehicle or vessel or other place where or in which. there are reasonable grounds to believe that an offence under this Act has been, or is being, committed;

(h) take samples of any materials, products, articles or substances or of the effluent, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission;

(i) arrange for test and analysis of the samples at a certified laboratory;

(j) confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time:

Provided that the power under clauses (f), (h), (I) and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898), or the rules made under this Act and under the direction of the Environmental Court or Environmental Magistrate; and

(k) establish a National Environmental Co-ordination Committee comprising the Director-General as its chairman and the Director Generals of the Provincial Environmental Protection Agencies and such other persons as the Federal Government may appoint as its members to exercise such powers and perform such functions as may be delegated or assigned to it by the Federal Government for carrying out the purposes of this Act and for ensuring inter provincial co-ordination in environmental policies.

8. Establishment, powers and functions of the Provincial Environmental Protection Agencies.—(1) Every Provincial Government shall, by notification in the official Gazette, establish an Environmental Protection Agency, to exercise such powers and perform such functions as may be delegated to it by the Provincial Government under sub-section (2) of section 26.

(2) The Provincial Agency shall be headed by a Director-General who shall be appointed by the Provincial Government on such terms and conditions as it may determine.

(3) The Provincial Agency shall have such administrative, technical and legal staff as the Provincial Government may specify, to be appointed in accordance with such procedure as may be prescribed.

(4) The powers and functions of the Provincial Agency shall be exercised and performed by the Director-General.

(5) The Director General may, by general or special order, delegate any of the powers and functions to staff appointed under sub-section (3).

(6) For assistance of the Provincial Agency in the discharge of its functions, the Provincial Government shall establish Sectoral Advisory Committees for various sectors and appoint members from amongst eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

9. Establishment of the Provincial Sustainable Development Funds.— (1) There shall be established in each Province a Sustainable Development Fund.

(2) The Provincial Sustainable Development Fund shall be derived from the following sources, namely:—

(a) grants made or loans advanced by the Federal Government or the Provincial Governments;

(b) aid and assistance, grants, advances, donations and other non-obligatory funds received from foreign governments, national or international agencies, and non-governmental organizations; and

(c) contributions from private organizations and other persons.

(3) The Provincial Sustainable Development Fund shall be utilized in accordance with such procedure as may be prescribed for—

(a) providing financial assistance to the projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the sustainable development of resources and for research in any aspect of environment; and

(b) any other purpose which in the opinion of the Board shall help achieve environmental objectives and the purposes of this Act.

10. Management of the Provincial Sustainable Development Fund.—(1) The Provincial Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board consisting of—

- | | |
|---|------------------|
| (i) Chairman, Planning and Development Board/Additional Chief Secretary Planning and Development Department | Chairperson |
| (ii) such officers of the Provincial Governments, not exceeding six, as the Provincial Government may appoint including Secretaries incharge of the Finance, Industries and Environment Departments | Members |
| (iii) such non-official persons not exceeding ten as the Provincial Government may appoint including representatives of the Provincial Chamber of Commerce and Industry, non governmental organizations, and major donors. | Members |
| (iv) Director-General of the Provincial Agency | Member/Secretary |

(2) In accordance with such procedure and such criteria as may be prescribed, the Board shall have the power to—

(a) sanction financial assistance for eligible projects;

(b) invest moneys held in the Provincial Sustainable Development Fund in such profit-bearing Government bonds, savings schemes and securities as it may deem suitable; and

(c) take such measures and exercise such powers as may be necessary for utilization of the Provincial Sustainable Development Fund for the purposes specified in sub-section (3) of section 9.

(3) The Board shall constitute committees of its members to undertake regular monitoring of projects financed from the Provincial Sustainable Development Fund and to submit progress reports to the Board which shall publish an Annual Report incorporating its annual audited accounts and performance evaluation based on the progress reports.

11. Prohibition of certain discharges or emissions.—(1) Subject to the provisions of this Act and the rules and regulations no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards or, where applicable, the standards established under sub-clause (I) of clause (g) of sub-section (1) of section 6.

(2) The Federal Government may levy a pollution charge on any person who contravenes or fails to comply with the provisions of sub-section (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed.

(3) Any person who pays the pollution charge levied under sub-section (2) shall not be charged with an offence with respect to that contravention or failure.

(4) The provisions of sub-section (3) shall not apply to projects which commenced industrial activity on or after the thirtieth day of June, 1994.

12. Initial environmental examination and environmental impact assessment.—(1) No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Protection Agencies, as the case may be, or, where the project is likely to cause an adverse environmental effects an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof.

(2) The Government Agency shall subject to standards fixed by the Federal Environmental Protection Agency—

(a) review the initial environmental examination and accord its approval, or require submission of an environmental impact assessment by the proponent; or

(b) review the environmental impact assessment and accord its approval subject to such conditions as it may deem fit to impose, require that the environmental impact assessment be re-submitted after such modifications as may be stipulated or reject the project as being contrary to environmental objectives.

(3) Every review of an environmental impact assessment shall be carried out with public participation and no information will be disclosed during the course of such public participation which relates to—

(i) trade, manufacturing or business activities, processes or techniques of a proprietary nature, or financial, commercial, scientific or technical matters which the proponent has requested should remain confidential, unless for reasons to be recorded in writing, the Director General of the Federal Agency is of the opinion that the request for confidentiality is not well-founded or the public interest in the disclosure outweighs the possible prejudice to the competitive position of the project or its proponent; or

(ii) international relations, national security or maintenance of law and order, except with the consent of the Federal Government; or

(iii) matters covered by legal professional privilege.

(4) The Government Agency shall communicate its approval or otherwise within a period of four months from the date the initial environmental examination or environmental impact assessment is filed complete in all respects in accordance with the prescribed procedure, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations.

(5) Subject to sub-section (4) the appropriate Government may in a particular case extend the aforementioned period of four months if the nature of the project so warrants.

(6) The provisions of sub-sections (1), (2), (3), (4) and (5) shall apply to such categories of projects and in such manner as may be prescribed.

(7) The Government Agency shall maintain separate registers for initial environmental examination and environmental impact assessment projects, which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open to inspection by the public at all reasonable hours and the disclosure of information in such registers shall be subject to the restrictions specified in sub-section (3).

13. Prohibition of import of hazardous waste.—No person shall import hazardous waste into Pakistan and its territorial waters, Exclusive economic Zone and historic waters.

14. Handling of hazardous substances.—Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except—

(a) under a licence issued by the Federal Agency and in such manner as may be prescribed; or

(b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party.

15. Regulation of motor vehicles.---(1) Subject to the provisions of this Act, and the rules and regulations, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the National Environmental Quality Standards, or where applicable the standards established under clause (g) of sub-section (I) of section 6.

(2) For ensuring compliance with the standards mentioned in sub-section (1), the Federal Agency may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as may be prescribed.

(3) Where a direction has been issued by the Government Agency under subsection (2) in respect of any motor vehicles or class of motor vehicles, no person shall operate any such vehicle till such direction has been complied with.

16. Environmental protection order.---(1) Where the Federal Agency or a Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of the provisions of this Act, rules or regulations or of the conditions of a licence, and is likely to cause, or is causing or has caused an adverse environmental effect, the Federal Agency or, as the case may be, the Provincial Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures that the Federal Agency or Provincial Agency may consider necessary within such period as may be specified in the order.

(2) In particular and without prejudice to the generality of the foregoing power, such measures may include—

(a) immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;

(b) installation, replacement or alteration of any equipment or thing to eliminate, control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;

(c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances; and

(d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Federal Agency or, Provincial Agency.

(3) Where the person, to whom directions under sub-section (1) are given, does not comply therewith, the Federal Agency or Provincial Agency may, in addition to the proceedings initiated against him under this Act, the rules and regulations, itself take or cause to be taken such measures specified in the order as it may deem necessary and may recover the reasonable costs of taking such measures from such person as arrears of land revenue.

17. Penalties.—(1) Whoever contravenes or fails to comply with the provisions of sections 11, 12, 13 or section 16 or any order issued thereunder shall be punishable with fine which may extend to one million rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues:

Provided that if contravention of the provisions of section 11 also constitutes contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

(2) Whoever contravenes or fails to comply with the provisions of section 14 or 15 or any rule or regulation or conditions of any licence, any order or direction, issued by the Council or the Federal Agency or Provincial Agency, shall be punishable with fine which may extend to one hundred thousand rupees, and in case of continuing contravention or failure with an additional fine which extend to one thousand rupees for every day during which such contravention continues.

(3) Where an accused has been convicted of an offence under sub-sections (1) and (2), the Environmental Court and Environmental Magistrate, as the case may be, shall, in passing sentence, take into account the extent and duration of the contravention or failure constituting the offence and the attendant circumstances.

(4) Where an accused has been convicted of an offence under sub-section (1) and the Environmental Court is satisfied that as a result of the commission of the offence

monetary benefits have accrued to the offender, the Environmental Court may order the offender to pay, in addition to the fines under sub-section (1), further additional fine commensurate with the amount of the monetary benefits.

(5) Where a person convicted under sub-sections (1) or sub-section (2) had been previously convicted for any contravention under this Act, the Environmental Court or, as the case may be, Environmental Magistrate may, in addition to the punishment awarded thereunder—

(a) endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of Commerce and Industry or the Federation of Pakistan Chambers of Commerce and Industry;

(b) sentence him to imprisonment for a term which may extend to two years;

(c) order the closure of the factory;

(d) order confiscation of the factory, machinery, and equipment, vehicle, material or substance, record or document or other object used or involved in contravention of the provisions of the Act:

Provided that for a period of three years from the date of commencement of this Act the sentence of imprisonment shall be passed only in respect of persons who have been previously convicted for more than once for any contravention of sections 11, 13, 14 or 16 involving hazardous waste;

(e) order such person to restore the environment at his own cost, to the conditions existing prior to such contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the Federal Agency or, as the case may be, Provincial Agency; and

(f) order that such sum be paid to any person as compensation for any loss, bodily injury, damage to his health or property suffered by such contravention.

(6) The Director-General of the Federal Agency or of a Provincial Agency or an officer generally or specially authorised by him in this behalf may, on the application of the accused compound an offence under this Act with the permission of the Environmental Tribunals or Environmental Magistrate in accordance with such procedure as may be prescribed.

(7) Where the Director-General of the Federal Agency or of a Provincial Agency is of the opinion that a person has contravened any provision of Act he may, subject to the rules, by notice in writing to that person require him to pay to the Federal Agency or, as the case may be, Provincial Agency an administrative penalty in the amount set out in the notice for each day the contravention continues; and a person who pays an administrative

penalty for a contravention shall not be charged under this Act with an offence in respect of such contravention.

(8) The provisions of sub-sections (6) and (7) shall not apply to a person who has been previously convicted of offence or who has compounded an offence under this Act who has paid an administrative penalty for a contravention of any provision of this Act.

18. Offences by bodies corporate.— Where any contravention of this Act has been committed by a body corporate, and it is proved that such offence has been committed with the consent or connivance of, or is attributed to any negligence on the part of, any director, partner, manager, secretary or other Officer of the body corporate, such director, partner, manager, secretary or other officer of the body corporate, shall be deemed guilty of such contravention along with the body corporate and shall be punished accordingly:

Provided that in the case of a company as defined under the Companies Ordinance, 1984 (XLVII of 1984), only the Chief Executive as defined in the said Ordinance shall be liable under this section.

Explanation.— For the purposes of this section, "body corporate" includes a firm, association of persons and a society registered under the Societies Registration Act, 1860 (XXI of 1860), or under the Co-operative Societies Act, 1925 (VII of 1925).

19. Offences by Government Agencies, local authorities or local councils.—Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such contravention has been committed with the consent or connivance of, or is attributable to any negligence on the part of, the Head or any other officer of the Government Agency, local authority or local council, such Head or other officer shall also be deemed guilty of such contravention along with the Government Agency, local authority or local council and shall be liable to be proceeded against and punished accordingly.

20. Environmental Tribunals.—(1) The Federal Government may, by notification in the official gazette, establish as many Environmental Tribunals as it consider necessary and, where it establishes more than one Environmental Tribunals, it shall specify territorial limits within which, or the class of cases in respect of which, each one of them shall exercise jurisdiction under this Act.

(2) An Environmental Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as, a judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by the Federal Government of which at least one shall be a technical member with suitable professional qualifications and experience; in the environmental field as may be prescribed.

(3) For every sitting of the Environmental Tribunal, the presence of the Chairperson and not less than one Member shall be necessary.

(4) A decision of an Environmental Tribunal shall be expressed in terms of the opinion of the majority of its members, including the Chairperson, or if the case has been decided by the Chairperson and only one of the members and there is a difference of opinion between them, the decision of the Environmental Tribunal shall be expressed in terms of the opinion of the Chairperson.

(5) An environmental Tribunal shall not, merely because of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehear any witness who has given evidence, and may act on the evidence already recorded by, or produced, before it.

(6) An Environmental Tribunal may hold its sittings at such places within its territorial jurisdiction as the Chairperson may decide.

(7) No act or proceeding of an Environmental Tribunal shall be invalid by reason only of the existence of a vacancy in, or defect in the constitution, of, the Environmental Tribunal.

(8) The terms and conditions of service of the Chairperson and members of the Environmental Tribunal shall be such as may be prescribed.

21. Jurisdiction and powers of Environmental Tribunals.—(1) An Environmental Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act or the rules and regulations made thereunder.

(2) All contravention punishable under sub-section (1) of section 17 shall exclusively be triable by an Environmental Tribunal.

(3) An Environmental Tribunal shall not take cognizance of any offence triable under sub-section (2) except on a complaint in writing by--

(a) the Federal Agency or any Government Agency or local council; and

(b) any aggrieved person, who has given notice of not less than thirty days to the Federal Agency, or the Provincial Agency concerned, of the alleged contravention and of his intention to make a complaint to the Environment Tribunal.

(4) In exercise of its criminal jurisdiction, the Environmental Tribunals shall have the same powers as are vested in Court of Session under the Code of Criminal Procedure, 1898 (Act V of 1898).

(5) In exercise of the appellate jurisdiction under section 22 the Environmental Tribunals shall have the same powers and shall follow the same procedure as an appellate court in the Code of Civil Procedure, 1908 (Act V of 1908).

(6) In all matters with respect to which no procedure has been provided for in this Act, the Environmental Tribunal shall follow the procedure laid down in the Code of Civil Procedure, 1908 (Act V of 1908).

(7) An Environmental Tribunal may, on application filed by any officer duly authorised in this behalf by the Director-General of the Federal Agency or of Provincial Agency, issue bailable warrant for the arrest of any person against whom reasonable suspicion exist, of his having been involved in contravention punishable under sub-section (1) of Section 17:

Provided that such warrant shall be applied for, issued, and executed in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898):

Provided further that if the person arrested executes a bond with sufficient sureties in accordance with the endorsement on the warrant he shall be released from custody, failing which he shall be taken or sent without delay to the officer in-charge of the nearest police station.

(8) All proceedings before the Environmental Tribunal shall be deemed to be judicial proceedings within the meaning of section 193 and 228 of the Pakistan Penal Code (Act XLV of 1860), and the Environmental Tribunal shall be deemed to be a court for the purpose of section 480 and 482 of the Code of Criminal Procedure, 1898 (Act V of 1898).

(9) No court other than an Environmental Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Tribunal extends under this Act, the rules and regulations made thereunder.

(10) Where the Environmental Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

22. Appeals to the Environmental Tribunal.—(1) Any person aggrieved by any order or direction of the Federal Agency or any Provincial Agency under any provision of this Act, and rules or regulations may prefer an appeal with the Environmental Tribunal within thirty days of the date of communication of the impugned order or direction to such person.

(2) An appeal to the Environmental Tribunal shall be in such form, contain such particulars and be accompanied by such fees as may be prescribed.

23. Appeals from orders of the Environmental Tribunal.---(1) Any person aggrieved by any final order or by any sentence of the Environmental Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.

(2) An appeal under sub-section (1) shall be heard by a Bench of not less than two Judges.

24. Jurisdiction of Environmental Magistrates.—(1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all contravention punishable under sub-section (2) of section 17 shall exclusively be triable by a judicial Magistrate of the first class as Environmental Magistrate especially empowered in this behalf by the High Court.

(2) An Environmental Magistrate shall be competent to impose any punishment specified in sub-sections (2) and (4) of section 17.

(3) An Environmental Magistrate shall not take cognizance of an offence triable under sub-section (1) except on a complaint in writing by—

(a) the Federal Agency, Provincial Agency, or Government Agency or a local council; and

(b) any aggrieved person.

25. Appeals from orders of Environmental Magistrates.—Any person convicted of any contravention of this Act or the rules or regulations by an Environmental Magistrate may, within thirty days from the date of his conviction, appeal to the Court of Sessions whose decision thereon shall be final.

26. Power to delegate.—(1) The Federal Government may, by notification in the official Gazette, delegate any of its or of the Federal Agency's powers and functions under this Act and the rules and regulations to any Provincial Government, any Government Agency, local council or local authority.

(2) The Provincial Government may, by notification in the official Gazette, delegate any of its or of the Provincial Agency's powers or functions under this Act and the rules and regulations to any Government Agency of such Provincial Government or any local council or local authority in the Province.

27. Power to give directions.—In the performance of their functions under this Act-

(a) the Federal Agency and Provincial Agencies shall be bound by the directions given to them in writing by the Federal Government; and

(b) a Provincial Agency shall be bound by the directions given to it in writing by the Provincial Government.

28. Indemnity.—No suit, prosecution or other legal proceedings shall lie against the Federal or Provincial Governments, the Council, the Federal Agency or Provincial Agencies, the Director-Generals of the Federal Agency and the Provincial Agency, members, officers, employees, experts, advisers, committees or consultants of the Federal or Provincial Agencies or the Environmental Tribunal or Environmental Magistrates or any other person for anything which is in good faith done or intended to be done under this Act or the rules or regulations made thereunder.

29. Dues recoverable as arrears of land revenue.—Any dues recoverable by the Federal Agency or Provincial Agency under this Act, or the rules or regulations shall be recoverable as arrears of land revenue.

30. Act to override other laws.—The provisions of this Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force.

31. Power to make rules.—The Federal Government may, by notification in the official Gazette, make rules for carrying out the purposes of this Act including rules for implementing the provisions of the international environmental Agreements, specified in the Schedule to this Act.

32. Power to amend the Schedule.—The Federal Government may, by notification in the official Gazette, amend the Schedule so as to add any entry thereat or modify or omit any entry therein.

33. Power to make regulations.—(1) For carrying out the purposes of this Act, the Federal Agency may, by notification in the official Gazette and with the approval of the Federal Government, make regulations not inconsistent with the provisions of this Act or the rules made thereunder.

(2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for—

(a) submission of periodical reports, data or information by any Government agency, local authority or local council in respect of environmental matters;

(b) preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities;

(c) appointment of officers, advisers, experts, consultants and employees;

(d) levy of fees, rates and charges in respect of services rendered, actions taken and schemes implemented;

(e) monitoring and measurement of discharges and emissions;

(f) categorization of projects to which, and the manner in which, section 12 applies;

(g) laying down of guidelines for preparation of initial environmental examination and environmental impact assessment and Development of procedures for their filing, review and approval;

(h) providing procedures for handling hazardous substances; and

(i) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

34. Repeal, savings and succession.—(1) The Pakistan Environmental Protection Ordinance 1983 (XXXVII of 1983) is hereby repealed.

(2) Notwithstanding the repeal of the Pakistan Environmental Protection Ordinance, 1983 (XXVII of 1983), any rules or regulations or appointments made, orders passed, notifications issued, powers delegated, contracts entered into, proceedings commenced, rights acquired liabilities incurred, penalties, rates, fees or charges levied, things done or action taken under any provisions of that Ordinance shall, so far as they are not inconsistent with the provisions of this Act be deemed to have been made, passed, issued, delegated, entered into, commenced, acquired, incurred, levied, done or taken under this Act.

(3) On the establishment of the Federal Agency and Provincial Agencies under this Act, all properties, assets and liabilities pertaining to the Federal Agency and Provincial Agencies established under that Ordinance shall vest in and be the properties, assets and liabilities, as the case may be, of the Federal Agency and Provincial Agency established under this Act.

SCHEDULE

(See section 31)

1. International Plant Protection Convention, Rome, 1951.
2. Plant Protection Agreement for the South-East Asia and Pacific Region (as amended), Rome, 1956.
3. Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia (as amended), Rome, 1963.
4. Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar, 1971 and its amending Protocol, Paris, 1982.
5. Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention), 1972.
6. Convention on International Trade in Endangered Species of Wild Funa and Flora (CITES), Washington, 1973.
7. Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979.
8. Convention on the Law of the Sea, Montego Bay, 1982.
9. Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985.
10. Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 and amendments thereto.
11. Agreement on the Network of Agriculture Centres in Asia and the Pacific, Bangkok, 1988.
12. Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Basel, 1989.
13. Convention on Biological Diversity, Rio de Janeiro, 1992.
14. United Nations Framework Convention on Climate Change, Rio De Janeiro, 1992.

ANNEXURE-IV

**PUNJAB IEE/EIA GUIDELINES, (2012, Amended) &
GUIDELINES IEE/EIA, 2016**

[Click Here](#)

[Click Here](#)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
	Project Sponsor: Zorlu Solar Pakistan (Pvt.) Ltd	Document Issue 02	Page Number 165

AMENDED UPTO ACT 35 OF 2012, DATED 18.4.2012

THE PUNJAB ENVIRONMENTAL PROTECTION ACT, 1997
(XXXIV OF 1997)

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attested
Ruqiyah
RUQIYA UMBREEN
Law Officer/Prosecutor
Environmental Protection Agency
Punjab, Lahore.

SCHEDULE

TEXT

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to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development,

WHEREAS it is expedient to provide for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution, promotion of sustainable development, and for matters connected therewith and incidental thereto;

It is hereby enacted as follows:

1. **Short title, extent and commencement.**— (1) This Act shall be called the ¹[Punjab] Environmental Protection Act, 1997.

(2) It extends to the whole of ²[the Punjab].

(3) It shall come into force at once.

2. **Definitions.**— In this Act, unless there is anything repugnant in the subject or context:-

(i) "adverse environmental effect" means impairment of, or damage to, the environment and includes:

(a) impairment of, or damage to, human health and safety or to biodiversity or property;

(b) pollution; and

(c) any adverse environmental effect as may be specified in the regulations;

(ii) "agriculture waste" means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry, residues from the use of fertilizers, pesticides and other farm chemicals;

(iii) "air pollutant" means any substance that causes pollution of, air and includes soot, smoke, dust particles, odor, light, electro-magnetic radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substance and radioactive substances;

(iv) "biodiversity" or "biological diversity" means the variability among living organisms from all sources, including inter alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; including diversity within species, between species and of eco-systems;

(v) "Council" means the ³[Punjab] Environmental Protection Council established under section 3;

(vi) "discharge" includes spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping;

(vii) "ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit;

(viii) "effluent" means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;

(ix) "emission standards" means the permissible standards established by the ⁴[Provincial Agency] for emission of air pollutants and noise and for discharge of effluent and waste;

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attested
Ruqiya
RUQIYA UMBREEN
 Law Officer/Prosecutor
 Environmental Protection Agency
 Punjab, Lahore.

- (x) "environment" means:-
- air, water and land;
 - all layers of the atmosphere;
 - all organic and inorganic matter and living organisms;
 - the ecosystem and ecological relationships;
 - buildings, structures, roads, facilities and works;
 - all social and economic conditions affecting community life; and
 - the inter-relationships between any of the factors specified in sub-clauses (a) to (f);
- (xi) "environmental impact assessment" means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed;
- (xii) "Environmental Magistrate" means the Magistrate of the First Class appointed under section 24;
- (xiii) "Environmental Tribunal" means the Environmental Tribunal constituted under section 20;
- (xiv) ⁶[*****];
- (xv) "Factory" means any premises in which industrial activity is being under taken.
- ⁶[(xvi) "Government" means Government of the Punjab.]
- ⁷[(xvii) "Government Agency" includes—
- a department, an attached department or any other office of the Government; and
 - a development authority, local authority, company or a body corporate established or controlled by the Government;]
- (xviii) "hazardous substance" means:-
- a substance or mixture of substances, other than a pesticide as defined in the Agricultural Pesticides Ordinance, 1971 (II of 1971), which, by reason of its chemical activity or toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters, an adverse environmental effect; and
 - any substance which may be prescribed as a hazardous substance;
- (xix) "hazardous waste" means waste which is or which contains a hazardous substance or which may be prescribed as hazardous substance or which may be prescribed as hazardous waste, and includes hospital waste and nuclear waste;
- (xx) ⁸[*****];

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- (xxi) **"hospital waste"** includes waste medical supplies and materials of all kinds, and waste blood, tissue, organs and other parts of the human and animal bodies, from hospitals, clinics and laboratories;
- (xxii) **"industrial activity"** means any operation or process for manufacturing, making, formulating, synthesising, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purpose;
- (xxiii) **"industrial waste"** means waste resulting from an industrial activity;
- (xxiv) **"initial environmental examination"** means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an adverse environmental effect for requiring preparation of an environmental impact assessment;
- (xxv) **"local authority"** means any agency set up or designated by the ²[Government] by notification in the official Gazette to be a local authority for the purposes of this Act;
- (xxvi) **"local council"** means a local council constituted or established under a law relating to local government;
- (xxvii) **"motor vehicle"** means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails;
- (xxviii) **"municipal waste"** includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like;
- (xxix) ¹⁰[*****];
- (xxx) **"noise"** means the intensity, duration and character of sounds from all sources, and includes vibration;
- (xxxi) **"nuclear waste"** means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive;
- (xxxii) **"person"** means any natural person or legal entity and includes an individual, firm, association, partnership, society, group, company, corporation, co-operative society, Government Agency, non-governmental organization, community-based organization, village organization, local council or local authority and, in the case of a vessel, the master or other person having for the time being the charge or control of the vessel;
- (xxxiii) **"pollution"** means the contamination of air, land or water by the discharge or emission of effluents or wastes or air pollutants or noise or other matter which either directly or indirectly or in combination with other discharges or substances alters unfavourably the chemical, physical, biological, radiational, thermal or radiological or aesthetic properties of the air, land or water or which may, or is likely to make the air, land or water unclean, noxious or impure or injurious, disagreeable or detrimental to the health, safety, welfare or property of persons or

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(xxxv) **"project"** means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes:-

- (a) construction by use of buildings or other works;
- (b) construction or use of roads or other transport systems;
- (c) construction or operation of factories or other installations;
- (d) mineral prospecting, mining, quarrying, stone-crushing, drilling and the like;
- (e) any change of land use or water use; and
- (f) alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems, factories or other installations;

(xxxvi) **"proponent"** means the person who proposes or intends to undertake a project;

¹²[(xxxvii) **"Provincial Agency"** means the Provincial Environmental Protection Agency established under the Act, or any Government Agency, local council or local authority exercising the powers and functions of the Provincial Agency];

¹³[(xxxvii-a) **"Punjab Environmental Quality Standards"** mean the standards prepared by the Provincial Agency and approved by the Council];

(xxxviii) **"regulations"** means regulations made under the Act;

(xxxix) **"rules"** means rules made under this Act;

(xi) **"sewage"** means liquid or semi-solid wastes and sludge from sanitary conveniences, kitchens, laundries, washing and similar activities and from any sewerage system or sewage disposal works;

(xii) **"standards"** means qualitative and quantitative standards for discharge of effluents and wastes and for emission of air pollutants and noise either for general applicability or for a particular area, or from a particular production process, or for a particular product, and includes the ¹⁴[Punjab] Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulations made there under;

(xiii) **"sustainable development"** means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs;

(xiv) ¹⁵[*****];

(xv) **"vessel"** includes anything made for the conveyance by water of human beings or of goods; and

(xvi) **"waste"** means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.

¹¹ Clause (xxxiv) substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

¹² Clause (xxxvii) substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV

attested
 RUQIYA UMBREEN
 Law Officer/Prosecutor
 Environmental Protection Agency
 Punjab, Lahore.

3. **Establishment of the ¹⁶[Punjab] Environmental Protection Council.**— ¹⁷[(1) The Government shall, by notification in the official Gazette, establish a Council to be known as the Punjab Environmental Protection Council consisting of—

- i) Chief Minister of the Punjab; or such other **Chairperson**
person as nominated by the Chief Minister;
- ii) Minister Incharge of the Environment **Vice Chairperson**
Protection Department;
- iii) such other persons not exceeding thirty five **Members**
as the Government may appoint, of which at least twenty five shall be non-official including at least three Members of the Provincial Assembly of the Punjab, five representatives of the Chambers of Commerce and Industry and one or more representatives of the Chambers of Agriculture, Medical and legal profession, trade unions and non-governmental organizations concerned with the environment and sustainable development, and scientists, technical experts and educationalists; and
- iv) Secretary to the Government, Environment **Member/Secretary]**
Protection Department.

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RUQIYA UMBREEN
Law Officer/Prosecutor
Environmental Protection Agency
Punjab, Lahore.

(2) The Members of the Council, other than ex officio members, shall be appointed in accordance with the prescribed procedure and shall hold office for a term of three years.

(3) The Council shall frame its own rules of procedure.

(4) The Council shall hold meetings as and when necessary, but not less than two meetings shall be held in a year.

(5) The Council may constitute committees of its members and entrust them with such functions as it may deem fit, and the recommendations of the committees shall be submitted to the Council for approval.

(6) The Council or any of its committees may invite any technical expert or representative of any Government Agency or non-governmental organization or other person possessing specialized knowledge of any subject for assistance in performance of its functions.

4. **Functions and powers of the Council.**— (1) The Council shall—

- (a) co-ordinate and supervise enforcement of the provisions of this Act;
- (b) approve comprehensive ¹⁸[Punjab] environmental policies and ensure their implementation within the framework of a ¹⁹[Punjab] conservation strategy as may be approved by the ²⁰[Government] from time to time;
- (c) approve the ²¹[Punjab] Environmental Quality Standards;

¹⁶ Word "Pakistan" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

¹⁷ Sub-section (1) substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

attested

- (d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources;
- (e) coordinate integration of the principles and concerns of sustainable development into ²²[Punjab] development plans and policies; and
- (f) consider the ²³[Punjab] Environment Report and give appropriate directions thereon.

(2) The Council may, either itself or on the request of any person or organisation, direct the ²⁴[Provincial Agency] or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources, or to undertake research in any aspect of environment.

5. Establishment of the ²⁵[Provincial] Environmental Protection Agency.—

²⁶[(1) The Government shall, by notification in the official Gazette, establish the Provincial Environmental Protection Agency to exercise the powers and perform the functions assigned to it under this Act, the rules and the regulations]

(2) The ²⁷[Provincial Agency] shall be headed by a Director General, who shall be appointed by the ²⁸[Government] on such terms and conditions as it may determine.

(3) The ²⁹[Provincial Agency] shall have such administrative, technical and legal staff as the ³⁰[Government] may specify, to be appointed in accordance with such procedure as may be prescribed.

(4) The powers and functions of the ³¹[Provincial Agency] shall be exercised and performed by the Director-General.

(5) The Director-General may, by general or special order, delegate any of these powers and functions to staff appointed under sub-section (3).

(6) For assisting the ³²[Provincial Agency] in the discharge of its functions, the ³³[Government] shall establish Advisory Committees for various sectors, and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

6. Functions of the ³⁴[Provincial Agency].— (1) The ³⁵[Provincial Agency] shall—

²² Word "National" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

²³ Word "National" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

²⁴ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

²⁵ Words "Pakistan" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

²⁶ Sub-section (1) substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

²⁷ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

²⁸ Words "Federal Government" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

²⁹ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

³⁰ Words "Federal Government" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

³¹ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

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- (a) administer and implement the provisions of this Act and the rules and regulations made thereunder;
- (b) prepare, in coordination with the appropriate Government Agency and in consultation with the concerned sectoral Advisory Committees, ³⁶[****] environmental policies for approval by the Council;
- (c) take all necessary measures for the implementation of the ³⁷[****] environmental policies approved by the Council;
- (d) prepare and publish an annual ³⁸[Punjab] Environmental Report on the state of the environment;
- (e) prepare or revise, and establish the ³⁹[Punjab] Environmental Quality Standards with approval of the Council;

Provided that before seeking approval of the Council, the ⁴⁰[Provincial Agency] shall publish the proposed ⁴¹[Punjab] Environmental Quality Standards for public opinion in accordance with the prescribed procedure; and

- (f) ensure enforcement of the ⁴²[Punjab] Environmental Quality Standards;
- ⁴³[(g) establish standards for the quality of the ambient air, water and land, by Notification in the Official Gazette];
- (h) co-ordinate environmental policies and programmes nationally and internationally;
- (i) establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors;
- (j) take measures to promote research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development;
- (k) certify one or more laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation, for the purposes of this Act;
- (l) identify the needs for, and initiate legislation in various sectors of the environment;
- (m) render advice and assistance in environmental matters, including such information and data available with its as may be required for carrying out the purposes of this Act;

Provided that the disclosure of such information shall be subject to the restrictions contained in the proviso to sub-section (3) of section 12;

³⁶ Word "National" omitted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)
³⁷ Word "National" omitted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)
³⁸ Word "National" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)
³⁹ Word "National" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)
⁴⁰ Word "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act.

- (n) assist the local councils, local authorities, Government Agencies and other persons to implement schemes for the proper disposal of wastes so as to ensure compliance with the standards established by it;
 - (o) provide information and guidance to the public environmental matters;
 - (p) recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;
 - (q) promote public education and awareness of environmental issues through mass media and other means, including seminars and workshops;
 - (r) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned person in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;
 - (s) encourage the formation and working of non-governmental organizations, community organizations and village organizations to prevent and control pollution and promote sustainable development;
 - (t) take or cause to be taken all necessary measure for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development; and
 - (u) perform any function which the Council may assign to it.
- (2) The ⁴⁴[Provincial Agency] may—
- (a) undertake inquires or investigation into environmental issues, either of its own accord or upon complaint from any person or organisation;
 - (b) request any person to furnish any information or data relevant to its functions;
 - (c) initiate with the approval of the ⁴⁵[Government], requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material or information and participate in international seminars or meetings;
 - (d) recommend to the ⁴⁶[Government] the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act including:-
 - (i) incentives, prizes awards, subsidies, tax exemptions, rebates and depreciation allowances;
 - (ii) taxes, duties, cesses and other levies;
 - (e) establish and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for establishment of similar laboratories in the private sector; and
 - (f) provide or arrange, in accordance with such procedure as may be prescribed, financial assistance for projects designed to facilitate the discharge of its functions.

7. Powers of the ⁴⁷[Provincial Agency].— Subject to the provisions of this Act, the ⁴⁸[Provincial Agency] may—

⁴⁴ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

- (a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both movable and immovable;
- (b) sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;
- (c) fix and realize fees, rates and charges for rendering any service or providing any facility, information or data under this Act or the rules and regulations made thereunder;
- (d) enter into the contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;
- (e) appoint with the approval of the ⁴⁹[Government] and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit;
- (f) summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue;
- (g) enter and inspect and under the authority of a search warrant issued by the Environmental Tribunal or Environmental Magistrate, search at any reasonable time, any land, building, premises, vehicle or vessel or other place where or in which, there are reasonable grounds to believe that an offence under this Act has been or is being committed;
- (h) take samples of any materials, products, articles or substances or of the effluents, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission;
- (i) arrange for test and analysis of the samples at a certified laboratory;
- (j) confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time;

Provided that the power under clauses (f), (h), (i), and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898), or the rules made under this Act and under the direction of the Environmental Tribunal or Environmental Magistrate; and

- ⁵⁰[(k) establish the Punjab Environmental Coordination Committee comprising the Director General as its convener and such other members as the Government may appoint to exercise such powers and perform such functions as may be delegated or assigned to it by the Government for carrying out the purposes of this Act.]

8. ⁵¹[*****].

9. **Establishment of the Provincial Sustainable Development Funds.**— ⁵²[(1) There shall be established a Provincial Sustainable Development Fund].

(2) The Provincial Sustainable Development Fund shall be derived from the following sources, namely:-

- (a) grants made or loans advanced by the ⁵³[Government or the Federal Government];

⁴⁸ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

⁴⁹ Words "Federal Government" substituted by the Punjab Environmental Protection (Amendment) Act

- (b) aid and assistance, grants, advances, donations and other non-obligatory funds received from foreign governments, ⁵⁴[punjab] or international agencies, and non-governmental organizations; and
 - (c) contributions from private organizations, and other persons.
- (3) The Provincial Sustainable Development Fund shall be utilized in accordance with such procedure as may be prescribed for..
- (a) providing financial assistance to the projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the sustainable development of resources and for research in any specified aspect of environment; and
 - (b) any other purpose which in the opinion of the Board shall help achieve environmental objectives and the purposes of this Act.

10. Management of the Provincial Sustainable Development Fund.—⁵⁵{(1) The Provincial Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board consisting of-

- (i) Chairman, Planning and Development Board; Chairperson
- (ii) Such officers of the Government, not exceeding six, as the Government may appoint including Secretaries incharge of the Finance, Industries and Environment Departments; Members
- (iii) such non-official persons not exceeding ten as the Government may appoint including representatives of the Chamber of Commerce and Industry, non-governmental organizations and major donors; and Members
- (iv) Director General of the Provincial Agency. Member/Secretary]

(2) In accordance with such procedure and such criteria as may be prescribed, the Board shall have the power to—

- (a) sanction financial assistance for eligible projects;
- (b) invest moneys held in the Provincial Sustainable Development Fund in such profit-bearing government bonds, savings schemes and securities as it may deem suitable; and
- (c) take such measures and exercise such powers as may be necessary for utilization of the Provincial Sustainable Development fund for the purposes specified in sub-section (3) of section 9.

(3) The Board shall constitute committees of its members to undertake regular monitoring of projects financed from the Provincial Sustainable Development Fund and to submit progress reports to the Board which shall publish an Annual Report incorporating its annual audited accounts, and performance evaluation based on the progress reports.

11. Prohibition of certain discharges or emissions.— (1) Subject to the provisions of this Act and the rules and regulations made there under no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is a source of the

⁵⁶[Punjab] Environmental Quality Standards or, where applicable, the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6.

(2) The ⁵⁷[Government] may levy a pollution charge on any person who contravenes or fails to comply with the provisions of sub-section (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed.

(3) Any person who pays the pollution charge levied under sub-section (2) shall not be charged with an offence with respect to that contravention or failure.

(4) The provision of sub-section (3) shall not apply to projects, which commenced industrial activity on or after the thirtieth day of June, 1994.

12. Initial environmental examination and environmental impact assessment— (1) No proponent of a project shall commence construction or operation unless he has filed with the ⁵⁸[Provincial Agency] an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the ⁵⁹[Provincial Agency] approval in respect thereof.

(2) The ⁶⁰[Provincial Agency] shall -

(a) review the initial environmental examination and accord its approval, or require submission of an environmental impact assessment by the proponent; or

(b) review the environmental impact assessment and accord its approval subject to such conditions as it may deem fit to impose, require that the environmental impact assessment be re-submitted after such modifications as may be stipulated, or reject the project as being contrary to environmental objectives.

(3) Every review of an environmental impact assessment shall be carried out with public participation and no information will be disclosed during the course of such public participation which relates to--

(i) trade, manufacturing or business activities, processes or techniques of a proprietary nature, or financial, commercial, scientific or technical matters which the proponent has requested should remain confidential, unless for reasons to be recorded in writing, the Director - General of the ⁶¹[Provincial Agency] is of the opinion that the request for confidentiality is not well-founded or the public interest in the disclosure outweighs the possible prejudice to the competitive position of the project or its proponent; or

(ii) international relations, ⁶²[punjab] security or maintenance of law and order, except with the consent of the ⁶³[Government]; or

(iii) matters covered by legal professional privilege.

(4) The ⁶⁴[Provincial Agency] shall communicate its approval or otherwise within a period of four months from the date the initial environmental examination or

⁵⁶ Word "National" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

⁵⁷ Words "Federal Government" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

⁵⁸ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

⁵⁹ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

⁶⁰ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

⁶¹ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

environmental impact assessment is filed complete in all respects in accordance with the prescribed procedure, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations made thereunder.

(5) Subject to sub-section (4) the ⁶⁵[Government] may in a particular case extend the aforementioned period of four months if the nature of the project so warrants.

(6) The provisions of sub-section (1), (2), (3), (4), and (5) shall apply to such categories of projects and in such manner as may be prescribed.

(7) The ⁶⁶[Provincial Agency] shall maintain separate Registers for initial environmental examination and environmental impact assessment project, which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open to inspection by the public at all reasonable hours and the disclosure of information in such Registers shall be subject to the restrictions specified in sub-section (3).

⁶⁷[13. Prohibition of import of hazardous waste.— No person shall import hazardous waste into the Punjab.]

14. Handling of hazardous substances.— Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except:-

- (a) under a licence issued by the ⁶⁸[Provincial Agency] and in such manner as may be prescribed; or
- (b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party.

15. Regulation of motor vehicles.— (1) subject to the provisions of this Act and the rules and regulations made thereunder, no person shall operate a motor vehicle from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the ⁶⁹[Punjab] Environmental quality standards, or where applicable the standards established under clause (g) of sub-section (1) of section 6.

(2) For ensuring compliance with the standards mentioned in sub-section (1), the ⁷⁰[Provincial Agency] may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as may be prescribed.

(3) where a direction has been issued by the ⁷¹[Provincial Agency] under sub-section (2) in respect of any motor vehicles or class of motor vehicles, no person shall operate any such vehicle till such direction has been complied with.

16. Environmental protection order.— ⁷²[(1) Where the Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or handling of hazardous substance, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of any provision of this Act, rules

⁶⁵ Words "Federal Government" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

⁶⁶ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

⁶⁷ Section 13 substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

⁶⁸ Words "Federal Agency" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

⁶⁹ Word "National" substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012)

or regulations or of the conditions of a license, or is likely to cause, or is causing, or has caused an adverse environmental effect, the Provincial Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order, direct such person to take such measures as the Provincial Agency may consider necessary within such period as may be specified in the order.]

(2) In particular and without prejudice to the generality of the foregoing power, such measures may include—

- (a) immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;
- (b) installation, replacement or alteration of any equipment or thing to eliminate or control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;
- (c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances; and
- (d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such conditions may be reasonable in the circumstances, to the satisfaction of the ⁷³[Provincial Agency].

(3) Where the person, to whom directions under sub-section (1) are given, does not comply therewith, the ⁷⁴[Provincial Agency] may, in addition to the proceeding initiated against him under this Act or the rules and regulations, itself take or cause to be taken such measures specified in the order as it may deem necessary, and may recover the costs of taking such measures from such person as arrears of land revenue.

17. Penalties.—(1) Whoever contravenes or fails to comply with the provisions of sections 11, 12, 13, or section 16 or any order issued thereunder shall be punishable with fine which may extend to ⁷⁵[five million] rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues and where such contravention or failure continues;

Provided that if contravention of the provision of section 11 also constitutes contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

(2) Whoever contravenes or fails to comply with the provisions of section 14 or 15 or any rule or regulation or conditions of any licence, any order or direction issued by the Council or by the ⁷⁶[Provincial Agency] shall be punishable with fine which may extend to ⁷⁷[five hundred thousand] rupees, and in case of continuing contravention, or failure with an additional fine which extend to one thousand rupees for every day during which such contravention continues.

(3) Where an accused has been convicted of an offence under sub-section (1) and (2), the Environmental Tribunal and Environmental magistrate shall, in passing sentence, take into account the extent and duration of the contravention or failure constituting the offence, and the attendant circumstances.

(4) Where an accused has been convicted of an offence under sub-section (1) and the Environmental Tribunal is satisfied that as a result of the commission of the offence monetary benefits have accrued to the offender, the Environmental Tribunal may order the offender to pay, in addition to the fines under sub-section (1), further additional fine commensurate with the amount of the monetary benefits.

⁷³ Words substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012).

(5) Where a person convicted under sub-sections (1) or sub-section (2); and had been previously convicted for any contravention under this act, the Environmental Tribunal or, as the case may be, Environmental Magistrate may, in addition to the punishment awarded thereunder:-

- (a) endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of commerce and Industry or the Federation of Pakistan Chambers of Commerce and Industry;
- (b) sentence him to imprisonment for a term which may extend up to two years;
- (c) order the closure of the factory;
- (d) order confiscation of the factory, machinery, and equipment, vehicle, material or substance, record or document or other object used or involved in contravention of the provisions of the Act.

Provided that for a period of three years from the date of commencement of this Act, the sentence of imprisonment shall be passed only in respect of persons who have been previous convicted for more than once for any contravention of section 11, 13, 14 or 16 hazardous waste;

- (e) order such person to restore the environment at his own cost, to the conditions existing prior to such contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the ^{7d}[Provincial Agency]; and
- (f) order that such sum be paid to any person as compensation for any loss, bodily injury, damage to his health or property suffered by such contravention.

(6) The Director-General of the ^{7a}[Provincial Agency] or an officer generally or specially authorized by him in this behalf may, on the application of the accused compound as offence under this Act with the permission of Environmental Tribunal or Environmental Magistrate in accordance with such procedure as may be prescribed.

(7) Where the Director-General of the ⁸⁰[Provincial Agency] is of the opinion that a person has contravened any provision of this Act, he may, subject to the rules, by notice in writing to that person require him to pay to the ⁸¹[Provincial Agency] an administrative penalty in the amount set out in the notice for each day the contravention continues; and a person who pays an administrative penalty for a contravention shall not be charged under this Act with an offence in respect of such contravention.

(8) The provisions of sub-sections (6) and (7) shall not apply to a person who has been previously convicted of offence or who has compounded an offence under this Act or who has paid an administrative penalty for a contravention of any provision of this Act.

18. Offences by bodies corporate.— Where any contravention of this Act has been committed by a body corporate, and it is proved that such offence has been committed with the consent or connivance or, or is attributed to any negligence on the part of, any director, partner, manager, secretary or other officer of the Body corporate, such director, partner, manager, secretary or other officer of the body corporate, shall be deemed guilty of such contravention along with the body corporate and shall be punished accordingly;

Provided that in the case of a company as defined under the Companies Ordinance, 1984 (XLVII of 1984), only the Chief Executive as defined in the said Ordinance shall be liable under this section.

Explanation.- For the purposes of this section, "body corporate" includes a firm, association of persons and a society registered under the Societies Registration Act, 1860 (XXI of 1860), or under the Co-operative Societies Act, 1925 (VII of 1925).

19. Offences by Government Agencies, local authorities or local councils.— Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such contravention has been committed with the consent or connivance of, or is attributable to any negligence on the part of, the Head or any other officer of the Government Agency, local authority or local council, such Head or other officer shall also be deemed guilty of such contravention along with the Government Agency, local authority or local council and shall be liable to be proceeded against and punished accordingly.

20. Environmental Tribunals.— (1) The ⁸²[Government] may, by notification in the official Gazette, establish as many Environmental Tribunals as it considers necessary and, where it establishes more than one Environmental Tribunal, it shall specify territorial limits within which, or the class of cases in respect of which, each one of them shall exercise jurisdiction under this Act.

(2) An Environmental Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as, a Judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by the ⁸³[Government] of which at least one shall be a technical member with suitable professional qualifications and experience in the environmental field as may be prescribed.

(3) For every sitting of the Environmental Tribunal, the presence of the Chairperson and not less than one Member shall be necessary.

⁸⁴[(4) A decision of an Environmental Tribunal shall be expressed in terms of the opinion of the majority, or if the case has been decided by the Chairperson and only one of the members and there is a difference of opinion between them, the decision of the Environmental Tribunal shall be expressed in terms of the opinion of the Chairperson.]

(5) An Environmental Tribunal shall not, merely by reason of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehear any witness who was given evidence, and may act on the evidence already recorded by, or produced, before it.

(6) An Environmental Tribunal may hold its sittings at such places within its territorial jurisdiction as the Chairperson may decide.

(7) No act or proceeding of an Environmental Tribunal shall be invalid by reason only of the existence of vacancy in, or defect in the constitution of the Environmental Tribunal.

(8) The terms and conditions of service of the Chairperson and members of the Environmental Tribunal shall be such as may be prescribed.

21. Jurisdiction and powers of Environmental Tribunals.— (1) An Environmental Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act, or the rules and regulations made thereunder.

(2) All contravention punishable under sub-section (1) of section 17 shall exclusively be triable by an Environmental Tribunal.

(3) An Environmental Tribunal shall not take cognizance of any offence triable under sub-section (2) except on a complaint in writing by—

- (a) the ⁶⁶[Provincial Agency] or any Government Agency or local council; and
- (b) any aggrieved person, who has given notice of not less than thirty days to the ⁶⁶[Provincial Agency] concerned of the alleged contravention and of his intention to make a complaint to the Environmental Tribunal.

(4) In exercise of its criminal jurisdiction, the Environmental Tribunal shall have the same powers as are vested in Court of Session under the Code of Criminal Procedure, 1898 (Act V of 1898).

(5) In exercise of the appellate jurisdiction under section 22 of Environmental Tribunal shall have the same powers and shall follow the same procedure as an appellate court in the Code of civil Procedure, 1908 (Act V of 1908).

(6) In all matters with respect to which no procedure has been provided for in this Act, the Environmental Tribunal shall follow the procedure laid down in the Code of civil Procedure, 1908 (Act V of 1908)

(7) An Environmental Tribunal may, on application filed by any officer duly authorized on this behalf by the Director General of the ⁶⁷[Provincial Agency], issue bail able warrant for the arrest of any person against who reasonable suspicion exist, of his having been involved in contravention punishable under sub-section (1) of section 17:

Provided that such warrant shall be applied for, issued, and executed in accordance with the provisions of the code of Criminal Procedure, 1898 (Act V of 1898);

Provided further that if the person arrested executes a bond with sufficient sureties in accordance with the endorsement on the warrant, he shall be released from custody, failing which he shall be taken or sent without delay to the officer-in-charge of the nearest police station.

(8) All proceedings before the Environmental Tribunal shall be deemed to be judicial proceedings within the meaning of sections 193 and 228 of the Pakistan Penal Code (Act XLV of 1860), and the Environmental Tribunal shall be deemed to be a court for the purposes of sections 480 and 482 of the code of Criminal Procedure, 1898 (Act V of 1898).

(9) No court other than an Environmental Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Tribunal extends under this Act or the rules and regulations made thereunder.

(10) Where the Environmental Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

22. Appeals to the Environmental Tribunal.— (1) any person aggrieved by any order or direction of the ⁶⁸[Provincial Agency] under any provision of this Act and rules or regulations made thereunder may refer an appeal with the Environmental Tribunal within thirty days of the date of communication of the impugned order or direction to such person.

(2) An appeal to the Environmental Tribunal shall be in such form, contain such particulars and be accompanied by such fees as may be prescribed.

23. Appeals from orders of the Environmental Tribunal.— (1) Any person aggrieved by any final order or by any sentence of the Environmental Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.

(2) An appeal under sub-section (1) shall be heard by a Bench of not less than two Judges.

24. Jurisdiction of Environmental Magistrates.— (1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all contraventions punishable under sub-section (2) of section 17 shall exclusively be triable by a judicial Magistrate of the first class as Environmental Magistrate especially empowered in this behalf by the High Court.

(2) An Environmental Magistrate shall be competent to impose any punishment specified in sub-sections (2) and (4) of section 17.

(3) An Environmental Magistrate shall not take cognizance of an offence triable under sub-section (1) except on a complaint in writing by—

- (a) the ⁸⁹[Provincial Agency], or Government Agency or local council; and
- (b) any aggrieved person.

25. Appeals from orders of Environmental Magistrates.— Any person convicted of any contravention of this Act or the rules or regulations by an Environmental Magistrate may, within thirty days from the date of his conviction, appeal to the Court of Sessions, whose decision thereon shall be final.

⁹⁰[**26. Power to delegate.—** The Government may, by notification in the official Gazette, delegate any of its or of the Provincial Agency's powers or functions under this Act, the rules or the regulations to any Government Agency, local council or local authority.]

⁹¹[**27. Power to give directions.—** In the performance of its functions, the Provincial Agency shall be bound by the directions given to it in writing by the Government.]

⁹²[**28. Indemnity.—** No suit, prosecution or other legal proceedings shall lie against the Government, the Council, the Provincial Agency, the Director General of the Provincial Agency, members, officers, employees, experts, advisors, or consultants of the Provincial Agency or the Environmental Tribunal, an Environmental Magistrate or any other person for anything which is in good faith done or intended to be done under this Act or the rules or the regulations.]

29. Dues recoverable as arrears of land revenue.— Any dues recoverable by the ⁹³[Provincial Agency] under this Act, or the rules or regulations made thereunder shall be recoverable as arrears of land revenue.

30. Ordinance to override other laws.— The provisions of this Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force.

31. Power to make rules. - The ⁹⁴[Government] may, by notification in the official Gazette, make rules for carrying out the purposes of this Act including rules may for implementing the provisions of the international environmental agreements, specified in the Schedule to this Act.

32. Power to amend the Schedule.— The ⁹⁵[Government] may, by notification in the official Gazette, amend the Schedule so as to add any entry thereto or modify or omit any entry therein.

⁸⁹ Words substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012).

⁹⁰ Section 26 substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012).

⁹¹ Section 27 substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012).

⁹² Section 28 substituted by the Punjab Environmental Protection (Amendment) Act, 2012 (XXXV of 2012).

attested

33. Power to make regulations.— (1) For carrying out the purposes of this Act, the ⁹⁶[Provincial Agency] may, by notification in the official Gazette and with the approval of the ⁹⁷[Government], make regulations not inconsistent with the provisions of this Act or the rules made thereunder.

(2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for:-

- (a) submission of periodical reports, data or information by any Government Agency, local authority or local council in respect of environmental matters;
- (b) preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities;
- (c) appointment of officers, advisors, experts, consultants and employees;
- (d) levy of fees, rates and charges in respect of services rendered, actions taken and schemes implemented;
- (e) monitoring and measurement of discharges and emissions;
- (f) categorization of projects to which, and the manner in which, section 12 applies;
- (g) laying down of guidelines for preparation of initial environmental examination and environmental impact assessment and development of procedures for their filing, review and approval;
- (h) providing procedures for handling hazardous substances; and
- (i) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

34. Repeal, savings and succession.— (1) The Pakistan Environmental Protection Ordinance, 1983 (XXXVII of 1983) is hereby repealed.

(2) Notwithstanding the repeal of the Pakistan Environmental Protection Ordinance, 1983 (XXVII of 1983), any rules or regulations or appointments made, orders passed, notifications issued, powers delegated, contracts entry into, proceedings commenced, rights acquired liabilities incurred, penalties, rates, fees or charges levied, things done or action taken under any provisions of that Act shall, so far as they are not inconsistent with the provisions of this Act, be deemed to have been made, passed, issued, delegated, entered into, commenced, acquired, incurred, levied, done or taken under this Act.

⁹⁸[*****]

SCHEDULE

(See section 31)

1. International Plant Protection Convention, Rome, 1951.
2. Plant Protection Agreement for the South-East Asia and Pacific Region (as amended), Rome, 1956.
3. Agreement for the Establishment of a Commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia (as amended), Rome, 1963.

4. Convention on Wetlands of International importance Especially as Waterfowl Habitat, Ramsar, 1971 and its amending Protocol, Paris, 1982.
5. Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention), Paris, 1972.
6. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington, 1973.
7. Convention on the Conservation of Migratory Species of Wild Animals, Bonn, 1979.
8. Convention on the Law of the Sea, Monte go Bay, 1982.
9. Vienna Convention for the Protection of the Ozone Layer, Vienna, 1985.
10. Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 and amendments thereto.
11. Agreement on the Network of Aquaculture Centres in Asia and the Pacific, Bangkok, 1988.
12. Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Basel, 1989.
13. Convention on Biological Diversity, Rio De Janeiro, 1992.
United Nations Framework Convention on Climate change, Rio De Janeiro, 1992.

attested

RUQIYA UMBREEN
Law Officer/Prosecutor
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THE PUNJAB ENVIRONMENTAL PROTECTION AGENCY (REVIEW OF IEE AND EIA) REGULATIONS, 2016

Short title and commencement

(1) These regulations may be called the Punjab Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2016.

(2) They shall come into force at once.

Definitions

(1) In these regulations, unless there is anything repugnant in the subject or context:

- a. "Act" means the Punjab Environmental Protection Act, 1997 (XXXIV of 1997);
- b. "Agency" means Environmental Protection Agency Punjab;
- c. "Committee" means the Environmental Assessment Advisory Committee constituted under regulation 24;
- d. "Director-General" means the Director-General of the Agency;
- e. "EIA" means an environmental impact assessment as defined in section 2(xi) of the Act;
- f. "Environmental consultant" means an expert registered with EPA Punjab who can conduct environmental studies in accordance with EPA Punjab guidelines;
- g. "Environmental Consulting Firm" means an EPA registered firm which can provide technical and regulatory support to the proponents for environment friendly execution of projects;
- h. "Environmentally Sensitive Area" means an area which falls under sensitive sites like protected areas, or the sites which may have crucial and growing importance;
- i. "Firm" means an Environmental Consulting Firm registered with EPA Punjab;
- j. "IEE" means an initial environmental examination as defined in section 2(xxiv) of the Act;
- k. "Protected area" means an area which safeguards the earth's precious bio-diversity, an area of outstanding natural beauty, and of cultural significance;
- l. "Regulation" means a regulation of the Punjab Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2016;
- m. "Schedule" means a schedule to these regulations;

- n. "Section" means a section of the Act;
- o. "Urban area" means an area within the limits of a town, municipality, or city and includes any area declared as such by Government by notification in the official gazette;

(2) All other words and expressions used in these regulations but not defined shall have the same meanings as are assigned to them in the Act.

3. Projects requiring an IEE

A proponent of a project falling in any of the categories listed in Schedule I shall file an IEE with the Agency, and the provisions of Section 12 shall apply to such project.

4. Projects requiring an EIA

A proponent of a project falling in any of the categories listed in Schedule II shall file an EIA with the Agency, and the provisions of Section 12 shall apply to such project.

5. Projects requiring IEE proforma

A proponent of a project falling in any category listed in Schedule-III shall file an IEE proforma with the Agency and the provisions of section 12 shall apply to such projects.

6. Other Projects requiring an IEE or EIA

(1) In addition to any category specified in Schedules I and II, a proponent of any of the following projects shall file

(a) an EIA if the project is likely to cause an adverse environmental effect;
or

(b) an application for approval for projects not listed in Schedules I and II but in respect of which the Agency has issued guidelines for construction and operation accompanied by an undertaking and an affidavit that the relevant guidelines shall be fully complied with.

(2) Notwithstanding anything contained in Sub-Regulation (1), the Agency may direct the proponent of a project, whether or not listed in Schedule I or II, to file an IEE or EIA, for reasons to be recorded in such direction.

(3) No direction under sub-regulation 2 shall be issued without the recommendation in writing of the Environmental Assessment Advisory Committee constituted under Regulation 24.

(4) The provisions of section 12 shall apply to a project in respect of which an IEE or EIA is filed under sub-regulation (1) or (2).

7. Preparation of IEE, EIA, and IEE proforma

(1) The Agency may issue guidelines for preparation of an IEE or an EIA, including guidelines of general applicability, and sectoral guidelines indicating specific assessment requirements for planning, construction, and operation of projects relating to a particular sector.

(2) Where guidelines have been issued under sub-regulation (1), an IEE or EIA shall be prepared, to the extent practicable, in accordance therewith and the proponent shall justify in the IEE or, as the case may be, EIA and departure there from.

8. Review Fees

The proponent shall pay, at the time of submission of an IEE or EIA, a nonrefundable Review Fee and annual Renewal Fee to the Agency, as per fee structure given in Schedule IV.

9. Filing of IEE, EIA, and IEE proforma

(1) An electronic copy of an IEE or EIA shall be filed with the Agency.

(2) Every IEE and EIA shall be accompanied by:

(a) an application, in the form set out in Schedule V; and

(b) copy of receipt showing payment of the review fee.

(c) no objection certificates from the relevant departments in case of EIA shall be a part of report;

10. Preliminary scrutiny

(1) Within 10 working days of filing of an IEE or EIA, the Agency shall

(a) confirm that the IEE or EIA is complete for purposes of initiation of the review process; or

(b) require the proponent to submit such additional information as may be specified; or

(c) return the IEE or EIA to the proponent for revision, clearly recording the reason(s) requiring further study and discussion.

(2) Nothing in sub-regulation (1) shall prohibit the Agency from requiring the proponent to submit additional information at any stage during the review process.

11. Public participation

(1) In the case of an EIA, the Agency shall, simultaneously with confirmation of completeness under clause (a) of sub-regulation (1) of Regulation 9, cause to be published through proponent in at least one English Daily and one Urdu

National Daily of general circulation in the area affected by the project, a public notice mentioning the type of project, its exact location, the name and address of the proponent and the place at which the EIA of the project can, subject to the restrictions in sub-section (3) of section 12, be accessed.

(2) The notice issued under sub-regulation (1) shall fix a date, time and place for public hearing of any comments on the project or its EIA.

(3) The date fixed under sub-regulation (2) shall not be earlier than 30 days from the date of publication of the notice.

(4) The Agency shall, if deemed necessary, circulate the EIA to the concerned Government Agencies and solicit their comments thereon.

(5) All comments received by the Agency from the public or any Government Agency shall be duly considered by it, responded, and recorded in the final decision on the EIA.

(6) The Agency may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement, and participation in EIA assessment.

12. Review

(1) The Agency shall carry out its review of the IEE within 45 days, and of the EIA within 90 days of confirmation of completeness under Regulation 9.

(2) In reviewing the IEE or EIA, the Agency may consult such Committee of Experts as may be constituted for the purpose by the Director-General where expert opinion is required.

(3) The Director-General may, where he considers it necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified. by him

(4) The review of the IEE or EIA by the Agency shall be based on assessment of the documents and data furnished by the proponent, comments from the public and Government Agencies received under Regulation 10, and views of the committees mentioned in sub-regulations (2) and (3).

(5) During the review process, the proponent and /or the consultant may be asked to make a presentation of the project at such place and time as may be specified.

(6) The review of the IEE or EIA by the Agency shall be based on quantitative and qualitative assessment of the documents and the data furnished by the proponent and/or his consultant/firm, comments from the public and Government

Agencies received under regulation 10, and, where available, views of the committees mentioned in sub-regulations (2) and (3) above.

(7) The IEE proforma shall be reviewed as per guidelines issued by the Agency.

(8) Subject to regulation 9 and 11, the documentary evidence in the form of videos (softcopies) of public hearing shall be submitted by the proponent to the Agency at the time of environmental approval or at any stage of the review process.

13. Decision

(1) On completion of the review, the decision of the Agency shall be communicated to the proponent in the form prescribed in Schedule VI in the case of an IEE, and in the form prescribed in Schedule VII in the case of an EIA.

14. Conditions of approval

(1) Every approval of an IEE or EIA shall, in addition to such conditions as may be imposed by the Agency, be subject to the condition that the project shall be designed and constructed, and mitigatory and other measures adopted, strictly in accordance with the IEE/EIA, unless any variation thereto have been specified in the approval by the Agency.

(2) Where the Agency accords its approval subject to certain conditions, the proponent shall:

(a) before commencing construction of the project, acknowledge acceptance of the stipulated conditions by executing an undertaking in the form set out in Schedule VIII; and

(b) before commencing operation of the project, obtain from the Agency Environmental Approval for Operational Phase by ensuring the Agency that the conditions of approval, and the requirements in the IEE/EIA relating to design and construction, adoption of mitigatory and other measures and other relevant matters, have been duly complied with.

15. Environmental Approval for Operational Phase

(1) The request for obtaining Environmental Approval for Operational Phase under clause (b) of sub-regulation (2) of Regulation 14 shall be accompanied by an environmental audit of the construction phase and the constructed project clearly indicating compliance with the conditions, if any, of the environmental approval and an Environmental Management Plan indicating the measures and procedures proposed to be taken to manage or mitigate the environmental impacts for the entire life of the project, including provisions for monitoring, reporting, and auditing.

(2) Where a request for issuance of Environmental Approval for operational phase is received from a proponent, the Agency may carry out such inspection of the project and plant and machinery and seek such additional information from the proponent as it may deem fit:

Provided that every effort shall be made by the Agency to provide the requisite Environmental Approval for operational phase or otherwise within 45 days of receipt of the request complete in all aspects, from the proponent.

(3) The Agency may, while issuing the Environmental Approval for operational phase, impose such other conditions for ensuring implementation of the Environmental Management Plan, and environmental friendly operation, maintenance and monitoring of the project as it may deem fit, and such conditions shall be deemed to be included in the conditions to which approval of the project is subject.

16. Deemed Approval

The four-month period for communication of decision on IEE/EIA stipulated in sub-section (4) of Section 12 of the Act shall commence from the date of issuance of confirmation of completeness by the Agency under clause (a) of sub-regulation (1) of Regulation 10.

17. Extension in review period

Where the Agency extends the four-month period for communication of approval prescribed in sub-section (5) of Section 12 of the Act, the Agency shall indicate the various steps of the review process to be taken during the extended period, and the estimated time required for each step.

18. Validity period of approval

(1) The approval accorded by the Agency under Section 12 of the Act read with Regulation 13 shall be valid for commencement of construction for a period of three years from the date of its issuance.

(2) If construction is commenced during the initial three years validity period, the validity of the approval shall stand extended for a further period of three years from the expiry of period specified in sub-regulation (1).

(3) After issuance of environmental approval for operational phase, the approval shall be valid for a period of one year from the date thereof and shall, inter alia, be subject to depositing of annual renewal fee as prescribed under these regulations.

(4) The proponent may apply to the Agency for an extension in the validity period mentioned in sub-regulations (1) and (2), which may be granted by the Agency

in its discretion for such period not exceeding three years at a time, if the conditions of the requested extension in approval do not constitute any change in the project.

(5) For the purposes of sub-regulation (4) the Agency may require the proponent to submit a fresh IEE, or as the case may be, an EIA, if in its opinion, changes in location, design, construction and operation of the project so warrant.

19. Entry and inspection

(1) For the purposes of verification of any matter relating to the review or to the conditions of approval of an IEE or EIA prior to, during, or after commencement of construction or operation of a project, duly authorized staff of the Agency shall be entitled to enter and inspect the project: site, factory building and plant and equipment installed therein.

(2) The proponent shall ensure full cooperation of the project staff at site to facilitate the inspection, and shall provide such information as may be required by the Agency for this purpose and pursuant thereto.

20. Monitoring

(1) After issuance of environmental approval for operational phase, the proponent shall submit a report to the Agency on operational compliance of the project before commencement of operations.

(2) After issue of commencing operations of the project, the proponent shall submit an environmental audit of the operation of the project summarizing operational performance of the project, with reference to the conditions of approval and maintenance and mitigatory measures adopted by the project, as required in the Environmental Approval of the operational phase of the project.

(3) To enable the Agency to effectively monitor compliance with the conditions of approval, the proponent shall furnish such additional information as the Agency may require from time to time.

21. Cancellation of approval

(1) Notwithstanding anything contained in these Regulations, if, at any time, on the basis of information or report received or inspection carried out, the Agency is of the opinion that the conditions of an approval have not been complied with, or that the information supplied by a proponent in the approved IEE or EIA is incorrect, it shall issue notice to the proponent to show cause, within two weeks of its receipt thereof, as to why the approval should not be cancelled.

(2) If no reply is received or if the reply is considered unsatisfactory, the Agency may, after giving the proponent an opportunity of being heard:

- (a) require the proponent to take such measures and to comply with such conditions within such period of time as it may be specified, failing which the approval shall stand cancelled; or
 - (b) cancel the approval.
- (3) On cancellation of the approval, the proponent shall cease construction or operation of the project forthwith.
- (4) Any action taken under this Regulation shall be without prejudice to any other action that may be taken against the proponent under the Act, rules, regulations or any other law for the time being in force.

22. Registers of IEE and EIA projects

Separate Registers shall be maintained by the Agency for IEE and EIA projects under sub-section (7) of section 12 of the Act in the form set out in Schedule IX.

23. Registration of Consultants for preparation of IEE & EIA Reports

(1) The Agency shall register with consultants having prescribed qualification and experience for conducting IEE/EIA against non-refundable registration fee and refundable security as mentioned in schedule-III. A license renewable annually shall be issued by the Agency to the consultant. No one other than the proponent himself/herself shall be competent to prepare IEE or EIA reports for any project for the purpose of environmental approval. The Agency shall issue necessary instructions in shape of guidelines for environmental consultants from time to time. The license holder under this regulation shall abide by the terms and conditions of license as well as the guidelines. In case of any violation either reported to Agency or comes into the notice of Agency by any mean, after affording an opportunity of hearing to the concerned license holder, the Agency shall

- i. Cancel the registration and license and ban such person from practicing as such for the period of 3-5 years, and
- ii. Forfeit of the security.

(2) Any aggrieved person may file an appeal in this regard to the Government within 30 days of the communication of the order passed under this regulation.

24. Environmentally sensitive areas

(1) The Agency may, by notification in the official Gazette, designate an area to be an environmentally sensitive area.

(2) Notwithstanding anything contained in Regulations 3, 4 and 5, the proponent of a project situated in an environmentally sensitive area shall be required to file an EIA with the Agency.

(3) The Agency may from time to time issue guidelines to assist proponents and other persons involved in the environmental assessment process for planning and preparing projects located in environmentally sensitive areas.

(4) Where guidelines have been issued under sub-regulation (3), the projects shall be planned and prepared, to the extent practicable, in accordance therewith and any departure there from justified in the EIA pertaining to the project.

25. Environmental Assessment Advisory Committee

For purposes of rendering advice on the processes of environmental assessment, including guidelines, procedures and categorization of projects, the Director-General may constitute an Environmental Assessment Advisory Committee comprising:

(a)	Additional Director General	Chairperson
(b)	One representative from Federation of Chambers of Commerce & Industry	Member
(c)	One representative from the Planning and Development Department, Government of the Punjab	Member
(d)	Representatives of Universities	Member
(e)	Legal Expert from EPA, Punjab	Member
(f)	Any specialist(s) coopted by the Chairperson	Member
(g)	Director (EIA), EPA	Member/Secretary

26. Other approvals

(1) Issue of an approval under section 12 of the Act read with Regulation 13 shall not absolve the proponent of the responsibility of obtaining any other approval or consent that may be required under any law of the land for the time being in force.

27. Repeal and Savings

(1) The provisions of the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Assessment Impact Regulations 2000, to the extent of the Province of Punjab are hereby repealed.

(2) All orders made, notification issued, actions taken under the repealed Regulations shall remain in force until amended, altered or repealed by the provisions of these Regulations.

DRAFT

SCHEDULE I

(See Regulation 3)

List of projects requiring an IEE

A. Agriculture, Livestock and Fisheries

1. Poultry, livestock, dairy, stud and fish farms with total cost more than Rs. 20 million
2. Projects involving repacking, formulation or warehousing of agricultural products
3. Fruit & vegetable processing units

B. Energy

1. Hydroelectric power generation less than 100 MW
2. Thermal, biomass, solar and wind power generation less than 200 MW
3. Coal power generation less than 100 MW
4. Transmission lines less than 11 KV and large distribution projects
5. Oil and gas transmission systems
6. Oil and gas extraction projects including exploration, production, gathering systems, separation and storage
7. Waste-to-energy generation projects
8. BTS, telecom & other wireless communication towers

C. Manufacturing and Processing

1. Ceramics and glass units with total cost less than Rs. 100 million
2. Food processing industries including ice mills, rice units, flour mills, poultry feed mills using wheat, maize etc. as raw material, ghee and oil mills, beverages, milk & dairy products and all edible processing /producing, with total cost less than Rs.100 million
3. Man-made fibers and resin projects with total cost less than Rs.100 million
4. Manufacturing of apparel, spinning mills, woolen mills, weaving mills including dyeing and printing, garments and leather stitching units, cotton ginning mills, plastic materials & products, glue manufacturing, detergent, rubber products, printing with total cost less than Rs. 100 million
5. Wood & Cork products with total cost less than Rs.100 million

6. Marble cutting units, stone crushers, stone grinding mills, floor tiles manufacturing mills, pipes manufacturing mills, fan manufacturing, sanitary fitting & other electrical appliances manufacturing units, plaster of Paris units with total cost less than Rs.100 million
7. Steel mills, furnaces with total cost less than Rs. 50 million
8. Petroleum refining units, oil reclamation units cost less than Rs. 100 million
9. Biogas Plants, Boilers
10. **Pharmaceutical industries.**

D. Mining and Mineral Processing

1. Commercial extraction of sand, gravel, limestone, clay, sulphur and other minerals not included in Schedule-II with total cost less than Rs.100million
2. Crushing, grinding and separation processes
3. Smelting plants with total cost less than Rs.50 million

E. Transport

1. Federal or Provincial highways, bridges, overheads, underpasses (except maintenance, rebuilding or reconstruction of existing metaled roads) with total cost less than Rs. 100 million
2. Ports and harbor development for ships having less than 500 gross tons capacity per day.

F. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume less than 50 million cubic meters of surface area covering less than 8 square kilometers
2. Irrigation and drainage projects serving less than 15,000 hectares
3. Small-scale irrigation systems with total cost less than Rs.50 million

G. Water supply and treatment

Water supply schemes and treatment plants with total cost less than Rs.25 million

H. Waste disposal

Waste disposal processing facility unit for domestic or industrial wastes, with annual capacity less than 10,000 cubic meters

I. Urban development and tourism

1. Housing schemes
2. Public facilities with significant off-site impacts (e.g., Incinerators, autoclaves having capacity less than 100 kg per day for disposal of hospital wastes)
3. Urban development projects
4. Commercial buildings having area less than 02 acres and height less than 200 feet
5. Marriage halls, ware houses for industrial goods and cold storage
6. Hospitals less than 50 beds
7. Hotels / guest houses less than 50 living rooms
8. General bus & truck stands (Category D &above)

J. Other projects

Any other project for which filing of an IEE is required by the Provincial Agency under sub-regulation (2) of Regulation 5

SCHEDULE II

(See Regulation 4)

List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation more than 100 MW
2. Thermal, Biomass, Solar and Wind power generation more than 200 MW
3. Coal, power generation more than 100 MW
4. Transmission lines more than 11 KV and large distribution projects
5. Oil and gas transmission systems having cost more than 100 million
6. Oil and gas extraction projects including exploration, production, gathering, generating systems, separation and storage having cost of more than 100 million.
7. Waste-to-energy generation projects

B. Manufacturing and processing

1. Cement plants
2. Chemical processing / production projects
3. Fertilizer plants
4. Food processing industries including ice mills, rice units, flour mills, poultry feed mills using wheat, maize etc. as raw material ghee and oil mills, beverages, milk and dairy products, with total cost more than Rs.100 million
5. Industrial estates (including export processing zones / ports)
6. Manufacturing of apparel, spinning mills, woolen mills, weaving mills including dyeing and printing, garments and leather stitching units, cotton ginning mills, plastic materials & products, glue manufacturing, detergent, rubber products, printing with total cost more than Rs. 100 million
7. Pesticides (manufacture or formulation) units.
8. Petrochemicals complex/production, processing units.
9. Synthetic resins, plastics and man-made fibers, paper and paper board, paper pulping, plastic products, textiles (except apparel), printing and

publishing, paints and dyes, oils and fats and vegetable ghee projects, with total cost more than Rs.100 million

10. Tanning and leather finishing projects having wet process
11. Poultry rendering units, brick kilns and pyrolysis plants
12. Ceramics and glass units with total cost more than Rs. 100 million
13. Wood & Cork products with total cost more than Rs. 100 million
14. Marble cutting units, stone crushers, stone grinding mills, floor tiles/ceramic manufacturing mills, pipes manufacturing mills, fan manufacturing, sanitary fitting & other electrical appliances manufacturing mills, plaster of Paris, stone grinding units with total cost less than Rs. 100 million
15. Steel mills, re-rolling mills and furnaces with total cost more than Rs. 50 million
16. Petroleum refining units, oil reclamation units cost more than Rs. 100 million

C. Mining and mineral processing

1. Mining and processing of coal, gold, copper, sulphur, precious stones and other raw minerals.
2. Mining and processing of major non-ferrous metals, iron and steel rolling etc.
3. Smelting plants with total cost of Rs.50 million and above

D. Transport

1. Airports
2. Federal or Provincial highways or major roads, bridges, overheads, underpasses (except maintenance, rebuilding or reconstruction of existing roads) with total cost of Rs. 100 million and above
3. Dry ports development
4. Railway works

E. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume of 50 million cubic meters and above or having surface area of 8 square kilometers and above
2. Irrigation and drainage projects serving 15,000 hectares and above

F. Water supply and treatment

Water supply schemes and treatment plants with total cost more than Rs.25 million

G. Waste Disposal

1. Drainage schemes, Waste disposal and/or storage of hazardous or toxic wastes (including landfill sites, incineration of hospital toxic waste) with total cost more than Rs. 25 million
2. Waste disposal processing facilities for domestic or industrial wastes, with annual capacity more than 10,000 cubic meters

H. Urban development and tourism

1. Land use studies and urban plans (large cities)
2. Large-scale tourism development projects with total cost more than Rs.50million
3. Public facilities with significant off-site impacts (e.g., Incinerators, autoclaves having capacity more than 40 kg for disposal of hospital wastes)
4. General bus & truck stands (Category A, B, & C)

I. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas

J. Other projects

1. Any other project for which filing of an EIA is required by the Provincial Agency under sub-regulation (2) of Regulation 5.
2. Any other project likely to cause an adverse environmental effect

SCHEDULE III

(See Regulation 5)

The projects requiring IEE Performa:

- A. Construction and lining of water courses
- B. Rural schools and Basic Health Units
- C. Construction of roads in urban areas up to 10 Km Small to medium size water supply and sanitation schemes
- D. Canal cleaning and de-siltation in urban areas
- E. Establishment and operation of Petrol and CNG Stations
- F. Establishment and operation of Brick Kiln Units

DRAFT

SCHEDULE IV

(See Regulation 7)

(a) IEE PROFORMA / IEE/EIA REVIEW FEE

Total Project Cost	Type	Proposed	Annual Renewal
Up to Rs. 5,000,000	IEE	50,000/-	5,000/-
	EIA	50,000/-	10,000/-
Rs. 5,000,001 to 10,000,000	IEE	100,000/-	25,000/-
	EIA	200,000/-	50,000/-
Greater than Rs. 10,000,000	IEE	200,000/-	50,000/-
	EIA	500,000/-	100,000/-

(b) REGISTRATION / LICENSING FEE OF CONSULTANTS

Category	Fee	Surety	Annual
Consulting Firm	100,000/0	500,000/-	100,000/-
Individual Consultant	25,000/-	100,000/-	25,000/-
Subject Specialist	5,000/-	50,000/-	5,000/-

SCHEDULE V

[See Regulation 8(2)(a)]

Application Form

1.	Name and address of proponent	Phone: Fax: Telex:	
2.	Description of project		
3.	Location of project		
4.	IEE/EIA attached?	IEE/EIA : Yes/No	
5.	Have alternative sites been considered and reported in EIA?	Yes/No	
6.	Existing land use	Land Requirement	
7.	Is basic site data available, or has it been measured?	(only tick yes if the data is reported in the EIA) Metrology (including rainfall) Ambient air quality Ambient water quality Ground water quality	Available Yes/No Yes/No Yes/No Yes/No
8.	Has information of the following been reported?	Water requirement Solid waste disposal Liquid waste treatment	Estimated Yes/No Yes/No Yes/No
9.	Public consultation proof in case of EIA	Available	Un-available
10.	Review Fee	Attached	Not attached

Verification. I do, solemnly affirm and declare that the information given above and contained in the attached IEE/EIA is true and correct to the best of my knowledge and belief.

Date _____

Signature, Name and
designation of proponent
(with official stamp/seal)

DRAFT

SCHEDULE VI

[See Regulation 12]

Decision on IEE

1. Name and address of proponent

2. Description of project

3. Location of project

4. Date of filing of IEE

5. After review of the IEE, the Provincial Agency has decided –

a) to accord its approval, subject to the following conditions:

or (b) that the proponent may submit an EIA of the project, for the following reasons:

[Delete (a) or (b), whichever is inapplicable]

Dated _____

Tracking No. ____

Director-General, EPA Punjab
(with official stamp/seal)

SCHEDULE VII

[See Regulation 12]

Decision on EIA

1. Name and address of proponent

2. Description of project

3. Location of project

4. Date of filing of EIA

5. After review of the EIA, and all comments thereon, the Provincial Agency has decided

(a) to accord its approval, subject to the following conditions:

or (b) that the proponent may submit an EIA with the following modifications:

or (c) to reject the project, being contrary to environmental objectives, for the following reasons:

[Delete (a)/(b)/(c), whichever is inapplicable]

Dated _____

Tracking No.____

Director-General, EPA Punjab

(with official stamp/seal)

SCHEDULE VIII

[See Regulation 13(2)]

Undertaking

I, (full name and address) as proponent for (name, description and location of project) do hereby solemnly affirm and declare that I fully understand and accept the conditions contained in the approval accorded by the Provincial Agency bearing tracking No. _____ dated _____, and undertake to design, construct and operate the project strictly in accordance with the said conditions and the IEE/EIA.

Date _____

Signature, _____
name and designation of proponent
(with official stamp/seal)

Witnesses

(full names and addresses)

(1) _____

(2) _____

(3) _____

SCHEDULE VIX

(See Regulation 21)

Register

1. Tracking number
2. Category type (as per Schedules I and II)
3. Name of proponent
4. Name and designation of contact person
5. Name of consultant
6. Description of project
7. Location of project
8. Project capital cost
9. Date of receipt of IEE/EIA
10. Date of confirmation of completeness
11. Approval granted (Yes/No)
12. Date of approval granted or refused
13. Conditions of approval/reasons for refusal
14. Date of Undertaking
15. Date of extension of approval validity
16. Period of extension
17. Date of commencement of construction
18. Date of issue of confirmation of compliance
19. Date of commencement of operations
20. Dates of filing of monitoring reports
21. Date of cancellation, if applicable

ANNEXURE-V

**NATIONAL ENVIRONMENTAL QUALITY
STANDARDS**

[Click Here](#)

[Click Here](#)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
	Project Sponsor: Zorlu Solar Pakistan (Pvt.) Ltd	Document Issue 02	Page Number 166

The Gazette



of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY

ISLAMABD, SUNDAY, AUGUST 29, 1993

PART-II

Statutory Notification (S.R.O)

GOVERNMENT OF PAKISTAN

MINISTRY OF ENVIRONMENT, LOCAL GOVERNMENT AND
RURAL DEVELOPMENT

NOTIFICATION

Islamabad, the 24th August 1993

S.R.O. 742 (I)/93. – In pursuance of the powers conferred by clause (d) of section 6 of the Pakistan Environmental Protection Ordinance, 1983 (**XXXVII of 1983**), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, hereby establishes the National Environmental Quality Standards as contained in the Annexes to this notification.

2. These National Environmental Quality Standards relating to municipal and liquid industrial effluents (Annex I), industrial gaseous emissions (Annex II) and motor vehicle exhaust and noise (Annex III), shall come into force with immediate effect, except in the case of industrial units to which the following schedule shall apply:

Existing industrial units i.e. those units already in production	01 July, 1996
New industrial units i.e. those units that will come into production or after 30 th June, 1994	01 July, 1994

**NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR MUNICIPAL
AND LIQUID INDUSTRIAL EFFLUENTS (mg/L, UNLESS OTHERWISE
DEFINED)**

<u>S No</u>	<u>Parameter</u>	<u>Standards</u>
1.	Temperature	40° C
2.	pH value (acidity/basicity)	6-10pH
3.	5-days Biochemical Oxygen Demand (BOD) at 20 °C	80 mg/L
4.	Chemical Oxygen Demand (COD)	150 mg/L
5.	Total Suspended Solids	150 mg/L
6.	Total Dissolved Solids	3500 mg/L
7.	Oil and Grease	10 mg/L
8.	Phenolic compounds (as phenol)	0.1 mg/L
9.	Chloride (as Cl ⁻)	1000 mg/L
10.	Fluoride (as F ⁻)	20 mg/L
11.	Cyanide (as CN ⁻)	2 mg/L
12.	An-ionic detergents ⁽²⁾ (as MBAS) ⁽⁵⁾	20 mg/L
13.	Sulphate (SO ₄ ²⁻)	600 mg/L
14.	Sulphide (S ²⁻)	1.0 mg/L
15.	Ammonia (NH ₃)	40 mg/L
16.	Pesticides, herbicides, fungicides and insecticides	0.15 mg/L
17.	Cadmium ⁽⁴⁾	0.1 mg/L
18.	Chromium ⁽⁴⁾ (trivalent and hexavalent)	1.0 mg/L
19.	Copper ⁽⁴⁾	1.0 mg/L
20.	Lead ⁽⁴⁾	0.5 mg/L
21.	Mercury ⁽⁴⁾	0.01 mg/L
22.	Selenium ⁽⁴⁾	0.5 mg/L
23.	Nickel ⁽⁴⁾	1.0 mg/L
24.	Silver ⁽⁴⁾	1.0 mg/L
25.	Total toxic metals	2.0 mg/L
26.	Zinc	5.0 mg/L
27.	Arsenic	1.0 mg/L
28.	Barium	1.5 mg/L
29.	Iron	2.0 mg/L
30.	Manganese	1.5 mg/L
31.	Boron	6.0 mg/L
32.	Chlorine	1.0 mg/L

Explanations:

1. Assuming minimum dilution 1: 10 on discharge. Lower ratios would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency.
2. Assuming surfactant as biodegradable.
3. MBAS means Methylene Blue Active Substances.
4. Subject to total toxic metals discharge as at S. No. 25.

**NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR
INDUSTRIAL GASEOUS EMISSIONS (mg/Nm³, UNLESS
OTHERWISE DEFINED)**

S. NO.	Parameter	Source of emission	Standards
1	2	3	4
1.	Smoke	Smoke opacity not to exceed :-	40% or 2 (Ringlemann Scale)
2.	Particulate matter. ⁽¹⁾	Boilers and furnaces: (i) Using Oil. (ii) Using Coal. (iii) Cement Kilns. Grinding, crushing, clinker coolers and related processes, metallurgical processes, converters, blast furnaces, and cupolas.	300 500 200 500
3.	Hydrogen Chloride	Any.	400
4.	Chlorine	Any.	150
5.	Hydrogen Fluoride	Any.	150
6.	Hydrogen Sulphide	Any.	10
7.	Sulphur Oxides	Sulfuric Acid plants. Others.	400 400
8.	Carbon Monoxide	Any.	800
9.	Lead	Any.	50
10.	Mercury	Any.	10
11.	Cadmium	Any.	20
12.	Arsenic.	Any.	20
13.	Copper	Any.	50
14.	Antimony	Any.	20
15.	Zinc	Any.	200
16.	Oxides of Nitrogen (NO _x).	(i) Any Nitric Acid manufacturing unit (ii) other sources.	400 400

Explanations:

1. Based on the assumption that the size of the particles is 10 microns or more.

**NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR MOTOR
VEHICLE EXHAUST AND NOISE**

S. NO.	Parameter	Standards (maximum permissible limit)	Measuring method						
1	2	3	4						
1.	Smoke	40% or 2 on the Ringelmann Scale during engine acceleration mode.	To be compared with Ringelmann Chart at a distance of 6 meters or more.						
2	Carbon Monoxide.	<u>Emission Standards:</u> <table border="0"> <tr> <td><u>New</u></td> <td><u>Used</u></td> </tr> <tr> <td><u>Vehicles</u></td> <td><u>vehicles</u></td> </tr> <tr> <td>4.5%</td> <td>6%</td> </tr> </table>	<u>New</u>	<u>Used</u>	<u>Vehicles</u>	<u>vehicles</u>	4.5%	6%	Under idling conditions: Non-depressive infrared detection through gas analyzer
<u>New</u>	<u>Used</u>								
<u>Vehicles</u>	<u>vehicles</u>								
4.5%	6%								
3.	Noise	85 db (A)	Sound-meter at 7.5 meters from the source						

[F. No. 2(21)/93-E-II

Mohammad Aslam Malik
Section Officer

ENVIRONMENT AND URBAN AFFAIRS DIVISION

Islamabad, the 16th October, 1995

S.R.O. 1023 (I)/95.-In exercise of the powers conferred under clause (e) of section 6 of the Pakistan Environmental Protection Ordinance, 1983 (**XXXVII of 1983**), the Pakistan Environmental Protection Agency, with the approval of the Pakistan Environmental Protection Council, is pleased to make the following amendments in its Notification No. S.R.O. 742 (1)/93, dated the 24th August, 1993, namely:-

In the aforesaid Notification :-

- (i) In Annex II, in column 1:-
- (a) In S.No. 7, in column 3, after the word "Others", the comma and words " , except for power plants operating on oil land coal" shall be added;
- (b) In S.No. 16, in column 3, in clause (ii), after the words "other sources", the comma and words " , except for power plants operating on oil and coal" shall be added; and
- (c) After the Explanations, the following shall be added, namely:-
"In respect of emissions of Sulphur Dioxide and Nitrogen Oxides, the power plants operating on oil or coal as fuel shall, in addition to National Environmental Quality Standards (NEQS) specified above, comply with the following standards:-

A. Sulphur Dioxide

Sulphur Dioxide Back-ground levels Micro-gram per cubic meter ($\mu\text{g}/\text{m}^3$).	Standards			
			Criterion I	Criterion I
Background Air Quality (SO ₂ Basis).	Annual Average	Max. 24-hours Interval	Max. SO ₂ Emission (Tons per Day per plant)	Max. allowable ground level increment to ambient ($\mu\text{g}/\text{m}^3$) (One Year Average).
Unpolluted	<50	<200	500	50
Moderately Polluted*				
Low	50	200	500	50
High	100	400	100	10
	>100	<400	100	100

*For intermediate values between 50 and 100 $\mu\text{g}/\text{m}^3$ linear interpolations should be used.

**No projects with Sulphur dioxide emissions will be recommended.

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ISLAMABAD, FRIDAY, NOVEMBER 26, 2010

PART II

Statutory Notifications (S. R. O.)

GOVERNMENT OF PAKISTAN

MINISTRY OF ENVIRONMENT

NOTIFICATIONS

Islamabad, the 18th October, 2010

S. R. O. 1062(I)/2010.—In exercise of the powers conferred under clause (c) of sub-section (I) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to establish the following National Environmental Quality Standards for Ambient Air.

National Environmental Quality Standards for Ambient Air

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of measurement
		Effective from 1st July, 2010	Effective from 1st January 2013	
Sulphur Dioxide (SO ₂)	Annual Average* 24 hours**	80 µg/m ³ 120 µg/m ³	80 µg/m ³ 120 µg/m ³	-Ultraviolet Fluorescence method
Oxides of Nitrogen as (NO)	Annual Average* 24 hours**	40 µg/m ³ 40 µg/m ³	40 µg/m ³ 40 µg/m ³	- Gas Phase Chemiluminescence

(3205)

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of measurement
		Effective from 1st July, 2010	Effective from 1st January 2013	
Oxides of Nitrogen as (NO ₂)	Annual Average*	40 µg/m ³	40 µg/m ³	- Gas Phase Chemiluminescence
	24 hours**	80 µg/m ³	80 µg/m ³	
O ₃	1 hour	180 µg/m ³	130 µg/m ³	-Non dispersive UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	400 µg/m ³	360 µg/m ³	- High Volume Sampling, (Average flow rate not less than 1.1 m ³ /minute).
Respirable Particulate Matter. PM ₁₀	Annual Average*	200 µg/m ³	120 µg/m ³	-β Ray absorption method
	24 hours**	250 µg/m ³	150 µg/m ³	
Respirable Particulate Matter. PM _{2.5}	Annual Average*	25 µg/m ³	15 µg/m ³	-β Ray absorption method
	24 hours**	40 µg/m ³	35 µg/m ³	
	1 hour	25 µg/m ³	15 µg/m ³	
Lead Pb	Annual Average*	1.5 µg/m ³	1 µg/m ³	- ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2 µg/m ³	1.5 µg/m ³	
Carbon Monoxide (CO)	8 hours**	5 mg/m ³	5 mg/m ³	- Non Dispersive Infra Red (NDIR) method
	1 hour	10 mg/m ³	10 mg/m ³	

*Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.

** 24 hourly /8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but not on two consecutive days.

S. R. O. 1063(I)/2010.— In exercise of the powers conferred under clause (c) of sub-section (1) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to establish the following National Standards for Drinking Water Quality.

National Standards for Drinking Water Quality

Properties/Parameters	Standard Values for Pakistan	Who Standards	Remarks
Bacterial			
All water intended for drinking (e.Coli or Thermotolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water in the distribution system (E. coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12 month period.	Most Asian countries also follow WHO standards
Physical			
Colour	≤ 15 TCU	≤ 15 TCU	
Taste	Non objectionable/Acceptable	Non objectionable/Acceptable	
Odour	Non objectionable/Acceptable	Non objectionable/Acceptable	
Turbidity	< 5 NTU	< 5 NTU	
Total hardness as CaCO ₃	< 500 mg/l	---	
TDS	< 1000	< 1000	
pH	6.5 - 8.5	6.5 - 8.5	
Chemical			
<i>Essential Inorganic</i>	<i>mg/Litre</i>	<i>mg/Litre</i>	
Aluminium (Al) mg/l	≤ 0.2	0.2	

Properties/Parameters	Standard Values for Pakistan	Who Standards	Remarks
Antimony (Sb)	≤ 0.005 (P)	0.02	
Arsenic (As)	≤ 0.05 (P)	0.01	Standard for Pakistan similar to most Asian developing countries
Barium (Ba)	0.7	0.7	
Boron (B)	0.3	0.3	
Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing countries
Chloride (Cl)	< 250	250	
Chromium (Cr)	≤ 0.05	0.05	
Copper (Cu)	2	2	
<i>Toxic Inorganic</i>	<i>mg/Litre</i>	<i>mg/Litre</i>	
Cyanide (CN)	≤ 0.05	0.07	Standard for Pakistan similar to Asian developing countries
Fluoride (F)*	≤ 1.5	1.5	
Lead (Pb)	≤ 0.05	0.01	Standard for Pakistan similar to most Asian developing countries
Manganese (Mn)	≤ 0.5	0.5	
Mercury (Hg)	≤ 0.001	0.001	
Nickel (Ni)	≤ 0.02	0.02	
Nitrate (NO ₃)*	≤ 50	50	
Nitrite (NO ₂)*	≤ 3 (P)	3	
Selenium (Se)	0.01(P)	0.01	
Residual chlorine	0.2-0.5 at consumer-end 0.5-1.5 at source	—	
Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing countries

* indicates priority health related inorganic constituents which need regular monitoring.

Properties/Parameters	Standard Values for Pakistan	Who Standards	Remarks
Organic			
Pesticides mg/L		PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20- 58 may be consulted.***	Annex II
Phenolic compounds (as Phenols) mg/L		≤ 0.002	
Polynuclear aromatic hydrocarbons (as PAH) g/L		* 0.01 (By GC/MS method)	
Radioactive			
Alpha Emitters bq/L or pCi	0.1	0.1	
Beta emitters	1	1	

*** PSQCA: Pakistan Standards Quality Control Authority.

Proviso:

The existing drinking water treatment infrastructure is not adequate to comply with WHO guidelines. The Arsenic concentrations in South Punjab and in some parts of Sindh have been found high then Revised WHO guidelines. It will take some time to control arsenic through treatment process. Lead concentration in the proposed standards is higher than WHO Guidelines. As the piping system for supply of drinking water in urban centres are generally old and will take significant resources and time to get them replaced. In the recent past, Lead was completely phased out from petroleum products to cut down Lead entering into environment. These steps will enable to achieve WHO guidelines for Arsenic, Lead, Cadmium and Zinc. However, for bottled water, WHO limits for Arsenic, Lead, Cadmium and Zinc will be applicable and PSQCA Standards for all the remaining parameters.

S. R. O. 1064(I)/2010.—In exercise of the powers conferred under clause (c) of sub-section (1) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to establish the following National Environmental Quality Standards for Noise.

National Environmental Quality Standards for Noise

S. No.	Category of Area / Zone	Effective from 1st July, 2010		Effective from 1st July, 2012	
		Limit in dB(A) Leq *			
		Day Time	Night Time	Day Time	Night Time
1.	Residential area (A)	65	50	55	45
2.	Commercial area (B)	70	60	65	55
3.	Industrial area (C)	80	75	75	65
4.	Silence Zone (D)	55	45	50	45

- Note:*
1. Day time hours: 6.00 a. m to 10.00 p. m.
 2. Night time hours: 10.00 p. m. to 6.00 a.m.
 3. Silence zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.
 4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

*dB(A) Leq: Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

[No. F. I(12)/2010-11-General.]

MUHAMMAD KHALIL AWAN,
Section Officer (PEPC).

ANNEXURE-VI

***IFC EHS GUIDELINES & OPIC ENVIRONMENTAL
GUIDELINES 2012 FOR SOLAR POWER PROJECT***

[Click Here](#)

[Click Here](#)

[Click Here](#)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
	Project Sponsor: Zorlu Solar Pakistan (Pvt.) Ltd	Document Issue 02	Page Number 167

**Overseas Private Investment
Corporation
Environmental Guidance
Renewable Energy – Solar Projects**

January 31, 2012

Acknowledgements

These guidelines were developed with the technical support of:

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Overseas Private Investment Corporation Environmental Guidance Renewable Energy – Solar Projects

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Appendix A Flowchart

Overseas Private Investment Corporation

Environmental Guidance

Renewable Energy – Solar Projects

Section 1.0 - Introduction

1.1 Project Definition

These guidelines address evaluation features most significant to solar photovoltaic (PV) projects, both utility scale central generating facilities and stand-alone units. PV technologies convert energy from sunlight directly into electricity, using large arrays of solar cells electrically connected and encapsulated as modules. The modules often have a sheet of glass on the front, which allows light to pass through while protecting the semiconductor wafers from natural elements such as abrasion and impacts due to debris, rain, or hail. In large-scale installations the electricity produced by the modules is usually fed into the electrical grid using inverters. Stand-alone solar photovoltaic systems often use batteries to store energy on-site.

Photovoltaic modules are typically made from monocrystalline silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium selenide/sulfide. While cadmium present in the cadmium telluride cells would be toxic if released, the quantity of cadmium present in the cells is typically small, stable and poses little threat; however, the cadmium does pose some issues for disposal of the units at the end of their lifetime.

The scope of solar PV projects also includes any associated infrastructure or ancillary facilities associated with the Project, including those that are not funded as part of the Project (funding may be provided separately), but whose viability and existence depend exclusively on the Project, and whose goods and services are essential for the successful operation of the Project. These may include pipelines, power transmission lines, access roads, and temporary-worker housing.

1.2 Summary of Significant Issues

These guidelines discuss the evaluation features most significant to solar PV projects and reflect the information contained in the International Finance Corporation's General Environmental, Health and Safety Guidelines and Performance Standards and other relevant standards and guidelines. These features include:

- Presence of critical or sensitive habitat on or adjacent to the site.
- Socio-cultural issues.
- Visual impacts, particularly if the installation is located near residential developments.
- Disposal of the modules at the end of their lifetime.
- Impacts related to the construction of ancillary facilities including access roads and power transmission lines.
- Cumulative effects.

1.3 Scope of the Guidelines

These guidelines present potential environmental and social issues associated with solar PV energy projects, how OPIC may consider each of these issues when screening projects, applicable guidelines and standards, recommended measures to mitigate impacts, information needed to review a project and monitoring recommendations.

These guidelines discuss the evaluation features that, in general, are most significant with respect to solar energy projects and therefore require more emphasis while conducting environmental and social due diligence. As each project is unique, these guidelines may not capture the complete set of environmental and social issues related to solar projects. Each project is distinct and therefore will have environmental and social issues associated exclusively with that particular project.

This guidance document is restricted to the review of solar PV projects either for the construction of utility scale solar photovoltaic projects or smaller solar stand-alone installations. Concentrated solar projects, which use various techniques to track the sun and focus light to heat a fluid which then is used for thermal power generation, are not included as a part of these guidelines, although the siting issues would be similar. These guidelines also do not address impacts related to the manufacturing of solar modules.

It should be noted that these guidelines do not discuss typical impacts from construction and civil works such as erosion, impacts to water quality, solid waste disposal and occupational health and safety issues. For additional guidance on these matters, please refer to IFC's General Environmental, Health, and Safety Guidelines, Section 2.0: Standards and Guidelines (2007).

Section 2.0 - Standards and Guidelines

In addition to applicable host country requirements, solar PV projects are assessed using the following criteria:

- **OPIC's Environmental and Social Policy Statement (2011).**
http://www.opic.gov/sites/default/files/consolidated_esps.pdf
- **International Finance Corporation's (IFC) Performance Standards on Social and Environmental Sustainability (2012).**
<http://www.ifc.org/ifcext/policyreview.nsf/Content/2012-Edition-PerformanceStandards>
- Applicable provisions of **IFC's General Environmental Health and Safety Guidelines**, including the following:
 1. **Environment**
 - Section 1.1 Air Emissions and Ambient Air Quality
 - Fugitive Sources
 - Mobile Sources - Land-Based
 - Section 1.3 Wastewater and Ambient Water Quality
 - Section 1.6 Waste Management
 - Section 1.7 Noise
 2. **Occupational Health and Safety**
 - Section 2.1 General Facility Design and Operation
 - Section 2.2 Communication and Training
 - Section 2.3 Physical Hazards
 - Section 2.7 Personal Protective Equipment
 - Section 2.9 Monitoring
 3. **Community Health and Safety**
 - Section 3.2 Structural Safety of Project Infrastructure
 - Section 3.4 Traffic Safety
 - Section 3.7 Emergency Preparedness and Response
 4. **Construction and Decommissioning**
 - Section 4.1 Environment
 - Section 4.2 Occupational Health and Safety
 - Section 4.3 Community Health and Safety

[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/\\$FILE/Final+-+General+EHS+Guidelines.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS/$FILE/Final+-+General+EHS+Guidelines.pdf)

Other guidelines relevant to ancillary infrastructure include applicable provisions of:

- **IFC's Environmental, Health and Safety Guidelines for Electrical Power and Distribution.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_ElectricTransmission/\\$FILE/Final+-+Electric+Transmission+and+Distribution.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_ElectricTransmission/$FILE/Final+-+Electric+Transmission+and+Distribution.pdf)
- **IFC's Environmental Health and Safety Guidelines for Toll Roads.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_TollRoads/\\$FILE/Final+-+Toll+Roads.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_TollRoads/$FILE/Final+-+Toll+Roads.pdf)
- **Workers' Accommodation: Processes and Standards: A Guidance Note by IFC and the EBRD.**
[http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_WorkersAccommodation/\\$FILE/workers_accomodation.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_WorkersAccommodation/$FILE/workers_accomodation.pdf)

Note: International organizations, the United States Government and Industry groups periodically revise guidelines and standards to reflect technological advances and improved understanding of environmental, health, safety, and social risks. Completed applications that are received before the effective date of a new guideline or standard will be assessed using the guideline or standard that is in effect on the date of application, provided OPIC commitment for support is achieved within one year of the effective date of the new guideline or standard. If commitment is not achieved within one year after the effective date of the new guideline, the Project will be subject to the new guideline.

Section 3.0 - Screening

Based on information received from the Project applicant for the purposes of environmental, social, health and safety review, OPIC screens projects into one of three categories: Categorically Prohibited, Category A, and Category B.

3.1 Categorically Prohibited

Solar PV projects can result in adverse impacts and land disturbances that may preclude OPIC support. Project location is the primary determinant of eligibility. OPIC will not support the following types of projects:

- Projects that involve conversion or degradation of Critical Forest Areas or forest-related Critical Natural Habitats.
- Projects that require resettlement of 5,000 or more persons.
- Projects in or impacting natural World Heritage Sites (<http://whc.unesco.org/en/list>) unless it can be demonstrated through an environmental assessment that the Project (i) will not result in the degradation of the protected area and (ii) will produce positive environmental and social benefits.
- Projects in or impacting areas on the United Nations List of National Parks and Protected Areas (http://www.unep-wcmc.org/un-list-of-protected-areas_269.html) unless it can be demonstrated through an environmental assessment that the Project (i) will not result in the degradation of the protected area and (ii) will produce positive environmental and social benefits.
- Extraction or infrastructure projects in or impacting: protected area Categories I, II, III, and IV (Strict Nature Reserve/Wilderness Areas and National Parks, Natural Monuments and Habitat/Species Management Areas), as defined by the International Union for the Conservation of Nature (IUCN). Projects in IUCN Categories V (Protected Landscape/Seascape) and VI (Managed Resource Protected Area) must be consistent with IUCN management objectives (http://www.iucn.org/about/work/programmes/pa/pa_products/wcpa_categories/) (http://www.iucn.org/about/work/programmes/species/red_list/) unless it can be demonstrated through an environmental assessment that the Project (i) will not result in the degradation of the protected area and (ii) will produce positive environmental and social benefits.

If not prohibited, then the solar PV project is further screened as either Category A or Category B.

3.2 Category A or Category B

Category A solar PV projects are likely to have significant adverse environmental and social impacts that are irreversible, sensitive, diverse or unprecedented. Category A projects require submission of an Environmental and Social Impact Assessment (ESIA) developed in accordance with IFC P.S. 1, an on-site due-diligence visit by an OPIC environmental analyst or a third-party consultant approved by OPIC and development and implementation of an Environmental and Social Action Plan (ESAP). Within three years of the execution of the contract with OPIC, Category A projects are required to conduct a third party audit.

Issues that require careful consideration in determining whether a project is Category A or B for solar PV projects include the following:

- Potential for significant habitat alteration or wildlife disturbance, including disruption of wildlife migration corridors.
- Potential for significant socio-cultural impacts related to land acquisition, land use, indigenous peoples, and cultural heritage
- Potential for significant environmental and social impacts from ancillary features.
- Potential for significant environmental and social impacts due to cumulative effects.

If a project originally screened as a Category A is subsequently found to result in major or unreasonable adverse environmental, social, health or safety impacts, OPIC may decide to decline support.

Advanced planning in siting may be used to avoid or significantly reduce adverse impacts of solar PV projects. A solar PV project may be screened as Category B if significant impacts are avoided, adequately mitigated and sufficient information is provided to assess such impacts, and there is no significant opposition to the Project by local stakeholders.

Section 4.0 - Significant Issues and Applicable Guidelines and Standards

This section describes environmental and social evaluation features associated with solar PV projects, how each of these features may affect screening determinations, and measures to mitigate impacts as provided in applicable guidelines and standards.

4.1 Presence of Critical or Sensitive Habitat on or Adjacent to the Site

Description of Impact. Solar PV projects use large amounts of land (typically at least five acres per MW); however, the exact amount depends on location and type of technology employed. Impacts to habitat due to siting of solar energy projects also vary according to location and size of the Project, but may present the potential for significant impacts to wildlife and vegetation given the large tracts of land needed for the Projects. Long-term displacement and fragmentation of habitat may occur as a result of the installation of the solar array itself, construction of access roads, and power transmission line construction.

The natural areas where solar projects are to be sited could be adversely impacted in the short-term from sedimentation and erosion caused during construction of the facilities themselves as well as by the construction of ancillary facilities such as transmission lines and roads. Often specific regions can have more than one solar array proposed and cumulative impacts to wildlife and vegetation need to be considered. Indicators of the potential presence of critical habitats that can affect categorization include the presence of wetlands or known wildlife breeding or nesting areas. The presence of limited range endemic species may also be a strong indicator of a critical habitat.

Screening. OPIC cannot support projects that involve conversion or degradation of Critical Forest Areas or forest-related Critical Natural Habitats or projects located in or adversely impacting internationally recognized protected areas unless it can be demonstrated through an environmental assessment that the Project (i) will not result in the degradation of the protected area, and (ii) will produce positive environmental and social benefits.

Projects that are not located in forest-related Critical Natural Habitats or Critical Forest Areas but that have the potential to result in significant habitat alteration or wildlife disturbance, including disruption of wildlife migration corridors, may be classified as Category A. The extent of impact and species located in or near the habitat or corridors are considered in determining the classification of the Project.

Impact mitigation. The installation of a solar PV facility often results in long-term land use alterations and the most effective means of limiting any impacts to sensitive habitats is to avoid them. This involves siting facilities outside of any environmentally sensitive areas. Examples of recommended mitigation measures include:

- Siting to avoid critical terrestrial and aquatic habitat.
- Designing and constructing wildlife access to avoid or minimize habitat fragmentation.
- Avoiding or modifying construction activities during breeding or other sensitive seasons.
- Minimizing removal of native plant species and replanting of native plant species in disturbed areas.

4.2 Socio-cultural issues

4.2.1 Land Acquisition and Land Use

Description of Impact. Solar PV projects can involve large tracks of land and therefore significant land acquisition. Any project involving land acquisition can impact local communities and their livelihoods, current landowners and/or current land users. Land acquisition that results in involuntary resettlement can complicate the social impact of the Project. This is compounded when projects are located in countries where land tenure and ownership laws are tenuous and/or in situations where local communities or groups do not hold title to the land.

Solar projects impacting large amounts of agricultural land could have particularly significant impacts on people's livelihoods and raise issues related to the substitution of fuel for food.

Screening. Land acquisition procedures, physical or economic displacement of people and/or impacts on their livelihood, and changes in land use are factors considered in screening projects as Category A or B. Information regarding actual land ownership, and in some countries, past ownership, as well as existing and adjacent land use, can assist in determining if effects in this area would result in a Category A or B classification. Projects involving significant resettlement or impacts on livelihoods due to changes in land use are likely to be screened as Category A.

Impact Mitigation. Land should be acquired on a voluntary basis with current landowners and tenants and prices should be negotiated with current owners at market rates. For projects that involve involuntary physical or economic displacement, land must be acquired in accordance with IFC's Performance Standard 5 (Land Acquisition and Involuntary Resettlement) and, where indigenous peoples are involved, IFC's Performance Standard 7 (Indigenous Peoples). The resettlement, compensation and community consultation processes, and agreements must be clearly documented.

Land use patterns should be assessed to determine if there are current existing land uses, such as agriculture or tourism that could be diminished as a result of the establishment of a solar PV project.

4.2.2 Indigenous Peoples and Cultural Heritage

Description of Impact. Indigenous people may be particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs and institutions may also come under threat.

Projects may be located in an area with the potential for containing tangible cultural resources. In addition, a solar project may impact the cultural heritage of the area by changing the landscape and possibly the type of economic activity in the area (IFC, 2006).

Screening. Projects with the potential to adversely impact indigenous peoples are sensitive and as such are more likely to be screened as Category A. Projects with the potential to affect cultural heritage may be screened as Category A if impacts are determined to be significant.

Impact Mitigation. Projects should anticipate and avoid adverse impacts on communities of indigenous peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts. For additional information on standards and requirements related to impacts on indigenous peoples, consult IFC's P.S. 7.

If a solar project has the potential to impact cultural resources, either tangible or intangible, mitigation measures found in IFC P.S. 8 should be implemented.

4.3 Community Issues

4.3.1 Visual Impacts

Description of Impact. Visual impacts associated with solar PV projects typically concern the appearance of the solar modules and their interference with the character of the surrounding landscape, particularly to nearby residential communities. Additionally, sometimes reflection from the module surfaces exacerbates visual impacts from a project. Consideration should be given to the landscape character during siting and visual impacts from relevant viewing angles.

Screening. If opposition to a project develops, the level of opposition can affect a project's classification as Category A or Category B.

Impact Mitigation. The IFC guidelines recommend consideration of the landscape character during siting and evaluation of visual impacts from relevant viewing angles. Specific assessment from critical viewsheds with renderings is appropriate. Ancillary structures such as fencing and on-site roads should be minimized, steep slopes avoided, erosion control measures, and revegetation procedures implemented.

4.4 Panel Disposal

Description of Impact. While solar modules can last up to thirty years, a significant quantity of material needs to be disposed of at the end of the life of the modules. Because modules can contain potentially hazardous materials and many countries where OPIC projects are located lack adequate disposal facilities, consideration should be given at the start of a solar PV project as to how units will be disposed of at the end of their useful life. Additionally, projects with battery storage must address disposal of batteries at the end of their useful life.

Screening. Impacts with respect to panel disposal can be mitigated to acceptable levels as long as adequate consideration is given to the issue at the developmental stage of the Project. Implementation of appropriate mitigation measures with respect to panel disposal would assist in screening the Project as Category B.

Impact Mitigation. Project developers should consider ultimate disposal options at the start of the Project and devise plans. Many components of photovoltaic modules are recyclable and some solar module manufacturers provide recycling of the panels with purchase. Recycling will greatly reduce potential adverse impacts associated with panel disposal.

4.5 Ancillary Facilities

Description of Impact. Ancillary features, including access roads and power transmission lines to connect a project to an existing electrical grid, can result in significant land use disturbances, visual intrusions, and wildlife impacts. In addition, because sites for large-scale solar PV projects can sometimes be located in remote areas where the required skilled workers do not live near the Project site, workers' accommodations may need to be constructed on-site. Workers' accommodations require consideration of siting issues as discussed above, provision of potable water and availability of wastewater, and solid waste disposal services.

Screening. The significance of the impacts that ancillary facilities may have and their potential cumulative effects need to be considered during the screening process as they could have an effect of a project's category classification. The length and route of a transmission line or access road, outside the Project boundary, and their impact on the siting criteria discussed above, will determine if effects related to ancillary facilities would result in a Category A or B classification.

Potential social impacts that may result from worker housing should be considered including impacts on community infrastructure, health, and safety. Depending on the size, duration and potential risks

associated with workers' accommodations, impacts from workers' accommodations may be considered during classification of a project as Category A or Category B.

Impact Mitigation. For access roads and transmission lines, IFC's EHS Guidelines for Toll Roads and for Electric Power Transmission and Distribution should be consulted and recommendations applied.

For workers' accommodations, projects should adhere to international standards for worker housing such as "Workers' Accommodation: Processes and Standards: A Guidance Note by IFC and the EBRD" ([http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_WorkersAccommodation/\\$FILE/workers_accomodation.pdf](http://www.ifc.org/ifcext/sustainability.nsf/AttachmentsByTitle/p_WorkersAccommodation/$FILE/workers_accomodation.pdf)).

4.6 Cumulative Effects

Description of Impact. Often specific regions with good solar resources will have more than one solar project proposed and cumulative impacts should be considered. Cumulative effects can also result from the additive effects of other activities from different projects in a region, or secondary development that is likely to occur as a result of project development, each of which taken individually may not create significant impacts, but taken together could result in considerable impacts.

Screening. Having more than one large-scale solar PV facility within the same area or community can significantly exacerbate environmental and social impacts. Cumulative impacts from ancillary features should also be considered. If there are potential significant adverse impacts to the environment or nearby communities due to cumulative effects, a project may be classified as Category A rather than Category B.

Applicable Guidelines and Standards. The potential for cumulative impacts should be identified during the Project's environmental and social assessment process. Opportunities exist to reduce land-clearance impacts through shared use of power transmission lines, substations and access roads. Monitoring plans and procedures should take into account the cumulative effects.

Section 5.0 - Information Needed from the Project Applicant

Information that can be supplied by a project applicant that would assist OPIC in the screening and review of any proposed solar PV project includes:

■ **Technical information on solar modules**

- Manufacturer.
- Type of cell used in the module panel.
- Number of modules to be installed on site.
- Specifics about the installation (i.e. tracking or non-tracking, spacing of modules).
- Whether or not there will be on-site storage of electricity.

■ **Project site**

- Exact location including latitude and longitude coordinates.
- Current land use of the site including whether or not there are existing structures on the site that will need to be removed and other impacts of land clearing.
- Presence of protected/endangered plants or animals on the site.
- Proximity to protected areas, sensitive ecosystems or areas of cultural significance.
- Proximity to closest residence/neighborhood.
- Information regarding physical or economic displacement of any person or persons.
- Information regarding potential impacts on indigenous peoples.
- Information regarding how the land for the Project was acquired.
- Any public meetings held with nearby residents and issues that arose.

■ **Project impacts**

- Specifics on the Project installation such as how the cables connecting panels will be installed and depth of holes for mounting the panels.
- Plans for disposal of solid waste and sewage.
- Measures to control erosion.
- Presence and storage of hazardous substances on site.
- Amount and source of water needed for the Project including potable water for drinking and water for panel washing.
- Plans to screen the facility from nearby residences.
- Whether or not a social and environmental impact assessment, social and environmental management plan, social and environmental policy and grievance mechanism have been prepared for the Project.
- Whether or not an Occupational Health and Safety plan has been prepared for the construction and/or operational phase of the Project.
- Whether or not a Life and Fire Safety plan has been prepared for the Project.

■ **Connection to the electrical grid and other related infrastructure needed for the Project**

- Description of any on-site substation to be constructed.
- Complete description of how the Project will tie into the existing power transmission system including whether or not there will be construction of a transmission line, its length, its route and who is responsible for the construction of the line.
- Whether or not roads will be constructed for the Project and their length and width.
- Whether or not there will be worker housing needed on site and the plans for the construction of that housing.

■ **Disposal of panels and batteries**

- How panels will be disposed of at the end of their life (i.e. recycled, landfilled).
- Description of plans for battery disposal if there is on-site battery storage.

Section 6.0 - Monitoring Recommendations

Because each project and site is unique, monitoring requirements should be determined on a project-by-project basis and should be largely based on the significant issues that were identified during the environmental and social impact assessment of the Project.

In general, monitoring for a solar PV project may include the following:

- **Construction phase**
 - Monitor that occupational health and safety measures are carried out in accordance with IFC's General Environmental, Health and Safety Guidelines.
 - Monitor that impacts from construction such as erosion and sedimentation, solid and sanitary waste disposal, hazardous materials (including fuels and lubricants) management, are being mitigated in accordance with IFC's General Environmental, Health and Safety Guidelines Erosion.
 - If applicable, monitor that any cultural heritage that may be found or affected during construction is treated in accordance with IFC P.S. 8.
 - Respond to and record community grievances.
 - If applicable, monitor habitat and species impacts in accordance with IFC P.S. 6 and/or the Project's biodiversity management plan.
 - If applicable, monitor that temporary worker housing is constructed and maintained in accordance with Workers' Accommodation: Processes and Standards: A Guidance Note by IFC and the EBRD.
- **Operation phase**
 - Monitor for potential cumulative impacts.
 - Ensure that restoration of any disturbance during construction has occurred.

Section 7.0 - Resources

<p>Presence of critical or sensitive habitat</p> <p>Socio-cultural issues</p> <p>Visual impacts</p> <p>Disposal of the modules</p> <p>Impacts related to the construction of ancillary facilities</p> <p>Cumulative effects</p>	<p>Bosatra, M, Fazi, F, Lionetto, P.F, Travagnin, L. (2010): Utility Scale PV and CSP Solar Power Plants Performance, Impact on the Territory and Interaction with the Grid. Foster Wheeler Italiana, Milan, Italy. http://www.fwc.com/publications/tech_papers/files/TP_Solar_10_01.pdf</p> <p>Bright Source Energy. (2009): Utility-Scale Solar: Reducing Risk for Utilities. BSE, 2111 E Highland Ave – Suite 170 Phoenix, AZ 85016 http://www.swhydro.arizona.edu/renewable/presentations/thursday/rasmussen.pdf</p> <p>Bureau of Land Management. (2011): Renewable Energy and the BLM: SOLAR. U.S. Department of the Interior, 1849 C Street NW, Washington, DC 20240. http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS_REALTY_AND_RESOURCE_PROTECTION_/energy.Par.28512.File.dat/Fact_Sheet_Solar_Oct_2011.pdf</p> <p>Bureau of Land Management. (201): Solar Energy. U.S. Department of the Interior, 1849 C Street NW, Washington, DC 20240. http://www.blm.gov/wo/st/en/prog/energy/solar_energy.html</p> <p>Cacadu District Municipality. (2011): Land Use and Locational Policy for Renewable Energy Projects: Cacadu District Municipality: CDM Renewable Energy Seminar: 2011. http://cacadu.co.za/assets//UrbanDynamics/URBAN_DYNAMICS.pdf</p> <p>California Energy Commission. (2011): Large Solar Energy Projects. California Energy Commission. 1516 Ninth Street, MS-29 Sacramento, CA 95814-5512. http://www.energy.ca.gov/siting/solar/index.html</p> <p>California Native Plant Society. (2011): Conservation Program, Desert: Solar Energy Development. California Native Plant Society. 2707 K Street, Suite 1, Sacramento, CA 95816-5113. http://www.cnps.org/cnps/conservation/desert.php</p> <p>European Commission. (2010): Renewable Energy: Studies-Land Use Change. http://ec.europa.eu/energy/renewables/studies/land_use_change_en.htm</p> <p>Federal Aviation Administration. (2010): Technical Guidance for Evaluating Selected Solar Technologies at Airports. Airport Planning and Environmental Division (APP-400) 800 Independence Avenue, SW Washington, DC 20591. http://www.faa.gov/airports/environmental/policy_guidance/media/airport_solar_guide_print.pdf</p> <p>Government of South Australia: Renewables SA: Renewable Energy Resource Map. Government of South Australia, GPO Box 2343, Adelaide SA 5001 Level 7, 131-139 Grenfell Street, The Conservatory, Adelaide SA 5000. http://www.renewablesa.sa.gov.au/investor-information/resources</p> <p>Ministry of Environments and Forests, Government of India. (2011): Environmental Information Division. Paryavaran Bhavan, CGO Complex, Lodhi Road, New Delhi - 110 003. http://moef.nic.in/index.php</p>
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Section 8.0 - Glossary of Terms - Solar

Categorically Prohibited Project - A project of the type listed in Appendix B of OPIC's Environmental and Social Policy Statement where potential adverse environmental or social impacts of the Project preclude OPIC support.

Category A - Category A projects are likely to have significant adverse environmental and/or social impacts that are irreversible, sensitive, diverse, or unprecedented. In the absence of adequate mitigation measures, Category A projects are considered higher risk.

Category B - Category B projects are likely to have limited adverse environmental and/or social impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures. Category B projects are considered medium risk. For these reasons, the scope of OPIC's environmental and social assessment for a Category B project is narrower than that required for Category A projects.

Concentrated Photovoltaic (CPV) Systems - Systems that concentrate sunlight on solar cells, greatly increasing the efficiency of the cells. The photovoltaic cells in a CPV system are built into concentrating collectors that use a lens or mirrors to focus the sunlight onto the cells. CPV systems must track the sun to keep the light focused on the PV cells.

Concentrating Solar Power (CSP) Systems - Systems that use the sun as the heat source to boil water and produce electricity. There are three main types of concentrating solar power systems; linear concentrators, dish/engine, and power tower systems.
http://www.nrel.gov/learning/re_csp.html

Critical Forest Areas - A type of Natural Forest that qualifies as Critical Natural Habitat. Critical Forest Areas include, but are not limited to, primary Forests and old growth Forests that may serve as critical carbon sinks.

Critical Natural Habitats - (i) Existing internationally recognized protected areas, areas initially recognized as protected by traditional local communities (i.e. sacred groves), and sites that maintain conditions vital to the viability of protected areas (as determined by the environmental assessment procedure); and (ii) sites identified on supplementary lists by authoritative sources identified by OPIC. Such sites may include areas recognized by traditional local communities (i.e. sacred groves), areas with known high suitability for biodiversity conservation and sites that are critical for vulnerable, migratory or endangered species. Listings are based on systematic evaluations of such factors as species richness, the degree of endemism, rarity, and vulnerability of component species, representativeness and the integrity of ecosystem processes.

Cultural Heritage - Tangible property or sites having archaeological (prehistoric), paleontological, historical, cultural, artistic and religious value, as well as unique environmental features that embody cultural values, such as sacred groves. Cultural heritage also includes intangible forms of culture, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

Economic Displacement - Loss of assets or access to assets that leads to loss of income sources or means of livelihood.

Environmental and Social Action Plan (ESAP) - A systematic program designed to prevent, mitigate and monitor anticipated environmental and related human impacts of prospective and ongoing activities. Required on all Category A projects.

Environmental and Social Impact Assessment (ESIA) - A comprehensive analytical body of work designed to evaluate environmental impacts of major projects having the potential to have significant, diverse, and irreversible impacts on the natural environment and on humans dependent on that environment. An ESIA is required for all Category A projects involving new ("greenfield") developments or significant expansion of existing facilities.

Environmental and Social Management System (ESMS) - Part of a project's overall management system that includes the organizational structure, responsibilities, practices and resources necessary for implementing the Project-specific management program developed through the environmental and social assessment of the Project.

Forest - An area of land not less than 1.0 ha with a tree crown cover (or equivalent stocking level) of more than 10 percent that has trees with the potential to reach a minimum height of 2 meters at maturity *in situ*. A forest may consist of either closed forest formations, where trees of various and all plantations that have yet to reach a crown density of 10 percent or tree height of 2 meters are included under forest, as are areas normally forming part of the forest area that are temporarily destocked as a result of human intervention such as harvesting or natural causes but that are expected to revert to forest. The definition includes forests dedicated to forest production, protection, multiple uses, or conservation, whether formally recognized or not. The definition excludes areas where other land uses not dependent on tree cover predominate, such as agriculture, grazing, or settlements. In countries with low forest cover, the definition may be expanded to include areas covered by trees that fall below the 10 percent threshold for canopy density, but are considered forest under local conditions.

Fragmentation of Habitat - The emergence of discontinuities (fragmentation) in an organism's preferred environment (habitat), causing population fragmentation. Geological processes that slowly alter the layout of the physical environment can cause habitat fragmentation. Sahney, S, Benton, M.J. & Falcon-Lang, H.J. (2010). "Rainforest collapse triggered Pennsylvanian tetrapod diversification in Euramerica" (PDF). *Geology* 38 (12): 1079–1082. doi:10.1130/G31182.1.

Industry Sector Guidelines - Technical reference documents issued by the International Finance Corporation with general and industry specific performance levels and measures.

Natural Forests - Forest lands and associated waterways where the ecosystem's biological communities are formed largely by native plant and animal species and where human activity has not essentially modified the area's primary ecological functions.

Performance Standards - Technical reference documents issued by the International Finance Corporation with environmental and social impact management performance criteria.

Photovoltaic (PV) Cell Technology - Utility-scale solar PV technologies convert energy from sunlight directly into electricity, using large arrays of solar panels. Solar PV technologies convert solar energy into useful energy forms by directly absorbing solar photons, particles of light that act as individual units of energy, and converting part of the energy to electricity. Solar PV is particularly well suited to off-grid applications, making it ideal for rural electrification.

Physical Displacement - Relocation or loss of shelter.

Project - All facilities owned or controlled within a physical project boundary that constitute a commercially viable business unit eligible for OPIC support.

Project Affected People - Individuals, workers, groups, or local communities that is or could be affected by the **Project**, directly or indirectly, including through cumulative impacts. Emphasis should be placed on those who are directly and adversely affected, disadvantaged, or vulnerable.

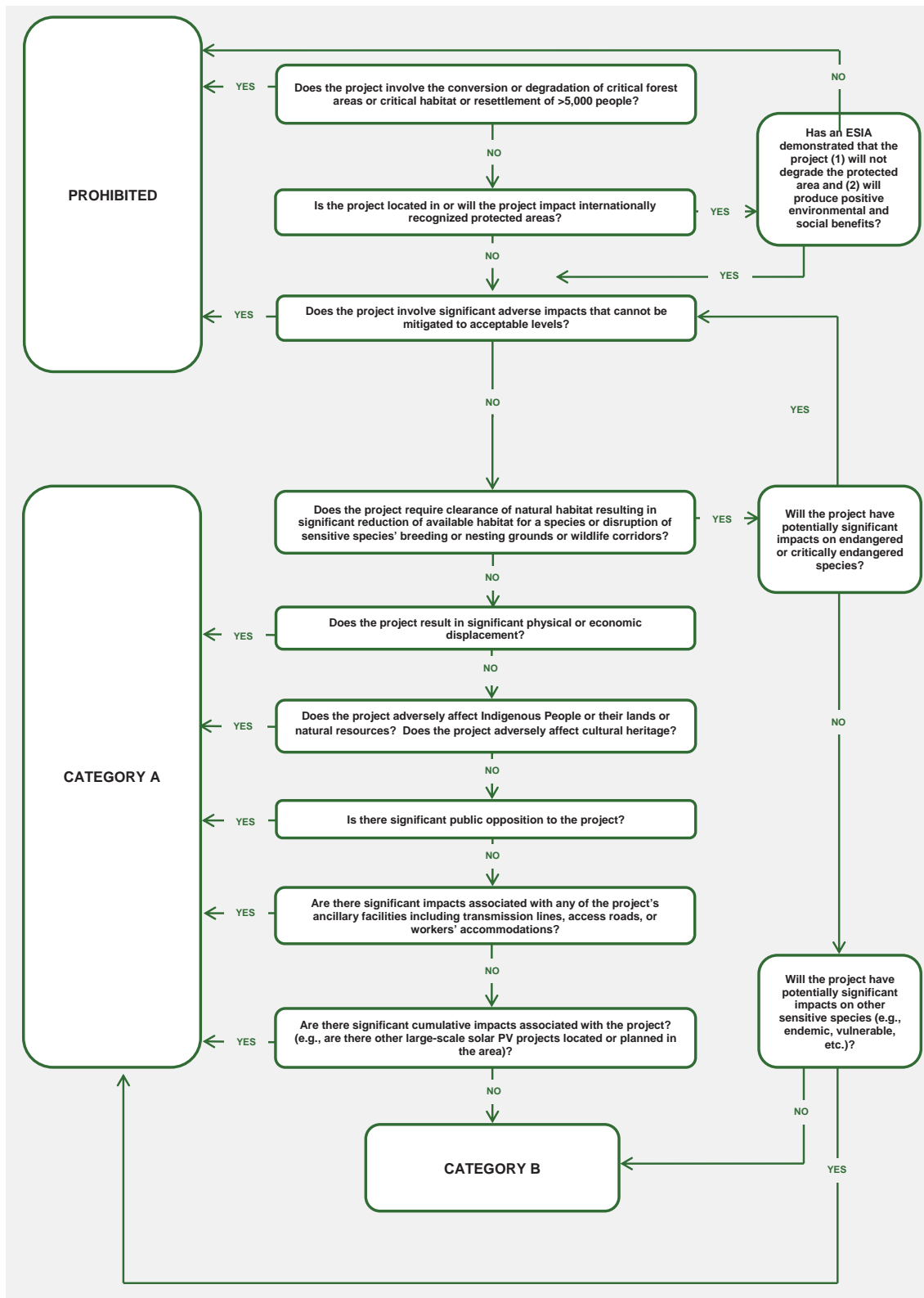
Renewable Energy - Energy supplied from renewable energy sources, such as wind and solar power, geothermal, and hydropower not *otherwise* categorically prohibited, and renewable biomass, but does not include nuclear power.

Visual Effects - "Visual effects relate to the changes that arise in the composition of available views as a result of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visual amenity" (LI-IEMA, 2002).

Appendix A

Flowchart

**Screening Flow Chart
Solar Power Projects**



Environmental, Health, and Safety General Guidelines

Introduction

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP)¹. When one or more members of the World Bank Group are involved in a project, these EHS Guidelines are applied as required by their respective policies and standards. These **General EHS Guidelines** are designed to be used together with the relevant **Industry Sector EHS Guidelines** which provide guidance to users on EHS issues in specific industry sectors. For complex projects, use of multiple industry-sector guidelines may be necessary. A complete list of industry-sector guidelines can be found at:

www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines

The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project on the basis of the results of an environmental assessment² in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account. The applicability of specific technical recommendations should be

¹ Defined as the exercise of professional skill, diligence, prudence and foresight that would be reasonably expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally. The circumstances that skilled and experienced professionals may find when evaluating the range of pollution prevention and control techniques available to a project may include, but are not limited to, varying levels of environmental degradation and environmental assimilative capacity as well as varying levels of financial and technical feasibility.

² For IFC, such assessment is carried out consistent with Performance Standard 1, and for the World Bank, with Operational Policy 4.01.

based on the professional opinion of qualified and experienced persons. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures than those provided in these EHS Guidelines are appropriate, in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

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General Approach to the Management of EHS Issues at the Facility or Project Level

Effective management of environmental, health, and safety (EHS) issues entails the inclusion of EHS considerations into corporate- and facility-level business processes in an organized, hierarchical approach that includes the following steps:

- Identifying EHS project hazards³ and associated risks⁴ as early as possible in the facility development or project cycle, including the incorporation of EHS considerations into the site selection process, product design process, engineering planning process for capital requests, engineering work orders, facility modification authorizations, or layout and process change plans.
- Involving EHS professionals, who have the experience, competence, and training necessary to assess and manage EHS impacts and risks, and carry out specialized environmental management functions including the preparation of project or activity-specific plans and procedures that incorporate the technical recommendations presented in this document that are relevant to the project.
- Understanding the likelihood and magnitude of EHS risks, based on:
 - The nature of the project activities, such as whether the project will generate significant quantities of emissions or effluents, or involve hazardous materials or processes;
 - The potential consequences to workers, communities, or the environment if hazards are not adequately managed, which may depend on the proximity of project activities to

people or to the environmental resources on which they depend.

- Prioritizing risk management strategies with the objective of achieving an overall reduction of risk to human health and the environment, focusing on the prevention of irreversible and / or significant impacts.
- Favoring strategies that eliminate the cause of the hazard at its source, for example, by selecting less hazardous materials or processes that avoid the need for EHS controls.
- When impact avoidance is not feasible, incorporating engineering and management controls to reduce or minimize the possibility and magnitude of undesired consequences, for example, with the application of pollution controls to reduce the levels of emitted contaminants to workers or environments.
- Preparing workers and nearby communities to respond to accidents, including providing technical and financial resources to effectively and safely control such events, and restoring workplace and community environments to a safe and healthy condition.
- Improving EHS performance through a combination of ongoing monitoring of facility performance and effective accountability.

³ Defined as “threats to humans and what they value” (Kates, et al., 1985).

⁴ Defined as “quantitative measures of hazard consequences, usually expressed as conditional probabilities of experiencing harm” (Kates, et. al., 1985)

1.0 Environmental

1.1 Air Emissions and Ambient Air Quality

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Applicability and Approach

This guideline applies to facilities or projects that generate emissions to air at any stage of the project life-cycle. It complements the industry-specific emissions guidance presented in the Industry Sector Environmental, Health, and Safety (EHS) Guidelines by providing information about common techniques for emissions management that may be applied to a range of industry sectors. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts. It is also intended to provide additional information on approaches to emissions management in projects located in areas of poor air quality, where it may be necessary to establish project-specific emissions standards.

Emissions of air pollutants can occur from a wide variety of activities during the construction, operation, and decommissioning phases of a project. These activities can be categorized based on

the spatial characteristic of the source including point sources, fugitive sources, and mobile sources and, further, by process, such as combustion, materials storage, or other industry sector-specific processes.

Where possible, facilities and projects should avoid, minimize, and control adverse impacts to human health, safety, and the environment from emissions to air. Where this is not possible, the generation and release of emissions of any type should be managed through a combination of:

- Energy use efficiency
- Process modification
- Selection of fuels or other materials, the processing of which may result in less polluting emissions
- Application of emissions control techniques

The selected prevention and control techniques may include one or more methods of treatment depending on:

- Regulatory requirements
- Significance of the source
- Location of the emitting facility relative to other sources
- Location of sensitive receptors
- Existing ambient air quality, and potential for degradation of the airshed from a proposed project
- Technical feasibility and cost effectiveness of the available options for prevention, control, and release of emissions

Ambient Air Quality

General Approach

Projects with significant^{5,6} sources of air emissions, and potential for significant impacts to ambient air quality, should prevent or minimize impacts by ensuring that:

- Emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards⁹ by applying national legislated standards, or in their absence, the current WHO Air Quality Guidelines¹⁰ (see Table 1.1.1), or other internationally recognized sources¹¹;
- Emissions do not contribute a significant portion to the attainment of relevant ambient air quality guidelines or standards. As a general rule, this Guideline suggests 25 percent of the applicable air quality standards to allow

additional, future sustainable development in the same airshed.¹²

At facility level, impacts should be estimated through qualitative or quantitative assessments by the use of baseline air quality assessments and atmospheric dispersion models to assess potential ground level concentrations. Local atmospheric, climatic, and air quality data should be applied when modeling dispersion, protection against atmospheric downwash, wakes, or eddy effects of the source, nearby¹³ structures, and terrain features. The dispersion model applied should be internationally recognized, or comparable. Examples of acceptable emission estimation and dispersion modeling approaches for point and fugitive sources are

Table 1.1.1: WHO Ambient Air Quality Guidelines^{7, 8}

	Averaging Period	Guideline value in $\mu\text{g}/\text{m}^3$
Sulfur dioxide (SO ₂)	24-hour	125 (Interim target-1) 50 (Interim target-2) 20 (guideline)
	10 minute	500 (guideline)
Nitrogen dioxide (NO ₂)	1-year	40 (guideline)
	1-hour	200 (guideline)
Particulate Matter PM ₁₀	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
	24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter PM _{2.5}	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

⁵ Significant sources of point and fugitive emissions are considered to be general sources which, for example, can contribute a net emissions increase of one or more of the following pollutants within a given airshed: PM₁₀: 50 tons per year (tpy); NO_x: 500 tpy; SO₂: 500 tpy; or as established through national legislation; and combustion sources with an equivalent heat input of 50 MWh or greater. The significance of emissions of inorganic and organic pollutants should be established on a project-specific basis taking into account toxic and other properties of the pollutant.

⁶ United States Environmental Protection Agency, Prevention of Significant Deterioration of Air Quality, 40 CFR Ch. 1 Part 52.21. Other references for establishing significant emissions include the European Commission. 2000. "Guidance Document for EPER implementation." <http://ec.europa.eu/environment/ippc/eper/index.htm>; and Australian Government. 2004. "National Pollutant Inventory Guide." <http://www.npi.gov.au/handbooks/pubs/npiguide.pdf>

⁷ World Health Organization (WHO). Air Quality Guidelines Global Update, 2005. PM 24-hour value is the 99th percentile.

⁸ Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

⁹ Ambient air quality standards are ambient air quality levels established and published through national legislative and regulatory processes, and ambient quality guidelines refer to ambient quality levels primarily developed through clinical, toxicological, and epidemiological evidence (such as those published by the World Health Organization).

¹⁰ Available at World Health Organization (WHO). <http://www.who.int/en>

¹¹ For example the United States National Ambient Air Quality Standards (NAAQS) (<http://www.epa.gov/air/criteria.html>) and the relevant European Council Directives (Council Directive 1999/30/EC of 22 April 1999 / Council Directive 2002/3/EC of February 12 2002).

¹² US EPA Prevention of Significant Deterioration Increments Limits applicable to non-degraded airsheds.

included in Annex 1.1.1. These approaches include screening models for single source evaluations (SCREEN3 or AIRSCREEN), as well as more complex and refined models (AERMOD OR ADMS). Model selection is dependent on the complexity and geomorphology of the project site (e.g. mountainous terrain, urban or rural area).

Projects Located in Degraded Airsheds or Ecologically Sensitive Areas

Facilities or projects located within poor quality airsheds¹⁴, and within or next to areas established as ecologically sensitive (e.g. national parks), should ensure that any increase in pollution levels is as small as feasible, and amounts to a fraction of the applicable short-term and annual average air quality guidelines or standards as established in the project-specific environmental assessment. Suitable mitigation measures may also include the relocation of significant sources of emissions outside the airshed in question, use of cleaner fuels or technologies, application of comprehensive pollution control measures, offset activities at installations controlled by the project sponsor or other facilities within the same airshed, and buy-down of emissions within the same airshed.

Specific provisions for minimizing emissions and their impacts in poor air quality or ecologically sensitive airsheds should be established on a project-by-project or industry-specific basis. Offset provisions outside the immediate control of the project sponsor or buy-downs should be monitored and enforced by the local agency responsible for granting and monitoring emission permits. Such provisions should be in place prior to final commissioning of the facility / project.

Point Sources

Point sources are discrete, stationary, identifiable sources of emissions that release pollutants to the atmosphere. They are typically located in manufacturing or production plants. Within a given point source, there may be several individual 'emission points' that comprise the point source.¹⁵

Point sources are characterized by the release of air pollutants typically associated with the combustion of fossil fuels, such as nitrogen oxides (NO_x), sulfur dioxide (SO₂), carbon monoxide (CO), and particulate matter (PM), as well as other air pollutants including certain volatile organic compounds (VOCs) and metals that may also be associated with a wide range of industrial activities.

Emissions from point sources should be avoided and controlled according to good international industry practice (GIIP) applicable to the relevant industry sector, depending on ambient conditions, through the combined application of process modifications and emissions controls, examples of which are provided in Annex 1.1.2. Additional recommendations regarding stack height and emissions from small combustion facilities are provided below.

Stack Height

The stack height for all point sources of emissions, whether 'significant' or not, should be designed according to GIIP (see Annex 1.1.3) to avoid excessive ground level concentrations due to downwash, wakes, and eddy effects, and to ensure reasonable diffusion to minimize impacts. For projects where there are multiple sources of emissions, stack heights should be established with due consideration to emissions from all other project sources, both point and fugitive. Non-significant sources of emissions,

¹³ "Nearby" generally considers an area within a radius of up to 20 times the stack height.

¹⁴ An airshed should be considered as having poor air quality if nationally legislated air quality standards or WHO Air Quality Guidelines are exceeded significantly.

¹⁵ Emission points refer to a specific stack, vent, or other discrete point of pollution release. This term should not be confused with point source, which is a regulatory distinction from area and mobile sources. The characterization of point sources into multiple emissions points is useful for allowing more detailed reporting of emissions information.

including small combustion sources,¹⁶ should also use GIP in stack design.

Small Combustion Facilities Emissions Guidelines

Small combustion processes are systems designed to deliver electrical or mechanical power, steam, heat, or any combination of these, regardless of the fuel type, with a total, rated heat input capacity of between three Megawatt thermal (MWth) and 50 MWth.

The emissions guidelines in Table 1.1.2 are applicable to small combustion process installations operating more than 500 hours per year, and those with an annual capacity utilization of more than 30 percent. Plants firing a mixture of fuels should compare emissions performance with these guidelines based on the sum of the relative contribution of each applied fuel¹⁷. Lower emission values may apply if the proposed facility is located in an ecologically sensitive airshed, or airshed with poor air quality, in order to address potential cumulative impacts from the installation of more than one small combustion plant as part of a distributed generation project.

¹⁶ Small combustion sources are those with a total rated heat input capacity of 50MWth or less.

¹⁷ The contribution of a fuel is the percentage of heat input (LHV) provided by this fuel multiplied by its limit value.

Table 1.1.2 - Small Combustion Facilities Emissions Guidelines (3MWh – 50MWh) – (in mg/Nm³ or as indicated)

Combustion Technology / Fuel	Particulate Matter (PM)	Sulfur Dioxide (SO ₂)	Nitrogen Oxides (NOx)	Dry Gas, Excess O ₂ Content (%)
Engine				
Gas	N/A	N/A	200 (Spark Ignition) 400 (Dual Fuel) 1,600 (Compression Ignition)	15
Liquid	50 or up to 100 if justified by project specific considerations (e.g. Economic feasibility of using lower ash content fuel, or adding secondary treatment to meet 50, and available environmental capacity of the site)	1.5 percent Sulfur or up to 3.0 percent Sulfur if justified by project specific considerations (e.g. Economic feasibility of using lower S content fuel, or adding secondary treatment to meet levels of using 1.5 percent Sulfur, and available environmental capacity of the site)	If bore size diameter [mm] < 400: 1460 (or up to 1,600 if justified to maintain high energy efficiency.) If bore size diameter [mm] > or = 400: 1,850	15
Turbine				
Natural Gas =3MWh to < 15MWh	N/A	N/A	42 ppm (Electric generation) 100 ppm (Mechanical drive)	15
Natural Gas =15MWh to < 50MWh	N/A	N/A	25 ppm	15
Fuels other than Natural Gas =3MWh to < 15MWh	N/A	0.5 percent Sulfur or lower percent Sulfur (e.g. 0.2 percent Sulfur) if commercially available without significant excess fuel cost	96 ppm (Electric generation) 150 ppm (Mechanical drive)	15
Fuels other than Natural Gas =15MWh to < 50MWh	N/A	0.5% S or lower % S (0.2%S) if commercially available without significant excess fuel cost	74 ppm	15
Boiler				
Gas	N/A	N/A	320	3
Liquid	50 or up to 150 if justified by environmental assessment	2000	460	3
Solid	50 or up to 150 if justified by environmental assessment	2000	650	6

Notes: -N/A - no emissions guideline; Higher performance levels than these in the Table should be applicable to facilities located in urban / industrial areas with degraded airsheds or close to ecologically sensitive areas where more stringent emissions controls may be needed.; MWh is heat input on HHV basis; Solid fuels include biomass; Nm³ is at one atmosphere pressure, 0°C.; MWh category is to apply to the entire facility consisting of multiple units that are reasonably considered to be emitted from a common stack except for NOx and PM limits for turbines and boilers. Guidelines values apply to facilities operating more than 500 hours per year with an annual capacity utilization factor of more than 30 percent.

Fugitive Sources

Fugitive source air emissions refer to emissions that are distributed spatially over a wide area and not confined to a specific discharge point. They originate in operations where exhausts are not captured and passed through a stack. Fugitive emissions have the potential for much greater ground-level impacts per unit than stationary source emissions, since they are discharged and dispersed close to the ground. The two main types of fugitive emissions are Volatile Organic Compounds (VOCs) and particulate matter (PM). Other contaminants (NO_x, SO₂ and CO) are mainly associated with combustion processes, as described above. Projects with potentially significant fugitive sources of emissions should establish the need for ambient quality assessment and monitoring practices.

Open burning of solid wastes, whether hazardous or non-hazardous, is not considered good practice and should be avoided, as the generation of polluting emissions from this type of source cannot be controlled effectively.

Volatile Organic Compounds (VOCs)

The most common sources of fugitive VOC emissions are associated with industrial activities that produce, store, and use VOC-containing liquids or gases where the material is under pressure, exposed to a lower vapor pressure, or displaced from an enclosed space. Typical sources include equipment leaks, open vats and mixing tanks, storage tanks, unit operations in wastewater treatment systems, and accidental releases. Equipment leaks include valves, fittings, and elbows which are subject to leaks under pressure. The recommended prevention and control techniques for VOC emissions associated with equipment leaks include:

- Equipment modifications, examples of which are presented in Annex 1.1.4;

- Implementing a leak detection and repair (LDAR) program that controls fugitive emissions by regularly monitoring to detect leaks, and implementing repairs within a predefined time period.¹⁸

For VOC emissions associated with handling of chemicals in open vats and mixing processes, the recommended prevention and control techniques include:

- Substitution of less volatile substances, such as aqueous solvents;
- Collection of vapors through air extractors and subsequent treatment of gas stream by removing VOCs with control devices such as condensers or activated carbon absorption;
- Collection of vapors through air extractors and subsequent treatment with destructive control devices such as:
 - Catalytic Incinerators: Used to reduce VOCs from process exhaust gases exiting paint spray booths, ovens, and other process operations
 - Thermal Incinerators: Used to control VOC levels in a gas stream by passing the stream through a combustion chamber where the VOCs are burned in air at temperatures between 700° C to 1,300° C
 - Enclosed Oxidizing Flares: Used to convert VOCs into CO₂ and H₂O by way of direct combustion
- Use of floating roofs on storage tanks to reduce the opportunity for volatilization by eliminating the headspace present in conventional storage tanks.

Particulate Matter (PM)

The most common pollutant involved in fugitive emissions is dust or particulate matter (PM). This is released during certain operations, such as transport and open storage of solid materials, and from exposed soil surfaces, including unpaved roads.

¹⁸ For more information, see Leak Detection and Repair Program (LDAR), at: <http://www.ldar.net>

Recommended prevention and control of these emissions sources include:

- Use of dust control methods, such as covers, water suppression, or increased moisture content for open materials storage piles, or controls, including air extraction and treatment through a baghouse or cyclone for material handling sources, such as conveyors and bins;
- Use of water suppression for control of loose materials on paved or unpaved road surfaces. Oil and oil by-products is not a recommended method to control road dust. Examples of additional control options for unpaved roads include those summarized in Annex 1.1.5.

Ozone Depleting Substances (ODS)

Several chemicals are classified as ozone depleting substances (ODSs) and are scheduled for phase-out under the Montreal Protocol on Substances that Deplete the Ozone Layer.¹⁹ No new systems or processes should be installed using CFCs, halons, 1,1,1-trichloroethane, carbon tetrachloride, methyl bromide or HBFCs. HCFCs should only be considered as interim / bridging alternatives as determined by the host country commitments and regulations.²⁰

Mobile Sources – Land-based

Similar to other combustion processes, emissions from vehicles include CO, NO_x, SO₂, PM and VOCs. Emissions from on-road and off-road vehicles should comply with national or regional

¹⁹ Examples include: chlorofluorocarbons (CFCs); halons; 1,1,1-trichloroethane (methyl chloroform); carbon tetrachloride; hydrochlorofluorocarbons (HCFCs); hydrobromofluorocarbons (HBFCs); and methyl bromide. They are currently used in a variety of applications including: domestic, commercial, and process refrigeration (CFCs and HCFCs); domestic, commercial, and motor vehicle air conditioning (CFCs and HCFCs); for manufacturing foam products (CFCs); for solvent cleaning applications (CFCs, HCFCs, methyl chloroform, and carbon tetrachloride); as aerosol propellants (CFCs); in fire protection systems (halons and HBFCs); and as crop fumigants (methyl bromide).

²⁰ Additional information is available through the Montreal Protocol Secretariat web site available at: <http://ozone.unep.org/>

programs. In the absence of these, the following approach should be considered:

- Regardless of the size or type of vehicle, fleet owners / operators should implement the manufacturer recommended engine maintenance programs;
- Drivers should be instructed on the benefits of driving practices that reduce both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits;
- Operators with fleets of 120 or more units of heavy duty vehicles (buses and trucks), or 540 or more light duty vehicles²¹ (cars and light trucks) within an airshed should consider additional ways to reduce potential impacts including:
 - Replacing older vehicles with newer, more fuel efficient alternatives
 - Converting high-use vehicles to cleaner fuels, where feasible
 - Installing and maintaining emissions control devices, such as catalytic converters
 - Implementing a regular vehicle maintenance and repair program

Greenhouse Gases (GHGs)

Sectors that may have potentially significant emissions of greenhouse gases (GHGs)²² include energy, transport, heavy industry (e.g. cement production, iron / steel manufacturing, aluminum smelting, petrochemical industries, petroleum refining, fertilizer manufacturing), agriculture, forestry and waste management. GHGs may be generated from direct emissions

²¹ The selected fleet size thresholds are assumed to represent potentially significant sources of emissions based on individual vehicles traveling 100,000 km / yr using average emission factors.

²² The six greenhouse gases that form part of the Kyoto Protocol to the United Nations Framework Convention on Climate Change include carbon dioxide (CO₂); methane (CH₄); nitrous oxide (N₂O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); and sulfur hexafluoride (SF₆).

from facilities within the physical project boundary and indirect emissions associated with the off-site production of power used by the project.

Recommendations for reduction and control of greenhouse gases include:

- Carbon financing;²³
- Enhancement of energy efficiency (see section on 'Energy Conservation');
- Protection and enhancement of sinks and reservoirs of greenhouse gases;
- Promotion of sustainable forms of agriculture and forestry;
- Promotion, development and increased use of renewable forms of energy;
- Carbon capture and storage technologies;²⁴
- Limitation and / or reduction of methane emissions through recovery and use in waste management, as well as in the production, transport and distribution of energy (coal, oil, and gas).

Monitoring

Emissions and air quality monitoring programs provide information that can be used to assess the effectiveness of emissions management strategies. A systematic planning process is recommended to ensure that the data collected are adequate for their intended purposes (and to avoid collecting unnecessary data). This process, sometimes referred to as a data quality objectives process, defines the purpose of collecting the data, the

decisions to be made based on the data and the consequences of making an incorrect decision, the time and geographic boundaries, and the quality of data needed to make a correct decision.²⁵ The air quality monitoring program should consider the following elements:

- *Monitoring parameters:* The monitoring parameters selected should reflect the pollutants of concern associated with project processes. For combustion processes, indicator parameters typically include the quality of inputs, such as the sulfur content of fuel.
- *Baseline calculations:* Before a project is developed, baseline air quality monitoring at and in the vicinity of the site should be undertaken to assess background levels of key pollutants, in order to differentiate between existing ambient conditions and project-related impacts.
- *Monitoring type and frequency:* Data on emissions and ambient air quality generated through the monitoring program should be representative of the emissions discharged by the project over time. Examples of time-dependent variations in the manufacturing process include batch process manufacturing and seasonal process variations. Emissions from highly variable processes may need to be sampled more frequently or through composite methods. Emissions monitoring frequency and duration may also range from continuous for some combustion process operating parameters or inputs (e.g. the quality of fuel) to less frequent, monthly, quarterly or yearly stack tests.
- *Monitoring locations:* Ambient air quality monitoring may consist of off-site or fence line monitoring either by the project sponsor, the competent government agency, or by collaboration between both. The location of ambient air

²³ Carbon financing as a carbon emissions reduction strategy may include the host government-endorsed Clean Development Mechanism or Joint Implementation of the United Nations Framework Convention on Climate Change.

²⁴ Carbon dioxide capture and storage (CCS) is a process consisting of the separation of CO₂ from industrial and energy-related sources; transport to a storage location; and long-term isolation from the atmosphere, for example in geological formations, in the ocean, or in mineral carbonates (reaction of CO₂ with metal oxides in silicate minerals to produce stable carbonates). It is the object of intensive research worldwide (Intergovernmental Panel on Climate Change (IPCC), Special Report, Carbon Dioxide Capture and Storage (2006).

²⁵ See, for example, United States Environmental Protection Agency, Guidance on Systematic Planning Using the Data Quality Objectives Process EPA QA/G-4, EPA/240/B-06/001 February 2006.

quality monitoring stations should be established based on the results of scientific methods and mathematical models to estimate potential impact to the receiving airshed from an emissions source taking into consideration such aspects as the location of potentially affected communities and prevailing wind directions.

- *Sampling and analysis methods:* Monitoring programs should apply national or international methods for sample collection and analysis, such as those published by the International Organization for Standardization,²⁶ the European Committee for Standardization,²⁷ or the U.S. Environmental Protection Agency.²⁸ Sampling should be conducted by, or under, the supervision of trained individuals. Analysis should be conducted by entities permitted or certified for this purpose. Sampling and analysis Quality Assurance / Quality Control (QA/QC) plans should be applied and documented to ensure that data quality is adequate for the intended data use (e.g., method detection limits are below levels of concern). Monitoring reports should include QA/QC documentation.

Monitoring of Small Combustion Plants Emissions

- Additional recommended monitoring approaches for **boilers**:

Boilers with capacities between =3 MWth and < 20 MWth:

- Annual Stack Emission Testing: SO₂, NO_x and PM. For gaseous fuel-fired boilers, only NO_x. SO₂ can be calculated based on fuel quality certification if no SO₂ control equipment is used.

²⁶ An on-line catalogue of ISO standards relating to the environment, health protection, and safety is available at: <http://www.iso.org/iso/en/CatalogueListPage.CatalogueList?ICS1=13&ICS2=&ICS3=&scopelist=>

²⁷ An on-line catalogue of European Standards is available at: <http://www.cen.eu/catweb/cwen.htm>.

²⁸ The National Environmental Methods Index provides a searchable clearinghouse of U.S. methods and procedures for both regulatory and non-regulatory monitoring purposes for water, sediment, air and tissues, and is available at <http://www.nemi.gov/>.

- If Annual Stack Emission Testing demonstrates results consistently and significantly better than the required levels, frequency of Annual Stack Emission Testing can be reduced from annual to every two or three years.
- Emission Monitoring: None

Boilers with capacities between =20 MWth and < 50 MWth

- Annual Stack Emission Testing: SO₂, NO_x and PM. For gaseous fuel-fired boilers, only NO_x. SO₂ can be calculated based on fuel quality certification (if no SO₂ control equipment is used)
- Emission Monitoring: SO₂. Plants with SO₂ control equipment: Continuous. NO_x: Continuous monitoring of either NO_x emissions or indicative NO_x emissions using combustion parameters. PM: Continuous monitoring of either PM emissions, opacity, or indicative PM emissions using combustion parameters / visual monitoring.

- Additional recommended monitoring approaches for **turbines**:

- Annual Stack Emission Testing: NO_x and SO₂ (NO_x only for gaseous fuel-fired turbines).
- If Annual Stack Emission Testing results show constantly (3 consecutive years) and significantly (e.g. less than 75 percent) better than the required levels, frequency of Annual Stack Emission Testing can be reduced from annual to every two or three years.
- Emission Monitoring: NO_x: Continuous monitoring of either NO_x emissions or indicative NO_x emissions using combustion parameters. SO₂: Continuous monitoring if SO₂ control equipment is used.

- Additional recommended monitoring approaches for **engines**:

- Annual Stack Emission Testing: NO_x, SO₂ and PM (NO_x only for gaseous fuel-fired diesel engines).

- If Annual Stack Emission Testing results show constantly (3 consecutive years) and significantly (e.g. less than 75 percent) better than the required levels, frequency of Annual Stack Emission Testing can be reduced from annual to every two or three years.
- Emission Monitoring: NO_x: Continuous monitoring of either NO_x emissions or indicative NO_x emissions using combustion parameters. SO₂: Continuous monitoring if SO₂ control equipment is used. PM: Continuous monitoring of either PM emissions or indicative PM emissions using operating parameters.

Annex 1.1.1 – Air Emissions Estimation and Dispersion

Modeling Methods

The following is a partial list of documents to aid in the estimation of air emissions from various processes and air dispersion models:

Australian Emission Estimation Technique Manuals

<http://www.npi.gov.au/handbooks/>

Atmospheric Emission Inventory Guidebook, UN / ECE / EMEP and the European Environment Agency

<http://www.aeat.co.uk/netcen/airqual/TFEI/unece.htm>

Emission factors and emission estimation methods, US EPA Office of Air Quality Planning & Standards

<http://www.epa.gov/ttn/chief>

Guidelines on Air Quality Models (Revised), US Environmental Protection Agency (EPA), 2005

http://www.epa.gov/scram001/guidance/guide/appw_05.pdf

Frequently Asked Questions, Air Quality Modeling and Assessment Unit (AQMAU), UK Environment Agency

http://www.environment-agency.gov.uk/subjects/airquality/236092/?version=1&lang=_e

OECD Database on Use and Release of Industrial Chemicals

<http://www.olis.oecd.org/ehs/urchem.nsf/>

Annex 1.1.2 – Illustrative Point Source Air Emissions Prevention and Control Technologies

Principal Sources and Issues	General Prevention / Process Modification Approach	Control Options	Reduction Efficiency (%)	Gas Condition	Comments
Particulate Matter (PM)					
Main sources are the combustion of fossil fuels and numerous manufacturing processes that collect PM through air extraction and ventilation systems. Volcanoes, ocean spray, forest fires and blowing dust (most prevalent in dry and semiarid climates) contribute to background levels.	Fuel switching (e.g. selection of lower sulfur fuels) or reducing the amount of fine particulates added to a process.	Fabric Filters	99 - 99.7%	Dry gas, temp <400F	Applicability depends on flue gas properties including temperature, chemical properties, abrasion and load. Typical air to cloth ratio range of 2.0 to 3.5 cfm/ft ² . Achievable outlet concentrations of 23 mg/Nm ³
		Electrostatic Precipitator (ESP)	97 – 99%	Varies depending of particle type	Precondition gas to remove large particles. Efficiency dependent on resistivity of particle. Achievable outlet concentration of 23 mg/Nm ³
		Cyclone	74 – 95%	None	Most efficient for large particles. Achievable outlet concentrations of 30 - 40 mg/Nm ³
		Wet Scrubber	93 – 95%	None	Wet sludge may be a disposal problem depending on local infrastructure. Achievable outlet concentrations of 30 - 40 mg/Nm ³
Sulfur Dioxide (SO₂)					
Mainly produced by the combustion of fuels such as oil and coal and as a by-product from some chemical production or wastewater treatment processes.	Control system selection is heavily dependent on the inlet concentration. For SO ₂ concentrations in excess of 10%, the stream is passed through an acid plant not only to lower the SO ₂ emissions but also to generate high grade sulfur for sale. Levels below 10% are not rich enough for this process and should therefore utilize absorption or 'scrubbing,' where SO ₂ molecules are captured into a liquid phase or adsorption, where SO ₂ molecules are captured on the surface of a solid adsorbent.	Fuel Switching	>90%		Alternate fuels may include low sulfur coal, light diesel or natural gas with consequent reduction in particulate emissions related to sulfur in the fuel. Fuel cleaning or beneficiation of fuels prior to combustion is another viable option but may have economic consequences.
		Sorbent Injection	30% - 70%		Calcium or lime is injected into the flue gas and the SO ₂ is adsorbed onto the sorbent
		Dry Flue Gas Desulfurization	70%-90%		Can be regenerable or throwaway.
		Wet Flue Gas Desulfurization	>90%		Produces gypsum as a by-product

Annex 1.1.2: Illustrative Point Source Air Emissions Prevention and Control Technologies (continued)

Oxides of Nitrogen (NOx)	Combustion modification (Illustrative of boilers)	Percent Reduction by Fuel Type				Comments
		Coal	Oil	Gas	Gas	
Associated with combustion of fuel. May occur in several forms of nitrogen oxide: namely nitric oxide (NO), nitrogen dioxide (NO ₂) and nitrous oxide (N ₂ O), which is also a greenhouse gas. The term NOx serves as a composite between NO and NO ₂ and emissions are usually reported as NOx. Here the NO is multiplied by the ratio of molecular weights of NO ₂ to NO and added to the NO ₂ emissions.	Low-excess-air firing	10-30	10-30	10-30	10-30	These modifications are capable of reducing NOx emissions by 50 to 95%. The method of combustion control used depends on the type of boiler and the method of firing fuel.
	Staged Combustion	20-50	20-50	20-50	20-50	
	Flue Gas Recirculation	N/A	20-50	20-50	20-50	
	Water/Steam Injection	N/A	10-50	N/A	N/A	
	Low-NOx Burners	30-40	30-40	30-40	30-40	
Means of reducing NOx emissions are based on the modification of operating conditions such as minimizing the resident time at peak temperatures, reducing the peak temperatures by increasing heat transfer rates or minimizing the availability of oxygen.	Flue Gas Treatment	Coal	Oil	Gas	Gas	Flue gas treatment is more effective in reducing NOx emissions than are combustion controls. Techniques can be classified as SCR, SNCR, and adsorption. SCR involves the injection of ammonia as a reducing agent to convert NOx to nitrogen in the presence of a catalyst in a converter upstream of the air heater. Generally, some ammonia slips through and is part of the emissions. SNCR also involves the injection of ammonia or urea based products without the presence of a catalyst.
	Selective Catalytic Reduction (SCR)	60-90	60-90	60-90	60-90	
	Selective Non-Catalytic Reduction (SNCR)	N/A	30-70	30-70	30-70	

Note: Compiled by IFC based on inputs from technical experts.

Annex 1.1.3 - Good International Industry Practice (GIIP)

Annex 1.1.4 - Examples of VOC Emissions Controls

Stack Height

(Based on United States 40 CFR, part 51.100 (ii)).

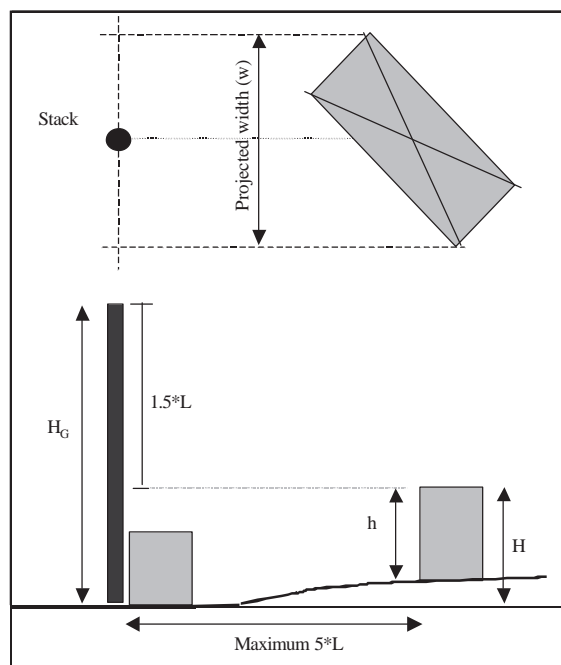
$H_G = H + 1.5L$; where

H_G = GEP stack height measured from the ground level elevation at the base of the stack

H = Height of nearby structure(s) above the base of the stack.

L = Lesser dimension, height (h) or width (w), of nearby structures

"Nearby structures" = Structures within/touching a radius of $5L$ but less than 800 m.



Equipment Type	Modification	Approximate Control Efficiency (%)
Pumps	Seal-less design	100 ²⁹
	Closed-vent system	90 ³⁰
	Dual mechanical seal with barrier fluid maintained at a higher pressure than the pumped fluid	100
Compressors	Closed-vent system	90
	Dual mechanical seal with barrier fluid maintained at a higher pressure than the compressed gas	100
Pressure Relief Devices	Closed-vent system	Variable ³¹
	Rupture disk assembly	100
Valves	Seal-less design	100
Connectors	Weld together	100
Open-ended Lines	Blind, cap, plug, or second valve	100
Sampling Connections	Closed-loop sampling	100
Note: Examples of technologies are provided for illustrative purposes. The availability and applicability of any particular technology will vary depending on manufacturer specifications.		

29 Seal-less equipment can be a large source of emissions in the event of equipment failure.

30 Actual efficiency of a closed-vent system depends on percentage of vapors collected and efficiency of control device to which the vapors are routed.

31 Control efficiency of closed vent-systems installed on a pressure relief device may be lower than other closed-vent systems.

Annex 1.1.5 - Fugitive PM Emissions Controls

Control Type	Control Efficiency
Chemical Stabilization	0% - 98%
Hygroscopic salts Bitumens/adhesives	60% - 96%
Surfactants	0% - 68%
Wet Suppression – Watering	12% - 98%
Speed Reduction	0% - 80%
Traffic Reduction	Not quantified
Paving (Asphalt / Concrete)	85% - 99%
Covering with Gravel, Slag, or "Road Carpet"	30% - 50%
Vacuum Sweeping	0% - 58%
Water Flushing/Broom Sweeping	0% - 96%

1.2 Energy Conservation

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Applicability and Approach

This guideline applies to facilities or projects that consume energy in process heating and cooling; process and auxiliary systems, such as motors, pumps, and fans; compressed air systems and heating, ventilation and air conditioning systems (HVAC); and lighting systems. It complements the industry-specific emissions guidance presented in the Industry Sector Environmental, Health, and Safety (EHS) Guidelines by providing information about common techniques for energy conservation that may be applied to a range of industry sectors.

Energy management at the facility level should be viewed in the context of overall consumption patterns, including those associated with production processes and supporting utilities, as well as overall impacts associated with emissions from power sources. The following section provides guidance on energy management with a focus on common utility systems often representing technical and financially feasible opportunities for improvement in energy conservation. However, operations

should also evaluate energy conservation opportunities arising from manufacturing process modifications.

Energy Management Programs

Energy management programs should include the following elements:

- Identification, and regular measurement and reporting of principal energy flows within a facility at unit process level
- Preparation of mass and energy balance;
- Definition and regular review of energy performance targets, which are adjusted to account for changes in major influencing factors on energy use
- Regular comparison and monitoring of energy flows with performance targets to identify where action should be taken to reduce energy use
- Regular review of targets, which may include comparison with benchmark data, to confirm that targets are set at appropriate levels

Energy Efficiency

For any energy-using system, a systematic analysis of energy efficiency improvements and cost reduction opportunities should include a hierarchical examination of opportunities to:

- Demand/Load Side Management by reducing loads on the energy system
- Supply Side Management by:
 - Reduce losses in energy distribution
 - Improve energy conversion efficiency
 - Exploit energy purchasing opportunities
 - Use lower-carbon fuels

Common opportunities in each of these areas are summarized below.³²

Process Heating

Process heating is vital to many manufacturing processes, including heating for fluids, calcining, drying, heat treating, metal heating, melting, melting agglomeration, curing, and forming³³.

In process heating systems, a system heat and mass balance will show how much of the system's energy input provides true process heating, and quantify fuel used to satisfy energy losses caused by excessive parasitic loads, distribution, or conversion losses. Examination of savings opportunities should be directed by the results of the heat and mass balance, though the following techniques are often valuable and cost-effective.

Heating Load Reduction

- Ensure adequate insulation to reduce heat losses through furnace/oven etc. structure
- Recover heat from hot process or exhaust streams to reduce system loads
- In intermittently-heated systems, consider use of low thermal mass insulation to reduce energy required to heat the system structure to operating temperature
- Control process temperature and other parameters accurately to avoid, for example, overheating or overdrying
- Examine opportunities to use low weight and/or low thermal mass product carriers, such as heated shapers, kiln cars etc.

³² Additional guidance on energy efficiency is available from sources such as Natural Resources Canada (NRCAN <http://oee.nrcan.gc.ca/commercial/financial-assistance/new-buildings/mnebc.cfm?attr=20>); the European Union (EUROPA. <http://europa.eu.int/scadplus/leg/en/s15004.htm>), and United States Department of Energy (US DOE, <http://www.eere.energy.gov/consumer/industry/process.html>).

³³ US DOE. <http://www.eere.energy.gov/consumer/industry/process.html>

- Review opportunities to schedule work flow to limit the need for process reheating between stages
- Operate furnaces/ovens at slight positive pressure, and maintain air seals to reduce air in-leakage into the heated system, thereby reducing the energy required to heat unnecessary air to system operating temperature
- Reduce radiant heat losses by sealing structural openings and keep viewing ports closed when not in use
- Where possible, use the system for long runs close to or at operating capacity
- Consider use of high emissivity coatings of high temperature insulation, and consequent reduction in process temperature
- Near net weight and shape heat designs
- Robust Quality assurance on input material
- Robust Scheduled maintenance programs

Heat Distribution Systems

Heat distribution in process heating applications typically takes place through steam, hot water, or thermal fluid systems.

Losses can be reduced through the following actions:

- Promptly repair distribution system leaks
- Avoid steam leaks despite a perceived need to get steam through the turbine. Electricity purchase is usually cheaper overall, especially when the cost to treat turbine-quality boiler feed water is included. If the heat-power ratio of the distribution process is less than that of power systems, opportunities should be considered to increase the ratio; for example, by using low-pressure steam to drive absorption cooling systems rather than using electrically-driven vapor-compression systems.
- Regularly verify correct operation of steam traps in steam systems, and ensure that traps are not bypassed. Since

- steam traps typically last approximately 5 years, 20% should be replaced or repaired annually
- Insulate distribution system vessels, such as hot wells and de-aerators, in steam systems and thermal fluid or hot water storage tanks
 - Insulate all steam, condensate, hot water and thermal fluid distribution pipework, down to and including 1" (25 mm) diameter pipe, in addition to insulating all hot valves and flanges
 - In steam systems, return condensate to the boiler house for re-use, since condensate is expensive boiler-quality water and valuable beyond its heat content alone
 - Use flash steam recovery systems to reduce losses due to evaporation of high-pressure condensate
 - Consider steam expansion through a back-pressure turbine rather than reducing valve stations
 - Eliminate distribution system losses by adopting point-of-use heating systems

Energy Conversion System Efficiency Improvements

The following efficiency opportunities should be examined for process furnaces or ovens, and utility systems, such as boilers and fluid heaters:

- Regularly monitor CO, oxygen or CO₂ content of flue gases to verify that combustion systems are using the minimum practical excess air volumes
- Consider combustion automation using oxygen-trim controls
- Minimize the number of boilers or heaters used to meet loads. It is typically more efficient to run one boiler at 90% of capacity than two at 45%. Minimize the number of boilers kept at hot-standby
- Use flue dampers to eliminate ventilation losses from hot boilers held at standby

- Maintain clean heat transfer surfaces; in steam boilers, flue gases should be no more than 20 K above steam temperature)
- In steam boiler systems, use economizers to recover heat from flue gases to pre-heat boiler feed water or combustion air
- Consider reverse osmosis or electro dialysis feed water treatment to minimize the requirement for boiler blowdown
- Adopt automatic (continuous) boiler blowdown
- Recover heat from blowdown systems through flash steam recovery or feed-water preheat
- Do not supply excessive quantities of steam to the de-aerator
- With fired heaters, consider opportunities to recover heat to combustion air through the use of recuperative or regenerative burner systems
- For systems operating for extended periods (> 6000 hours/year), cogeneration of electrical power, heat and /or cooling can be cost effective
- Oxy Fuel burners
- Oxygen enrichment/injection
- Use of turbolators in boilers
- Sizing design and use of multiple boilers for different load configurations
- Fuel quality control/fuel blending

Process Cooling

The general methodology outlined above should be applied to process cooling systems. Commonly used and cost-effective measures to improve process cooling efficiency are described below.

Load Reduction

- Ensure adequate insulation to reduce heat gains through cooling system structure and to below-ambient temperature refrigerant pipes and vessels
- Control process temperature accurately to avoid overcooling
- Operate cooling tunnels at slight positive pressure and maintain air seals to reduce air in-leakage into the cooled system, thus reducing the energy required to cool this unnecessary air to system operating temperature
- Examine opportunities to pre-cool using heat recovery to a process stream requiring heating, or by using a higher temperature cooling utility
- In cold and chill stores, minimize heat gains to the cooled space by use of air curtains, entrance vestibules, or rapidly opening/closing doors. Where conveyors carry products into chilled areas, minimize the area of transfer openings, for example, by using strip curtains
- Quantify and minimize “incidental” cooling loads, for example, those due to evaporator fans, other machinery, defrost systems and lighting in cooled spaces, circulation fans in cooling tunnels, or secondary refrigerant pumps (e.g. chilled water, brines, glycols)
- Do not use refrigeration for auxiliary cooling duties, such as compressor cylinder head or oil cooling
- While not a thermal load, ensure there is no gas bypass of the expansion valve since this imposes compressor load while providing little effective cooling
- In the case of air conditioning applications, energy efficiency techniques include:
 - Placing air intakes and air-conditioning units in cool, shaded locations
 - Improving building insulation including seals, vents, windows, and doors

- Planting trees as thermal shields around buildings
- Installing timers and/or thermostats and/or enthalpy-based control systems
- Installing ventilation heat recovery systems³⁴

Energy Conversion

The efficiency of refrigeration service provision is normally discussed in terms of Coefficient of Performance (“COP”), which is the ratio of cooling duty divided by input power. COP is maximized by effective refrigeration system design and increased refrigerant compression efficiency, as well as minimization of the temperature difference through which the system works and of auxiliary loads (i.e. those in addition to compressor power demand) used to operate the refrigeration system.

System Design

- If process temperatures are above ambient for all, or part, of the year, use of ambient cooling systems, such as provided by cooling towers or dry air coolers, may be appropriate, perhaps supplemented by refrigeration in summer conditions.
- Most refrigeration systems are electric-motor driven vapor compression systems using positive displacement or centrifugal compressors. The remainder of this guideline relates primarily to vapor-compression systems. However, when a cheap or free heat source is available (e.g. waste heat from an engine-driven generator—low-pressure steam

³⁴ More information on HVAC energy efficiency can be found at the British Columbia Building Corporation (Woolliams, 2002. http://www.greenbuildingsbc.com/new_buildings/pdf_files/greenbuild_strategy_es_guide.pdf), NRCAN's EnerGuide (<http://oeenrcan.gc.ca/equipment/english/index.cfm?PrintView=N&Text=N>) and NRCAN's Energy Star Programs (<http://oeenrcan.gc.ca/energystar/english/consumers/heating.cfm?text=N&printview=N#AC>), and the US Energy Star Program (http://www.energystar.gov/index.cfm?c=guidelines.download_guidelines).

that has passed through a back-pressure turbine), absorption refrigeration may be appropriate.

- Exploit high cooling temperature range: precooling by ambient and/or 'high temperature' refrigeration before final cooling can reduce refrigeration capital and running costs. High cooling temperature range also provides an opportunity for countercurrent (cascade) cooling, which reduces refrigerant flow needs.
- Keep 'hot' and 'cold' fluids separate, for example, do not mix water leaving the chiller with water returning from cooling circuits.
- In low-temperature systems where high temperature differences are inevitable, consider two-stage or compound compression, or economized screw compressors, rather than single-stage compression.

Minimizing Temperature Differences

A vapor-compression refrigeration system raises the temperature of the refrigerant from somewhat below the lowest process temperature (the evaporating temperature) to provide process cooling, to a higher temperature (the condensing temperature), somewhat above ambient, to facilitate heat rejection to the air or cooling water systems. Increasing evaporating temperature typically increases compressor cooling capacity without greatly affecting power consumption. Reducing condensing temperature increases evaporator cooling capacity and substantially reduces compressor power consumption.

Elevating Evaporating Temperature

- Select a large evaporator to permit relatively low temperature differences between process and evaporating temperatures. Ensure that energy use of auxiliaries (e.g. evaporator fans) does not outweigh compression savings. In air-cooling applications, a design temperature difference of 6-10 K between leaving air temperature and evaporating

temperature is indicative of an appropriately sized evaporator. When cooling liquids, 2K between leaving liquid and evaporating temperatures can be achieved, though a 4K difference is generally indicative of a generously-sized evaporator.

- Keep the evaporator clean. When cooling air, ensure correct defrost operation. In liquid cooling, monitor refrigerant/process temperature differences and compare with design expectations to be alert to heat exchanger contamination by scale or oil.
- Ensure oil is regularly removed from the evaporator, and that oil additions and removals balance.
- Avoid the use of back-pressure valves.
- Adjust expansion valves to minimize suction superheat consistent with avoidance of liquid carry-over to compressors.
- Ensure that an appropriate refrigerant charge volume is present.

Reducing Condensing Temperature

- Consider whether to use air-cooled or evaporation-based cooling (e.g. evaporative or water cooled condensers and cooling towers). Air-cooled evaporators usually have higher condensing temperatures, hence higher compressor energy use, and auxiliary power consumption, especially in low humidity climates. If a wet system is used, ensure adequate treatment to prevent growth of *legionella* bacteria.
- Whichever basic system is chosen, select a relatively large condenser to minimize differences between condensing and the heat sink temperatures. Condensing temperatures with air cooled or evaporative condensers should not be more than 10K above design ambient condition, and a 4K approach in a liquid-cooled condenser is possible.

- Avoid accumulation of non-condensable gases in the condenser system. Consider the installation of refrigerated non-condensable purgers, particularly for systems operating below atmospheric pressure.
- Keep condensers clean and free from scale. Monitor refrigerant/ambient temperature differences and compare with design expectations to be alert to heat exchanger contamination.
- Avoid liquid backup, which restricts heat transfer area in condensers. This can be caused by installation errors such as concentric reducers in horizontal liquid refrigerant pipes, or “up and over” liquid lines leading from condensers.
- In multiple condenser applications, refrigerant liquid lines should be connected via drop-leg traps to the main liquid refrigerant line to ensure that hot gases flow to all condensers.
- Avoid head pressure control to the extent possible. Head pressure control maintains condensing temperature at, or near, design levels. It therefore prevents reduction in compressor power consumption, which accompanies reduced condensing temperature, by restricting condenser capacity (usually by switching off the condenser, or cooling tower fans, or restricting cooling water flow) under conditions of less severe than design load or ambient temperature conditions. Head pressure is often kept higher than necessary to facilitate hot gas defrost or adequate liquid refrigerant circulation. Use of electronic rather than thermostatic expansion valves, and liquid refrigerant pumps can permit effective refrigerant circulation at much reduced condensing temperatures.
- Site condensers and cooling towers with adequate spacing so as to prevent recirculation of hot air into the tower.

Refrigerant Compression Efficiency

- Some refrigerant compressors and chillers are more efficient than others offered for the same duty. Before purchase, identify the operating conditions under which the compressor or chiller is likely to operate for substantial parts of its annual cycle. Check operating efficiency under these conditions, and ask for estimates of annual running cost. Note that refrigeration and HVAC systems rarely run for extended periods at design conditions, which are deliberately extreme. Operational efficiency under the most commonly occurring off-design conditions is likely to be most important.
- Compressors lose efficiency when unloaded. Avoid operation of multiple compressors at part-load conditions. Note that package chillers can gain coefficient of performance (COP) when slightly unloaded, as loss of compressor efficiency can be outweighed by the benefits of reduced condensing and elevated evaporating temperature. However, it is unlikely to be energy efficient to operate a single compressor-chiller at less than 50% of capacity.
- Consider turndown efficiency when specifying chillers. Variable speed control or multiple compressor chillers can be highly efficient at part loads.
- Use of thermal storage systems (e.g., ice storage) can avoid the need for close load-tracking and, hence, can avoid part-loaded compressor operation.

Refrigeration System Auxiliaries

Many refrigeration system auxiliaries (e.g. evaporator fans and chilled water pumps) contribute to refrigeration system load, so reductions in their energy use have a double benefit. General energy saving techniques for pumps and fans, listed in the next section of these guidelines, should be applied to refrigeration auxiliaries.

Additionally, auxiliary use can be reduced by avoidance of part-load operation and in plant selection (e.g. axial fan evaporative condensers generally use less energy than equivalent centrifugal fan towers).

Under extreme off-design conditions, reduction in duty of cooling system fans and pumps can be worthwhile, usually when the lowest possible condensing pressure has been achieved.

Compressed Air Systems

Compressed air is the most commonly found utility service in industry, yet in many compressed air systems, the energy contained in compressed air delivered to the user is often 10% or less of energy used in air compression. Savings are often possible through the following techniques:

Load reduction

- Examine each true user of compressed air to identify the air volume needed and the pressure at which this should be delivered.
- Do not mix high volume low pressure and low volume high pressure loads. Decentralize low volume high-pressure applications or provide dedicated low-pressure utilities, for example, by using fans rather than compressed air.
- Review air use reduction opportunities, for example:
 - Use air amplifier nozzles rather than simple open-pipe compressed air jets
 - Consider whether compressed air is needed at all
 - Where air jets are required intermittently (e.g. to propel product), consider operating the jet via a process-related solenoid valve, which opens only when air is required
 - Use manual or automatically operated valves to isolate air supply to individual machines or zones that are not in continuous use

- Implement systems for systematic identification and repair of leaks
- All condensate drain points should be trapped. Do not leave drain valves continuously 'cracked open'
- Train workers never to direct compressed air against their bodies or clothing to dust or cool themselves down.

Distribution

- Monitor pressure losses in filters and replace as appropriate
- Use adequately sized distribution pipework designed to minimize pressure losses

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Applicability and Approach

This guideline applies to projects that have either direct or indirect discharge of process wastewater, wastewater from utility operations or stormwater to the environment. These guidelines are also applicable to industrial discharges to sanitary sewers that discharge to the environment without any treatment. Process wastewater may include contaminated wastewater from utility operations, stormwater, and sanitary sewage. It provides information on common techniques for wastewater management, water conservation, and reuse that can be applied to a wide range of industry sectors. This guideline is meant to be complemented by the industry-specific effluent guidelines presented in the Industry Sector Environmental, Health, and Safety (EHS) Guidelines. Projects with the potential to generate process wastewater, sanitary (domestic) sewage, or stormwater should incorporate the necessary precautions to avoid, minimize, and control adverse impacts to human health, safety, or the environment.

In the context of their overall ESHS management system, facilities should:

- Understand the quality, quantity, frequency and sources of liquid effluents in its installations. This includes knowledge about the locations, routes and integrity of internal drainage systems and discharge points
- Plan and implement the segregation of liquid effluents principally along industrial, utility, sanitary, and stormwater categories, in order to limit the volume of water requiring specialized treatment. Characteristics of individual streams may also be used for source segregation.
- Identify opportunities to prevent or reduce wastewater pollution through such measures as recycle/reuse within their facility, input substitution, or process modification (e.g. change of technology or operating conditions/modes).
- Assess compliance of their wastewater discharges with the applicable: (i) discharge standard (if the wastewater is discharged to a surface water or sewer), and (ii) water quality standard for a specific reuse (e.g. if the wastewater is reused for irrigation).

Additionally, the generation and discharge of wastewater of any type should be managed through a combination of:

- Water use efficiency to reduce the amount of wastewater generation
- Process modification, including waste minimization, and reducing the use of hazardous materials to reduce the load of pollutants requiring treatment
- If needed, application of wastewater treatment techniques to further reduce the load of contaminants prior to discharge, taking into consideration potential impacts of cross-media transfer of contaminants during treatment (e.g., from water to air or land)

When wastewater treatment is required prior to discharge, the level of treatment should be based on:

- Whether wastewater is being discharged to a sanitary sewer system, or to surface waters
- National and local standards as reflected in permit requirements and sewer system capacity to convey and treat wastewater if discharge is to sanitary sewer
- Assimilative capacity of the receiving water for the load of contaminant being discharged wastewater if discharge is to surface water
- Intended use of the receiving water body (e.g. as a source of drinking water, recreation, irrigation, navigation, or other)
- Presence of sensitive receptors (e.g., endangered species) or habitats
- Good International Industry Practice (GIIP) for the relevant industry sector

General Liquid Effluent Quality

Discharge to Surface Water

Discharges of process wastewater, sanitary wastewater, wastewater from utility operations or stormwater to surface water should not result in contaminant concentrations in excess of local ambient water quality criteria or, in the absence of local criteria, other sources of ambient water quality.³⁵ Receiving water use³⁶ and assimilative capacity³⁷, taking other sources of discharges to

³⁵ An example is the US EPA National Recommended Water Quality Criteria <http://www.epa.gov/waterscience/criteria/wqcriteria.html>

³⁶ Examples of receiving water uses as may be designated by local authorities include: drinking water (with some level of treatment), recreation, aquaculture, irrigation, general aquatic life, ornamental, and navigation. Examples of health-based guideline values for receiving waters include World Health Organization (WHO) guidelines for recreational use (http://www.who.int/water_sanitation_health/dwq/guidelines/en/index.html)

³⁷ The assimilative capacity of the receiving water body depends on numerous factors including, but not limited to, the total volume of water, flow rate, flushing rate of the water body and the loading of pollutants from other effluent sources in

the receiving water into consideration, should also influence the acceptable pollution loadings and effluent discharge quality. Additional considerations that should be included in the setting of project-specific performance levels for wastewater effluents include:

- Process wastewater treatment standards consistent with applicable Industry Sector EHS Guidelines. Projects for which there are no industry-specific guidelines should reference the effluent quality guidelines of an industry sector with suitably analogous processes and effluents;
- Compliance with national or local standards for sanitary wastewater discharges or, in their absence, the indicative guideline values applicable to sanitary wastewater discharges shown in Table 1.3.1 below;
- Temperature of wastewater prior to discharge does not result in an increase greater than 3°C of ambient temperature at the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use and assimilative capacity among other considerations.

Discharge to Sanitary Sewer Systems

Discharges of industrial wastewater, sanitary wastewater, wastewater from utility operations or stormwater into public or private wastewater treatment systems should:

- Meet the pretreatment and monitoring requirements of the sewer treatment system into which it discharges.
- Not interfere, directly or indirectly, with the operation and maintenance of the collection and treatment systems, or pose a risk to worker health and safety, or adversely impact

the area or region. A seasonally representative baseline assessment of ambient water quality may be required for use with established scientific methods and mathematical models to estimate potential impact to the receiving water from an effluent source.

characteristics of residuals from wastewater treatment operations.

- Be discharged into municipal or centralized wastewater treatment systems that have adequate capacity to meet local regulatory requirements for treatment of wastewater generated from the project. Pretreatment of wastewater to meet regulatory requirements before discharge from the project site is required if the municipal or centralized wastewater treatment system receiving wastewater from the project does not have adequate capacity to maintain regulatory compliance.

Land Application of Treated Effluent

The quality of treated process wastewater, wastewater from utility operations or stormwater discharged on land, including wetlands, should be established based on local regulatory requirements.

Where land is used as part of the treatment system and the ultimate receptor is surface water, water quality guidelines for surface water discharges specific to the industry sector process should apply.³⁸ Potential impact on soil, groundwater, and surface water, in the context of protection, conservation and long term sustainability of water and land resources should be assessed when land is used as part of any wastewater treatment system.

Septic Systems

Septic systems are commonly used for treatment and disposal of domestic sanitary sewage in areas with no sewerage collection networks, Septic systems should only be used for treatment of sanitary sewage, and unsuitable for industrial wastewater treatment. When septic systems are the selected form of wastewater disposal and treatment, they should be:

- Properly designed and installed in accordance with local regulations and guidance to prevent any hazard to public health or contamination of land, surface or groundwater.
- Well maintained to allow effective operation.
- Installed in areas with sufficient soil percolation for the design wastewater loading rate.
- Installed in areas of stable soils that are nearly level, well drained, and permeable, with enough separation between the drain field and the groundwater table or other receiving waters.

Wastewater Management

Wastewater management includes water conservation, wastewater treatment, stormwater management, and wastewater and water quality monitoring.

Industrial Wastewater

Industrial wastewater generated from industrial operations includes process wastewater, wastewater from utility operations,, runoff from process and materials staging areas, and miscellaneous activities including wastewater from laboratories, equipment maintenance shops, etc.. The pollutants in an industrial wastewater may include acids or bases (exhibited as low or high pH), soluble organic chemicals causing depletion of dissolved oxygen, suspended solids, nutrients (phosphorus, nitrogen), heavy metals (e.g. cadmium, chromium, copper, lead, mercury, nickel, zinc), cyanide, toxic organic chemicals, oily materials, and volatile materials. , as well as from thermal characteristics of the discharge (e.g., elevated temperature). Transfer of pollutants to another phase, such as air, soil, or the sub-surface, should be minimized through process and engineering controls.

Process Wastewater – – Examples of treatment approaches typically used in the treatment of industrial wastewater are summarized in Annex 1.3.1. While the choice of treatment

³⁸ Additional guidance on water quality considerations for land application is available in the WHO Guidelines for the Safe Use of Wastewater, Excreta and Greywater. Volume 2: Wastewater Use in Agriculture http://www.who.int/water_sanitation_health/wastewater/gsuweg2/en/index.html

technology is driven by wastewater characteristics, the actual performance of this technology depends largely on the adequacy of its design, equipment selection, as well as operation and maintenance of its installed facilities. Adequate resources are required for proper operation and maintenance of a treatment facility, and performance is strongly dependent on the technical ability and training of its operational staff. One or more treatment technologies may be used to achieve the desired discharge quality and to maintain consistent compliance with regulatory requirements. The design and operation of the selected wastewater treatment technologies should avoid uncontrolled air emissions of volatile chemicals from wastewaters. Residuals from industrial wastewater treatment operations should be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent with protection of public health and safety, and conservation and long term sustainability of water and land resources.

Wastewater from Utilities Operations - Utility operations such as cooling towers and demineralization systems may result in high rates of water consumption, as well as the potential release of high temperature water containing high dissolved solids, residues of biocides, residues of other cooling system anti-fouling agents, etc. Recommended water management strategies for utility operations include:

- Adoption of water conservation opportunities for facility cooling systems as provided in the Water Conservation section below;
- Use of heat recovery methods (also energy efficiency improvements) or other cooling methods to reduce the temperature of heated water prior to discharge to ensure the discharge water temperature does not result in an increase greater than 3°C of ambient temperature at the edge of a scientifically established mixing zone which takes into

account ambient water quality, receiving water use, potential receptors and assimilative capacity among other considerations;

- Minimizing use of antifouling and corrosion inhibiting chemicals by ensuring appropriate depth of water intake and use of screens. Least hazardous alternatives should be used with regards to toxicity, biodegradability, bioavailability, and bioaccumulation potential. Dose applied should accord with local regulatory requirements and manufacturer recommendations;
- Testing for residual biocides and other pollutants of concern should be conducted to determine the need for dose adjustments or treatment of cooling water prior to discharge.

Stormwater Management - Stormwater includes any surface runoff and flows resulting from precipitation, drainage or other sources. Typically stormwater runoff contains suspended sediments, metals, petroleum hydrocarbons, Polycyclic Aromatic Hydrocarbons (PAHs), coliform, etc. Rapid runoff, even of uncontaminated stormwater, also degrades the quality of the receiving water by eroding stream beds and banks. In order to reduce the need for stormwater treatment, the following principles should be applied:

- Stormwater should be separated from process and sanitary wastewater streams in order to reduce the volume of wastewater to be treated prior to discharge
- Surface runoff from process areas or potential sources of contamination should be prevented
- Where this approach is not practical, runoff from process and storage areas should be segregated from potentially less contaminated runoff
- Runoff from areas without potential sources of contamination should be minimized (e.g. by minimizing the area of impermeable surfaces) and the peak discharge rate should

be reduced (e.g. by using vegetated swales and retention ponds);

- Where stormwater treatment is deemed necessary to protect the quality of receiving water bodies, priority should be given to managing and treating the first flush of stormwater runoff where the majority of potential contaminants tend to be present;
- When water quality criteria allow, stormwater should be managed as a resource, either for groundwater recharge or for meeting water needs at the facility;
- Oil water separators and grease traps should be installed and maintained as appropriate at refueling facilities, workshops, parking areas, fuel storage and containment areas.
- Sludge from stormwater catchments or collection and treatment systems may contain elevated levels of pollutants and should be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent with protection of public health and safety, and conservation and long term sustainability of water and land resources.

Sanitary Wastewater

Sanitary wastewater from industrial facilities may include effluents from domestic sewage, food service, and laundry facilities serving site employees. Miscellaneous wastewater from laboratories,

medical infirmaries, water softening etc. may also be discharged to the sanitary wastewater treatment system. Recommended sanitary wastewater management strategies include:

- Segregation of wastewater streams to ensure compatibility with selected treatment option (e.g. septic system which can only accept domestic sewage);
- Segregation and pretreatment of oil and grease containing effluents (e.g. use of a grease trap) prior to discharge into sewer systems;
- If sewage from the industrial facility is to be discharged to surface water, treatment to meet national or local standards for sanitary wastewater discharges or, in their absence, the indicative guideline values applicable to sanitary wastewater discharges shown in Table 1.3.1;
- If sewage from the industrial facility is to be discharged to either a septic system, or where land is used as part of the treatment system, treatment to meet applicable national or local standards for sanitary wastewater discharges is required.
- Sludge from sanitary wastewater treatment systems should be disposed in compliance with local regulatory requirements, in the absence of which disposal has to be consistent with protection of public health and safety, and conservation and long term sustainability of water and land resources.

Table 1.3.1 Indicative Values for Treated Sanitary Sewage Discharges^a

Pollutants	Units	Guideline Value
pH	pH	6 – 9
BOD	mg/l	30
COD	mg/l	125
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total coliform bacteria	MPN ^b / 100 ml	400 ^a
Notes: ^a Not applicable to centralized, municipal, wastewater treatment systems which are included in EHS Guidelines for Water and Sanitation. ^b MPN = Most Probable Number		

Emissions from Wastewater Treatment Operations

Air emissions from wastewater treatment operations may include hydrogen sulfide, methane, ozone (in the case of ozone disinfection), volatile organic compounds (e.g., chloroform generated from chlorination activities and other volatile organic compounds (VOCs) from industrial wastewater), gaseous or volatile chemicals used for disinfection processes (e.g., chlorine and ammonia), and bioaerosols. Odors from treatment facilities can also be a nuisance to workers and the surrounding community. Recommendations for the management of emissions are presented in the Air Emissions and Ambient Air Quality section of this document and in the EHS Guidelines for Water and Sanitation.

Residuals from Wastewater Treatment Operations

Sludge from a waste treatment plant needs to be evaluated on a case-by-case basis to establish whether it constitutes a hazardous

or a non-hazardous waste and managed accordingly as described in the Waste Management section of this document.

Occupational Health and Safety Issues in Wastewater Treatment Operations

Wastewater treatment facility operators may be exposed to physical, chemical, and biological hazards depending on the design of the facilities and the types of wastewater effluents managed. Examples of these hazards include the potential for trips and falls into tanks, confined space entries for maintenance operations, and inhalation of VOCs, bioaerosols, and methane, contact with pathogens and vectors, and use of potentially hazardous chemicals, including chlorine, sodium and calcium hypochlorite, and ammonia. Detailed recommendations for the management of occupational health and safety issues are presented in the relevant section of this document. Additional guidance specifically applicable to wastewater treatment systems is provided in the EHS Guidelines for Water and Sanitation.

Monitoring

A wastewater and water quality monitoring program with adequate resources and management oversight should be developed and implemented to meet the objective(s) of the monitoring program. The wastewater and water quality monitoring program should consider the following elements:

- *Monitoring parameters:* The parameters selected for monitoring should be indicative of the pollutants of concern from the process, and should include parameters that are regulated under compliance requirements;
- *Monitoring type and frequency:* Wastewater monitoring should take into consideration the discharge characteristics from the process over time. Monitoring of discharges from processes with batch manufacturing or seasonal process variations should take into consideration of time-dependent

variations in discharges and, therefore, is more complex than monitoring of continuous discharges. Effluents from highly variable processes may need to be sampled more frequently or through composite methods. Grab samples or, if automated equipment permits, composite samples may offer more insight on average concentrations of pollutants over a 24-hour period. Composite samplers may not be appropriate where analytes of concern are short-lived (e.g., quickly degraded or volatile).

- *Monitoring locations:* The monitoring location should be selected with the objective of providing representative monitoring data. Effluent sampling stations may be located at the final discharge, as well as at strategic upstream points prior to merging of different discharges. Process discharges should not be diluted prior or after treatment with the objective of meeting the discharge or ambient water quality standards.
- *Data quality:* Monitoring programs should apply internationally approved methods for sample collection, preservation and analysis. Sampling should be conducted by or under the supervision of trained individuals. Analysis should be conducted by entities permitted or certified for this purpose. Sampling and Analysis Quality Assurance/Quality Control (QA/QC) plans should be prepared and implemented. QA/QC documentation should be included in monitoring reports.

Annex 1.3.1 - Examples of Industrial Wastewater Treatment Approaches

Pollutant/Parameter	Control Options / Principle	Common End of Pipe Control Technology
pH	Chemical, Equalization	Acid/Base addition, Flow equalization
Oil and Grease / TPH	Phase separation	Dissolved Air Floatation, oil water separator, grease trap
TSS - Settleable	Settling, Size Exclusion	Sedimentation basin, clarifier, centrifuge, screens
TSS - Non-Settleable	Floatation, Filtration - traditional and tangential	Dissolved air floatation, Multimedia filter, sand filter, fabric filter, ultrafiltration, microfiltration
Hi - BOD (> 2 Kg/m ³)	Biological - Anaerobic	Suspended growth, attached growth, hybrid
Lo - BOD (< 2 Kg/m ³)	Biological - Aerobic, Facultative	Suspended growth, attached growth, hybrid
COD - Non-Biodegradable	Oxidation, Adsorption, Size Exclusion	Chemical oxidation, Thermal oxidation, Activated Carbon, Membranes
Metals - Particulate and Soluble	Coagulation, flocculation, precipitation, size exclusion	Flash mix with settling, filtration - traditional and tangential
Inorganics / Non-metals	Coagulation, flocculation, precipitation, size exclusion, Oxidation, Adsorption	Flash mix with settling, filtration - traditional and tangential, Chemical oxidation, Thermal oxidation, Activated Carbon, Reverse Osmosis, Evaporation
Organics - VOCs and SVOCs	Biological - Aerobic, Anaerobic, Facultative; Adsorption, Oxidation	Biological : Suspended growth, attached growth, hybrid; Chemical oxidation, Thermal oxidation, Activated Carbon
Emissions – Odors and VOCs	Capture – Active or Passive; Biological; Adsorption, Oxidation	Biological : Attached growth; Chemical oxidation, Thermal oxidation, Activated Carbon
Nutrients	Biological Nutrient Removal, Chemical, Physical, Adsorption	Aerobic/Anoxic biological treatment, chemical hydrolysis and air stripping, chlorination, ion exchange
Color	Biological - Aerobic, Anaerobic, Facultative; Adsorption, Oxidation	Biological Aerobic, Chemical oxidation, Activated Carbon
Temperature	Evaporative Cooling	Surface Aerators, Flow Equalization
TDS	Concentration, Size Exclusion	Evaporation, crystallization, Reverse Osmosis
Active Ingredients/Emerging Contaminants	Adsorption, Oxidation, Size Exclusion, Concentration	Chemical oxidation, Thermal oxidation, Activated Carbon, Ion Exchange, Reverse Osmosis, Evaporation, Crystallization
Radionuclides	Adsorption, Size Exclusion, Concentration	Ion Exchange, Reverse Osmosis, Evaporation, Crystallization
Pathogens	Disinfection, Sterilization	Chlorine, Ozone, Peroxide, UV, Thermal
Toxicity	Adsorption, Oxidation, Size Exclusion, Concentration	Chemical oxidation, Thermal oxidation, Activated Carbon, Evaporation, crystallization, Reverse Osmosis

1.4 Water Conservation

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Applicability and Approach

Water conservation programs should be implemented commensurate with the magnitude and cost of water use. These programs should promote the continuous reduction in water consumption and achieve savings in the water pumping, treatment and disposal costs. Water conservation measures may include water monitoring/management techniques; process and cooling/heating water recycling, reuse, and other techniques; and sanitary water conservation techniques.

General recommendations include:

- Storm/Rainwater harvesting and use
- Zero discharge design/Use of treated waste water to be included in project design processes
- Use of localized recirculation systems in plant/facility/shops (as opposed to centralized recirculation system), with provision only for makeup water
- Use of dry process technologies e.g. dry quenching
- Process water system pressure management
- Project design to have measures for adequate water collection, spill control and leakage control system

Water Monitoring and Management

The essential elements of a water management program involve:

- Identification, regular measurement, and recording of principal flows within a facility;
- Definition and regular review of performance targets, which are adjusted to account for changes in major factors affecting water use (e.g. industrial production rate);
- Regular comparison of water flows with performance targets to identify where action should be taken to reduce water use.

Water measurement (metering) should emphasize areas of greatest water use. Based on review of metering data, 'unaccounted' use—indicating major leaks at industrial facilities—could be identified.

Process Water Reuse and Recycling

Opportunities for water savings in industrial processes are highly industry-specific. However, the following techniques have all been used successfully, and should be considered in conjunction with the development of the metering system described above.

- *Washing Machines:* Many washing machines use large quantities of hot water. Use can increase as nozzles become enlarged due to repeated cleaning and /or wear. Monitor machine water use, compare with specification, and replace nozzles when water and heat use reaches levels warranting such work.
- *Water reuse:* Common water reuse applications include countercurrent rinsing, for example in multi-stage washing

and rinsing processes, or reusing waste water from one process for another with less exacting water requirements. For example, using bleaching rinse water for textile washing, or bottle-washer rinse water for bottle crate washing, or even washing the floor. More sophisticated reuse projects requiring treatment of water before reuse are also sometimes practical.

- *Water jets/sprays:* If processes use water jets or sprays (e.g. to keep conveyors clean or to cool product) review the accuracy of the spray pattern to prevent unnecessary water loss.
- *Flow control optimization:* Industrial processes sometimes require the use of tanks, which are refilled to control losses. It is often possible to reduce the rate of water supply to such tanks, and sometimes to reduce tank levels to reduce spillage. If the process uses water cooling sprays, it may be possible to reduce flow while maintaining cooling performance. Testing can determine the optimum balance.
 - If hoses are used in cleaning, use flow controls to restrict wasteful water flow
 - Consider the use of high pressure, low volume cleaning systems rather than using large volumes of water sprayed from hosepipes
 - Using flow timers and limit switches to control water use
 - Using 'clean-up' practices rather than hosing down

Building Facility Operations

Consumption of building and sanitary water is typically less than that used in industrial processes. However, savings can readily be identified, as outlined below:

- Compare daily water use per employee to existing benchmarks taking into consideration the primary use at

the facility, whether sanitary or including other activities such as showering or catering

- Regularly maintain plumbing, and identify and repair leaks
- Shut off water to unused areas
- Install self-closing taps, automatic shut-off valves, spray nozzles, pressure reducing valves, and water conserving fixtures (e.g. low flow shower heads, faucets, toilets, urinals; and spring loaded or sensed faucets)
- Operate dishwashers and laundries on full loads, and only when needed
- Install water-saving equipment in lavatories, such as low-flow toilets

Cooling Systems

Water conservation opportunities in cooling systems include:

- Use of closed circuit cooling systems with cooling towers rather than once-through cooling systems
- Limiting condenser or cooling tower blowdown to the minimum required to prevent unacceptable accumulation of dissolved solids
- Use of air cooling rather than evaporative cooling, although this may increase electricity use in the cooling system
- Use of treated waste water for cooling towers
- Reusing/recycling cooling tower blowdown

Heating Systems

Heating systems based on the circulation of low or medium pressure hot water (which do not consume water) should be closed. If they do consume water, regular maintenance should be conducted to check for leaks. However, large quantities of water may be used by steam systems, and this can be reduced by the following measures:

- Repair of steam and condensate leaks, and repair of all failed steam traps
- Return of condensate to the boilerhouse, and use of heat exchangers (with condensate return) rather than direct steam injection where process permits
- Flash steam recovery
- Minimizing boiler blowdown consistent with maintaining acceptably low dissolved solids in boiler water. Use of reverse osmosis boiler feed water treatment substantially reduces the need for boiler blowdown
- Minimizing deaerator heating

1.5 Hazardous Materials Management

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Applicability and Approach

These guidelines apply to projects that use, store, or handle any quantity of hazardous materials (Hazmats), defined as materials that represent a risk to human health, property, or the environment due to their physical or chemical characteristics. Hazmats can be classified according to the hazard as explosives; compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidizing substances; toxic materials; radioactive material; and corrosive substances. Guidance on the transport of hazardous materials is covered in Section 3 of this document.

When a hazardous material is no longer usable for its original purpose and is intended for disposal, but still has hazardous properties, it is considered a *hazardous waste* (see Section 1.4).

This guidance is intended to be applied in conjunction with traditional occupational health and safety and emergency preparedness programs which are included in Section 2.0 on Occupational Health and Safety Management, and Section 3.7 on Emergency Preparedness and Response. Guidance on the Transport of Hazardous Materials is provided in Section 3.5.

This section is divided into two main subsections:

General Hazardous Materials Management: Guidance applicable to all projects or facilities that handle or store any quantity of hazardous materials.

Management of Major Hazards: Additional guidance for projects or facilities that store or handle hazardous materials at, or above, threshold quantities³⁹, and thus require special treatment to prevent accidents such as fire, explosions, leaks or spills, and to prepare and respond to emergencies.

The overall objective of hazardous materials management is to avoid or, when avoidance is not feasible, minimize uncontrolled releases of hazardous materials or accidents (including explosion and fire) during their production, handling, storage and use. This objective can be achieved by:

³⁹ For examples, threshold quantities should be those established for emergency planning purposes such as provided in the US Environmental Protection Agency. *Protection of Environment* (Title Threshold quantities are provided in the US Environmental Protection Agency. *Protection of Environment* (Title 40 CFR Parts 68, 112, and 355).

- Establishing hazardous materials management priorities based on hazard analysis of risky operations identified through Social and Environmental Assessment;
 - Where practicable, avoiding or minimizing the use of hazardous materials. For example, non-hazardous materials have been found to substitute asbestos in building materials, PCBs in electrical equipment, persistent organic pollutants (POPs) in pesticides formulations, and ozone depleting substances in refrigeration systems;
 - Preventing uncontrolled releases of hazardous materials to the environment or uncontrolled reactions that might result in fire or explosion;
 - Using engineering controls (containment, automatic alarms, and shut-off systems) commensurate with the nature of hazard;
 - Implementing management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been prevented or controlled through engineering measures.
- The types and amounts of hazardous materials present in the project. This information should be recorded and should include a summary table with the following information:
 - Name and description (e.g. composition of a mixture) of the Hazmat
 - Classification (e.g. code, class or division) of the Hazmat
 - Internationally accepted regulatory reporting threshold quantity or national equivalent⁴⁰ of the Hazmat
 - Quantity of Hazmat used per month
 - Characteristic(s) that make(s) the Hazmat hazardous (e.g. flammability, toxicity)
 - Analysis of potential spill and release scenarios using available industry statistics on spills and accidents where available
 - Analysis of the potential for uncontrolled reactions such as fire and explosions
 - Analysis of potential consequences based on the physical-geographical characteristics of the project site, including aspects such as its distance to settlements, water resources, and other environmentally sensitive areas

General Hazardous Materials Management

Projects which manufacture, handle, use, or store hazardous materials should establish management programs that are commensurate with the potential risks present. The main objectives of projects involving hazardous materials should be the protection of the workforce and the prevention and control of releases and accidents. These objectives should be addressed by integrating prevention and control measures, management actions, and procedures into day-to-day business activities. Potentially applicable elements of a management program include the following:

Hazard Assessment

The level of risk should be established through an on-going assessment process based on:

Hazard assessment should be performed by specialized professionals using internationally-accepted methodologies such as Hazardous Operations Analysis (HAZOP), Failure Mode and Effects Analysis (FMEA), and Hazard Identification (HAZID).

Management Actions

The management actions to be included in a Hazardous Materials Management Plan should be commensurate with the level of

⁴⁰ Threshold quantities are provided in the US Environmental Protection Agency. *Protection of Environment* (Title 40 CFR Parts 68, 112, and 355).

potential risks associated with the production, handling, storage, and use of hazardous materials.

Release Prevention and Control Planning

Where there is risk of a spill of uncontrolled hazardous materials, facilities should prepare a spill control, prevention, and countermeasure plan as a specific component of their Emergency Preparedness and Response Plan (described in more detail in Section 3.7). The plan should be tailored to the hazards associated with the project, and include:

- Training of operators on release prevention, including drills specific to hazardous materials as part of emergency preparedness response training
- Implementation of inspection programs to maintain the mechanical integrity and operability of pressure vessels, tanks, piping systems, relief and vent valve systems, containment infrastructure, emergency shutdown systems, controls and pumps, and associated process equipment
- Preparation of written Standard Operating Procedures (SOPs) for filling USTs, ASTs or other containers or equipment as well as for transfer operations by personnel trained in the safe transfer and filling of the hazardous material, and in spill prevention and response
- SOPs for the management of secondary containment structures, specifically the removal of any accumulated fluid, such as rainfall, to ensure that the intent of the system is not accidentally or willfully defeated
- Identification of locations of hazardous materials and associated activities on an emergency plan site map
- Documentation of availability of specific personal protective equipment and training needed to respond to an emergency
- Documentation of availability of spill response equipment sufficient to handle at least initial stages of a spill and a list of

external resources for equipment and personnel, if necessary, to supplement internal resources

- Description of response activities in the event of a spill, release, or other chemical emergency including:
 - Internal and external notification procedures
 - Specific responsibilities of individuals or groups
 - Decision process for assessing severity of the release, and determining appropriate actions
 - Facility evacuation routes
 - Post-event activities such as clean-up and disposal, incident investigation, employee re-entry, and restoration of spill response equipment.

Occupational Health and Safety

The Hazardous Materials Management Plan should address applicable, essential elements of occupational health and safety management as described in Section 2.0 on Occupational Health and Safety, including:

- Job safety analysis to identify specific potential occupational hazards and industrial hygiene surveys, as appropriate, to monitor and verify chemical exposure levels, and compare with applicable occupational exposure standards⁴¹
- Hazard communication and training programs to prepare workers to recognize and respond to workplace chemical hazards. Programs should include aspects of hazard identification, safe operating and materials handling procedures, safe work practices, basic emergency procedures, and special hazards unique to their jobs.

⁴¹ Including: Threshold Limit Value (TLV®) occupational exposure guidelines and Biological Exposure Indices (BEIs®), American Conference of Governmental Industrial Hygienists (ACGIH), <http://www.acgih.org/TLV/>; U.S. National Institute for Occupational Health and Safety (NIOSH), <http://www.cdc.gov/niosh/npg/>; Permissible Exposure Limits (PELs), U.S. Occupational Safety and Health Administration (OSHA), http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARD&p_id=9992; Indicative Occupational Exposure Limit Values, European Union, http://europe.osha.eu.int/good_practice/risks/ds/oel/; and other similar sources.

Training should incorporate information from Material Safety Data Sheets⁴² (MSDSs) for hazardous materials being handled. MSDSs should be readily accessible to employees in their local language.

- Definition and implementation of permitted maintenance activities, such as hot work or confined space entries
- Provision of suitable personal protection equipment (PPE) (footwear, masks, protective clothing and goggles in appropriate areas), emergency eyewash and shower stations, ventilation systems, and sanitary facilities
- Monitoring and record-keeping activities, including audit procedures designed to verify and record the effectiveness of prevention and control of exposure to occupational hazards, and maintaining accident and incident investigation reports on file for a period of at least five years

Process Knowledge and Documentation

The Hazardous Materials Management Plan should be incorporated into, and consistent with, the other elements of the facility ES/OHS MS and include:

- Written process safety parameters (i.e., hazards of the chemical substances, safety equipment specifications, safe operation ranges for temperature, pressure, and other applicable parameters, evaluation of the consequences of deviations, etc.)
- Written operating procedures
- Compliance audit procedures

⁴² MSDSs are produced by the manufacturer, but might not be prepared for chemical intermediates that are not distributed in commerce. In these cases, employers still need to provide workers with equivalent information.

Preventive Measures

Hazardous Materials Transfer

Uncontrolled releases of hazardous materials may result from small cumulative events, or from more significant equipment failure associated with events such as manual or mechanical transfer between storage systems or process equipment.

Recommended practices to prevent hazardous material releases from processes include:

- Use of dedicated fittings, pipes, and hoses specific to materials in tanks (e.g., all acids use one type of connection, all caustics use another), and maintaining procedures to prevent addition of hazardous materials to incorrect tanks
- Use of transfer equipment that is compatible and suitable for the characteristics of the materials transferred and designed to ensure safe transfer
- Regular inspection, maintenance and repair of fittings, pipes and hoses
- Provision of secondary containment, drip trays or other overflow and drip containment measures, for hazardous materials containers at connection points or other possible overflow points.

Overfill Protection

Overfills of vessels and tanks should be prevented as they are among the most common causes of spills resulting in soil and water contamination, and among the easiest to prevent.

Recommended overfill protection measures include:

- Prepare written procedures for transfer operations that includes a checklist of measures to follow during filling operations and the use of filling operators trained in these procedures
- Installation of gauges on tanks to measure volume inside
- Use of dripless hose connections for vehicle tank and fixed connections with storage tanks

- Provision of automatic fill shutoff valves on storage tanks to prevent overfilling
- Use of a catch basin around the fill pipe to collect spills
- Use of piping connections with automatic overflow protection (float valve)
- Pumping less volume than available capacity into the tank or vessel by ordering less material than its available capacity
- Provision of overflow or over pressure vents that allow controlled release to a capture point

Reaction, Fire, and Explosion Prevention

Reactive, flammable, and explosive materials should also be managed to avoid uncontrolled reactions or conditions resulting in fire or explosion. Recommended prevention practices include:

- Storage of incompatible materials (acids, bases, flammables, oxidizers, reactive chemicals) in separate areas, and with containment facilities separating material storage areas
- Provision of material-specific storage for extremely hazardous or reactive materials
- Use of flame arresting devices on vents from flammable storage containers
- Provision of grounding and lightning protection for tank farms, transfer stations, and other equipment that handles flammable materials
- Selection of materials of construction compatible with products stored for all parts of storage and delivery systems, and avoiding reuse of tanks for different products without checking material compatibility
- Storage of hazardous materials in an area of the facility separated from the main production works. Where proximity is unavoidable, physical separation should be provided using structures designed to prevent fire, explosion, spill, and other emergency situations from affecting facility operations

- Prohibition of all sources of ignition from areas near flammable storage tanks

Control Measures

Secondary Containment (Liquids)

A critical aspect for controlling accidental releases of liquid hazardous materials during storage and transfer is the provision of secondary containment. It is not necessary for secondary containment methods to meet long term material compatibility as with primary storage and piping, but their design and construction should hold released materials effectively until they can be detected and safely recovered. Appropriate secondary containment structures consist of berms, dikes, or walls capable of containing the larger of 110 percent of the largest tank or 25 percent of the combined tank volumes in areas with above-ground tanks with a total storage volume equal or greater than 1,000 liters and will be made of impervious, chemically resistant material. Secondary containment design should also consider means to prevent contact between incompatible materials in the event of a release.

Other secondary containment measures that should be applied depending on site-specific conditions include:

- Transfer of hazardous materials from vehicle tanks to storage in areas with surfaces sufficiently impervious to avoid loss to the environment and sloped to a collection or a containment structure not connected to municipal wastewater/stormwater collection system
- Where it is not practical to provide permanent, dedicated containment structures for transfer operations, one or more alternative forms of spill containment should be provided, such as portable drain covers (which can be deployed for the duration of the operations), automatic shut-off valves on storm water basins, or shut off valves in drainage or sewer facilities, combined with oil-water separators

- Storage of drummed hazardous materials with a total volume equal or greater than 1,000 liters in areas with impervious surfaces that are sloped or bermed to contain a minimum of 25 percent of the total storage volume
- Provision of secondary containment for components (tanks, pipes) of the hazardous material storage system, to the extent feasible
- Conducting periodic (e.g. daily or weekly) reconciliation of tank contents, and inspection of visible portions of tanks and piping for leaks;
- Use of double-walled, composite, or specially coated storage and piping systems particularly in the use of underground storage tanks (USTs) and underground piping. If double-walled systems are used, they should provide a means of detecting leaks between the two walls.

Storage Tank and Piping Leak Detection

Leak detection may be used in conjunction with secondary containment, particularly in high-risk locations⁴³. Leak detection is especially important in situations where secondary containment is not feasible or practicable, such as in long pipe runs. Acceptable leak detection methods include:

- Use of automatic pressure loss detectors on pressurized or long distance piping
- Use of approved or certified integrity testing methods on piping or tank systems, at regular intervals
- Considering the use of SCADA⁴⁴ if financially feasible

⁴³ High-risk locations are places where the release of product from the storage system could result in the contamination of drinking water source or those located in water resource protection areas as designated by local authorities.

⁴⁴ Supervisory Control and Data Acquisition

Underground Storage Tanks (USTs)⁴⁵

Although there are many environmental and safety advantages of underground storage of hazardous materials, including reduced risk of fire or explosion, and lower vapor losses into the atmosphere, leaks of hazardous materials can go undetected for long periods of time with potential for soil and groundwater contamination. Examples of techniques to manage these risks include:

- Avoiding use of USTs for storage of highly soluble organic materials
 - Assessing local soil corrosion potential, and installing and maintaining cathodic protection (or equivalent rust protection) for steel tanks
 - For new installations, installing impermeable liners or structures (e.g., concrete vaults) under and around tanks and lines that direct any leaked product to monitoring ports at the lowest point of the liner or structure
 - Monitoring the surface above any tank for indications of soil movement
 - Reconciling tank contents by measuring the volume in store with the expected volume, given the stored quantity at last stocking, and deliveries to and withdrawals from the store
 - Testing integrity by volumetric, vacuum, acoustic, tracers, or other means on all tanks at regular intervals
 - Considering the monitoring groundwater of quality down gradient of locations where multiple USTs are in use
 - Evaluating the risk of existing UST in newly acquired facilities to determine if upgrades are required for USTs that will be continued to be used, including replacement with new systems or permanent closure of abandoned USTs.
- Ensuring that new USTs are sited away from wells,

⁴⁵ Additional details on the management of USTs is provided in the EHS Guidelines for Retail Petroleum Stations.

reservoirs and other source water protection areas and floodplains, and maintained so as to prevent corrosion.

Management of Major Hazards

In addition to the application of the above-referenced guidance on prevention and control of releases of hazardous materials, projects involving production, handling, and storage of hazardous materials *at or above threshold limits*⁴⁶ should prepare a Hazardous Materials Risk Management Plan, in the context of its overall ES/OHS MS, containing all of the elements presented below.⁴⁷ The objective of this guidance is the prevention and control of catastrophic releases of toxic, reactive, flammable, or explosive chemicals that may result in toxic, fire, or explosion hazards.⁴⁸

Management Actions

- **Management of Change:** These procedures should address:
 - The technical basis for changes in processes and operations
 - The impact of changes on health and safety
 - Modification to operating procedures
 - Authorization requirements
 - Employees affected
 - Training needs
- **Compliance Audit:** A compliance audit is a way to evaluate compliance with the prevention program requirements for each process. A compliance audit covering each element of

the prevention measures (see below) should be conducted at least every three years and should include:

- Preparation of a report of the findings
- Determination and documentation of the appropriate response to each finding
- Documentation that any deficiency has been corrected
- **Incident Investigation:** Incidents can provide valuable information about site hazards and the steps needed to prevent accidental releases. An incident investigation mechanism should include procedures for:
 - Initiation of the investigation promptly
 - Summarizing the investigation in a report
 - Addressing the report findings and recommendations
 - A review of the report with staff and contractors
- **Employee Participation:** A written plan of action should describe an active employee participation program for the prevention of accidents.
- **Contractors:** There should be a mechanism for contractor control which should include a requirement for them to develop hazardous materials management procedures that meet the requirements of the hazardous materials management plan. Their procedures should be consistent with those of the contracting company and the contractor workforce should undergo the same training. Additionally, procedures should require that contractors are:
 - Provided with safety performance procedures and safety and hazard information
 - Observe safety practices
 - Act responsibly
 - Have access to appropriate training for their employees
 - Ensure that their employees know process hazards and applicable emergency actions

⁴⁶ Threshold quantities should be those established for emergency planning purposes such as provided in the US Environmental Protection Agency. *Protection of Environment* (Title 40 CFR Parts 300-399 and 700 to 789).

⁴⁷ For further information and guidance, please refer to International Finance Corporation (IFC) Hazardous Materials Risk Management Manual. Washington, D.C. December 2000.

⁴⁸ The approach to the management of major hazards is largely based on an approach to Process Safety Management developed by the American Institute of Chemical Engineers.

- Prepare and submit training records for their employees to the contracting company
- Inform their employees about the hazards presented by their work
- Assess trends of repeated similar incidents
- Develop and implement procedures to manage repeated similar incidents
- *Training.* Project employees should be provided training on Hazmat management. The training program should include:
 - A list of employees to be trained
 - Specific training objectives
 - Mechanisms to achieve the objectives (i.e., hands-on workshops, videos, etc.)
 - The means to determine whether the training program is effective
 - Training procedures for new hires and refresher courses for existing employees

Preventive Measures

The purpose of preventive measures is to ensure that safety-related aspects of the process and equipment are considered, limits to be placed on the operations are well known, and accepted standards and codes are adopted, where they apply.

- *Process Safety Information:* Procedures should be prepared for each hazardous materials and include:
 - Compilation of Material Safety Data Sheets (MSDS)
 - Identification of maximum intended inventories and safe upper/lower parameters
 - Documentation of equipment specifications and of codes and standards used to design, build and operate the process
- *Operating Procedures:* SOPs should be prepared for each step of all processes or operations within the project (e.g.

initial startup, normal operations, temporary operations, emergency shutdown, emergency operations, normal shutdown, and start-up following a normal or emergency shutdown or major change). These SOPs should include special considerations for Mazmats used in the process or operations (e.g. temperature control to prevent emissions of a volatile hazardous chemical; diversion of gaseous discharges of hazardous pollutants from the process to a temporary storage tank in case of emergency).

Other procedures to be developed include impacts of deviations, steps to avoid deviations, prevention of chemical exposure, exposure control measures, and equipment inspections.

Mechanical Integrity of process equipment, piping and instrumentation: Inspection and maintenance procedures should be developed and documented to ensure mechanical integrity of equipment, piping, and instrumentation and prevent uncontrolled releases of hazardous materials from the project. These procedures should be included as part of the project SOPs. The specific process components of major interest include pressure vessels and storage tanks, piping systems, relief and vent systems and devices, emergency shutdown systems, controls, and pumps. Recommended aspects of the inspection and maintenance program include:

- Developing inspection and maintenance procedures
- Establishing a quality assurance plan for equipment, maintenance materials, and spare parts
- Conducting employee training on the inspection and maintenance procedures
- Conducting equipment, piping, and instrumentation inspections and maintenance
- Identifying and correcting identified deficiencies

- Evaluating the inspection and maintenance results and, if necessary, updating the inspection and maintenance procedures
- Reporting the results to management.
- *Hot Work Permit:* Hot work operations – such as brazing, torch-cutting, grinding, soldering, and welding – are associated with potential health, safety, and property hazards resulting from the fumes, gases, sparks, and hot metal and radiant energy produced during hot work. Hot work permit is required for any operation involving open flames or producing heat and/or sparks. The section of SOPs on hot work should include the responsibility for hot work permitting, personal protection equipment (PPE), hot work procedures, personnel training, and recordkeeping.
- *Pre-Start Review:* Procedures should be prepared to carry out pre-start reviews when a modification is significant enough to require a change in safety information under the management of change procedure. The procedures should:
 - Confirm that the new or modified construction and/or equipment meet design specifications
 - Ensure that procedures for safety, operation, maintenance, and emergency are adequate
 - Include a process hazard assessment, and resolve or implement recommendations for new process
 - Ensure that training for all affected employees is being conducted

Emergency Preparedness and Response

When handling hazardous materials, procedures and practices should be developed allowing for quick and efficient responses to accidents that could result in human injury or damage to the environment. An Emergency Preparedness and Response Plan,

incorporated into and consistent with, the facility's overall ES/OHS MS, should be prepared to cover the following:⁴⁹

- *Planning Coordination:* Procedures should be prepared for:
 - Informing the public and emergency response agencies
 - Documenting first aid and emergency medical treatment
 - Taking emergency response actions
 - Reviewing and updating the emergency response plan to reflect changes, and ensuring that employees are informed of such changes
- *Emergency Equipment:* Procedures should be prepared for using, inspecting, testing, and maintaining the emergency response equipment.
- *Training:* Employees and contractors should be trained on emergency response procedures.

Community Involvement and Awareness

When hazardous materials are in use above threshold quantities, the management plan should include a system for community awareness, notification and involvement that should be commensurate with the potential risks identified for the project during the hazard assessment studies. This should include mechanisms for sharing the results of hazard and risk assessment studies in a timely, understandable and culturally sensitive manner with potentially affected communities that provides a means for public feedback. Community involvement activities should include:

- Availability of general information to the potentially affected community on the nature and extent of project operations, and the prevention and control measures in place to ensure no effects to human health

⁴⁹ For a comprehensive treatment of the development of emergency response plans in conjunction with communities refer to the Awareness and Preparedness for Emergencies at Local Level (APELL) Guidelines available at: <http://www.uneptie.org/pc/apell/publications/handbooks.html>

- The potential for off-site effects to human health or the environment following an accident at planned or existing hazardous installations
- Specific and timely information on appropriate behavior and safety measures to be adopted in the event of an accident including practice drills in locations with higher risks
- Access to information necessary to understand the nature of the possible effect of an accident and an opportunity to contribute effectively, as appropriate, to decisions concerning hazardous installations and the development of community emergency preparedness plans.

1.6 Waste Management

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Applicability and Approach

These guidelines apply to projects that generate, store, or handle any quantity of waste across a range of industry sectors. It is not intended to apply to projects or facilities where the primary business is the collection, transportation, treatment, or disposal of wastes. Specific guidance for these types of facilities is presented in the Environmental Health and Safety (EHS) Guidelines for Waste Management Facilities.

A *waste* is any solid, liquid, or contained gaseous material that is being discarded by disposal, recycling, burning or incineration. It can be byproduct of a manufacturing process or an obsolete commercial product that can no longer be used for intended purpose and requires disposal.

Solid (non-hazardous) wastes generally include any garbage, refuse. Examples of such waste include domestic trash and garbage; inert construction / demolition materials; refuse, such as metal scrap and empty containers (except those previously used to contain hazardous materials which should, in principle, be managed as a hazardous waste); and

residual waste from industrial operations, such as boiler slag, clinker, and fly ash.

Hazardous waste shares the properties of a hazardous material (e.g. ignitability, corrosivity, reactivity, or toxicity), or other physical, chemical, or biological characteristics that may pose a potential risk to human health or the environment if improperly managed. Wastes may also be defined as “hazardous” by local regulations or international conventions, based on the origin of the waste and its inclusion on hazardous waste lists, or based on its characteristics.

Sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial operations needs to be evaluated on a case-by-case basis to establish whether it constitutes a hazardous or a non-hazardous waste.

Facilities that generate and store wastes should practice the following:

- Establishing waste management priorities at the outset of activities based on an understanding of potential Environmental, Health, and Safety (EHS) risks and impacts and considering waste generation and its consequences
- Establishing a waste management hierarchy that considers prevention, reduction, reuse, recovery, recycling, removal and finally disposal of wastes.
- Avoiding or minimizing the generation waste materials, as far as practicable
- Where waste generation cannot be avoided but has been minimized, recovering and reusing waste

- Where waste can not be recovered or reused, treating, destroying, and disposing of it in an environmentally sound manner

General Waste Management

The following guidance applies to the management of non-hazardous and hazardous waste. Additional guidance specifically applicable to hazardous wastes is presented below. Waste management should be addressed through a Waste management system that addresses issues linked to waste minimization, generation, transport, disposal, and monitoring.

Waste Management Planning

Facilities that generate waste should characterize their waste according to composition, source, types of wastes produced, generation rates, or according to local regulatory requirements. Effective planning and implementation of waste management strategies should include:

- Review of new waste sources during planning, siting, and design activities, including during equipment modifications and process alterations, to identify expected waste generation, pollution prevention opportunities, and necessary treatment, storage, and disposal infrastructure
- Collection of data and information about the process and waste streams in existing facilities, including characterization of waste streams by type, quantities, and potential use/disposition
- Establishment of priorities based on a risk analysis that takes into account the potential EHS risks during the waste cycle and the availability of infrastructure to manage the waste in an environmentally sound manner
- Definition of opportunities for source reduction, as well as reuse and recycling

- Definition of procedures and operational controls for on-site storage
- Definition of options / procedures / operational controls for treatment and final disposal

Waste Prevention

Processes should be designed and operated to prevent, or minimize, the quantities of wastes generated and hazards associated with the wastes generated in accordance with the following strategy:

- Substituting raw materials or inputs with less hazardous or toxic materials, or with those where processing generates lower waste volumes
- Applying manufacturing process that convert materials efficiently, providing higher product output yields, including modification of design of the production process, operating conditions, and process controls⁵⁰
- Instituting good housekeeping and operating practices, including inventory control to reduce the amount of waste resulting from materials that are out-of-date, off-specification, contaminated, damaged, or excess to plant needs
- Instituting procurement measures that recognize opportunities to return usable materials such as containers and which prevents the over ordering of materials
- Minimizing hazardous waste generation by implementing stringent waste segregation to prevent the commingling of non-hazardous and hazardous waste to be managed

⁵⁰ Examples of waste prevention strategies include the concept of Lean Manufacturing found at <http://www.epa.gov/epaoswer/hazwaste/minimize/lean.htm>

Recycling and Reuse

In addition to the implementation of waste prevention strategies, the total amount of waste may be significantly reduced through the implementation of recycling plans, which should consider the following elements:

- Evaluation of waste production processes and identification of potentially recyclable materials
- Identification and recycling of products that can be reintroduced into the manufacturing process or industry activity at the site
- Investigation of external markets for recycling by other industrial processing operations located in the neighborhood or region of the facility (e.g., waste exchange)
- Establishing recycling objectives and formal tracking of waste generation and recycling rates
- Providing training and incentives to employees in order to meet objectives

Treatment and Disposal

If waste materials are still generated after the implementation of feasible waste prevention, reduction, reuse, recovery and recycling measures, waste materials should be treated and disposed of and all measures should be taken to avoid potential impacts to human health and the environment. Selected management approaches should be consistent with the characteristics of the waste and local regulations, and may include one or more of the following:

- On-site or off-site biological, chemical, or physical treatment of the waste material to render it non-hazardous prior to final disposal
- Treatment or disposal at permitted facilities specially designed to receive the waste. Examples include: composting operations for organic non-hazardous

wastes; properly designed, permitted and operated landfills or incinerators designed for the respective type of waste; or other methods known to be effective in the safe, final disposal of waste materials such as bioremediation.

Hazardous Waste Management

Hazardous wastes should always be segregated from non-hazardous wastes. If generation of hazardous waste can not be prevented through the implementation of the above general waste management practices, its management should focus on the prevention of harm to health, safety, and the environment, according to the following additional principles:

- Understanding potential impacts and risks associated with the management of any generated hazardous waste during its complete life cycle
- Ensuring that contractors handling, treating, and disposing of hazardous waste are reputable and legitimate enterprises, licensed by the relevant regulatory agencies and following good international industry practice for the waste being handled
- Ensuring compliance with applicable local and international regulations⁵¹

Waste Storage

Hazardous waste should be stored so as to prevent or control accidental releases to air, soil, and water resources in area location where:

⁵¹ International requirements may include host-country commitments under the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their disposal (<http://www.basel.int/>) and Rotterdam Convention on the prior Inform Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (<http://www.pic.int/>)

- Waste is stored in a manner that prevents the commingling or contact between incompatible wastes, and allows for inspection between containers to monitor leaks or spills. Examples include sufficient space between incompatibles or physical separation such as walls or containment curbs
- Store in closed containers away from direct sunlight, wind and rain
- Secondary containment systems should be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment
- Secondary containment is included wherever liquid wastes are stored in volumes greater than 220 liters. The available volume of secondary containment should be at least 110 percent of the largest storage container, or 25 percent of the total storage capacity (whichever is greater), in that specific location
- Provide adequate ventilation where volatile wastes are stored.
- Preparing and implementing spill response and emergency plans to address their accidental release (additional information on Emergency Plans is provided in Section 3 of this document)
- Avoiding underground storage tanks and underground piping of hazardous waste

Transportation

On-site and Off-site transportation of waste should be conducted so as to prevent or minimize spills, releases, and exposures to employees and the public. All waste containers designated for off-site shipment should be secured and labeled with the contents and associated hazards, be properly loaded on the transport vehicles before leaving the site, and be accompanied by a shipping paper (i.e., manifest) that describes the load and its associated hazards, consistent with the guidance provided in Section 3.4 on the Transport of Hazardous Materials.

Treatment and Disposal

In addition to the recommendations for treatment and disposal applicable to general wastes, the following issues specific to hazardous wastes should be considered:

Commercial or Government Waste Contractors

In the absence of qualified commercial or government-owned waste vendors (taking into consideration proximity and transportation requirements), facilities generating waste should consider using:

Hazardous waste storage activities should also be subject to special management actions, conducted by employees who have received specific training in handling and storage of hazardous wastes:

- Provision of readily available information on chemical compatibility to employees, including labeling each container to identify its contents
- Limiting access to hazardous waste storage areas to employees who have received proper training
- Clearly identifying (label) and demarcating the area, including documentation of its location on a facility map or site plan
- Conducting periodic inspections of waste storage areas and documenting the findings
- Have the technical capability to manage the waste in a manner that reduces immediate and future impact to the environment
- Have all required permits, certifications, and approvals, of applicable government authorities

- Have been secured through the use of formal procurement agreements

In the absence of qualified commercial or government-owned waste disposal operators (taking into consideration proximity and transportation requirements), project sponsors should consider using:

- Installing on-site waste treatment or recycling processes
- As a final option, constructing facilities that will provide for the environmental sound long-term storage of wastes on-site (as described elsewhere in the General EHS Guidelines) or at an alternative appropriate location up until external commercial options become available

Small Quantities of Hazardous Waste

Hazardous waste materials are frequently generated in small quantities by many projects through a variety of activities such as equipment and building maintenance activities. Examples of these types of wastes include: spent solvents and oily rags, empty paint cans, chemical containers; used lubricating oil; used batteries (such as nickel-cadmium or lead acid); and lighting equipment, such as lamps or lamp ballasts. These wastes should be managed following the guidance provided in the above sections.

Monitoring

Monitoring activities associated with the management of hazardous and non-hazardous waste should include:

- Regular visual inspection of all waste storage collection and storage areas for evidence of accidental releases and to verify that wastes are properly labeled and stored. When significant quantities of hazardous wastes

are generated and stored on site, monitoring activities should include:

- Inspection of vessels for leaks, drips or other indications of loss
- Identification of cracks, corrosion, or damage to tanks, protective equipment, or floors
- Verification of locks, emergency valves, and other safety devices for easy operation (lubricating if required and employing the practice of keeping locks and safety equipment in standby position when the area is not occupied)
- Checking the operability of emergency systems
- Documenting results of testing for integrity, emissions, or monitoring stations (air, soil vapor, or groundwater)
- Documenting any changes to the storage facility, and any significant changes in the quantity of materials in storage
- Regular audits of waste segregation and collection practices
- Tracking of waste generation trends by type and amount of waste generated, preferably by facility departments
- Characterizing waste at the beginning of generation of a new waste stream, and periodically documenting the characteristics and proper management of the waste, especially hazardous wastes
- Keeping manifests or other records that document the amount of waste generated and its destination
- Periodic auditing of third party treatment, and disposal services including re-use and recycling facilities when significant quantities of hazardous wastes are managed by third parties. Whenever possible, audits should include site visits to the treatment storage and disposal location

- Regular monitoring of groundwater quality in cases of Hazardous Waste on site storage and/or pretreatment and disposal
- Monitoring records for hazardous waste collected, stored, or shipped should include:
 - Name and identification number of the material(s) composing the hazardous waste
 - Physical state (i.e., solid, liquid, gaseous or a combination of one, or more, of these)
 - Quantity (e.g., kilograms or liters, number of containers)
 - Waste shipment tracking documentation to include, quantity and type, date dispatched, date transported and date received, record of the originator, the receiver and the transporter
 - Method and date of storing, repacking, treating, or disposing at the facility, cross-referenced to specific manifest document numbers applicable to the hazardous waste
 - Location of each hazardous waste within the facility, and the quantity at each location

1.7 Noise

Applicability

This section addresses impacts of noise beyond the property boundary of the facilities. Worker exposure to noise is covered in Section 2.0 on Occupational Health and Safety.

Prevention and Control

Noise prevention and mitigation measures should be applied where predicted or measured noise impacts from a project facility or operations exceed the applicable noise level guideline at the most sensitive point of reception.⁵² The preferred method for controlling noise from stationary sources is to implement noise control measures at source.⁵³

Methods for prevention and control of sources of noise emissions depend on the source and proximity of receptors.

Noise reduction options that should be considered include:

- Selecting equipment with lower sound power levels
- Installing silencers for fans
- Installing suitable mufflers on engine exhausts and compressor components
- Installing acoustic enclosures for equipment casing radiating noise
- Improving the acoustic performance of constructed buildings, apply sound insulation
- Installing acoustic barriers without gaps and with a continuous minimum surface density of 10 kg/m² in order to minimize the transmission of sound through the

barrier. Barriers should be located as close to the source or to the receptor location to be effective

- Installing vibration isolation for mechanical equipment
- Limiting the hours of operation for specific pieces of equipment or operations, especially mobile sources operating through community areas
- Re-locating noise sources to less sensitive areas to take advantage of distance and shielding
- Siting permanent facilities away from community areas if possible
- Taking advantage of the natural topography as a noise buffer during facility design
- Reducing project traffic routing through community areas wherever possible
- Planning flight routes, timing and altitude for aircraft (airplane and helicopter) flying over community areas
- Developing a mechanism to record and respond to complaints

Noise Level Guidelines

Noise impacts should not exceed the levels presented in Table 1.7.1, or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

⁵² A point of reception or receptor may be defined as any point on the premises occupied by persons where extraneous noise and/or vibration are received. Examples of receptor locations may include: permanent or seasonal residences; hotels / motels; schools and daycares; hospitals and nursing homes; places of worship; and parks and campgrounds.

⁵³ At the design stage of a project, equipment manufacturers should provide design or construction specifications in the form of "Insertion Loss Performance" for silencers and mufflers, and "Transmission Loss Performance" for acoustic enclosures and upgraded building construction.

Table 1.7.1- Noise Level Guidelines⁵⁴

Receptor	One Hour L _{Aeq} (dBA)	
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational ⁵⁵	55	45
Industrial; commercial	70	70

m to any reflecting surface (e.g., wall). In general, the noise level limit is represented by the background or ambient noise levels that would be present in the absence of the facility or noise source(s) under investigation.

Highly intrusive noises, such as noise from aircraft flyovers and passing trains, should not be included when establishing background noise levels.

Monitoring

Noise monitoring⁵⁶ may be carried out for the purposes of establishing the existing ambient noise levels in the area of the proposed or existing facility, or for verifying operational phase noise levels.

Noise monitoring programs should be designed and conducted by trained specialists. Typical monitoring periods should be sufficient for statistical analysis and may last 48 hours with the use of noise monitors that should be capable of logging data continuously over this time period, or hourly, or more frequently, as appropriate (or else cover differing time periods within several days, including weekday and weekend workdays). The type of acoustic indices recorded depends on the type of noise being monitored, as established by a noise expert. Monitors should be located approximately 1.5 m above the ground and no closer than 3

⁵⁴ Guidelines values are for noise levels measured out of doors. Source: Guidelines for Community Noise, World Health Organization (WHO), 1999.

⁵⁵ For acceptable indoor noise levels for residential, institutional, and educational settings refer to WHO (1999).

⁵⁶ Noise monitoring should be carried out using a Type 1 or 2 sound level meter meeting all appropriate IEC standards.

1.8 Contaminated Land

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Applicability and Approach

This section provides a summary of management approaches for land contamination due to anthropogenic releases of hazardous materials, wastes, or oil, including naturally occurring substances. Releases of these materials may be the result of historic or current site activities, including, but not limited to, accidents during their handling and storage, or due to their poor management or disposal.

Land is considered contaminated when it contains hazardous materials or oil concentrations above background or naturally occurring levels.

Contaminated lands may involve surficial soils or subsurface soils that, through leaching and transport, may affect groundwater, surface water, and adjacent sites. Where subsurface contaminant sources include volatile substances, soil vapor may also become a transport and exposure medium, and create potential for contaminant infiltration of indoor air spaces of buildings.

Contaminated land is a concern because of:

- The potential risks to human health and ecology (e.g. risk of cancer or other human health effects, loss of ecology);

- The liability that it may pose to the polluter/business owners (e.g., cost of remediation, damage of business reputation and/or business-community relations) or affected parties (e.g. workers at the site, nearby property owners).

Contamination of land should be avoided by preventing or controlling the release of hazardous materials, hazardous wastes, or oil to the environment. When contamination of land is suspected or confirmed during any project phase, the cause of the uncontrolled release should be identified and corrected to avoid further releases and associated adverse impacts.

Contaminated lands should be managed to avoid the risk to human health and ecological receptors. The preferred strategy for land decontamination is to reduce the level of contamination at the site while preventing the human exposure to contamination.

To determine whether risk management actions are warranted, the following assessment approach should be applied to establish whether the three risk factors of 'Contaminants', 'Receptors', and 'Exposure Pathways' co-exist, or are likely to co-exist, at the project site under current or possible future land use:

- *Contaminant(s)*: Presence of hazardous materials, waste, or oil in any environmental media at potentially hazardous concentrations
- *Receptor(s)*: Actual or likely contact of humans, wildlife, plants, and other living organisms with the contaminants of concern
- *Exposure pathway(s)*: A combination of the route of migration of the contaminant from its point of release (e.g., leaching into potable groundwater) and exposure routes

(e.g., ingestion, transdermal absorption), which would allow receptor(s) to come into actual contact with contaminants

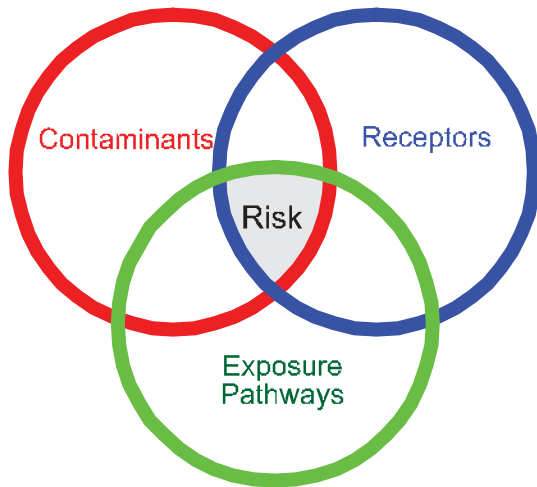


FIGURE 1.8.1: Inter-Relationship of Contaminant Risk Factors

When the three risk factors are considered to be present (in spite of limited data) under current or foreseeable future conditions, the following steps should be followed (as described in the remaining parts of this section):

- 1) Risk screening;
- 2) Interim risk management;
- 3) Detailed quantitative risk assessment; and
- 4) Permanent risk reduction measures.

Risk Screening

This step is also known as “problem formulation” for environmental risk assessment. Where there is potential evidence of contamination at a site, the following steps are recommended:

- Identification of the location of suspected highest level of contamination through a combination of visual and historical operational information;
- Sampling and testing of the contaminated media (soils or water) according to established technical methods applicable to suspected type of contaminant^{57,58};
- Evaluation of the analytical results against the local and national contaminated sites regulations. In the absence of such regulations or environmental standards, other sources of risk-based standards or guidelines should be consulted to obtain comprehensive criteria for screening soil concentrations of pollutants.⁵⁹
- Verification of the potential human and/or ecological receptors and exposure pathways relevant to the site in question

The outcome of risk-screening may reveal that there is no overlap between the three risk-factors as the contaminant levels identified are below those considered to pose a risk to human health or the environment. Alternatively, interim or permanent

⁵⁷ BC MOE. http://www.env.gov.bc.ca/epd/epdpa/contam_sites/guidance

⁵⁸ Massachusetts Department of Environment. <http://www.mass.gov/dep/cleanup>

⁵⁹ These may include the USEPA Region 3 Risk-Based Concentrations (RBCs). <http://www.epa.gov/reg3hwmd/risk/human/index.htm>. These RBCs are considered acceptable for specific land use and contaminant exposure scenarios as they have been developed by governments using risk assessment techniques for use as general targets in the site remediation. Separate PRGs have been developed or adopted for soil, sediment or groundwater, and often a distinction is made between land uses (as noted earlier) because of the need for more stringent guidelines for residential and agricultural versus commercial/industrial landuse. The RBC Tables contains Reference Doses (RfDs) and Cancer Slope Factors (CSFs) for about 400 chemicals. These toxicity factors have been combined with “standard” exposure scenarios to calculate RBCs--chemical concentrations corresponding to fixed levels of risk (i.e., a Hazard Quotient (HQ) of 1, or lifetime cancer risk of 1E-6, whichever occurs at a lower concentration) in water, air, fish tissue, and soil for individual chemical substances. The primary use of RBCs is for chemical screening during baseline risk assessment (see EPA Regional Guidance EPA/903/R-93-001, “Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening”). Additional useful soil quality guidelines can also be obtained from Lijzen et al. 2001.

risk reduction measures may need to be taken with, or without, more detailed risk assessment activities, as described below.

Interim Risk Management

Interim risk management actions should be implemented at any phase of the project life cycle if the presence of land contamination poses an “imminent hazard”, i.e., representing an immediate risk to human health and the environment if contamination were allowed to continue, even a short period of time. Examples of situations considered to involve imminent hazards include, but are not restricted to:

- Presence of an explosive atmosphere caused by contaminated land
- Accessible and excessive contamination for which short-term exposure and potency of contaminants could result in acute toxicity, irreversible long term effects, sensitization, or accumulation of persistent biocumulative and toxic substances
- Concentrations of pollutants at concentrations above the Risk Based Concentrations (RBCs⁶⁰) or drinking water standards in potable water at the point of abstraction

Appropriate risk reduction should be implemented as soon as practicable to remove the condition posing the imminent hazard.

Detailed Risk Assessment

As an alternative to complying with numerical standards or preliminary remediation goals, and depending on local regulatory requirements, a detailed site-specific, environmental risk assessment may be used to develop

⁶⁰ For example, USEPA Region 3 Risk-Based Concentrations (RBCs). <http://www.epa.gov/reg3hwmd/risk/human/index.htm>.

strategies that yield acceptable health risks, while achieving low level contamination on-site. An assessment of contaminant risks needs to be considered in the context of current and future land use, and development scenarios (e.g., residential, commercial, industrial, and urban parkland or wilderness use).

A detailed quantitative risk assessment builds on risk screening (problem formulation). It involves first, a detailed site investigation to identify the scope of contamination.⁶¹ Site investigation programs should apply quality assurance/quality control (QA/QC) measures to ensure that data quality is adequate for the intended data use (e.g., method detection limits are below levels of concern). The site investigation in turn should be used to develop a *conceptual site model* of how and where contaminants exist, how they are transported, and where routes of exposure occur to organisms and humans. The risk factors and conceptual site model provide a framework for assessing contaminant risks.

Human or ecological risk assessments facilitate risk management decisions at contaminated sites. Specific risk assessment objectives include:

- Identifying relevant human and ecological receptors (e.g., children, adults, fish, wildlife)
- Determining if contaminants are present at levels that pose potential human health and/or ecological concerns (e.g., levels above applicable regulatory criteria based on health or environmental risk considerations)
- Determining how human or ecological receptors are exposed to the contaminants (e.g., ingestions of soil, dermal contact, inhalation of dust)

⁶¹ Examples include processes defined by the American Society of Testing and Materials (ASTM) Phase II ESA Process; the British Columbia Ministry of Environment Canada (BC MOE) http://www.env.gov.bc.ca/epd/epdpa/contam_sites/guidance; and the Massachusetts Department of Environment <http://www.mass.gov/dep/cleanup>.

- Identifying the types of adverse effects that might result from exposure to the contaminants (e.g., effect on target organ, cancer, impaired growth or reproduction) in the absence of regulatory standards
- Quantifying the magnitude of health risks to human and ecological receptors based on a quantitative analysis of contaminant exposure and toxicity (e.g. calculate lifetime cancer risk or ratios of estimated exposure rates compared to safe exposure rates)
- Determining how current and proposed future land use influence the predicted risks (e.g. change of land use from industrial to residential with more sensitive receptors such as children)
- Quantifying the potential environmental and/or human health risks from off-site contaminant migration (e.g., consider if leaching and groundwater transport, or surface water transport results in exposure at adjacent lands/receptors)
- Determining if the risk is likely to remain stable, increase, or decrease with time in the absence of any remediation (e.g., consider if the contaminant is reasonably degradable and likely to remain in place, or be transported to other media)⁶²

Addressing these objectives provides a basis to develop and implement risk reduction measures (e.g., clean-up, on-site controls) at the site. If such a need exists, the following additional objectives become relevant:

- Determining where, and in what conceptual manner, risk reduction measures should be implemented

⁶² An example of a simplified quantitative risk assessment method is the ASTM E1739-95(2002) Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites and the ASTM E2081-00(2004)e1 Standard Guide for Risk-Based Corrective Action (at chemical release sites).

- Identifying the preferred technologies (including engineering controls) needed to implement the conceptual risk reduction measures
- Developing a monitoring plan to ascertain whether risk reduction measures are effective
- Considering the need and appropriateness for institutional controls (e.g. deed restriction, land use restrictions) as part of a comprehensive approach

Permanent Risk Reduction Measures

The *risk factors* and *conceptual site model* within the contaminant risk approach described also provide a basis to manage and mitigate environmental contaminant health risks. The underlying principle is to reduce, eliminate, or control any or all of the three risk factors illustrated in Figure 1.8.1. A short list of examples of risk mitigation strategies is provided below, although actual strategies should be developed based on site-specific conditions, and the practicality of prevailing factors and site constraints. Regardless of the management options selected, the action plan should include, whenever possible, *contaminant source reduction* (i.e., net improvement of the site) as part of the overall strategy towards managing health risks at contaminated sites, as this alone provides for improved environmental quality.

Figure 1.8.2 presents a schematic of the inter-relationship of risk factors and example strategies to mitigate contaminant health risk by modifying the conditions of one or more risk factors to ultimately reduce contaminant exposure to the receptor. The selected approach should take into consideration the technical and financial feasibility (e.g. operability of a selected technology given the local availability of technical expertise and equipment and its associated costs).

Example risk mitigation strategies for contaminant source and exposure concentrations include:

- Soil, sediment, and sludge:
 - In situ biological treatment (aerobic or anaerobic)
 - In situ physical/chemical treatment (e.g., soil vapor extraction with off-gas treatment, chemical oxidation)
 - In situ thermal treatment (e.g., steam injection, 6-phase heating)
 - Ex situ biological treatment (e.g., excavation and composting)
 - Ex situ physical/chemical treatment (e.g., excavation and stabilization)
 - Ex situ thermal treatment (e.g., excavation and thermal desorption or incineration)
 - Containment (e.g. landfill)
 - Natural attenuation
 - Other treatment processes
- Groundwater, surface water, and leachate:
 - In situ biological treatment (aerobic and/or aerobic)
 - In situ physical/chemical treatment (e.g., air sparging, zero-valent iron permeable reactive barrier)
 - Ex situ biological, physical, and or chemical treatment (i.e., groundwater extraction and treatment)
 - Containment (e.g., slurry wall or sheet pile barrier)
 - Natural attenuation
 - Other treatment processes
- Soil vapor intrusion:
 - Soil vapor extraction to reduce VOC contaminant source in soil
 - Installation of a sub-slab depressurization system to prevent migration of soil vapor into the building
 - Creating a positive pressure condition in buildings

- Installation (during building construction) of an impermeable barrier below the building and/or an alternative flow pathway for soil vapor beneath building foundations (e.g., porous media and ventilation to shunt vapors away from building)

Example risk mitigation strategies for receptors include:

- Limiting or preventing access to contaminant by receptors (actions targeted at the receptor may include signage with instructions, fencing, or site security)
- Imposing health advisory or prohibiting certain practices leading to exposure such as fishing, crab trapping, shellfish collection
- Educating receptors (people) to modify behavior in order to reduce exposure (e.g., improved work practices, and use of protective clothing and equipment)

Example risk mitigation strategies for exposure pathways include:

- Providing an alternative water supply to replace, for example, a contaminated groundwater supply well
- Capping contaminated soil with at least 1m of clean soil to prevent human contact, as well as plant root or small mammal penetration into contaminated soils
- Paving over contaminated soil as an interim measure to negate the pathway of direct contact or dust generation and inhalation
- Using an interception trench and pump, and treat technologies to prevent contaminated groundwater from discharging into fish streams

The above-reference containment measures should also be considered for immediate implementation in situations where source reduction measures are expected to take time.

Occupational Health and Safety Considerations

Investigation and remediation of contaminated lands requires that workers be mindful of the occupational exposures that could arise from working in close contact with contaminated soil or other environmental media (e.g., groundwater, wastewater, sediments, and soil vapor). Occupational health and safety precautions should be exercised to minimize exposure, as described in Section 2 on Occupational Health and Safety. In addition, workers on contaminated sites should receive special health and safety training specific to contaminated site investigation and remediation activities.⁶³

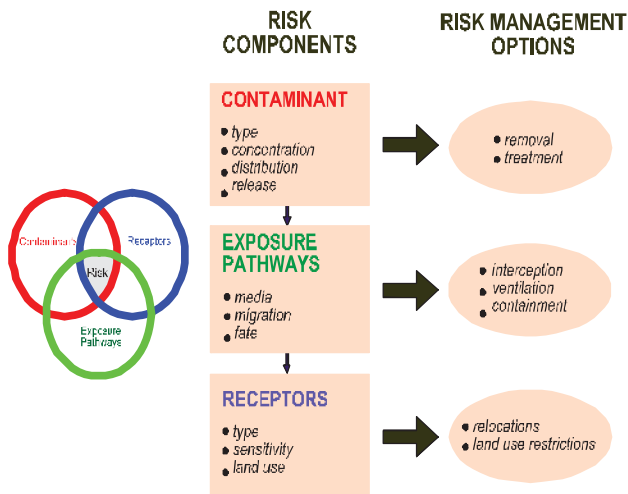


FIGURE 1.8.2: Inter-Relationship of Risk Factors and Management Options

⁶³ For example, US Occupational Safety and Health Agency (OSHA) regulations found at 40 CFR 1910.120. http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STAN DARDS&p_id=9765

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Applicability and Approach

Employers and supervisors are obliged to implement all reasonable precautions to protect the health and safety of workers. This section provides guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety. Although the focus is placed on the operational phase of projects, much of the guidance also applies to construction and decommissioning activities.

Companies should hire contractors that have the technical capability to manage the occupational health and safety issues of their employees, extending the application of the hazard management activities through formal procurement agreements.

Preventive and protective measures should be introduced according to the following order of priority:

- *Eliminating the hazard* by removing the activity from the work process. Examples include substitution with less hazardous chemicals, using different manufacturing processes, etc;
- *Controlling the hazard* at its source through use of engineering controls. Examples include local exhaust ventilation, isolation rooms, machine guarding, acoustic insulating, etc;
- *Minimizing the hazard* through design of safe work systems and administrative or institutional control measures. Examples include job rotation, training safe work procedures, lock-out and tag-out, workplace monitoring, limiting exposure or work duration, etc.
- *Providing appropriate personal protective equipment (PPE)* in conjunction with training, use, and maintenance of the PPE.

The application of prevention and control measures to occupational hazards should be based on comprehensive job

safety or job hazard analyses. The results of these analyses should be prioritized as part of an action plan based on the likelihood and severity of the consequence of exposure to the identified hazards. An example of a qualitative risk ranking or analysis matrix to help identify priorities is described in Table 2.1.1.

2.1 General Facility Design and Operation

Integrity of Workplace Structures

Permanent and recurrent places of work should be designed and equipped to protect OHS:

- Surfaces, structures and installations should be easy to clean and maintain, and not allow for accumulation of hazardous compounds.
- Buildings should be structurally safe, provide appropriate protection against the climate, and have acceptable light and noise conditions.
- Fire resistant, noise-absorbing materials should, to the extent feasible, be used for cladding on ceilings and walls.
- Floors should be level, even, and non-skid.
- Heavy oscillating, rotating or alternating equipment should be located in dedicated buildings or structurally isolated sections.

Severe Weather and Facility Shutdown

- Work place structures should be designed and constructed to withstand the expected elements for the region and have an area designated for safe refuge, if appropriate.
- Standard Operating Procedures (SOPs) should be developed for project or process shut-down, including an evacuation plan. Drills to practice the procedure and plan should also be undertaken annually.

Table 2.1.1. Risk Ranking Table to Classify Worker Scenarios Based on Likelihood and Consequence

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catas- trophic 5
A. Almost certain	L	M	E	E	E
B. Likely	L	M	H	E	E
C. Moderate	L	M	H	E	E
D. Unlikely	L	L	M	H	E
E. Rare	L	L	M	H	H

Legend
E: extreme risk; immediate action required
H: high risk; senior management attention needed
M: moderate risk; management responsibility should be specified
L: low risk; manage by routine procedures

Workspace and Exit

- The space provided for each worker, and in total, should be adequate for safe execution of all activities, including transport and interim storage of materials and products.
- Passages to emergency exits should be unobstructed at all times. Exits should be clearly marked to be visible in total darkness. The number and capacity of emergency exits should be sufficient for safe and orderly evacuation of the greatest number of people present at any time, and there should be a minimum two exits from any work area.

- Facilities also should be designed and built taking into account the needs of disabled persons.

Fire Precautions

The workplace should be designed to prevent the start of fires through the implementation of fire codes applicable to industrial settings. Other essential measures include:

- Equipping facilities with fire detectors, alarm systems, and fire-fighting equipment. The equipment should be maintained in good working order and be readily accessible. It should be adequate for the dimensions and use of the premises, equipment installed, physical and chemical properties of substances present, and the maximum number of people present.
- Provision of manual firefighting equipment that is easily accessible and simple to use
- Fire and emergency alarm systems that are both audible and visible

The IFC Life and Fire Safety Guideline should apply to buildings accessible to the public (See Section 3.3).

Lavatories and Showers

- Adequate lavatory facilities (toilets and washing areas) should be provided for the number of people expected to work in the facility and allowances made for segregated facilities, or for indicating whether the toilet facility is "In Use" or "Vacant". Toilet facilities should also be provided with adequate supplies of hot and cold running water, soap, and hand drying devices.
- Where workers may be exposed to substances poisonous by ingestion and skin contamination may occur, facilities for showering and changing into and out of street and work clothes should be provided.

Potable Water Supply

- Adequate supplies of potable drinking water should be provided from a fountain with an upward jet or with a sanitary means of collecting the water for the purposes of drinking
- Water supplied to areas of food preparation or for the purpose of personal hygiene (washing or bathing) should meet drinking water quality standards

Clean Eating Area

- Where there is potential for exposure to substances poisonous by ingestion, suitable arrangements are to be made for provision of clean eating areas where workers are not exposed to the hazardous or noxious substances

Lighting

- Workplaces should, to the degree feasible, receive natural light and be supplemented with sufficient artificial illumination to promote workers' safety and health, and enable safe equipment operation. Supplemental 'task lighting' may be required where specific visual acuity requirements should be met.
- Emergency lighting of adequate intensity should be installed and automatically activated upon failure of the principal artificial light source to ensure safe shut-down, evacuation, etc.

Safe Access

- Passageways for pedestrians and vehicles within and outside buildings should be segregated and provide for easy, safe, and appropriate access
- Equipment and installations requiring servicing, inspection, and/or cleaning should have unobstructed, unrestricted, and ready access
- Hand, knee and foot railings should be installed on stairs, fixed ladders, platforms, permanent and interim floor openings, loading bays, ramps, etc.

- Openings should be sealed by gates or removable chains
- Covers should, if feasible, be installed to protect against falling items
- Measures to prevent unauthorized access to dangerous areas should be in place

First Aid

- The employer should ensure that qualified first-aid can be provided at all times. Appropriately equipped first-aid stations should be easily accessible throughout the place of work
- Eye-wash stations and/or emergency showers should be provided close to all workstations where immediate flushing with water is the recommended first-aid response
- Where the scale of work or the type of activity being carried out so requires, dedicated and appropriately equipped first-aid room(s) should be provided. First aid stations and rooms should be equipped with gloves, gowns, and masks for protection against direct contact with blood and other body fluids
- Remote sites should have written emergency procedures in place for dealing with cases of trauma or serious illness up to the point at which patient care can be transferred to an appropriate medical facility.

Air Supply

- Sufficient fresh air should be supplied for indoor and confined work spaces. Factors to be considered in ventilation design include physical activity, substances in use, and process-related emissions. Air distribution systems should be designed so as not to expose workers to draughts
- Mechanical ventilation systems should be maintained in good working order. Point-source exhaust systems required for maintaining a safe ambient environment should have local indicators of correct functioning.
- Re-circulation of contaminated air is not acceptable. Air inlet filters should be kept clean and free of dust and

microorganisms. Heating, ventilation and air conditioning (HVAC) and industrial evaporative cooling systems should be equipped, maintained and operated so as to prevent growth and spreading of disease agents (e.g. *Legionella pneumophila*) or breeding of vectors (e.g. mosquitoes and flies) of public health concern.

Work Environment Temperature

- The temperature in work, rest room and other welfare facilities should, during service hours, be maintained at a level appropriate for the purpose of the facility.

2.2 Communication and Training

OHS Training

- Provisions should be made to provide OHS orientation training to all new employees to ensure they are apprised of the basic site rules of work at / on the site and of personal protection and preventing injury to fellow employees.
- Training should consist of basic hazard awareness, site-specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. Any site-specific hazard or color coding in use should be thoroughly reviewed as part of orientation training.

Visitor Orientation

- If visitors to the site can gain access to areas where hazardous conditions or substances may be present, a visitor orientation and control program should be established to ensure visitors do not enter hazard areas unescorted.

New Task Employee and Contractor Training

- The employer should ensure that workers and contractors, prior to commencement of new assignments, have received adequate training and information enabling them to

understand work hazards and to protect their health from hazardous ambient factors that may be present.

The training should adequately cover:

- Knowledge of materials, equipment, and tools
- Known hazards in the operations and how they are controlled
- Potential risks to health
- Precautions to prevent exposure
- Hygiene requirements
- Wearing and use of protective equipment and clothing
- Appropriate response to operation extremes, incidents and accidents

Basic OHS Training

- A basic occupational training program and specialty courses should be provided, as needed, to ensure that workers are oriented to the specific hazards of individual work assignments. Training should generally be provided to management, supervisors, workers, and occasional visitors to areas of risks and hazards.
- Workers with rescue and first-aid duties should receive dedicated training so as not to inadvertently aggravate exposures and health hazards to themselves or their co-workers. Training would include the risks of becoming infected with blood-borne pathogens through contact with bodily fluids and tissue.
- Through appropriate contract specifications and monitoring, the employer should ensure that service providers, as well as contracted and subcontracted labor, are trained adequately before assignments begin.

Area Signage

- Hazardous areas (electrical rooms, compressor rooms, etc), installations, materials, safety measures, and emergency exits, etc. should be marked appropriately.

- Signage should be in accordance with international standards and be well known to, and easily understood by workers, visitors and the general public as appropriate.

Labeling of Equipment

- All vessels that may contain substances that are hazardous as a result of chemical or toxicological properties, or temperature or pressure, should be labeled as to the contents and hazard, or appropriately color coded.
- Similarly, piping systems that contain hazardous substances should be labeled with the direction of flow and contents of the pipe, or color coded whenever the pipe passing through a wall or floor is interrupted by a valve or junction device.

Communicate Hazard Codes

- Copies of the hazard coding system should be posted outside the facility at emergency entrance doors and fire emergency connection systems where they are likely to come to the attention of emergency services personnel.
- Information regarding the types of hazardous materials stored, handled or used at the facility, including typical maximum inventories and storage locations, should be shared proactively with emergency services and security personnel to expedite emergency response when needed.
- Representatives of local emergency and security services should be invited to participate in periodic (annual) orientation tours and site inspections to ensure familiarity with potential hazards present.

2.3 Physical Hazards

Physical hazards represent potential for accident or injury or illness due to repetitive exposure to mechanical action or work activity. Single exposure to physical hazards may result in a wide range of injuries, from minor and medical aid only, to disabling, catastrophic, and/or fatal. Multiple exposures over prolonged

periods can result in disabling injuries of comparable significance and consequence.

Rotating and Moving Equipment

Injury or death can occur from being trapped, entangled, or struck by machinery parts due to unexpected starting of equipment or unobvious movement during operations. Recommended protective measures include:

- Designing machines to eliminate trap hazards and ensuring that extremities are kept out of harm's way under normal operating conditions. Examples of proper design considerations include two-hand operated machines to prevent amputations or the availability of emergency stops dedicated to the machine and placed in strategic locations. Where a machine or equipment has an exposed moving part or exposed pinch point that may endanger the safety of any worker, the machine or equipment should be equipped with, and protected by, a guard or other device that prevents access to the moving part or pinch point. Guards should be designed and installed in conformance with appropriate machine safety standards.⁶⁴
- Turning off, disconnecting, isolating, and de-energizing (Locked Out and Tagged Out) machinery with exposed or guarded moving parts, or in which energy can be stored (e.g. compressed air, electrical components) during servicing or maintenance, in conformance with a standard such as CSA Z460 Lockout or equivalent ISO or ANSI standard
- Designing and installing equipment, where feasible, to enable routine service, such as lubrication, without removal of the guarding devices or mechanisms

⁶⁴ For example: CSA Z432.04 Safe Guarding of Machinery, CSA Z434 Robot Safety, ISO 11161 Safety of Machinery – Integrated Manufacturing Systems or ISO 14121 Safety of Machinery – Principles of Risk Management or equivalent ANSI standard.

Noise

Noise limits for different working environments are provided in Table 2.3.1.

- No employee should be exposed to a noise level greater than 85 dB(A) for a duration of more than 8 hours per day without hearing protection. In addition, no unprotected ear should be exposed to a peak sound pressure level (instantaneous) of more than 140 dB(C).
- The use of hearing protection should be enforced actively when the equivalent sound level over 8 hours reaches 85 dB(A), the peak sound levels reach 140 dB(C), or the average maximum sound level reaches 110dB(A). Hearing protective devices provided should be capable of reducing sound levels at the ear to at least 85 dB(A).
- Although hearing protection is preferred for any period of noise exposure in excess of 85 dB(A), an equivalent level of protection can be obtained, but less easily managed, by limiting the duration of noise exposure. For every 3 dB(A) increase in sound levels, the 'allowed' exposure period or duration should be reduced by 50 percent.⁶⁵
- Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible
- Periodic medical hearing checks should be performed on workers exposed to high noise levels

Vibration

Exposure to hand-arm vibration from equipment such as hand and power tools, or whole-body vibrations from surfaces on which the worker stands or sits, should be controlled through choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure. Limits for vibration and

⁶⁵ The American Conference of Governmental Industrial Hygienists (ACGIH), 2006

action values, (i.e. the level of exposure at which remediation should be initiated) are provided by the ACGIH⁶⁶. Exposure levels should be checked on the basis of daily exposure time and data provided by equipment manufacturers.

Electrical

Exposed or faulty electrical devices, such as circuit breakers,

- Marking all energized electrical devices and lines with warning signs
- Locking out (de-charging and leaving open with a controlled locking device) and tagging-out (warning sign placed on the lock) devices during service or maintenance
- Checking all electrical cords, cables, and hand power tools for frayed or exposed cords and following manufacturer recommendations for maximum permitted operating voltage of the portable hand tools
- Double insulating / grounding all electrical equipment used in environments that are, or may become, wet; using equipment with ground fault interrupter (GFI) protected circuits
- Protecting power cords and extension cords against damage from traffic by shielding or suspending above traffic areas
- Appropriate labeling of service rooms housing high voltage equipment ('electrical hazard') and where entry is controlled or prohibited (see also Section 3 on Planning, Siting, and Design);
- Establishing "No Approach" zones around or under high voltage power lines in conformance with Table 2.3.2
- Rubber tired construction or other vehicles that come into direct contact with, or arcing between, high voltage wires may need to be taken out of service for periods of 48 hours and have the tires replaced to prevent catastrophic tire and wheel assembly failure, potentially causing serious injury or death;
- Conducting detailed identification and marking of all buried electrical wiring prior to any excavation work

Table 2.3.1. Noise Limits for Various Working Environments

Location /activity	Equivalent level LAeq,8h	Maximum LAmax,fast
Heavy Industry (no demand for oral communication)	85 dB(A)	110 dB(A)
Light industry (decreasing demand for oral communication)	50-65 dB(A)	110 dB(A)
Open offices, control rooms, service counters or similar	45-50 dB(A)	-
Individual offices (no disturbing noise)	40-45 dB(A)	-
Classrooms, lecture halls	35-40 dB(A)	-
Hospitals	30-35 dB(A)	40 dB(A)

panels, cables, cords and hand tools, can pose a serious risk to workers. Overhead wires can be struck by metal devices, such as poles or ladders, and by vehicles with metal booms. Vehicles or grounded metal objects brought into close proximity with overhead wires can result in arcing between the wires and the object, without actual contact. Recommended actions include:

⁶⁶ ACGIH, 2005

Table 2.3.2. No Approach Zones for High Voltage Power Lines	
Nominal phase-to-phase voltage rating	Minimum distance
750 or more volts, but no more than 150,000 volts	3 meters
More than 150,000 volts, but no more than 250,000 volts	4.5 meters
More than 250,000 volts	6 meters

Eye Hazards

Solid particles from a wide variety of industrial operations, and / or a liquid chemical spray may strike a worker in the eye causing an eye injury or permanent blindness. Recommended measures include:

- Use of machine guards or splash shields and/or face and eye protection devices, such as safety glasses with side shields, goggles, and/or a full face shield. Specific Safe Operating Procedures (SOPs) may be required for use of sanding and grinding tools and/or when working around liquid chemicals. Frequent checks of these types of equipment prior to use to ensure mechanical integrity is also good practice. Machine and equipment guarding should conform to standards published by organizations such as CSA, ANSI and ISO (see also Section 2.3 on Rotating and Moving Equipment and 2.7 on Personal Protective Equipment).
- Moving areas where the discharge of solid fragments, liquid, or gaseous emissions can reasonably be predicted (e.g. discharge of sparks from a metal cutting station, pressure relief valve discharge) away from places expected to be occupied or transited by workers or visitors. Where machine or work fragments could present a hazard to transient workers or passers-by, extra area guarding or proximity restricting systems should be implemented, or PPE required for transients and visitors.

- Provisions should be made for persons who have to wear prescription glasses either through the use overglasses or prescription hardened glasses.

Welding / Hot Work

Welding creates an extremely bright and intense light that may seriously injure a worker's eyesight. In extreme cases, blindness may result. Additionally, welding may produce noxious fumes to which prolonged exposure can cause serious chronic diseases. Recommended measures include:

- Provision of proper eye protection such as welder goggles and/or a full-face eye shield for all personnel involved in, or assisting, welding operations. Additional methods may include the use of welding barrier screens around the specific work station (a solid piece of light metal, canvas, or plywood designed to block welding light from others). Devices to extract and remove noxious fumes at the source may also be required.
- Special hot work and fire prevention precautions and Standard Operating Procedures (SOPs) should be implemented if welding or hot cutting is undertaken outside established welding work stations, including 'Hot Work Permits, stand-by fire extinguishers, stand-by fire watch, and maintaining the fire watch for up to one hour after welding or hot cutting has terminated. Special procedures are required for hotwork on tanks or vessels that have contained flammable materials.

Industrial Vehicle Driving and Site Traffic

Poorly trained or inexperienced industrial vehicle drivers have increased risk of accident with other vehicles, pedestrians, and equipment. Industrial vehicles and delivery vehicles, as well as private vehicles on-site, also represent potential collision scenarios. Industrial vehicle driving and site traffic safety practices include:

- Training and licensing industrial vehicle operators in the safe operation of specialized vehicles such as forklifts, including safe loading/unloading, load limits
- Ensuring drivers undergo medical surveillance
- Ensuring moving equipment with restricted rear visibility is outfitted with audible back-up alarms
- Establishing rights-of-way, site speed limits, vehicle inspection requirements, operating rules and procedures (e.g. prohibiting operation of forklifts with forks in down position), and control of traffic patterns or direction
- Restricting the circulation of delivery and private vehicles to defined routes and areas, giving preference to 'one-way' circulation, where appropriate

Working Environment Temperature

Exposure to hot or cold working conditions in indoor or outdoor environments can result temperature stress-related injury or death. Use of personal protective equipment (PPE) to protect against other occupational hazards can accentuate and aggravate heat-related illnesses. Extreme temperatures in permanent work environments should be avoided through implementation of engineering controls and ventilation. Where this is not possible, such as during short-term outdoor work, temperature-related stress management procedures should be implemented which include:

- Monitoring weather forecasts for outdoor work to provide advance warning of extreme weather and scheduling work accordingly
- Adjustment of work and rest periods according to temperature stress management procedures provided by ACGIH⁶⁷, depending on the temperature and workloads
- Providing temporary shelters to protect against the elements during working activities or for use as rest areas

- Use of protective clothing
- Providing easy access to adequate hydration such as drinking water or electrolyte drinks, and avoiding consumption of alcoholic beverages

Ergonomics, Repetitive Motion, Manual Handling

Injuries due to ergonomic factors, such as repetitive motion, over-exertion, and manual handling, take prolonged and repeated exposures to develop, and typically require periods of weeks to months for recovery. These OHS problems should be minimized or eliminated to maintain a productive workplace. Controls may include:

- Facility and workstation design with 5th to 95th percentile operational and maintenance workers in mind
- Use of mechanical assists to eliminate or reduce exertions required to lift materials, hold tools and work objects, and requiring multi-person lifts if weights exceed thresholds
- Selecting and designing tools that reduce force requirements and holding times, and improve postures
- Providing user adjustable work stations
- Incorporating rest and stretch breaks into work processes, and conducting job rotation
- Implementing quality control and maintenance programs that reduce unnecessary forces and exertions
- Taking into consideration additional special conditions such as left handed persons

Working at Heights

Fall prevention and protection measures should be implemented whenever a worker is exposed to the hazard of falling more than two meters; into operating machinery; into water or other liquid; into hazardous substances; or through an opening in a work surface. Fall prevention / protection measures may also be warranted on a case-specific basis when there are risks of falling from lesser heights. Fall prevention may include:

⁶⁷ ACGIH, 2005

- Installation of guardrails with mid-rails and toe boards at the edge of any fall hazard area
- Proper use of ladders and scaffolds by trained employees
- Use of fall prevention devices, including safety belt and lanyard travel limiting devices to prevent access to fall hazard area, or fall protection devices such as full body harnesses used in conjunction with shock absorbing lanyards or self-retracting inertial fall arrest devices attached to fixed anchor point or horizontal life-lines
- Appropriate training in use, serviceability, and integrity of the necessary PPE
- Inclusion of rescue and/or recovery plans, and equipment to respond to workers after an arrested fall

Illumination

Work area light intensity should be adequate for the general purpose of the location and type of activity, and should be

supplemented with dedicated work station illumination, as needed.

The minimum limits for illumination intensity for a range of locations/activities appear in Table 2.3.3.

Controls should include:

- Use of energy efficient light sources with minimum heat emission
- Undertaking measures to eliminate glare / reflections and flickering of lights
- Taking precautions to minimize and control optical radiation including direct sunlight. Exposure to high intensity UV and IR radiation and high intensity visible light should also be controlled
- Controlling laser hazards in accordance with equipment specifications, certifications, and recognized safety standards. The lowest feasible class Laser should be applied to minimize risks.

Location / Activity	Light Intensity
Emergency light	10 lux
Outdoor non working areas	20 lux
Simple orientation and temporary visits (machine storage, garage, warehouse)	50 lux
Workspace with occasional visual tasks only (corridors, stairways, lobby, elevator, auditorium, etc.)	100 lux
Medium precision work (simple assembly, rough machine works, welding, packing, etc.)	200 lux
Precision work (reading, moderately difficult assembly, sorting, checking, medium bench and machine works, etc.), offices.	500 lux
High precision work (difficult assembly, sewing, color inspection, fine sorting etc.)	1,000 – 3,000 lux

2.4 Chemical Hazards

Chemical hazards represent potential for illness or injury due to single acute exposure or chronic repetitive exposure to toxic, corrosive, sensitizing or oxidative substances. They also represent a risk of uncontrolled reaction, including the risk of fire and explosion, if incompatible chemicals are inadvertently mixed. Chemical hazards can most effectively be prevented through a hierarchical approach that includes:

- Replacement of the hazardous substance with a less hazardous substitute
- Implementation of engineering and administrative control measures to avoid or minimize the release of hazardous substances into the work environment keeping the level of exposure below internationally established or recognized limits
- Keeping the number of employees exposed, or likely to become exposed, to a minimum

- Communicating chemical hazards to workers through labeling and marking according to national and internationally recognized requirements and standards, including the International Chemical Safety Cards (ICSC), Materials Safety Data Sheets (MSDS), or equivalent. Any means of written communication should be in an easily understood language and be readily available to exposed workers and first-aid personnel
- Training workers in the use of the available information (such as MSDSs), safe work practices, and appropriate use of PPE

Air Quality

Poor air quality due to the release of contaminants into the work place can result in possible respiratory irritation, discomfort, or illness to workers. Employers should take appropriate measures to maintain air quality in the work area. These include:

- Maintaining levels of contaminant dusts, vapors and gases in the work environment at concentrations below those recommended by the ACGIH⁶⁸ as TWA-TLV's (threshold limit value)—concentrations to which most workers can be exposed repeatedly (8 hours/day, 40 hrs/week, week-after-week), without sustaining adverse health effects.
- Developing and implementing work practices to minimize release of contaminants into the work environment including:
 - Direct piping of liquid and gaseous materials
 - Minimized handling of dry powdered materials;
 - Enclosed operations
 - Local exhaust ventilation at emission / release points
 - Vacuum transfer of dry material rather than mechanical or pneumatic conveyance
 - Indoor secure storage, and sealed containers rather than loose storage

- Where ambient air contains several materials that have similar effects on the same body organs (additive effects), taking into account combined exposures using calculations recommended by the ACGIH⁶⁹
- Where work shifts extend beyond eight (8) hours, calculating adjusted workplace exposure criteria recommended by the ACGIH⁷⁰

Fire and Explosions

Fires and or explosions resulting from ignition of flammable materials or gases can lead to loss of property as well as possible injury or fatalities to project workers. Prevention and control strategies include:

- Storing flammables away from ignition sources and oxidizing materials. Further, flammables storage area should be:
 - Remote from entry and exit points into buildings
 - Away from facility ventilation intakes or vents
 - Have natural or passive floor and ceiling level ventilation and explosion venting
 - Use spark-proof fixtures
 - Be equipped with fire extinguishing devices and self-closing doors, and constructed of materials made to withstand flame impingement for a moderate period of time
- Providing bonding and grounding of, and between, containers and additional mechanical floor level ventilation if materials are being, or could be, dispensed in the storage area
- Where the flammable material is mainly comprised of dust, providing electrical grounding, spark detection, and, if needed, quenching systems

⁶⁸ ACGIH, 2005

⁶⁹ ACGIH, 2005.

⁷⁰ ACGIH, 2005.

- Defining and labeling fire hazards areas to warn of special rules (e.g. prohibition in use of smoking materials, cellular phones, or other potential spark generating equipment)
- Providing specific worker training in handling of flammable materials, and in fire prevention or suppression

Corrosive, oxidizing, and reactive chemicals

Corrosive, oxidizing, and reactive chemicals present similar hazards and require similar control measures as flammable materials. However, the added hazard of these chemicals is that inadvertent mixing or intermixing may cause serious adverse reactions. This can lead to the release of flammable or toxic materials and gases, and may lead directly to fires and explosions. These types of substances have the additional hazard of causing significant personal injury upon direct contact, regardless of any intermixing issues. The following controls should be observed in the work environment when handling such chemicals:

- Corrosive, oxidizing and reactive chemicals should be segregated from flammable materials and from other chemicals of incompatible class (acids vs. bases, oxidizers vs. reducers, water sensitive vs. water based, etc.), stored in ventilated areas and in containers with appropriate secondary containment to minimize intermixing during spills
- Workers who are required to handle corrosive, oxidizing, or reactive chemicals should be provided with specialized training and provided with, and wear, appropriate PPE (gloves, apron, splash suits, face shield or goggles, etc).
- Where corrosive, oxidizing, or reactive chemicals are used, handled, or stored, qualified first-aid should be ensured at all times. Appropriately equipped first-aid stations should be easily accessible throughout the place of work, and eye-wash stations and/or emergency showers should be provided close to all workstations where the recommended first-aid response is immediate flushing with water

Asbestos Containing Materials (ACM)

The use of asbestos containing materials (ACM) should be avoided in new buildings or as a new material in remodeling or renovation activities. Existing facilities with ACM should develop an asbestos management plan which clearly identifies the locations where the ACM is present, its condition (e.g. whether it is in friable form with the potential to release fibers), procedures for monitoring its condition, procedures to access the locations where ACM is present to avoid damage, and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all persons involved in operations and maintenance activities. Repair or removal and disposal of existing ACM in buildings should only be performed by specially trained personnel⁷¹ following host country requirements, or in their absence, internationally recognized procedures.⁷²

2.5 Biological Hazards

Biological agents represent potential for illness or injury due to single acute exposure or chronic repetitive exposure. Biological hazards can be prevented most effectively by implementing the following measures:

- If the nature of the activity permits, use of any harmful biological agents should be avoided and replaced with an agent that, under normal conditions of use, is not dangerous or less dangerous to workers. If use of harmful agents can not be avoided, precautions should be taken to keep the risk of exposure as low as possible and maintained below internationally established and recognized exposure limits.

⁷¹ Training of specialized personnel and the maintenance and removal methods applied should be equivalent to those required under applicable regulations in the United States and Europe (examples of North American training standards are available at: <http://www.osha.gov/SLTC/asbestos/training.html>)

⁷² Examples include the American Society for Testing and Materials (ASTM) E 1368 - Standard Practice for Visual Inspection of Asbestos Abatement Projects; E 2356 - Standard Practice for Comprehensive Building Asbestos Surveys; and E 2394 - Standard Practice for Maintenance, Renovation and Repair of Installed Asbestos Cement Products.

- Work processes, engineering, and administrative controls should be designed, maintained, and operated to avoid or minimize release of biological agents into the working environment. The number of employees exposed or likely to become exposed should be kept at a minimum.
- The employer should review and assess known and suspected presence of biological agents at the place of work and implement appropriate safety measures, monitoring, training, and training verification programs.
- Measures to eliminate and control hazards from known and suspected biological agents at the place of work should be designed, implemented and maintained in close co-operation with the local health authorities and according to recognized international standards.

Biological agents should be classified into four groups⁷³:

- **Group 1:** Biological agents unlikely to cause human disease, and consequently only require controls similar to those required for hazardous or reactive chemical substances;
- **Group 2:** Biological agents that can cause human disease and are thereby likely to require additional controls, but are unlikely to spread to the community;
- **Group 3:** Biological agents that can cause severe human disease, present a serious hazard to workers, and may present a risk of spreading to the community, for which there usually is effective prophylaxis or treatment available and are thereby likely to require extensive additional controls;
- **Group 4:** Biological agents that can cause severe human disease, are a serious hazard to workers, and present a high risk of spreading to the community, for which there is usually no effective prophylaxis or treatment available and are thereby likely to require very extensive additional controls.

The employer should at all times encourage and enforce the highest level of hygiene and personal protection, especially for activities employing biological agents of Groups 3 and 4 above. Work involving agents in Groups 3 and 4 should be restricted only to those persons who have received specific verifiable training in working with and controlling such materials.

Areas used for the handling of Groups 3 and 4 biological agents should be designed to enable their full segregation and isolation in emergency circumstances, include independent ventilation systems, and be subject to SOPs requiring routine disinfection and sterilization of the work surfaces.

HVAC systems serving areas handling Groups 3 and 4 biological agents should be equipped with High Efficiency Particulate Air (HEPA) filtration systems. Equipment should readily enable their disinfection and sterilization, and maintained and operated so as to prevent growth and spreading of disease agents, amplification of the biological agents, or breeding of vectors e.g. mosquitoes and flies of public health concern.

⁷³ World Health Organization (WHO) Classification of Infective Microorganisms by Risk Group (2004).

2.6 Radiological Hazards

Radiation exposure can lead to potential discomfort, injury or serious illness to workers. Prevention and control strategies include:

- Places of work involving occupational and/or natural exposure to ionizing radiation should be established and operated in accordance with recognized international safety standards and guidelines.⁷⁴ The acceptable effective dose limits appear Table 2.6.1.
- Exposure to non-ionizing radiation (including static magnetic fields; sub-radio frequency magnetic fields; static electric fields; radio frequency and microwave radiation; light and near-infrared radiation; and ultraviolet radiation) should be controlled to internationally recommended limits⁷⁵.

Table 2.6.1. Acceptable Effective Dose Limits for Workplace Radiological Hazards

Exposure	Workers (min. 19 years of age)	Apprentices and students (16-18 years of age)
	Five consecutive year average – effective dose	20 mSv/year
Single year exposure – effective dose	50 mSv/year	6 mSv/year
Equivalent dose to the lens of the eye	150 mSv/year	50 mSv/year
Equivalent dose to the extremities (hands, feet) or the skin	500 mSv/year	150 mSv/year

⁷⁴ International Basic Safety Standard for protection against Ionizing Radiation and for the Safety of Radiation Sources and its three interrelated Safety Guides.

IAEA. <http://www-ns.iaea.org/standards/documents/default.asp?sub=160>

⁷⁵ For example ACGIH (2005) and International Commission for Non-Ionizing Radiation (ICNIRP).

- In the case of both ionizing and non-ionizing radiation, the preferred method for controlling exposure is shielding and limiting the radiation source. Personal protective equipment is supplemental only or for emergency use. Personal protective equipment for near-infrared, visible and ultraviolet range radiation can include appropriate sun block creams, with or without appropriate screening clothing.

2.7 Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) provides additional protection to workers exposed to workplace hazards in conjunction with other facility controls and safety systems.

PPE is considered to be a last resort that is above and beyond the other facility controls and provides the worker with an extra level of personal protection. Table 2.7.1 presents general examples of occupational hazards and types of PPE available for different purposes. Recommended measures for use of PPE in the workplace include:

- Active use of PPE if alternative technologies, work plans or procedures cannot eliminate, or sufficiently reduce, a hazard or exposure
- Identification and provision of appropriate PPE that offers adequate protection to the worker, co-workers, and occasional visitors, without incurring unnecessary inconvenience to the individual
- Proper maintenance of PPE, including cleaning when dirty and replacement when damaged or worn out. Proper use of PPE should be part of the recurrent training programs for employees

- Selection of PPE should be based on the hazard and risk ranking described earlier in this section, and selected according to criteria on performance and testing established

by recognized organizations⁷⁶.

2.8 Special Hazard Environments

Special hazard environments are work situations where all of the previously described hazards may exist under unique or especially hazardous circumstances. Accordingly, extra precautions or rigor in application of precautions is required.

Confined Space

A confined space is defined as a wholly or partially enclosed space not designed or intended for human occupancy and in which a hazardous atmosphere could develop as a result of the contents, location or construction of the confined space or due to work done in or around the confined space. A “permit-required” confined space is one that also contains physical or atmospheric hazards that could trap or engulf the person.⁷⁷

Confined spaces can occur in enclosed or open structures or locations. Serious injury or fatality can result from inadequate preparation to enter a confined space or in attempting a rescue from a confined space. Recommended management approaches include:

- Engineering measures should be implemented to eliminate, to the degree feasible, the existence and adverse character of confined spaces.
- Permit-required confined spaces should be provided with permanent safety measures for venting, monitoring, and rescue operations, to the extent possible. The area adjoining an access to a confined space should provide ample room for emergency and rescue operations.

Table 2.7.1. Summary of Recommended Personal Protective Equipment According to Hazard		
Objective	Workplace Hazards	Suggested PPE
Eye and face protection	Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation.	Safety Glasses with side-shields, protective shades, etc.
Head protection	Falling objects, inadequate height clearance, and overhead power cords.	Plastic Helmets with top and side impact protection.
Hearing protection	Noise, ultra-sound.	Hearing protectors (ear plugs or ear muffs).
Foot protection	Falling or rolling objects, pointed objects. Corrosive or hot liquids.	Safety shoes and boots for protection against moving & falling objects, liquids and chemicals.
Hand protection	Hazardous materials, cuts or lacerations, vibrations, extreme temperatures.	Gloves made of rubber or synthetic materials (Neoprene), leather, steel, insulating materials, etc.
	Dust, fogs, fumes, mists, gases, smokes, vapors.	Facemasks with appropriate filters for dust removal and air purification (chemicals, mists, vapors and gases). Single or multi-gas personal monitors, if available.
Respiratory protection	Oxygen deficiency	Portable or supplied air (fixed lines). On-site rescue equipment.
	Extreme temperatures, hazardous materials, biological agents, cutting and laceration.	Insulating clothing, body suits, aprons etc. of appropriate materials.

⁷⁶ Examples include the American National Standards Institute (ANSI), <http://www.ansi.org/>; National Institute for Occupational Safety and Health⁷⁶ (NIOSH), <http://www.cdc.gov/niosh/homepage.html>; Canadian Standards Association⁷⁶ (CSA), <http://www.csa.ca/Default.asp?language=english>; Mine Safety and Health Administration⁷⁶ (MSHA), <http://www.msha.gov>.

⁷⁷ US OSHA CFR 1910.146

- Access hatches should accommodate 90% of the worker population with adjustments for tools and protective clothing. The most current ISO and EN standards should be consulted for design specifications;
- Prior to entry into a permit-required confined space:
 - Process or feed lines into the space should be disconnected or drained, and blanked and locked-out.
 - Mechanical equipment in the space should be disconnected, de-energized, locked-out, and braced, as appropriate.
 - The atmosphere within the confined space should be tested to assure the oxygen content is between 19.5 percent and 23 percent, and that the presence of any flammable gas or vapor does not exceed 25 percent of its respective Lower Explosive Limit (LEL).
 - If the atmospheric conditions are not met, the confined space should be ventilated until the target safe atmosphere is achieved, or entry is only to be undertaken with appropriate and additional PPE.
- Safety precautions should include Self Contained Breathing Apparatus (SCBA), life lines, and safety watch workers stationed outside the confined space, with rescue and first aid equipment readily available.
- Before workers are required to enter a permit-required confined space, adequate and appropriate training in confined space hazard control, atmospheric testing, use of the necessary PPE, as well as the serviceability and integrity of the PPE should be verified. Further, adequate and appropriate rescue and / or recovery plans and equipment should be in place before the worker enters the confined space.

Lone and Isolated Workers

A lone and isolated worker is a worker out of verbal and line of sight communication with a supervisor, other workers, or other

persons capable of providing aid and assistance, for continuous periods exceeding one hour. The worker is therefore at increased risk should an accident or injury occur.

- Where workers may be required to perform work under lone or isolated circumstances, Standard Operating Procedures (SOPs) should be developed and implemented to ensure all PPE and safety measures are in place before the worker starts work. SOPs should establish, at a minimum, verbal contact with the worker at least once every hour, and ensure the worker has a capability for summoning emergency aid.
- If the worker is potentially exposed to highly toxic or corrosive chemicals, emergency eye-wash and shower facilities should be equipped with audible and visible alarms to summon aid whenever the eye-wash or shower is activated by the worker and without intervention by the worker.

2.9 Monitoring

Occupational health and safety monitoring programs should verify the effectiveness of prevention and control strategies. The selected indicators should be representative of the most significant occupational, health, and safety hazards, and the implementation of prevention and control strategies. The occupational health and safety monitoring program should include:

- *Safety inspection, testing and calibration:* This should include regular inspection and testing of all safety features and hazard control measures focusing on engineering and personal protective features, work procedures, places of work, installations, equipment, and tools used. The inspection should verify that issued PPE continues to provide adequate protection and is being worn as required. All instruments installed or used for monitoring and recording of working environment parameters should be regularly tested and calibrated, and the respective records maintained.
- *Surveillance of the working environment:* Employers should document compliance using an appropriate combination of

portable and stationary sampling and monitoring instruments.

Monitoring and analyses should be conducted according to internationally recognized methods and standards.

Monitoring methodology, locations, frequencies, and parameters should be established individually for each project following a review of the hazards. Generally, monitoring should be performed during commissioning of facilities or equipment and at the end of the defect and liability period, and otherwise repeated according to the monitoring plan.

- *Surveillance of workers health:* When extraordinary protective measures are required (for example, against biological agents Groups 3 and 4, and/or hazardous compounds), workers should be provided appropriate and relevant health surveillance prior to first exposure, and at regular intervals thereafter. The surveillance should, if deemed necessary, be continued after termination of the employment.
- *Training:* Training activities for employees and visitors should be adequately monitored and documented (curriculum, duration, and participants). Emergency exercises, including fire drills, should be documented adequately. Service providers and contractors should be contractually required to submit to the employer adequate training documentation before start of their assignment.

Accidents and Diseases monitoring

- The employer should establish procedures and systems for reporting and recording:
 - Occupational accidents and diseases
 - Dangerous occurrences and incidents

These systems should enable workers to report immediately to their immediate supervisor any situation they believe presents a serious danger to life or health.

- The systems and the employer should further enable and encourage workers to report to management all:
 - Occupational injuries and near misses
 - Suspected cases of occupational disease
 - Dangerous occurrences and incidents
- All reported occupational accidents, occupational diseases, dangerous occurrences, and incidents together with near misses should be investigated with the assistance of a person knowledgeable/competent in occupational safety. The investigation should:
 - Establish what happened
 - Determine the cause of what happened
 - Identify measures necessary to prevent a recurrence
- Occupational accidents and diseases should, at a minimum, be classified according to Table 2.10.1. Distinction is made between fatal and non-fatal injuries. The two main categories are divided into three sub-categories according to time of death or duration of the incapacity to work. The total work hours during the specified reporting period should be reported to the appropriate regulatory agency.

Table 2.9.1. Occupational Accident Reporting		
a. Fatalities (number)	b. Non-fatal Injuries (number) ⁷⁸	c. Total time lost non-fatal injuries (days)
a.1 Immediate	b.1 Less than one day	
a.2 Within a month	b.2 Up to 3 days	c.1 Category b.2
a.3 Within a year	b.3 More than 3 days	c.2 Category b.3

⁷⁸ The day on which an incident occurs is not included in b.2 and b.3.

3.0 Community Health and Safety

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This section complements the guidance provided in the preceding environmental and occupational health and safety sections, specifically addressing some aspects of project activities taking place outside of the traditional project boundaries, but nonetheless related to the project operations, as may be applicable on a project basis. These issues may arise at any stage of a project life cycle and can have an impact beyond the life of the project.

3.1 Water Quality and Availability

Groundwater and surface water represent essential sources of drinking and irrigation water in developing countries, particularly in rural areas where piped water supply may be limited or unavailable and where available resources are collected by the consumer with little or no treatment. Project activities involving wastewater discharges, water extraction, diversion or

impoundment should prevent adverse impacts to the quality and availability of groundwater and surface water resources.

Water Quality

Drinking water sources, whether public or private, should at all times be protected so that they meet or exceed applicable national acceptability standards or in their absence the current edition of WHO Guidelines for Drinking-Water Quality. Air emissions, wastewater effluents, oil and hazardous materials, and wastes should be managed according to the guidance provided in the respective sections of the General EHS Guidelines with the objective of protecting soil and water resources.

Where the project includes the delivery of water to the community or to users of facility infrastructure (such as hotel hosts and hospital patients), where water may be used for drinking, cooking, washing, and bathing, water quality should comply with national acceptability standards or in their absence the current edition of WHO Drinking Water Guidelines. Water quality for more sensitive well-being-related demands such as water used in health care facilities or food production may require more stringent, industry-specific guidelines or standards, as applicable. Any dependency factors associated with the deliver of water to the local community should be planned for and managed to ensure the sustainability of the water supply by involving the community in its management to minimize the dependency in the long-term.

Water Availability

The potential effect of groundwater or surface water abstraction for project activities should be properly assessed through a combination of field testing and modeling techniques, accounting for seasonal variability and projected changes in demand in the project area.

Project activities should not compromise the availability of water for personal hygiene needs and should take account of potential future increases in demand. The overall target should be the availability of 100 liters per person per day although lower levels may be used to meet basic health requirements.⁷⁹ Water volume requirements for well-being-related demands such as water use in health care facilities may need to be higher.

3.2 Structural Safety of Project Infrastructure

Hazards posed to the public while accessing project facilities may include:

- Physical trauma associated with failure of building structures
- Burns and smoke inhalation from fires
- Injuries suffered as a consequence of falls or contact with heavy equipment
- Respiratory distress from dust, fumes, or noxious odors
- Exposure to hazardous materials

Reduction of potential hazards is best accomplished during the design phase when the structural design, layout and site modifications can be adapted more easily. The following issues should be considered and incorporated as appropriate into the planning, siting, and design phases of a project:

- Inclusion of buffer strips or other methods of physical separation around project sites to protect the public from major hazards associated with hazardous materials incidents or process failure, as well as nuisance issues related to noise, odors, or other emissions
- Incorporation of siting and safety engineering criteria to prevent failures due to natural risks posed by earthquakes, tsunamis, wind, flooding, landslides and fire. To this end, all

project structures should be designed in accordance with engineering and design criteria mandated by site-specific risks, including but not limited to seismic activity, slope stability, wind loading, and other dynamic loads

- Application of locally regulated or internationally recognized building codes⁸⁰ to ensure structures are designed and constructed in accordance with sound architectural and engineering practice, including aspects of fire prevention and response
- Engineers and architects responsible for designing and constructing facilities, building, plants and other structures should certify the applicability and appropriateness of the structural criteria employed.

International codes, such as those compiled by the International Code Council (ICC)⁸¹, are intended to regulate the design, construction, and maintenance of a built environment and contain detailed guidance on all aspects of building safety, encompassing methodology, best practices, and documenting compliance.

Depending on the nature of a project, guidance provided in the ICC or comparable codes should be followed, as appropriate, with respect to:

- Existing structures
- Soils and foundations
- Site grading
- Structural design
- Specific requirements based on intended use and occupancy
- Accessibility and means of egress
- Types of construction
- Roof design and construction
- Fire-resistant construction
- Flood-resistant construction

⁷⁹ World Health Organization (WHO) defines 100 liters/capita/day as the amount required to meet all consumption and hygiene needs. Additional information on lower service levels and potential impacts on health are described in "Domestic Water Quantity, Service Level and Health" 2003. http://www.who.int/water_sanitation_health/diseases/wsh0302/en/index.html

⁸⁰ ILO-OSH, 2001. <http://www.ilo.org/public/english/protection/safework/cops/english/download/e000013.pdf>

⁸¹ ICC, 2006.

- Construction materials
- Interior environment
- Mechanical, plumbing and electrical systems
- Elevators and conveying systems
- Fire safety systems
- Safeguards during construction
- Encroachments into public right-of-way

Although major design changes may not be feasible during the operation phase of a project, hazard analysis can be undertaken to identify opportunities to reduce the consequences of a failure or accident. Illustrative management actions, applicable to hazardous materials storage and use, include:

- Reducing inventories of hazardous materials through inventory management and process changes to greatly reduce or eliminate the potential off-site consequences of a release
- Modifying process or storage conditions to reduce the potential consequences of an accidental off-site release
- Improving shut-down and secondary containment to reduce the amount of material escaping from containment and to reduce the release duration
- Reducing the probability that releases will occur through improved site operations and control, and through improvements in maintenance and inspection
- Reducing off-site impacts of releases through measures intended to contain explosions and fires, alert the public, provide for evacuation of surrounding areas, establish safety zones around a site, and ensure the provision of emergency medical services to the public

3.3 Life and Fire Safety (L&FS)

Applicability and Approach

All new buildings accessible to the public should be designed, constructed, and operated in full compliance with local building

codes, local fire department regulations, local legal/insurance requirements, and in accordance with an internationally accepted life and fire safety (L&FS) standard. The Life Safety Code⁸², which provides extensive documentation on life and fire safety provisions, is one example of an internationally accepted standard and may be used to document compliance with the Life and Fire Safety objectives outlined in these guidelines. With regard to these objectives:

- Project sponsors' architects and professional consulting engineers should demonstrate that affected buildings meet these life and fire safety objectives.
- Life and fire safety systems and equipment should be designed and installed using appropriate prescriptive standards and/or performance based design, and sound engineering practices.
- Life and fire safety design criteria for all existing buildings should incorporate all local building codes and fire department regulations.

These guidelines apply to buildings that are accessible to the public. Examples of such buildings include:

- Health and education facilities
- Hotels, convention centers, and leisure facilities
- Retail and commercial facilities
- Airports, other public transport terminals, transfer facilities

Specific Requirements for New Buildings

The nature and extent of life and fire safety systems required will depend on the building type, structure, construction, occupancy, and exposures. Sponsors should prepare a Life and Fire Safety Master Plan identifying major fire risks, applicable codes, standards and regulations, and mitigation measures. The Master

⁸² US NFPA.
<http://www.nfpa.org/catalog/product.asp?category%5Fname=&pid=10106&target%5Fpid=10106&src%5Fpid=&link%5Ftype=search>

Plan should be prepared by a suitably qualified professional, and adequately cover, but not be limited to, the issues addressed briefly in the following points. The suitably qualified professional selected to prepare the Master Plan is responsible for a detailed treatment of the following illustrative, and all other required, issues.

Fire Prevention

Fire prevention addresses the identification of fire risks and ignition sources, and measures needed to limit fast fire and smoke development. These issues include:

- Fuel load and control of combustibles
- Ignition sources
- Interior finish flame spread characteristics
- Interior finish smoke production characteristics
- Human acts, and housekeeping and maintenance

Means of Egress

Means of Egress includes all design measures that facilitate a safe evacuation by residents and/or occupants in case of fire or other emergency, such as:

- Clear, unimpeded escape routes
- Accessibility to the impaired/handicapped
- Marking and signing
- Emergency lighting

Detection and Alarm Systems

These systems encompass all measures, including communication and public address systems needed to detect a fire and alert:

- Building staff
- Emergency response teams
- Occupants
- Civil defense

Compartmentation

Compartmentation involves all measures to prevent or slow the spread of fire and smoke, including:

- Separations
- Fire walls
- Floors
- Doors
- Dampers
- Smoke control systems

Fire Suppression and Control

Fire suppression and control includes all automatic and manual fire protection installations, such as:

- Automatic sprinkler systems
- Manual portable extinguishers
- Fire hose reels

Emergency Response Plan

An Emergency Response Plan is a set of scenario-based procedures to assist staff and emergency response teams during real life emergency and training exercises. This chapter of the Fire and Life Safety Master Plan should include an assessment of local fire prevention and suppression capabilities.

Operation and Maintenance

Operation and Maintenance involves preparing schedules for mandatory regular maintenance and testing of life and fire safety features to ensure that mechanical, electrical, and civil structures and systems are at all times in conformance with life and fire safety design criteria and required operational readiness.

L&FS Master Plan Review and Approval

- A suitably qualified professional prepares and submits a Life and Fire Safety (L&FS) Master Plan, including preliminary drawings and specifications, and certifies that the design

meets the requirements of these L&FS guidelines. The findings and recommendations of the review are then used to establish the conditions of a Corrective Action Plan and a time frame for implementing the changes.

- The suitably qualified professional conducts a review as part of the project completion test at the time of life and fire safety systems testing and commissioning, and certifies that construction of these systems has been carried out in accordance with the accepted design. The findings and recommendations of the review are used as the basis for establishing project completion or to establish the conditions of a Pre-Completion Corrective Action Plan and a time frame for implementing the changes.

Specific Requirements for Existing Buildings

- All life and fire safety guideline requirements for new buildings apply to existing buildings programmed for renovation. A suitably qualified professional conducts a complete life and fire safety review of existing buildings slated for renovation. The findings and recommendations of the review are used as the basis to establish the scope of work of a Corrective Action Plan and a time frame for implementing the changes.
- If it becomes apparent that life and fire safety conditions are deficient in an existing building that is not part of the project or that has not been programmed for renovation, a life and fire safety review of the building may be conducted by a suitably qualified professional. The findings and recommendations of the review are used as the basis to establish the scope of work of a Corrective Action Plan and a time frame for implementing the changes.

Other Hazards

- Facilities, buildings, plants, and structures should be situated to minimize potential risks from forces of nature (e.g.

earthquakes, tsunamis, floods, windstorms, and fires from surrounding areas).

- All such structures should be designed in accordance with the criteria mandated by situation-, climatic-, and geology-specific location risks (e.g. seismic activity, wind loading, and other dynamic loads).
- Structural engineers and architects responsible for facilities, buildings, plants and structures should certify the applicability and appropriateness of the design criteria employed.
- National or regional building regulations typically contain fire safety codes and standards⁸³ or these standards are found in separate Fire Codes.^{84,85} Generally, such codes and regulations incorporate further compliance requirements with respect to methodology, practice, testing, and other codes and standards⁸⁶. Such nationally referenced material constitutes the acceptable fire life safety code.

3.4 Traffic Safety

Traffic accidents have become one of the most significant causes of injuries and fatalities among members of the public worldwide. Traffic safety should be promoted by all project personnel during displacement to and from the workplace, and during operation of project equipment on private or public roads. Prevention and control of traffic related injuries and fatalities should include the adoption of safety measures that are protective of project workers and of road users, including those who are most vulnerable to road traffic accidents⁸⁷. Road safety initiatives proportional to the scope and nature of project activities should include:

⁸³ For example, Australia, Canada, South Africa, United Kingdom

⁸⁴ Réglementation Incendie [des ERP]

⁸⁵ USA NFPA, 2006.

⁸⁶ Prepared by National Institutes and Authorities such as American Society for Testing and Materials (ASTM), British Standards (BS), German Institute of Standardization (DIN), and French Standards (NF)

⁸⁷ Additional information on vulnerable users of public roads in developing countries is provided by Peden et al., 2004.

- Adoption of best transport safety practices across all aspects of project operations with the goal of preventing traffic accidents and minimizing injuries suffered by project personnel and the public. Measures should include:
 - Emphasizing safety aspects among drivers
 - Improving driving skills and requiring licensing of drivers
 - Adopting limits for trip duration and arranging driver rosters to avoid overtiredness
 - Avoiding dangerous routes and times of day to reduce the risk of accidents
 - Use of speed control devices (governors) on trucks, and remote monitoring of driver actions
- Regular maintenance of vehicles and use of manufacturer approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.

Where the project may contribute to a significant increase in traffic along existing roads, or where road transport is a significant component of a project, recommended measures include:

- Minimizing pedestrian interaction with construction vehicles
- Collaboration with local communities and responsible authorities to improve signage, visibility and overall safety of roads, particularly along stretches located near schools or other locations where children may be present. Collaborating with local communities on education about traffic and pedestrian safety (e.g. school education campaigns)⁸⁸
- Coordination with emergency responders to ensure that appropriate first aid is provided in the event of accidents
- Using locally sourced materials, whenever possible, to minimize transport distances. Locating associated facilities such as worker camps close to project sites and arranging worker bus transport to minimizing external traffic

⁸⁸ Additional sources of information for implementation of road safety measures is available at WHO, 1989, Ross et al., 1991, Tsunokawa and Hoban, 1997, and OECD, 1999

- Employing safe traffic control measures, including road signs and flag persons to warn of dangerous conditions

3.5 Transport of Hazardous Materials

General Hazardous Materials Transport

- Projects should have procedures in place that ensure compliance with local laws and international requirements applicable to the transport of hazardous materials, including:
 - IATA requirements⁸⁹ for air transport
 - IMDG Code⁹⁰ sea transport
 - UN Model Regulations⁹¹ of other international standards as well as local requirements for land transport
 - Host-country commitments under the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and their disposal and Rotterdam Convention on the prior Inform Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, if applicable to the project activities
- The procedures for transportation of hazardous materials (Hazmats) should include:
 - Proper labeling of containers, including the identify and quantity of the contents, hazards, and shipper contact information
 - Providing a shipping document (e.g. shipping manifest) that describes the contents of the load and its associated hazards in addition to the labeling of the containers. The shipping document should establish a chain-of-custody using multiple signed copies to show that the waste was properly shipped, transported and received by the recycling or treatment/disposal facility

⁸⁹ IATA, 2005. www.iata.org

⁹⁰ IMO. www.imo.org/safety

⁹¹ United Nations. Transport of Dangerous Goods - Model Regulations. 14th Revised Edition. Geneva 2005. http://www.unece.org/trans/danger/publi/unrec/rev14/14files_e.html

- Ensuring that the volume, nature, integrity and protection of packaging and containers used for transport are appropriate for the type and quantity of hazardous material and modes of transport involved
- Ensuring adequate transport vehicle specifications
- Training employees involved in the transportation of hazardous materials regarding proper shipping procedures and emergency procedures
- Using labeling and placarding (external signs on transport vehicles), as required
- Providing the necessary means for emergency response on call 24 hours/day

Major Transportation Hazards

Guidance related to major transportation hazards should be implemented in addition to measures presented in the preceding section for preventing or minimizing the consequences of catastrophic releases of hazardous materials, which may result in toxic, fire, explosion, or other hazards during transportation.

In addition to these aforementioned procedures, projects which transport hazardous materials *at or above the threshold quantities*⁹² should prepare a Hazardous Materials Transportation Plan containing all of the elements presented below⁹³.

Hazard Assessment

The hazard assessment should identify the potential hazard involved in the transportation of hazardous materials by reviewing:

- The hazard characteristics of the substances identified during the screening stage
- The history of accidents, both by the company and its contractors, involving hazardous materials transportation

⁹² Threshold quantities for the transport of hazardous materials are found in the UN – Transport of Dangerous Goods – Model Regulations cited above.

⁹³ For further information and guidance, please refer to International Finance Corporation (IFC) Hazardous Materials Transportation Manual. Washington, D.C. December 2000.

- The existing criteria for the safe transportation of hazardous materials, including environmental management systems used by the company and its contractors

This review should cover the management actions, preventive measures and emergency response procedures described below. The hazard assessment helps to determine what additional measures may be required to complete the plan.

Management Actions

- *Management of Change:* These procedures should address:
 - The technical basis for changes in hazardous materials offered for transportation, routes and/or procedures
 - The potential impact of changes on health and safety
 - Modification required to operating procedures
 - Authorization requirements
 - Employees affected
 - Training needs
- *Compliance Audit:* A compliance audit evaluates compliance with prevention requirements for each transportation route or for each hazardous material, as appropriate. A compliance audit covering each element of the prevention measures (see below) should be conducted at least every three years. The audit program should include:
 - Preparation of a report of the findings
 - Determination and documentation of the appropriate response to each finding
 - Documentation that any deficiency has been corrected.
- *Incident Investigation:* Incidents can provide valuable information about transportation hazards and the steps needed to prevent accidental releases. The implementation of incident investigation procedures should ensure that:
 - Investigations are initiated promptly
 - Summaries of investigations are included in a report
 - Report findings and recommendations are addressed

- Reports are reviewed with staff and contractors
- *Employee Participation:* There should be a written plan of action regarding the implementation of active employee participation in the prevention of accidents.
- *Contractors:* The plan should include procedures to ensure that:
 - The contractor is provided with safety performance procedures and safety and hazard information
 - Contractors observe safety practices
 - Verify that the contractor acts responsiblyThe plan should also include additional procedures to ensure the contractors will:
 - Ensure appropriate training for their employees
 - Ensure their employees know process hazards and applicable emergency actions
 - Prepare and submit training records
 - Inform employees about the hazards presented by their work
- *Training:* Good training programs on operating procedures will provide the employees with the necessary information to understand how to operate safely and why safe operations are needed. The training program should include:
 - The list of employees to be trained
 - Specific training objectives
 - Mechanisms to achieve objectives (i.e. hands-on workshops, videos, etc.)
 - Means to determine the effectiveness of the training program
 - Training procedures for new hires and refresher programs

Preventive Measures

The plan should include procedures to implement preventive measures specific to each hazardous material offered for transportation, including:

- Classification and segregation of hazardous materials in warehouses and transport units
- Packaging and packaging testing
- Marking and labeling of packages containing hazardous materials
- Handling and securing packages containing hazardous materials in transport units
- Marking and placarding of transport units
- Documentation (e.g. bills of lading)
- Application of special provisions, as appropriate

Emergency Preparedness and Response

It is important to develop procedures and practices for the handling of hazardous materials that allow for quick and efficient responses to accidents that may result in injury or environmental damage. The sponsor should prepare an Emergency Preparedness and Response Plan that should cover:

- *Planning Coordination:* This should include procedures for:
 - Informing the public and emergency response agencies
 - Documenting first aid and emergency medical treatment
 - Taking emergency response actions
 - Reviewing and updating the emergency response plan to reflect changes and ensuring that the employees are informed of such changes
- *Emergency Equipment:* The plan should include procedures for using, inspecting, testing, and maintaining emergency response equipment.
- *Training:* Employees should be trained in any relevant procedures

3.6 Disease Prevention

Communicable Diseases

Communicable diseases pose a significant public health threat worldwide. Health hazards typically associated with large development projects are those relating to poor sanitation and living conditions, sexual transmission and vector-borne infections. Communicable diseases of most concern during the construction phase due to labor mobility are sexually-transmitted diseases (STDs), such as HIV/AIDS. Recognizing that no single measure is likely to be effective in the long term, successful initiatives typically involve a combination of behavioral and environmental modifications.

Recommended interventions at the project level include⁹⁴:

- Providing surveillance and active screening and treatment of workers
- Preventing illness among workers in local communities by:
 - Undertaking health awareness and education initiatives, for example, by implementing an information strategy to reinforce person-to-person counseling addressing systemic factors that can influence individual behavior as well as promoting individual protection, and protecting others from infection, by encouraging condom use
 - Training health workers in disease treatment
 - Conducting immunization programs for workers in local communities to improve health and guard against infection
 - Providing health services
- Providing treatment through standard case management in on-site or community health care facilities. Ensuring ready

access to medical treatment, confidentiality and appropriate care, particularly with respect to migrant workers

- Promoting collaboration with local authorities to enhance access of workers families and the community to public health services and promote immunization

Vector-Borne Diseases

Reducing the impact of vector-borne disease on the long-term health of workers is best accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease. Project sponsors, in close collaboration with community health authorities, can implement an integrated control strategy for mosquito and other arthropod-borne diseases that might involve:

- Prevention of larval and adult propagation through sanitary improvements and elimination of breeding habitats close to human settlements
- Elimination of unusable impounded water
- Increase in water velocity in natural and artificial channels
- Considering the application of residual insecticide to dormitory walls
- Implementation of integrated vector control programs
- Promoting use of repellents, clothing, netting, and other barriers to prevent insect bites
- Use of chemoprophylaxis drugs by non-immune workers and collaborating with public health officials to help eradicate disease reservoirs
- Monitoring and treatment of circulating and migrating populations to prevent disease reservoir spread
- Collaboration and exchange of in-kind services with other control programs in the project area to maximize beneficial effects
- Educating project personnel and area residents on risks, prevention, and available treatment
- Monitoring communities during high-risk seasons to detect and treat cases

⁹⁴ Additional sources of information on disease prevention include IFC, 2006; UNDP, 2000, 2003; Walley et al., 2000; Kindhauser, 2003; Heymann, 2004.

- Distributing appropriate education materials
- Following safety guidelines for the storage, transport, and distribution of pesticides to minimize the potential for misuse, spills, and accidental human exposure

3.7 Emergency Preparedness and Response

An emergency is an unplanned event when a project operation loses control, or could lose control, of a situation that may result in risks to human health, property, or the environment, either within the facility or in the local community. Emergencies do not normally include safe work practices for frequent upsets or events that are covered by occupational health and safety.

All projects should have an Emergency Preparedness and Response Plan that is commensurate with the risks of the facility and that includes the following basic elements:

- Administration (policy, purpose, distribution, definitions, etc)
- Organization of emergency areas (command centers, medical stations, etc)
- Roles and responsibilities
- Communication systems
- Emergency response procedures
- Emergency resources
- Training and updating
- Checklists (role and action list and equipment checklist)
- Business Continuity and Contingency

Additional information is provided for key components of the emergency plan, as follows below.

Communication Systems

Worker notification and communication

Alarm bells, visual alarms, or other forms of communication should be used to reliably alert workers to an emergency. Related measures include:

- Testing warning systems at least annually (fire alarms monthly), and more frequently if required by local regulations, equipment, or other considerations
- Installing a back-up system for communications on-site with off-site resources, such as fire departments, in the event that normal communication methods may be inoperable during an emergency

Community Notification

If a local community may be at risk from a potential emergency arising at the facility, the company should implement communication measures to alert the community, such as:

- Audible alarms, such as fire bells or sirens
- Fan out telephone call lists
- Vehicle mounted speakers
- Communicating details of the nature of the emergency
- Communicating protection options (evacuation, quarantine)
- Providing advise on selecting an appropriate protection option

Media and Agency Relations

Emergency information should be communicated to the media through:

- A trained, local spokesperson able to interact with relevant stakeholders, and offer guidance to the company for speaking to the media, government, and other agencies
- Written press releases with accurate information, appropriate level of detail for the emergency, and for which accuracy can be guaranteed

Emergency Resources

Finance and Emergency Funds

- A mechanism should be provided for funding emergency activities.

Fire Services

- The company should consider the level of local fire fighting capacity and whether equipment is available for use at the facility in the event of a major emergency or natural disaster. If insufficient capacity is available, fire fighting capacity should be acquired that may include pumps, water supplies, trucks, and training for personnel.

Medical Services

- The company should provide first aid attendants for the facility as well as medical equipment suitable for the personnel, type of operation, and the degree of treatment likely to be required prior to transportation to hospital.

Availability of Resources

Appropriate measures for managing the availability of resources in case of an emergency include:

- Maintaining a list of external equipment, personnel, facilities, funding, expert knowledge, and materials that may be required to respond to emergencies. The list should include personnel with specialized expertise for spill clean-up, flood control, engineering, water treatment, environmental science, etc., or any of the functions required to adequately respond to the identified emergency
- Providing personnel who can readily call up resources, as required
- Tracking and managing the costs associated with emergency resources

- Considering the quantity, response time, capability, limitations, and cost of these resources, for both site-specific emergencies, and community or regional emergencies
- Considering if external resources are unable to provide sufficient capacity during a regional emergency and whether additional resources may need to be maintained on-site

Mutual Aid

Mutual aid agreements decrease administrative confusion and provide a clear basis for response by mutual aid providers.

- Where appropriate, mutual aid agreements should be maintained with other organizations to allow for sharing of personnel and specialized equipment.

Contact List

- The company should develop a list of contact information for all internal and external resources and personnel. The list should include the name, description, location, and contact details (telephone, email) for each of the resources, and be maintained annually.

Training and Updating

The emergency preparedness facilities and emergency response plans require maintenance, review, and updating to account for changes in equipment, personnel, and facilities. Training programs and practice exercises provide for testing systems to ensure an adequate level of emergency preparedness. Programs should:

- Identify training needs based on the roles and responsibilities, capabilities and requirements of personnel in an emergency
- Develop a training plan to address needs, particularly for fire fighting, spill response, and evacuation

- Conduct annual training, at least, and perhaps more frequent training when the response includes specialized equipment, procedures, or hazards, or when otherwise mandated
- Provide training exercises to allow personnel the opportunity to test emergency preparedness, including:
 - Desk top exercises with only a few personnel, where the contact lists are tested and the facilities and communication assessed
 - Response exercises, typically involving drills that allow for testing of equipment and logistics
 - Debrief upon completion of a training exercise to assess what worked well and what aspects require improvement
 - Update the plan, as required, after each exercise. Elements of the plan subject to significant change (such as contact lists) should be replaced
 - Record training activities and the outcomes of the training

Business Continuity and Contingency

Measures to address business continuity and contingency include:

- Identifying replacement supplies or facilities to allow business continuity following an emergency. For example, alternate sources of water, electricity, and fuel are commonly sought.
- Using redundant or duplicate supply systems as part of facility operations to increase the likelihood of business continuity.
- Maintaining back-ups of critical information in a secure location to expedite the return to normal operations following an emergency.

4.0 Construction and Decommissioning

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Applicability and Approach

This section provides additional, specific guidance on prevention and control of community health and safety impacts that may occur during new project development, at the end of the project life-cycle, or due to expansion or modification of existing project facilities. Cross referencing is made to various other sections of the General EHS Guidelines.

4.1 Environment{ TC "4.1 Environment" \f C \l "2" }

Noise and Vibration

During construction and decommissioning activities, noise and vibration may be caused by the operation of pile drivers, earth moving and excavation equipment, concrete mixers, cranes and the transportation of equipment, materials and people. Some recommended noise reduction and control strategies to consider in areas close to community areas include:

- Planning activities in consultation with local communities so that activities with the greatest potential to generate noise are

planned during periods of the day that will result in least disturbance

- Using noise control devices, such as temporary noise barriers and deflectors for impact and blasting activities, and exhaust muffling devices for combustion engines.
- Avoiding or minimizing project transportation through community areas

Soil Erosion

Soil erosion may be caused by exposure of soil surfaces to rain and wind during site clearing, earth moving, and excavation activities. The mobilization and transport of soil particles may, in turn, result in sedimentation of surface drainage networks, which may result in impacts to the quality of natural water systems and ultimately the biological systems that use these waters.

Recommended soil erosion and water system management approaches include:

Sediment mobilization and transport

- Reducing or preventing erosion by:
 - Scheduling to avoid heavy rainfall periods (i.e., during the dry season) to the extent practical
 - Contouring and minimizing length and steepness of slopes
 - Mulching to stabilize exposed areas
 - Re-vegetating areas promptly
 - Designing channels and ditches for post-construction flows
 - Lining steep channel and slopes (e.g. use jute matting)
- Reducing or preventing off-site sediment transport through use of settlement ponds, silt fences, and water treatment, and modifying or suspending activities during extreme rainfall and high winds to the extent practical.

Clean runoff management

- Segregating or diverting clean water runoff to prevent it mixing with water containing a high solids content, to minimize the volume of water to be treated prior to release

Road design

- Limiting access road gradients to reduce runoff-induced erosion
- Providing adequate road drainage based on road width, surface material, compaction, and maintenance

Disturbance to water bodies

- Depending on the potential for adverse impacts, installing free-spanning structures (e.g., single span bridges) for road watercourse crossings
- Restricting the duration and timing of in-stream activities to lower low periods, and avoiding periods critical to biological cycles of valued flora and fauna (e.g., migration, spawning, etc.)
- For in-stream works, using isolation techniques such as berming or diversion during construction to limit the exposure of disturbed sediments to moving water
- Consider using trenchless technology for pipeline crossings (e.g., suspended crossings) or installation by directional drilling

Structural (slope) stability

- Providing effective short term measures for slope stabilization, sediment control and subsidence control until long term measures for the operational phase can be implemented
- Providing adequate drainage systems to minimize and control infiltration

Air Quality

Construction and decommissioning activities may generate emission of fugitive dust caused by a combination of on-site excavation and movement of earth materials, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind. A secondary source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of solid waste on-site. Techniques to consider for the reduction and control of air emissions from construction and decommissioning sites include:

- Minimizing dust from material handling sources, such as conveyors and bins, by using covers and/or control equipment (water suppression, bag house, or cyclone)
- Minimizing dust from open area sources, including storage piles, by using control measures such as installing enclosures and covers, and increasing the moisture content
- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- Selectively removing potential hazardous air pollutants, such as asbestos, from existing infrastructure prior to demolition
- Managing emissions from mobile sources according to Section 1.1
- Avoiding open burning of solid (refer to solid waste management guidance in Section 1.6)

Solid Waste

Non-hazardous solid waste generated at construction and decommissioning sites includes excess fill materials from grading and excavation activities, scrap wood and metals, and small concrete spills. Other non-hazardous solid wastes include office, kitchen, and dormitory wastes when these types of operations are part of construction project activities. *Hazardous solid waste* includes contaminated soils, which could potentially be encountered on-site due to previous land use activities, or small

amounts of machinery maintenance materials, such as oily rags, used oil filters, and used oil, as well as spill cleanup materials from oil and fuel spills. Techniques for preventing and controlling non-hazardous and hazardous construction site solid waste include those already discussed in Section 1.6.

Hazardous Materials

Construction and decommissioning activities may pose the potential for release of petroleum based products, such as lubricants, hydraulic fluids, or fuels during their storage, transfer, or use in equipment. These materials may also be encountered during decommissioning activities in building components or industrial process equipment. Techniques for prevention, minimization, and control of these impacts include:

- Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids,
- Using impervious surfaces for refueling areas and other fluid transfer areas
- Training workers on the correct transfer and handling of fuels and chemicals and the response to spills
- Providing portable spill containment and cleanup equipment on site and training in the equipment deployment
- Assessing the contents of hazardous materials and petroleum-based products in building systems (e.g. PCB containing electrical equipment, asbestos-containing building materials) and process equipment and removing them prior to initiation of decommissioning activities, and managing their treatment and disposal according to Sections 1.5 and 1.6 on Hazardous Materials and Hazardous Waste Management, respectively
- Assessing the presence of hazardous substances in or on building materials (e.g., polychlorinated biphenyls, asbestos-containing flooring or insulation) and decontaminating or properly managing contaminated building materials

Wastewater Discharges

Construction and decommissioning activities may include the generation of sanitary wastewater discharges in varying quantities depending on the number of workers involved. Adequate portable or permanent sanitation facilities serving all workers should be provided at all construction sites. Sanitary wastewater in construction and other sites should be managed as described in Section 1.3.

Contaminated Land

Land contamination may be encountered in sites under construction or decommissioning due to known or unknown historical releases of hazardous materials or oil, or due to the presence of abandoned infrastructure formerly used to store or handle these materials, including underground storage tanks. Actions necessary to manage the risk from contaminated land will depend on factors such as the level and location of contamination, the type and risks of the contaminated media, and the intended land use. However, a basic management strategy should include:

- Managing contaminated media with the objective of protecting the safety and health of occupants of the site, the surrounding community, and the environment post construction or post decommissioning
- Understanding the historical use of the land with regard to the potential presence of hazardous materials or oil prior to initiation of construction or decommissioning activities
- Preparing plans and procedures to respond to the discovery of contaminated media to minimize or reduce the risk to health, safety, and the environment consistent with the approach for Contaminated Land in Section 1.6
- Preparation of a management plan to manage obsolete, abandoned, hazardous materials or oil consistent with the approach to hazardous waste management described in Section 1.6.

Successful implementation of any management strategy may require identification and cooperation with whoever is responsible and liable for the contamination.

4.2 Occupational Health and Safety

TC "4.2 Occupational Health and Safety" \f C \l "2" }

Over-exertion

Over-exertion, and ergonomic injuries and illnesses, such as repetitive motion, over-exertion, and manual handling, are among the most common causes of injuries in construction and decommissioning sites. Recommendations for their prevention and control include:

- Training of workers in lifting and materials handling techniques in construction and decommissioning projects, including the placement of weight limits above which mechanical assists or two-person lifts are necessary
- Planning work site layout to minimize the need for manual transfer of heavy loads
- Selecting tools and designing work stations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable work stations
- Implementing administrative controls into work processes, such as job rotations and rest or stretch breaks

Slips and Falls

Slips and falls on the same elevation associated with poor housekeeping, such as excessive waste debris, loose construction materials, liquid spills, and uncontrolled use of electrical cords and ropes on the ground, are also among the most frequent cause of lost time accidents at construction and decommissioning sites.

Recommended methods for the prevention of slips and falls from, or on, the same elevation include:

- Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths
- Cleaning up excessive waste debris and liquid spills regularly
- Locating electrical cords and ropes in common areas and marked corridors
- Use of slip retardant footwear

Work in Heights

Falls from elevation associated with working with ladders, scaffolding, and partially built or demolished structures are among the most common cause of fatal or permanent disabling injury at construction or decommissioning sites. If fall hazards exist, a fall protection plan should be in place which includes one or more of the following aspects, depending on the nature of the fall hazard⁹⁵:

- Training and use of temporary fall prevention devices, such as rails or other barriers able to support a weight of 200 pounds, when working at heights equal or greater than two meters or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface
- Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards able to support 5000 pounds (also described in this section in Working at Heights above), as well as fall rescue procedures to deal with workers whose fall has been successfully arrested. The tie in point of the fall arresting system should also be able to support 5000 pounds
- Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as

⁹⁵ Additional information on identification of fall hazards and design of protection systems can be found in the United States Occupational Health and Safety Administration's (US OSHA) web site: <http://www.osha.gov/SLTC/fallprotection/index.html>

securing, marking, and labeling covers for openings in floors, roofs, or walking surfaces

Struck By Objects

Construction and demolition activities may pose significant hazards related to the potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes, and extremities. Techniques for the prevention and control of these hazards include:

- Using a designated and restricted waste drop or discharge zones, and/or a chute for safe movement of wastes from upper to lower levels
- Conducting sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable
- Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap
- Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as hand rails and toe boards to prevent materials from being dislodged
- Evacuating work areas during blasting operations, and using blast mats or other means of deflection to minimize fly rock or ejection of demolition debris if work is conducted in proximity to people or structures
- Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes

Moving Machinery

Vehicle traffic and use of lifting equipment in the movement of machinery and materials on a construction site may pose temporary hazards, such as physical contact, spills, dust, emissions, and noise. Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle. Center-articulated vehicles create a significant impact or crush hazard zone on the outboard side of

a turn while moving. Techniques for the prevention and control of these impacts include:

- Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic
- Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle
- Ensuring moving equipment is outfitted with audible back-up alarms
- Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.

Dust

- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- PPE, such as dusk masks, should be used where dust levels are excessive

Confined Spaces and Excavations

Examples of confined spaces that may be present in construction or demolition sites include: silos, vats, hoppers, utility vaults, tanks, sewers, pipes, and access shafts. Ditches and trenches may also be considered a confined space when access or egress is limited. In addition to the guidance provided in Section 2.8 the occupational hazards associated with confined spaces and excavations in construction and decommissioning sites should be prevented according to the following recommendations:

- Controlling site-specific factors which may contribute to excavation slope instability including, for example, the use of excavation dewatering, side-walls support, and slope gradient adjustments that eliminate or minimize the risk of collapse, entrapment, or drowning
- Providing safe means of access and egress from excavations, such as graded slopes, graded access route, or stairs and ladders
- Avoiding the operation of combustion equipment for prolonged periods inside excavations areas where other workers are required to enter unless the area is actively ventilated

Other Site Hazards

Construction and decommissioning sites may pose a risk of exposure to dust, chemicals, hazardous or flammable materials, and wastes in a combination of liquid, solid, or gaseous forms, which should be prevented through the implementation of project-specific plans and other applicable management practices, including:

- Use of specially trained personnel to identify and remove waste materials from tanks, vessels, processing equipment or contaminated land as a first step in decommissioning activities to allow for safe excavation, construction, dismantling or demolition
- Use of specially trained personnel to identify and selectively remove potentially hazardous materials in building elements prior to dismantling or demolition including, for example, insulation or structural elements containing asbestos and Polychlorinated Biphenyls (PCBs), electrical components containing mercury⁹⁶
- Use of waste-specific PPE based on the results of an occupational health and safety assessment, including

respirators, clothing/protective suits, gloves and eye protection

4.3 Community Health and Safety{ TC "4.3 Community Health and Safety" \f C \l "2" }

General Site Hazards

Projects should implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning. Risks may arise from inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards. Risk management strategies may include:

- Restricting access to the site, through a combination of institutional and administrative controls, with a focus on high risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the local community
- Removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials

Disease Prevention

Increased incidence of communicable and vector-borne diseases attributable to construction activities represents a potentially serious health threat to project personnel and residents of local communities. Recommendations for the prevention and control of communicable and vector-borne diseases also applicable to

⁹⁶ Additional information on the management and removal of asbestos containing building materials can be found in ASTM Standard E2356 and E1368

construction phase activities are provided in Section 3.6 (Disease Prevention).

Traffic Safety

Construction activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers and local communities. The incidence of road accidents involving project vehicles during construction should be minimized through a combination of education and awareness-raising, and the adoption of procedures described in Section 3.4 (Traffic Safety).

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Overview of Performance Standards on Environmental and Social Sustainability

1. IFC's Sustainability Framework articulates the Corporation's strategic commitment to sustainable development, and is an integral part of IFC's approach to risk management. The Sustainability Framework comprises IFC's Policy and Performance Standards on Environmental and Social Sustainability, and IFC's Access to Information Policy. The Policy on Environmental and Social Sustainability describes IFC's commitments, roles, and responsibilities related to environmental and social sustainability. IFC's Access to Information Policy reflects IFC's commitment to transparency and good governance on its operations, and outlines the Corporation's institutional disclosure obligations regarding its investment and advisory services. The Performance Standards are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities. In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the Performance Standards to manage environmental and social risks and impacts so that development opportunities are enhanced. IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation in order to achieve its overall development objectives. The Performance Standards may also be applied by other financial institutions.

2. Together, the eight Performance Standards establish standards that the client¹ is to meet throughout the life of an investment by IFC:

Performance Standard 1:	Assessment and Management of Environmental and Social Risks and Impacts
Performance Standard 2:	Labor and Working Conditions
Performance Standard 3:	Resource Efficiency and Pollution Prevention
Performance Standard 4:	Community Health, Safety, and Security
Performance Standard 5:	Land Acquisition and Involuntary Resettlement
Performance Standard 6:	Biodiversity Conservation and Sustainable Management of Living Natural Resources
Performance Standard 7:	Indigenous Peoples
Performance Standard 8:	Cultural Heritage

3. Performance Standard 1 establishes the importance of (i) integrated assessment to identify the environmental and social impacts, risks, and opportunities of projects; (ii) effective community engagement through disclosure of project-related information and consultation with local communities on matters that directly affect them; and (iii) the client's management of environmental and social performance throughout the life of the project. Performance Standards 2 through 8 establish objectives and requirements to avoid, minimize, and where residual impacts remain, to compensate/offset for risks and impacts to workers, Affected Communities, and the environment. While all relevant environmental and social risks and potential impacts should be considered as part of the assessment, Performance Standards 2 through 8 describe potential environmental and social risks and impacts that require particular attention. Where environmental or social risks and impacts

¹ The term "client" is used throughout the Performance Standards broadly to refer to the party responsible for implementing and operating the project that is being financed, or the recipient of the financing, depending on the project structure and type of financing. The term "project" is defined in Performance Standard 1.

are identified, the client is required to manage them through its Environmental and Social Management System (ESMS) consistent with Performance Standard 1.

4. Performance Standard 1 applies to all projects that have environmental and social risks and impacts. Depending on project circumstances, other Performance Standards may apply as well. The Performance Standards should be read together and cross-referenced as needed. The requirements section of each Performance Standard applies to all activities financed under the project, unless otherwise noted in the specific limitations described in each paragraph. Clients are encouraged to apply the ESMS developed under Performance Standard 1 to all their project activities, regardless of financing source. A number of cross-cutting topics such as climate change, gender, human rights, and water, are addressed across multiple Performance Standards.

5. In addition to meeting the requirements under the Performance Standards, clients must comply with applicable national law, including those laws implementing host country obligations under international law.

6. The World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) are technical reference documents with general and industry-specific examples of good international industry practice. IFC uses the EHS Guidelines as a technical source of information during project appraisal. The EHS Guidelines contain the performance levels and measures that are normally acceptable to IFC, and that are generally considered to be achievable in new facilities at reasonable costs by existing technology. For IFC-financed projects, application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets with an appropriate timetable for achieving them. The environmental assessment process may recommend alternative (higher or lower) levels or measures, which, if acceptable to IFC, become project- or site-specific requirements. The General EHS Guideline contains information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. It should be used together with the relevant industry sector guideline(s). The EHS Guidelines may be occasionally updated.

7. When host country regulations differ from the levels and measures presented in the EHS Guidelines, projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is needed as part of the site-specific environmental assessment. This justification should demonstrate that the choice for any alternative performance level is protective of human health and the environment.

8. A set of eight Guidance Notes, corresponding to each Performance Standard, and an additional Interpretation Note on Financial Intermediaries offer guidance on the requirements contained in the Performance Standards, including reference materials, and on good sustainability practices to help clients improve project performance. These Guidance/Interpretation Notes may be occasionally updated.

Introduction

1. Performance Standard 1 underscores the importance of managing environmental and social performance throughout the life of a project. An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders.¹ Drawing on the elements of the established business management process of “plan, do, check, and act,” the ESMS entails a methodological approach to managing environmental and social risks² and impacts³ in a structured way on an ongoing basis. A good ESMS appropriate to the nature and scale of the project promotes sound and sustainable environmental and social performance, and can lead to improved financial, social, and environmental outcomes.

2. At times, the assessment and management of certain environmental and social risks and impacts may be the responsibility of the government or other third parties over which the client does not have control or influence.⁴ Examples of where this may happen include: (i) when early planning decisions are made by the government or third parties which affect the project site selection and/or design; and/or (ii) when specific actions directly related to the project are carried out by the government or third parties such as providing land for a project which may have previously involved the resettlement of communities or individuals and/or leading to loss of biodiversity. While the client cannot control these government or third party actions, an effective ESMS should identify the different entities involved and the roles they play, the corresponding risks they present to the client, and opportunities to collaborate with these third parties in order to help achieve environmental and social outcomes that are consistent with the Performance Standards. In addition, this Performance Standard supports the use of an effective grievance mechanism that can facilitate early indication of, and prompt remediation for those who believe that they have been harmed by a client's actions.

3. Business should respect human rights, which means to avoid infringing on the human rights of others and address adverse human rights impacts business may cause or contribute to. Each of the Performance Standards has elements related to human rights dimensions that a project may face in the course of its operations. Due diligence against these Performance Standards will enable the client to address many relevant human rights issues in its project.

Objectives

- To identify and evaluate environmental and social risks and impacts of the project.
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize,⁵ and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment.

¹ Other stakeholders are those not directly affected by the project but that have an interest in it. These could include national and local authorities, neighboring projects, and/or nongovernmental organizations.

² Environmental and social risk is a combination of the probability of certain hazard occurrences and the severity of impacts resulting from such an occurrence.

³ Environmental and social impacts refer to any change, potential or actual, to (i) the physical, natural, or cultural environment, and (ii) impacts on surrounding community and workers, resulting from the business activity to be supported.

⁴ Contractors retained by, or acting on behalf of the client(s), are considered to be under direct control of the client and not considered third parties for the purposes of this Performance Standard.

⁵ Acceptable options to minimize will vary and include: abate, rectify, repair, and/or restore impacts, as appropriate. The risk and impact mitigation hierarchy is further discussed and specified in the context of Performance Standards 2 through 8, where relevant.

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- To promote improved environmental and social performance of clients through the effective use of management systems.
- To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately.
- To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.

Scope of Application

4. This Performance Standard applies to business activities with environmental and/or social risks and/or impacts. For the purposes of this Performance Standard, the term “project” refers to a defined set of business activities, including those where specific physical elements, aspects, and facilities likely to generate risks and impacts, have yet to be identified.⁶ Where applicable, this could include aspects from the early developmental stages through the entire life cycle (design, construction, commissioning, operation, decommissioning, closure or, where applicable, post-closure) of a physical asset.⁷ The requirements of this Performance Standard apply to all business activities unless otherwise noted in the specific limitations described in each of the paragraphs below.

Requirements

Environmental and Social Assessment and Management System

5. The client, in coordination with other responsible government agencies and third parties as appropriate,⁸ will conduct a process of environmental and social assessment, and establish and maintain an ESMS appropriate to the nature and scale of the project and commensurate with the level of its environmental and social risks and impacts. The ESMS will incorporate the following elements: (i) policy; (ii) identification of risks and impacts; (iii) management programs; (iv) organizational capacity and competency; (v) emergency preparedness and response; (vi) stakeholder engagement; and (vii) monitoring and review.

Policy

6. The client will establish an overarching policy defining the environmental and social objectives and principles that guide the project to achieve sound environmental and social performance.⁹ The policy provides a framework for the environmental and social assessment and management process, and specifies that the project (or business activities, as appropriate) will comply with the applicable laws and regulations of the jurisdictions in which it is being undertaken, including those laws implementing host country obligations under international law. The policy should be consistent with the principles of the Performance Standards. Under some circumstances, clients may also subscribe

⁶ For example, corporate entities which have portfolios of existing physical assets, and/or intend to develop or acquire new facilities, and investment funds or financial intermediaries with existing portfolios of assets and/or which intend to invest in new facilities.

⁷ Recognizing that this Performance Standard is used by a variety of financial institutions, investors, insurers, and owner/operators, each user should separately specify the business activities to which this Performance Standard should apply.

⁸ That is, those parties legally obligated and responsible for assessing and managing specific risks and impacts (e.g., government-led resettlement).

⁹ This requirement is a stand-alone, project-specific policy and is not intended to affect (or require alteration of) existing policies the client may have defined for non-related projects, business activities, or higher-level corporate activities.

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to other internationally recognized standards, certification schemes, or codes of practice and these too should be included in the policy. The policy will indicate who, within the client's organization, will ensure conformance with the policy and be responsible for its execution (with reference to an appropriate responsible government agency or third party, as necessary). The client will communicate the policy to all levels of its organization.

Identification of Risks and Impacts

7. The client will establish and maintain a process for identifying the environmental and social risks and impacts of the project (see paragraph 18 for competency requirements). The type, scale, and location of the project guide the scope and level of effort devoted to the risks and impacts identification process. The scope of the risks and impacts identification process will be consistent with good international industry practice,¹⁰ and will determine the appropriate and relevant methods and assessment tools. The process may comprise a full-scale environmental and social impact assessment, a limited or focused environmental and social assessment, or straightforward application of environmental siting, pollution standards, design criteria, or construction standards.¹¹ When the project involves existing assets, environmental and/or social audits or risk/hazard assessments can be appropriate and sufficient to identify risks and impacts. If assets to be developed, acquired or financed have yet to be defined, the establishment of an environmental and social due diligence process will identify risks and impacts at a point in the future when the physical elements, assets, and facilities are reasonably understood. The risks and impacts identification process will be based on recent environmental and social baseline data at an appropriate level of detail. The process will consider all relevant environmental and social risks and impacts of the project, including the issues identified in Performance Standards 2 through 8, and those who are likely to be affected by such risks and impacts.¹² The risks and impacts identification process will consider the emissions of greenhouse gases, the relevant risks associated with a changing climate and the adaptation opportunities, and potential transboundary effects, such as pollution of air, or use or pollution of international waterways.

8. Where the project involves specifically identified physical elements, aspects, and facilities that are likely to generate impacts, environmental and social risks and impacts will be identified in the context of the project's area of influence. This area of influence encompasses, as appropriate:

- The area likely to be affected by: (i) the project¹³ and the client's activities and facilities that are directly owned, operated or managed (including by contractors) and that are a component of the project;¹⁴ (ii) impacts from unplanned but predictable developments caused by the project that may occur later or at a different location; or (iii) indirect project impacts on biodiversity or on ecosystem services upon which Affected Communities' livelihoods are dependent.

¹⁰ Defined as the exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally or regionally.

¹¹ For greenfield developments or large expansions with specifically identified physical elements, aspects, and facilities that are likely to generate potential significant environmental or social impacts, the client will conduct a comprehensive Environmental and Social Impact Assessment, including an examination of alternatives, where appropriate.

¹² In limited high risk circumstances, it may be appropriate for the client to complement its environmental and social risks and impacts identification process with specific human rights due diligence as relevant to the particular business.

¹³ Examples include the project's sites, the immediate airshed and watershed, or transport corridors.

¹⁴ Examples include power transmission corridors, pipelines, canals, tunnels, relocation and access roads, borrow and disposal areas, construction camps, and contaminated land (e.g., soil, groundwater, surface water, and sediments).

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- Associated facilities, which are facilities that are not funded as part of the project and that would not have been constructed or expanded if the project did not exist and without which the project would not be viable.¹⁵
- Cumulative impacts¹⁶ that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted.

9. In the event of risks and impacts in the project's area of influence resulting from a third party's actions, the client will address those risks and impacts in a manner commensurate with the client's control and influence over the third parties, and with due regard to conflict of interest.

10. Where the client can reasonably exercise control, the risks and impacts identification process will also consider those risks and impacts associated with primary supply chains, as defined in Performance Standard 2 (paragraphs 27–29) and Performance Standard 6 (paragraph 30).

11. Where the project involves specifically identified physical elements, aspects and facilities that are likely to generate environmental and social impacts, the identification of risks and impacts will take into account the findings and conclusions of related and applicable plans, studies, or assessments prepared by relevant government authorities or other parties that are directly related to the project and its area of influence.¹⁷ These include master economic development plans, country or regional plans, feasibility studies, alternatives analyses, and cumulative, regional, sectoral, or strategic environmental assessments where relevant. The risks and impacts identification will take account of the outcome of the engagement process with Affected Communities as appropriate.

12. Where the project involves specifically identified physical elements, aspects and facilities that are likely to generate impacts, and as part of the process of identifying risks and impacts, the client will identify individuals and groups that may be directly and differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status.¹⁸ Where individuals or groups are identified as disadvantaged or vulnerable, the client will propose and implement differentiated measures so that adverse impacts do not fall disproportionately on them and they are not disadvantaged in sharing development benefits and opportunities.

Management Programs

13. Consistent with the client's policy and the objectives and principles described therein, the client will establish management programs that, in sum, will describe mitigation and performance improvement measures and actions that address the identified environmental and social risks and impacts of the project.

¹⁵ Associated facilities may include railways, roads, captive power plants or transmission lines, pipelines, utilities, warehouses, and logistics terminals.

¹⁶ Cumulative impacts are limited to those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities. Examples of cumulative impacts include: incremental contribution of gaseous emissions to an airshed; reduction of water flows in a watershed due to multiple withdrawals; increases in sediment loads to a watershed; interference with migratory routes or wildlife movement; or more traffic congestion and accidents due to increases in vehicular traffic on community roadways.

¹⁷ The client can take these into account by focusing on the project's incremental contribution to selected impacts generally recognized as important on the basis of scientific concern or concerns from the Affected Communities within the area addressed by these larger scope regional studies or cumulative assessments.

¹⁸ This disadvantaged or vulnerable status may stem from an individual's or group's race, color, sex, language, religion, political or other opinion, national or social origin, property, birth, or other status. The client should also consider factors such as gender, age, ethnicity, culture, literacy, sickness, physical or mental disability, poverty or economic disadvantage, and dependence on unique natural resources.

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14. Depending on the nature and scale of the project, these programs may consist of some documented combination of operational procedures, practices, plans, and related supporting documents (including legal agreements) that are managed in a systematic way.¹⁹ The programs may apply broadly across the client's organization, including contractors and primary suppliers over which the organization has control or influence, or to specific sites, facilities, or activities. The mitigation hierarchy to address identified risks and impacts will favor the avoidance of impacts over minimization, and, where residual impacts remain, compensation/offset, wherever technically²⁰ and financially feasible.²¹

15. Where the identified risks and impacts cannot be avoided, the client will identify mitigation and performance measures and establish corresponding actions to ensure the project will operate in compliance with applicable laws and regulations, and meet the requirements of Performance Standards 1 through 8. The level of detail and complexity of this collective management program and the priority of the identified measures and actions will be commensurate with the project's risks and impacts, and will take account of the outcome of the engagement process with Affected Communities as appropriate.

16. The management programs will establish environmental and social Action Plans,²² which will define desired outcomes and actions to address the issues raised in the risks and impacts identification process, as measurable events to the extent possible, with elements such as performance indicators, targets, or acceptance criteria that can be tracked over defined time periods, and with estimates of the resources and responsibilities for implementation. As appropriate, the management program will recognize and incorporate the role of relevant actions and events controlled by third parties to address identified risks and impacts. Recognizing the dynamic nature of the project, the management program will be responsive to changes in circumstances, unforeseen events, and the results of monitoring and review.

Organizational Capacity and Competency

17. The client, in collaboration with appropriate and relevant third parties, will establish, maintain, and strengthen as necessary an organizational structure that defines roles, responsibilities, and authority to implement the ESMS. Specific personnel, including management representative(s), with clear lines of responsibility and authority should be designated. Key environmental and social responsibilities should be well defined and communicated to the relevant personnel and to the rest of the client's organization. Sufficient management sponsorship and human and financial resources will be provided on an ongoing basis to achieve effective and continuous environmental and social performance.

¹⁹ Existing legal agreements between the client and third parties that address mitigation actions with regard to specific impacts constitute part of a program. Examples are government-managed resettlement responsibilities specified in an agreement.

²⁰ Technical feasibility is based on whether the proposed measures and actions can be implemented with commercially available skills, equipment, and materials, taking into consideration prevailing local factors such as climate, geography, demography, infrastructure, security, governance, capacity, and operational reliability.

²¹ Financial feasibility is based on commercial considerations, including relative magnitude of the incremental cost of adopting such measures and actions compared to the project's investment, operating, and maintenance costs, and on whether this incremental cost could make the project nonviable to the client.

²² Action plans may include an overall Environmental and Social Action Plan necessary for carrying out a suite of mitigation measures or thematic action plans, such as Resettlement Action Plans or Biodiversity Action Plans. Action plans may be plans designed to fill in the gaps of existing management programs to ensure consistency with the Performance Standards, or they may be stand alone plans that specify the project's mitigation strategy. The "Action plan" terminology is understood by some communities of practice to mean Management plans, or Development plans. In this case, examples are numerous and include various types of environmental and social management plans.

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18. Personnel within the client's organization with direct responsibility for the project's environmental and social performance will have the knowledge, skills, and experience necessary to perform their work, including current knowledge of the host country's regulatory requirements and the applicable requirements of Performance Standards 1 through 8. Personnel will also possess the knowledge, skills, and experience to implement the specific measures and actions required under the ESMS and the methods required to perform the actions in a competent and efficient manner.

19. The process of identification of risks and impacts will consist of an adequate, accurate, and objective evaluation and presentation, prepared by competent professionals. For projects posing potentially significant adverse impacts or where technically complex issues are involved, clients may be required to involve external experts to assist in the risks and impacts identification process.

Emergency Preparedness and Response

20. Where the project involves specifically identified physical elements, aspects and facilities that are likely to generate impacts, the ESMS will establish and maintain an emergency preparedness and response system so that the client, in collaboration with appropriate and relevant third parties, will be prepared to respond to accidental and emergency situations associated with the project in a manner appropriate to prevent and mitigate any harm to people and/or the environment. This preparation will include the identification of areas where accidents and emergency situations may occur, communities and individuals that may be impacted, response procedures, provision of equipment and resources, designation of responsibilities, communication, including that with potentially Affected Communities and periodic training to ensure effective response. The emergency preparedness and response activities will be periodically reviewed and revised, as necessary, to reflect changing conditions.

21. Where applicable, the client will also assist and collaborate with the potentially Affected Communities (see Performance Standard 4) and the local government agencies in their preparations to respond effectively to emergency situations, especially when their participation and collaboration are necessary to ensure effective response. If local government agencies have little or no capacity to respond effectively, the client will play an active role in preparing for and responding to emergencies associated with the project. The client will document its emergency preparedness and response activities, resources, and responsibilities, and will provide appropriate information to potentially Affected Community and relevant government agencies.

Monitoring and Review

22. The client will establish procedures to monitor and measure the effectiveness of the management program, as well as compliance with any related legal and/or contractual obligations and regulatory requirements. Where the government or other third party has responsibility for managing specific risks and impacts and associated mitigation measures, the client will collaborate in establishing and monitoring such mitigation measures. Where appropriate, clients will consider involving representatives from Affected Communities to participate in monitoring activities.²³ The client's monitoring program should be overseen by the appropriate level in the organization. For projects with significant impacts, the client will retain external experts to verify its monitoring information. The extent of monitoring should be commensurate with the project's environmental and social risks and impacts and with compliance requirements.

23. In addition to recording information to track performance and establishing relevant operational controls, the client should use dynamic mechanisms, such as internal inspections and audits, where relevant, to verify compliance and progress toward the desired outcomes. Monitoring will normally

²³ For example, participatory water monitoring.

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include recording information to track performance and comparing this against the previously established benchmarks or requirements in the management program. Monitoring should be adjusted according to performance experience and actions requested by relevant regulatory authorities. The client will document monitoring results and identify and reflect the necessary corrective and preventive actions in the amended management program and plans. The client, in collaboration with appropriate and relevant third parties, will implement these corrective and preventive actions, and follow up on these actions in upcoming monitoring cycles to ensure their effectiveness.

24. Senior management in the client organization will receive periodic performance reviews of the effectiveness of the ESMS, based on systematic data collection and analysis. The scope and frequency of such reporting will depend upon the nature and scope of the activities identified and undertaken in accordance with the client's ESMS and other applicable project requirements. Based on results within these performance reviews, senior management will take the necessary and appropriate steps to ensure the intent of the client's policy is met, that procedures, practices, and plans are being implemented, and are seen to be effective.

Stakeholder Engagement

25. Stakeholder engagement is the basis for building strong, constructive, and responsive relationships that are essential for the successful management of a project's environmental and social impacts.²⁴ Stakeholder engagement is an ongoing process that may involve, in varying degrees, the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism, and ongoing reporting to Affected Communities. The nature, frequency, and level of effort of stakeholder engagement may vary considerably and will be commensurate with the project's risks and adverse impacts, and the project's phase of development.

Stakeholder Analysis and Engagement Planning

26. Clients should identify the range of stakeholders that may be interested in their actions and consider how external communications might facilitate a dialog with all stakeholders (paragraph 34 below). Where projects involve specifically identified physical elements, aspects and/or facilities that are likely to generate adverse environmental and social impacts to Affected Communities the client will identify the Affected Communities and will meet the relevant requirements described below.

27. The client will develop and implement a Stakeholder Engagement Plan that is scaled to the project risks and impacts and development stage, and be tailored to the characteristics and interests of the Affected Communities. Where applicable, the Stakeholder Engagement Plan will include differentiated measures to allow the effective participation of those identified as disadvantaged or vulnerable. When the stakeholder engagement process depends substantially on community representatives,²⁵ the client will make every reasonable effort to verify that such persons do in fact represent the views of Affected Communities and that they can be relied upon to faithfully communicate the results of consultations to their constituents.

28. In cases where the exact location of the project is not known, but it is reasonably expected to have significant impacts on local communities, the client will prepare a Stakeholder Engagement Framework, as part of its management program, outlining general principles and a strategy to identify Affected Communities and other relevant stakeholders and plan for an engagement process

²⁴ Requirements regarding engagement of workers and related grievance redress procedures are found in Performance Standard 2.

²⁵ For example, community and religious leaders, local government representatives, civil society representatives, politicians, school teachers, and/or others representing one or more affected stakeholder groups.

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compatible with this Performance Standard that will be implemented once the physical location of the project is known.

Disclosure of Information

29. Disclosure of relevant project information helps Affected Communities and other stakeholders understand the risks, impacts and opportunities of the project. The client will provide Affected Communities with access to relevant information²⁶ on: (i) the purpose, nature, and scale of the project; (ii) the duration of proposed project activities; (iii) any risks to and potential impacts on such communities and relevant mitigation measures; (iv) the envisaged stakeholder engagement process; and (v) the grievance mechanism.

Consultation

30. When Affected Communities are subject to identified risks and adverse impacts from a project, the client will undertake a process of consultation in a manner that provides the Affected Communities with opportunities to express their views on project risks, impacts and mitigation measures, and allows the client to consider and respond to them. The extent and degree of engagement required by the consultation process should be commensurate with the project's risks and adverse impacts and with the concerns raised by the Affected Communities. Effective consultation is a two-way process that should: (i) begin early in the process of identification of environmental and social risks and impacts and continue on an ongoing basis as risks and impacts arise; (ii) be based on the prior disclosure and dissemination of relevant, transparent, objective, meaningful and easily accessible information which is in a culturally appropriate local language(s) and format and is understandable to Affected Communities; (iii) focus inclusive²⁷ engagement on those directly affected as opposed to those not directly affected; (iv) be free of external manipulation, interference, coercion, or intimidation; (v) enable meaningful participation, where applicable; and (vi) be documented. The client will tailor its consultation process to the language preferences of the Affected Communities, their decision-making process, and the needs of disadvantaged or vulnerable groups. If clients have already engaged in such a process, they will provide adequate documented evidence of such engagement.

Informed Consultation and Participation

31. For projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation (ICP) process that will build upon the steps outlined above in Consultation and will result in the Affected Communities' informed participation. ICP involves a more in-depth exchange of views and information, and an organized and iterative consultation, leading to the client's incorporating into their decision-making process the views of the Affected Communities on matters that affect them directly, such as the proposed mitigation measures, the sharing of development benefits and opportunities, and implementation issues. The consultation process should (i) capture both men's and women's views, if necessary through separate forums or engagements, and (ii) reflect men's and women's different concerns and priorities about impacts, mitigation mechanisms, and benefits, where appropriate. The client will document the process, in particular the measures taken to avoid or minimize risks to and adverse impacts on the

²⁶ Depending on the scale of the project and significance of the risks and impacts, relevant document(s) could range from full Environmental and Social Assessments and Action Plans (i.e., Stakeholder Engagement Plan, Resettlement Action Plans, Biodiversity Action Plans, Hazardous Materials Management Plans, Emergency Preparedness and Response Plans, Community Health and Safety Plans, Ecosystem Restoration Plans, and Indigenous Peoples Development Plans, etc.) to easy-to-understand summaries of key issues and commitments. These documents could also include the client's environmental and social policy and any supplemental measures and actions defined as a result of independent due diligence conducted by financiers.

²⁷ Such as men, women, the elderly, youth, displaced persons, and vulnerable and disadvantaged persons or groups.

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Affected Communities, and will inform those affected about how their concerns have been considered.

Indigenous Peoples

32. For projects with adverse impacts to Indigenous Peoples, the client is required to engage them in a process of ICP and in certain circumstances the client is required to obtain their Free, Prior, and Informed Consent (FPIC). The requirements related to Indigenous Peoples and the definition of the special circumstances requiring FPIC are described in Performance Standard 7.

Private Sector Responsibilities Under Government-Led Stakeholder Engagement

33. Where stakeholder engagement is the responsibility of the host government, the client will collaborate with the responsible government agency, to the extent permitted by the agency, to achieve outcomes that are consistent with the objectives of this Performance Standard. In addition, where government capacity is limited, the client will play an active role during the stakeholder engagement planning, implementation, and monitoring. If the process conducted by the government does not meet the relevant requirements of this Performance Standard, the client will conduct a complementary process and, where appropriate, identify supplemental actions.

External Communications and Grievance Mechanisms

External Communications

34. Clients will implement and maintain a procedure for external communications that includes methods to (i) receive and register external communications from the public; (ii) screen and assess the issues raised and determine how to address them; (iii) provide, track, and document responses, if any; and (iv) adjust the management program, as appropriate. In addition, clients are encouraged to make publicly available periodic reports on their environmental and social sustainability.

Grievance Mechanism for Affected Communities

35. Where there are Affected Communities, the client will establish a grievance mechanism to receive and facilitate resolution of Affected Communities' concerns and grievances about the client's environmental and social performance. The grievance mechanism should be scaled to the risks and adverse impacts of the project and have Affected Communities as its primary user. It should seek to resolve concerns promptly, using an understandable and transparent consultative process that is culturally appropriate and readily accessible, and at no cost and without retribution to the party that originated the issue or concern. The mechanism should not impede access to judicial or administrative remedies. The client will inform the Affected Communities about the mechanism in the course of the stakeholder engagement process.

Ongoing Reporting to Affected Communities

36. The client will provide periodic reports to the Affected Communities that describe progress with implementation of the project Action Plans on issues that involve ongoing risk to or impacts on Affected Communities and on issues that the consultation process or grievance mechanism have identified as a concern to those Communities. If the management program results in material changes in or additions to the mitigation measures or actions described in the Action Plans on issues of concern to the Affected Communities, the updated relevant mitigation measures or actions will be communicated to them. The frequency of these reports will be proportionate to the concerns of Affected Communities but not less than annually.

Introduction

1. Performance Standard 2 recognizes that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental¹ rights of workers. For any business, the workforce is a valuable asset, and a sound worker-management relationship is a key ingredient in the sustainability of a company. Failure to establish and foster a sound worker-management relationship can undermine worker commitment and retention, and can jeopardize a project. Conversely, through a constructive worker-management relationship, and by treating the workers fairly and providing them with safe and healthy working conditions, clients may create tangible benefits, such as enhancement of the efficiency and productivity of their operations.

2. The requirements set out in this Performance Standard have been in part guided by a number of international conventions and instruments, including those of the International Labour Organization (ILO) and the United Nations (UN).²

Objectives

- To promote the fair treatment, non-discrimination, and equal opportunity of workers.
- To establish, maintain, and improve the worker-management relationship.
- To promote compliance with national employment and labor laws.
- To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain.
- To promote safe and healthy working conditions, and the health of workers.
- To avoid the use of forced labor.

Scope of Application

3. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System (ESMS), the elements of which are outlined in Performance Standard 1.

4. The scope of application of this Performance Standard depends on the type of employment relationship between the client and the worker. It applies to workers directly engaged by the client (direct workers), workers engaged through third parties to perform work related to core business

¹ As guided by the ILO Conventions listed in footnote 2.

² These conventions are:

ILO Convention 87 on Freedom of Association and Protection of the Right to Organize

ILO Convention 98 on the Right to Organize and Collective Bargaining

ILO Convention 29 on Forced Labor

ILO Convention 105 on the Abolition of Forced Labor

ILO Convention 138 on Minimum Age (of Employment)

ILO Convention 182 on the Worst Forms of Child Labor

ILO Convention 100 on Equal Remuneration

ILO Convention 111 on Discrimination (Employment and Occupation)

UN Convention on the Rights of the Child, Article 32.1

UN Convention on the Protection of the Rights of all Migrant Workers and Members of their Families

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processes³ of the project for a substantial duration (contracted workers), as well as workers engaged by the client's primary suppliers (supply chain workers).⁴

Direct Workers

5. With respect to direct workers, the client will apply the requirements of paragraphs 8–23 of this Performance Standard.

Contracted Workers

6. With respect to contracted workers, the client will apply the requirements of paragraphs 23–26 of this Performance Standard.

Supply Chain Workers

7. With respect to supply chain workers, the client will apply the requirements of paragraphs 27–29 of this Performance Standard.

Requirements

Working Conditions and Management of Worker Relationship

Human Resources Policies and Procedures

8. The client will adopt and implement human resources policies and procedures appropriate to its size and workforce that set out its approach to managing workers consistent with the requirements of this Performance Standard and national law.

9. The client will provide workers with documented information that is clear and understandable, regarding their rights under national labor and employment law and any applicable collective agreements, including their rights related to hours of work, wages, overtime, compensation, and benefits upon beginning the working relationship and when any material changes occur.

Working Conditions and Terms of Employment

10. Where the client is a party to a collective bargaining agreement with a workers' organization, such agreement will be respected. Where such agreements do not exist, or do not address working conditions and terms of employment,⁵ the client will provide reasonable working conditions and terms of employment.⁶

11. The client will identify migrant workers and ensure that they are engaged on substantially equivalent terms and conditions to non-migrant workers carrying out similar work.

³ Core business processes constitute those production and/or service processes essential for a specific business activity without which the business activity could not continue.

⁴ Primary suppliers are those suppliers who, on an ongoing basis, provide goods or materials essential for the core business processes of the project.

⁵ Working conditions and terms of employment examples are wages and benefits; wage deductions; hours of work; overtime arrangements and overtime compensation; breaks; rest days; and leave for illness, maternity, vacation or holiday.

⁶ Reasonable working conditions and terms of employment could be assessed by reference to (i) conditions established for work of the same character in the trade or industry concerned in the area/region where the work is carried out; (ii) collective agreement or other recognized negotiation between other organizations of employers and workers' representatives in the trade or industry concerned; (iii) arbitration award; or (iv) conditions established by national law.

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12. Where accommodation services⁷ are provided to workers covered by the scope of this Performance Standard, the client will put in place and implement policies on the quality and management of the accommodation and provision of basic services.⁸ The accommodation services will be provided in a manner consistent with the principles of non-discrimination and equal opportunity. Workers' accommodation arrangements should not restrict workers' freedom of movement or of association.

Workers' Organizations

13. In countries where national law recognizes workers' rights to form and to join workers' organizations of their choosing without interference and to bargain collectively, the client will comply with national law. Where national law substantially restricts workers' organizations, the client will not restrict workers from developing alternative mechanisms to express their grievances and protect their rights regarding working conditions and terms of employment. The client should not seek to influence or control these mechanisms

14. In either case described in paragraph 13 of this Performance Standard, and where national law is silent, the client will not discourage workers from electing worker representatives, forming or joining workers' organizations of their choosing, or from bargaining collectively, and will not discriminate or retaliate against workers who participate, or seek to participate, in such organizations and collective bargaining. The client will engage with such workers' representatives and workers' organizations, and provide them with information needed for meaningful negotiation in a timely manner. Workers' organizations are expected to fairly represent the workers in the workforce.

Non-Discrimination and Equal Opportunity

15. The client will not make employment decisions on the basis of personal characteristics⁹ unrelated to inherent job requirements. The client will base the employment relationship on the principle of equal opportunity and fair treatment, and will not discriminate with respect to any aspects of the employment relationship, such as recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, promotion, termination of employment or retirement, and disciplinary practices. The client will take measures to prevent and address harassment, intimidation, and/or exploitation, especially in regard to women. The principles of non-discrimination apply to migrant workers.

16. In countries where national law provides for non-discrimination in employment, the client will comply with national law. When national laws are silent on non-discrimination in employment, the client will meet this Performance Standard. In circumstances where national law is inconsistent with this Performance Standard, the client is encouraged to carry out its operations consistent with the intent of paragraph 15 above without contravening applicable laws.

17. Special measures of protection or assistance to remedy past discrimination or selection for a particular job based on the inherent requirements of the job will not be deemed as discrimination, provided they are consistent with national law.

⁷ Those services might be provided either directly by the client or by third parties.

⁸ Basic services requirements refer to minimum space, supply of water, adequate sewage and garbage disposal system, appropriate protection against heat, cold, damp, noise, fire and disease-carrying animals, adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting, and in some cases basic medical services.

⁹ Such as gender, race, nationality, ethnic, social and indigenous origin, religion or belief, disability, age, or sexual orientation.

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Retrenchment

18. Prior to implementing any collective dismissals,¹⁰ the client will carry out an analysis of alternatives to retrenchment.¹¹ If the analysis does not identify viable alternatives to retrenchment, a retrenchment plan will be developed and implemented to reduce the adverse impacts of retrenchment on workers. The retrenchment plan will be based on the principle of non-discrimination and will reflect the client's consultation with workers, their organizations, and, where appropriate, the government, and comply with collective bargaining agreements if they exist. The client will comply with all legal and contractual requirements related to notification of public authorities, and provision of information to, and consultation with workers and their organizations.

19. The client should ensure that all workers receive notice of dismissal and severance payments mandated by law and collective agreements in a timely manner. All outstanding back pay and social security benefits and pension contributions and benefits will be paid (i) on or before termination of the working relationship to the workers, (ii) where appropriate, for the benefit of the workers, or (iii) payment will be made in accordance with a timeline agreed through a collective agreement. Where payments are made for the benefit of workers, workers will be provided with evidence of such payments.

Grievance Mechanism

20. The client will provide a grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns. The client will inform the workers of the grievance mechanism at the time of recruitment and make it easily accessible to them. The mechanism should involve an appropriate level of management and address concerns promptly, using an understandable and transparent process that provides timely feedback to those concerned, without any retribution. The mechanism should also allow for anonymous complaints to be raised and addressed. The mechanism should not impede access to other judicial or administrative remedies that might be available under the law or through existing arbitration procedures, or substitute for grievance mechanisms provided through collective agreements.

Protecting the Work Force

Child Labor

21. The client will not employ children in any manner that is economically exploitative, or is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development. The client will identify the presence of all persons under the age of 18. Where national laws have provisions for the employment of minors, the client will follow those laws applicable to the client. Children under the age of 18 will not be employed in hazardous work.¹² All work of persons under the age of 18 will be subject to an appropriate risk assessment and regular monitoring of health, working conditions, and hours of work.

¹⁰ Collective dismissals cover all multiple dismissals that are a result of an economic, technical, or organizational reason; or other reasons that are not related to performance or other personal reasons.

¹¹ Examples of alternatives may include negotiated working-time reduction programs, employee capacity-building programs; long-term maintenance works during low production periods, etc.

¹² Examples of hazardous work activities include work (i) with exposure to physical, psychological, or sexual abuse; (ii) underground, underwater, working at heights, or in confined spaces; (iii) with dangerous machinery, equipment, or tools, or involving handling of heavy loads; (iv) in unhealthy environments exposing the worker to hazardous substances, agents, processes, temperatures, noise, or vibration damaging to health; or (v) under difficult conditions such as long hours, late night, or confinement by employer.

Forced Labor

22. The client will not employ forced labor, which consists of any work or service not voluntarily performed that is exacted from an individual under threat of force or penalty. This covers any kind of involuntary or compulsory labor, such as indentured labor, bonded labor, or similar labor-contracting arrangements. The client will not employ trafficked persons.¹³

Occupational Health and Safety

23. The client will provide a safe and healthy work environment, taking into account inherent risks in its particular sector and specific classes of hazards in the client's work areas, including physical, chemical, biological, and radiological hazards, and specific threats to women. The client will take steps to prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, as far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice,¹⁴ as reflected in various internationally recognized sources including the World Bank Group Environmental, Health and Safety Guidelines, the client will address areas that include the (i) identification of potential hazards to workers, particularly those that may be life-threatening; (ii) provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) training of workers; (iv) documentation and reporting of occupational accidents, diseases, and incidents; and (v) emergency prevention, preparedness, and response arrangements. For additional information related to emergency preparedness and response refer to Performance Standard 1.

Workers Engaged by Third Parties

24. With respect to contracted workers the client will take commercially reasonable efforts to ascertain that the third parties who engage these workers are reputable and legitimate enterprises and have an appropriate ESMS that will allow them to operate in a manner consistent with the requirements of this Performance Standard, except for paragraphs 18–19, and 27–29.

25. The client will establish policies and procedures for managing and monitoring the performance of such third party employers in relation to the requirements of this Performance Standard. In addition, the client will use commercially reasonable efforts to incorporate these requirements in contractual agreements with such third party employers.

26. The client will ensure that contracted workers, covered in paragraphs 24–25 of this Performance Standard, have access to a grievance mechanism. In cases where the third party is not able to provide a grievance mechanism the client will extend its own grievance mechanism to serve workers engaged by the third party.

¹³ Trafficking in persons is defined as the recruitment, transportation, transfer, harboring, or receipt of persons, by means of the threat or use of force or other forms of coercion, abduction, fraud, deception, abuse of power, or of a position of vulnerability, or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation. Women and children are particularly vulnerable to trafficking practices.

¹⁴ Defined as the exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances, globally or regionally.

Supply Chain

27. Where there is a high risk of child labor or forced labor¹⁵ in the primary supply chain, the client will identify those risks consistent with paragraphs 21 and 22 above. If child labor or forced labor cases are identified, the client will take appropriate steps to remedy them. The client will monitor its primary supply chain on an ongoing basis in order to identify any significant changes in its supply chain and if new risks or incidents of child and/or forced labor are identified, the client will take appropriate steps to remedy them.

28. Additionally, where there is a high risk of significant safety issues related to supply chain workers, the client will introduce procedures and mitigation measures to ensure that primary suppliers within the supply chain are taking steps to prevent or to correct life-threatening situations.

29. The ability of the client to fully address these risks will depend upon the client's level of management control or influence over its primary suppliers. Where remedy is not possible, the client will shift the project's primary supply chain over time to suppliers that can demonstrate that they are complying with this Performance Standard.

¹⁵ The potential risk of child labor and forced labor will be determined during the risks and impacts identification process as required in Performance Standard 1.

Introduction

1. Performance Standard 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels.¹ There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. At the same time, more efficient and effective resource use and pollution prevention² and GHG emission avoidance and mitigation technologies and practices have become more accessible and achievable in virtually all parts of the world. These are often implemented through continuous improvement methodologies similar to those used to enhance quality or productivity, which are generally well known to most industrial, agricultural, and service sector companies.

2. This Performance Standard outlines a project-level approach to resource efficiency and pollution prevention and control in line with internationally disseminated technologies and practices. In addition, this Performance Standard promotes the ability of private sector companies to adopt such technologies and practices as far as their use is feasible in the context of a project that relies on commercially available skills and resources.

Objectives

- To avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing pollution from project activities.
- To promote more sustainable use of resources, including energy and water.
- To reduce project-related GHG emissions.

Scope of Application

3. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System, the elements of which are outlined in Performance Standard 1.

Requirements

4. During the project life-cycle, the client will consider ambient conditions and apply technically and financially feasible resource efficiency and pollution prevention principles and techniques that are best suited to avoid, or where avoidance is not possible, minimize adverse impacts on human health and the environment.³ The principles and techniques applied during the project life-cycle will be

¹ For the purposes of this Performance Standard, the term "pollution" is used to refer to both hazardous and non-hazardous chemical pollutants in the solid, liquid, or gaseous phases, and includes other components such as pests, pathogens, thermal discharge to water, GHG emissions, nuisance odors, noise, vibration, radiation, electromagnetic energy, and the creation of potential visual impacts including light.

² For the purpose of this Performance Standard, the term "pollution prevention" does not mean absolute elimination of emissions, but the avoidance at source whenever possible, and, if not possible, then subsequent minimization of pollution to the extent that the Performance Standard objectives are satisfied.

³ Technical feasibility is based on whether the proposed measures and actions can be implemented with commercially available skills, equipment, and materials, taking into consideration prevailing local factors such as climate, geography, infrastructure, security, governance, capacity and operational reliability. Financial feasibility is

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tailored to the hazards and risks associated with the nature of the project and consistent with good international industry practice (GIIP),⁴ as reflected in various internationally recognized sources, including the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines).

5. The client will refer to the EHS Guidelines or other internationally recognized sources, as appropriate, when evaluating and selecting resource efficiency and pollution prevention and control techniques for the project. The EHS Guidelines contain the performance levels and measures that are normally acceptable and applicable to projects. When host country regulations differ from the levels and measures presented in the EHS Guidelines, clients will be required to achieve whichever is more stringent. If less stringent levels or measures than those provided in the EHS Guidelines are appropriate in view of specific project circumstances, the client will provide full and detailed justification for any proposed alternatives through the environmental and social risks and impacts identification and assessment process. This justification must demonstrate that the choice for any alternate performance levels is consistent with the objectives of this Performance Standard.

Resource Efficiency

6. The client will implement technically and financially feasible and cost effective⁵ measures for improving efficiency in its consumption of energy, water, as well as other resources and material inputs, with a focus on areas that are considered core business activities. Such measures will integrate the principles of cleaner production into product design and production processes with the objective of conserving raw materials, energy, and water. Where benchmarking data are available, the client will make a comparison to establish the relative level of efficiency.

Greenhouse Gases

7. In addition to the resource efficiency measures described above, the client will consider alternatives and implement technically and financially feasible and cost-effective options to reduce project-related GHG emissions during the design and operation of the project. These options may include, but are not limited to, alternative project locations, adoption of renewable or low carbon energy sources, sustainable agricultural, forestry and livestock management practices, the reduction of fugitive emissions and the reduction of gas flaring.

8. For projects that are expected to or currently produce more than 25,000 tonnes of CO₂-equivalent annually,⁶ the client will quantify direct emissions from the facilities owned or controlled within the physical project boundary,⁷ as well as indirect emissions associated with the off-site

based on commercial considerations, including relative magnitude of the incremental cost of adopting such measures and actions compared to the project's investment, operating, and maintenance costs.

⁴ GIIP is defined as the exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally or regionally. The outcome of such exercise should be that the project employs the most appropriate technologies in the project-specific circumstances.

⁵ Cost-effectiveness is determined according to the capital and operational cost and financial benefits of the measure considered over the life of the measure. For the purpose of this Performance Standard, a resource efficiency or GHG emissions reduction measure is considered cost-effective if it is expected to provide a risk-rated return on investment at least comparable to the project itself.

⁶ The quantification of emissions should consider all significant sources of greenhouse gas emissions, including non-energy related sources such as methane and nitrous oxide, among others.

⁷ Project-induced changes in soil carbon content or above ground biomass, and project-induced decay of organic matter may contribute to direct emissions sources and shall be included in this emissions quantification where such emissions are expected to be significant.

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production of energy⁸ used by the project. Quantification of GHG emissions will be conducted by the client annually in accordance with internationally recognized methodologies and good practice.⁹

Water Consumption

9. When the project is a potentially significant consumer of water, in addition to applying the resource efficiency requirements of this Performance Standard, the client shall adopt measures that avoid or reduce water usage so that the project's water consumption does not have significant adverse impacts on others. These measures include, but are not limited to, the use of additional technically feasible water conservation measures within the client's operations, the use of alternative water supplies, water consumption offsets to reduce total demand for water resources to within the available supply, and evaluation of alternative project locations.

Pollution Prevention

10. The client will avoid the release of pollutants or, when avoidance is not feasible, minimize and/or control the intensity and mass flow of their release. This applies to the release of pollutants to air, water, and land due to routine, non-routine, and accidental circumstances with the potential for local, regional, and transboundary impacts.¹⁰ Where historical pollution such as land or ground water contamination exists, the client will seek to determine whether it is responsible for mitigation measures. If it is determined that the client is legally responsible, then these liabilities will be resolved in accordance with national law, or where this is silent, with GIIP.¹¹

11. To address potential adverse project impacts on existing ambient conditions,¹² the client will consider relevant factors, including, for example (i) existing ambient conditions; (ii) the finite assimilative capacity¹³ of the environment; (iii) existing and future land use; (iv) the project's proximity to areas of importance to biodiversity; and (v) the potential for cumulative impacts with uncertain and/or irreversible consequences. In addition to applying resource efficiency and pollution control measures as required in this Performance Standard, when the project has the potential to constitute a significant source of emissions in an already degraded area, the client will consider additional strategies and adopt measures that avoid or reduce negative effects. These strategies include, but are not limited to, evaluation of project location alternatives and emissions offsets.

Wastes

12. The client will avoid the generation of hazardous and non-hazardous waste materials. Where waste generation cannot be avoided, the client will reduce the generation of waste, and recover and reuse waste in a manner that is safe for human health and the environment. Where waste cannot be recovered or reused, the client will treat, destroy, or dispose of it in an environmentally sound manner that includes the appropriate control of emissions and residues resulting from the handling and processing of the waste material. If the generated waste is considered hazardous,¹⁴ the client will

⁸ Refers to the off-site generation by others of electricity, and heating and cooling energy used in the project.

⁹ Estimation methodologies are provided by the Intergovernmental Panel on Climate Change, various international organizations, and relevant host country agencies.

¹⁰ Transboundary pollutants include those covered under the Convention on Long-Range Transboundary Air Pollution.

¹¹ This may require coordination with national and local government, communities, and the contributors to the contamination, and that any assessment follows a risk-based approach consistent with GIIP as reflected in the EHS Guidelines.

¹² Such as air, surface and groundwater, and soils.

¹³ The capacity of the environment for absorbing an incremental load of pollutants while remaining below a threshold of unacceptable risk to human health and the environment.

¹⁴ As defined by international conventions or local legislation.

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adopt GIIP alternatives for its environmentally sound disposal while adhering to the limitations applicable to its transboundary movement.¹⁵ When hazardous waste disposal is conducted by third parties, the client will use contractors that are reputable and legitimate enterprises licensed by the relevant government regulatory agencies and obtain chain of custody documentation to the final destination. The client should ascertain whether licensed disposal sites are being operated to acceptable standards and where they are, the client will use these sites. Where this is not the case, clients should reduce waste sent to such sites and consider alternative disposal options, including the possibility of developing their own recovery or disposal facilities at the project site.

Hazardous Materials Management

13. Hazardous materials are sometimes used as raw material or produced as product by the project. The client will avoid or, when avoidance is not possible, minimize and control the release of hazardous materials. In this context, the production, transportation, handling, storage, and use of hazardous materials for project activities should be assessed. The client will consider less hazardous substitutes where hazardous materials are intended to be used in manufacturing processes or other operations. The client will avoid the manufacture, trade, and use of chemicals and hazardous materials subject to international bans or phase-outs due to their high toxicity to living organisms, environmental persistence, potential for bioaccumulation, or potential for depletion of the ozone layer.¹⁶

Pesticide Use and Management

14. The client will, where appropriate, formulate and implement an integrated pest management (IPM) and/or integrated vector management (IVM) approach targeting economically significant pest infestations and disease vectors of public health significance. The client's IPM and IVM program will integrate coordinated use of pest and environmental information along with available pest control methods, including cultural practices, biological, genetic, and, as a last resort, chemical means to prevent economically significant pest damage and/or disease transmission to humans and animals.

15. When pest management activities include the use of chemical pesticides, the client will select chemical pesticides that are low in human toxicity, that are known to be effective against the target species, and that have minimal effects on non-target species and the environment. When the client selects chemical pesticides, the selection will be based upon requirements that the pesticides be packaged in safe containers, be clearly labeled for safe and proper use, and that the pesticides have been manufactured by an entity currently licensed by relevant regulatory agencies.

16. The client will design its pesticide application regime to (i) avoid damage to natural enemies of the target pest, and where avoidance is not possible, minimize, and (ii) avoid the risks associated with the development of resistance in pests and vectors, and where avoidance is not possible minimize. In addition, pesticides will be handled, stored, applied, and disposed of in accordance with the Food and Agriculture Organization's International Code of Conduct on the Distribution and Use of Pesticides or other GIIP.

17. The client will not purchase, store, use, manufacture, or trade in products that fall in WHO Recommended Classification of Pesticides by Hazard Class Ia (extremely hazardous); or Ib (highly

¹⁵ Transboundary movement of hazardous materials should be consistent with national, regional and international law, including the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal and the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.

¹⁶ Consistent with the objectives of the Stockholm Convention on Persistent Organic Pollutants and the Montreal Protocol on Substances that Deplete the Ozone Layer. Similar considerations will apply to certain World Health Organization (WHO) classes of pesticides.



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hazardous). The client will not purchase, store, use, manufacture or trade in Class II (moderately hazardous) pesticides, unless the project has appropriate controls on manufacture, procurement, or distribution and/or use of these chemicals. These chemicals should not be accessible to personnel without proper training, equipment, and facilities to handle, store, apply, and dispose of these products properly.

Introduction

1. Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, communities that are already subjected to impacts from climate change may also experience an acceleration and/or intensification of impacts due to project activities. While acknowledging the public authorities' role in promoting the health, safety, and security of the public, this Performance Standard addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups.
2. In conflict and post-conflict areas, the level of risks and impacts described in this Performance Standard may be greater. The risks that a project could exacerbate an already sensitive local situation and stress scarce local resources should not be overlooked as it may lead to further conflict.

Objectives

- To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances.
- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

Scope of Application

3. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System, the elements of which are outlined in Performance Standard 1.
4. This Performance Standard addresses potential risks and impacts to the Affected Communities from project activities. Occupational health and safety requirements for workers are included in Performance Standard 2, and environmental standards to avoid or minimize impacts on human health and the environment due to pollution are included in Performance Standard 3.

Requirements

Community Health and Safety

5. The client will evaluate the risks and impacts to the health and safety of the Affected Communities during the project life-cycle and will establish preventive and control measures consistent with good international industry practice (GIIP),¹ such as in the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) or other internationally recognized sources. The client will identify risks and impacts and propose mitigation measures that are commensurate with their nature and magnitude. These measures will favor the avoidance of risks and impacts over minimization.

¹ Defined as the exercise of professional skill, diligence, prudence, and foresight that would reasonably be expected from skilled and experienced professionals engaged in the same type of undertaking under the same or similar circumstances globally or regionally.

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Infrastructure and Equipment Design and Safety

6. The client will design, construct, operate, and decommission the structural elements or components of the project in accordance with GIIP, taking into consideration safety risks to third parties or Affected Communities. When new buildings and structures will be accessed by members of the public, the client will consider incremental risks of the public's potential exposure to operational accidents and/or natural hazards and be consistent with the principles of universal access. Structural elements will be designed and constructed by competent professionals, and certified or approved by competent authorities or professionals. When structural elements or components, such as dams, tailings dams, or ash ponds are situated in high-risk locations, and their failure or malfunction may threaten the safety of communities, the client will engage one or more external experts with relevant and recognized experience in similar projects, separate from those responsible for the design and construction, to conduct a review as early as possible in project development and throughout the stages of project design, construction, operation, and decommissioning. For projects that operate moving equipment on public roads and other forms of infrastructure, the client will seek to avoid the occurrence of incidents and injuries to members of the public associated with the operation of such equipment.

Hazardous Materials Management and Safety

7. The client will avoid or minimize the potential for community exposure to hazardous materials and substances that may be released by the project. Where there is a potential for the public (including workers and their families) to be exposed to hazards, particularly those that may be life-threatening, the client will exercise special care to avoid or minimize their exposure by modifying, substituting, or eliminating the condition or material causing the potential hazards. Where hazardous materials are part of existing project infrastructure or components, the client will exercise special care when conducting decommissioning activities in order to avoid exposure to the community. The client will exercise commercially reasonable efforts to control the safety of deliveries of hazardous materials, and of transportation and disposal of hazardous wastes, and will implement measures to avoid or control community exposure to pesticides, in accordance with the requirements of Performance Standard 3.

Ecosystem Services

8. The project's direct impacts on priority ecosystem services may result in adverse health and safety risks and impacts to Affected Communities. With respect to this Performance Standard, ecosystem services are limited to provisioning and regulating services as defined in paragraph 2 of Performance Standard 6. For example, land use changes or the loss of natural buffer areas such as wetlands, mangroves, and upland forests that mitigate the effects of natural hazards such as flooding, landslides, and fire, may result in increased vulnerability and community safety-related risks and impacts. The diminution or degradation of natural resources, such as adverse impacts on the quality, quantity, and availability of freshwater,² may result in health-related risks and impacts. Where appropriate and feasible, the client will identify those risks and potential impacts on priority ecosystem services that may be exacerbated by climate change. Adverse impacts should be avoided, and if these impacts are unavoidable, the client will implement mitigation measures in accordance with paragraphs 24 and 25 of Performance Standard 6. With respect to the use of and loss of access to provisioning services, clients will implement mitigation measures in accordance with paragraphs 25–29 of Performance Standard 5.

² Freshwater is an example of provisioning ecosystem services.

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Community Exposure to Disease

9. The client will avoid or minimize the potential for community exposure to water-borne, water-based, water-related, and vector-borne diseases, and communicable diseases that could result from project activities, taking into consideration differentiated exposure to and higher sensitivity of vulnerable groups. Where specific diseases are endemic in communities in the project area of influence, the client is encouraged to explore opportunities during the project life-cycle to improve environmental conditions that could help minimize their incidence.

10. The client will avoid or minimize transmission of communicable diseases that may be associated with the influx of temporary or permanent project labor.

Emergency Preparedness and Response

11. In addition to the emergency preparedness and response requirements described in Performance Standard 1, the client will also assist and collaborate with the Affected Communities, local government agencies, and other relevant parties, in their preparations to respond effectively to emergency situations, especially when their participation and collaboration are necessary to respond to such emergency situations. If local government agencies have little or no capacity to respond effectively, the client will play an active role in preparing for and responding to emergencies associated with the project. The client will document its emergency preparedness and response activities, resources, and responsibilities, and will disclose appropriate information to Affected Communities, relevant government agencies, or other relevant parties.

Security Personnel

12. When the client retains direct or contracted workers to provide security to safeguard its personnel and property, it will assess risks posed by its security arrangements to those within and outside the project site. In making such arrangements, the client will be guided by the principles of proportionality and good international practice³ in relation to hiring, rules of conduct, training, equipping, and monitoring of such workers, and by applicable law. The client will make reasonable inquiries to ensure that those providing security are not implicated in past abuses; will train them adequately in the use of force (and where applicable, firearms), and appropriate conduct toward workers and Affected Communities; and require them to act within the applicable law. The client will not sanction any use of force except when used for preventive and defensive purposes in proportion to the nature and extent of the threat. The client will provide a grievance mechanism for Affected Communities to express concerns about the security arrangements and acts of security personnel.

13. The client will assess and document risks arising from the project's use of government security personnel deployed to provide security services. The client will seek to ensure that security personnel will act in a manner consistent with paragraph 12 above, and encourage the relevant public authorities to disclose the security arrangements for the client's facilities to the public, subject to overriding security concerns.

14. The client will consider and, where appropriate, investigate all allegations of unlawful or abusive acts of security personnel, take action (or urge appropriate parties to take action) to prevent recurrence, and report unlawful and abusive acts to public authorities.

³ Including practice consistent with the United Nation's (UN) Code of Conduct for Law Enforcement Officials, and UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials.

Performance Standard 5

Land Acquisition and Involuntary Resettlement

January 1, 2012

Introduction

1. Performance Standard 5 recognizes that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood¹) as a result of project-related land acquisition² and/or restrictions on land use. Resettlement is considered involuntary when affected persons or communities do not have the right to refuse land acquisition or restrictions on land use that result in physical or economic displacement. This occurs in cases of (i) lawful expropriation or temporary or permanent restrictions on land use and (ii) negotiated settlements in which the buyer can resort to expropriation or impose legal restrictions on land use if negotiations with the seller fail.

2. Unless properly managed, involuntary resettlement may result in long-term hardship and impoverishment for the Affected Communities and persons, as well as environmental damage and adverse socio-economic impacts in areas to which they have been displaced. For these reasons, involuntary resettlement should be avoided. However, where involuntary resettlement is unavoidable, it should be minimized and appropriate measures to mitigate adverse impacts on displaced persons and host communities³ should be carefully planned and implemented. The government often plays a central role in the land acquisition and resettlement process, including the determination of compensation, and is therefore an important third party in many situations. Experience demonstrates that the direct involvement of the client in resettlement activities can result in more cost-effective, efficient, and timely implementation of those activities, as well as in the introduction of innovative approaches to improving the livelihoods of those affected by resettlement.

3. To help avoid expropriation and eliminate the need to use governmental authority to enforce relocation, clients are encouraged to use negotiated settlements meeting the requirements of this Performance Standard, even if they have the legal means to acquire land without the seller's consent.

Objectives

- To avoid, and when avoidance is not possible, minimize displacement by exploring alternative project designs.
- To avoid forced eviction.
- To anticipate and avoid, or where avoidance is not possible, minimize adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost⁴ and (ii) ensuring

¹ The term "livelihood" refers to the full range of means that individuals, families, and communities utilize to make a living, such as wage-based income, agriculture, fishing, foraging, other natural resource-based livelihoods, petty trade, and bartering.

² Land acquisition includes both outright purchases of property and acquisition of access rights, such as easements or rights of way.

³ A host community is any community receiving displaced persons.

⁴ Replacement cost is defined as the market value of the assets plus transaction costs. In applying this method of valuation, depreciation of structures and assets should not be taken into account. Market value is defined as the value required to allow Affected Communities and persons to replace lost assets with assets of similar value. The valuation method for determining replacement cost should be documented and included in applicable Resettlement and/or Livelihood Restoration plans (see paragraphs 18 and 25).

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that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected.

- To improve, or restore, the livelihoods and standards of living of displaced persons.
- To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure⁵ at resettlement sites.

Scope of Application

4. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System, the elements of which are outlined in Performance Standard 1.

5. This Performance Standard applies to physical and/or economic displacement resulting from the following types of land-related transactions:

- Land rights or land use rights acquired through expropriation or other compulsory procedures in accordance with the legal system of the host country;
- Land rights or land use rights acquired through negotiated settlements with property owners or those with legal rights to the land if failure to reach settlement would have resulted in expropriation or other compulsory procedures;⁶
- Project situations where involuntary restrictions on land use and access to natural resources cause a community or groups within a community to lose access to resource usage where they have traditional or recognizable usage rights;⁷
- Certain project situations requiring evictions of people occupying land without formal, traditional, or recognizable usage rights;⁸ or
- Restriction on access to land or use of other resources including communal property and natural resources such as marine and aquatic resources, timber and non-timber forest products, freshwater, medicinal plants, hunting and gathering grounds and grazing and cropping areas.⁹

6. This Performance Standard does not apply to resettlement resulting from voluntary land transactions (i.e., market transactions in which the seller is not obliged to sell and the buyer cannot resort to expropriation or other compulsory procedures sanctioned by the legal system of the host country if negotiations fail). It also does not apply to impacts on livelihoods where the project is not changing the land use of the affected groups or communities.¹⁰

⁵ Security of tenure means that resettled individuals or communities are resettled to a site that they can legally occupy and where they are protected from the risk of eviction.

⁶ This also applies to customary or traditional rights recognized or recognizable under the laws of the host country. The negotiations may be carried out by the government or by the company (in some circumstances, as an agent of the government).

⁷ In such situations, affected persons frequently do not have formal ownership. This may include freshwater and marine environments. This Performance Standard may also apply when project-related biodiversity areas or legally designated buffer zones are established but not acquired by the client.

⁸ While some people do not have rights over the land they occupy, this Performance Standard requires that non-land assets be retained, replaced, or compensated for; relocation take place with security of tenure; and lost livelihoods be restored.

⁹ Natural resource assets referred to in this Performance Standard are equivalent to ecosystem provisioning services as described in Performance Standard 6.

¹⁰ More generalized impacts on communities or groups of people are covered in Performance Standard 1. For example, disruption of access to mineral deposits by artisanal miners is covered by Performance Standard 1.

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7. Where project impacts on land, assets, or access to assets become significantly adverse at any stage of the project, the client should consider applying requirements of this Performance Standard, even where no land acquisition or land use restriction is involved.

Requirements

General

Project Design

8. The client will consider feasible alternative project designs to avoid or minimize physical and/or economic displacement, while balancing environmental, social, and financial costs and benefits, paying particular attention to impacts on the poor and vulnerable.

Compensation and Benefits for Displaced Persons

9. When displacement cannot be avoided, the client will offer displaced communities and persons compensation for loss of assets at full replacement cost and other assistance¹¹ to help them improve or restore their standards of living or livelihoods, as provided in this Performance Standard. Compensation standards will be transparent and applied consistently to all communities and persons affected by the displacement. Where livelihoods of displaced persons are land-based,¹² or where land is collectively owned, the client will, where feasible,¹³ offer the displaced land-based compensation. The client will take possession of acquired land and related assets only after compensation has been made available¹⁴ and, where applicable, resettlement sites and moving allowances have been provided to the displaced persons in addition to compensation.¹⁵ The client will also provide opportunities to displaced communities and persons to derive appropriate development benefits from the project.

Community Engagement

10. The client will engage with Affected Communities, including host communities, through the process of stakeholder engagement described in Performance Standard 1. Decision-making processes related to resettlement and livelihood restoration should include options and alternatives, where applicable. Disclosure of relevant information and participation of Affected Communities and persons will continue during the planning, implementation, monitoring, and evaluation of compensation payments, livelihood restoration activities, and resettlement to achieve outcomes that are consistent with the objectives of this Performance Standard.¹⁶ Additional provisions apply to consultations with Indigenous Peoples, in accordance with Performance Standard 7.

¹¹ As described in paragraphs 19 and 26.

¹² The term "land-based" includes livelihood activities such as subsistence cropping and grazing of livestock as well as the harvesting of natural resources.

¹³ Refer to paragraph 26 of this Performance Standard for further requirements.

¹⁴ In certain cases it may not be feasible to pay compensation to all those affected before taking possession of the land, for example when the ownership of the land in question is in dispute. Such circumstances shall be identified and agreed on a case-by-case basis, and compensation funds shall be made available for example through deposit into an escrow account before displacement takes place.

¹⁵ Unless government-managed resettlement is involved and where the client has no direct influence over the timing of compensation payments. Such cases should be handled in accordance with paragraphs 27–29 of this Performance Standard. Staggered compensation payments may be made where one-off cash payments would demonstrably undermine social and/or resettlement objectives, or where there are ongoing impacts to livelihood activities.

¹⁶ The consultation process should ensure that women's perspectives are obtained and their interests factored into all aspects of resettlement planning and implementation. Addressing livelihood impacts may require intra-household analysis in cases where women's and men's livelihoods are affected differently. Women's and men's preferences in terms of compensation mechanisms, such as compensation in kind rather than in cash, should be explored.

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Grievance Mechanism

11. The client will establish a grievance mechanism consistent with Performance Standard 1 as early as possible in the project development phase. This will allow the client to receive and address specific concerns about compensation and relocation raised by displaced persons or members of host communities in a timely fashion, including a recourse mechanism designed to resolve disputes in an impartial manner.

Resettlement and Livelihood Restoration Planning and Implementation

12. Where involuntary resettlement is unavoidable, either as a result of a negotiated settlement or expropriation, a census will be carried out to collect appropriate socio-economic baseline data to identify the persons who will be displaced by the project, determine who will be eligible for compensation and assistance,¹⁷ and discourage ineligible persons, such as opportunistic settlers, from claiming benefits. In the absence of host government procedures, the client will establish a cut-off date for eligibility. Information regarding the cut-off date will be well documented and disseminated throughout the project area.

13. In cases where affected persons reject compensation offers that meet the requirements of this Performance Standard and, as a result, expropriation or other legal procedures are initiated, the client will explore opportunities to collaborate with the responsible government agency, and, if permitted by the agency, play an active role in resettlement planning, implementation, and monitoring (see paragraphs 30–32).

14. The client will establish procedures to monitor and evaluate the implementation of a Resettlement Action Plan or Livelihood Restoration Plan (see paragraphs 19 and 25) and take corrective action as necessary. The extent of monitoring activities will be commensurate with the project's risks and impacts. For projects with significant involuntary resettlement risks, the client will retain competent resettlement professionals to provide advice on compliance with this Performance Standard and to verify the client's monitoring information. Affected persons will be consulted during the monitoring process.

15. Implementation of a Resettlement Action Plan or Livelihood Restoration Plan will be considered completed when the adverse impacts of resettlement have been addressed in a manner that is consistent with the relevant plan as well as the objectives of this Performance Standard. It may be necessary for the client to commission an external completion audit of the Resettlement Action Plan or Livelihood Restoration Plan to assess whether the provisions have been met, depending on the scale and/or complexity of physical and economic displacement associated with a project. The completion audit should be undertaken once all mitigation measures have been substantially completed and once displaced persons are deemed to have been provided adequate opportunity and assistance to sustainably restore their livelihoods. The completion audit will be undertaken by competent resettlement professionals once the agreed monitoring period is concluded. The completion audit will include, at a minimum, a review of the totality of mitigation measures implemented by the Client, a comparison of implementation outcomes against agreed objectives, and a conclusion as to whether the monitoring process can be ended.¹⁸

¹⁷ Documentation of ownership or occupancy and compensation arrangements should be issued in the names of both spouses or heads of households, and other resettlement assistance, such as skills training, access to credit, and job opportunities, should be equally available to women and adapted to their needs. Where national law and tenure systems do not recognize the rights of women to hold or contract in property, measures should be considered to provide women as much protection as possible with the objective to achieve equity with men.

¹⁸ The completion audit of the Resettlement Action Plan and/or Livelihood Restoration Plan, will be undertaken by external resettlement experts once the agreed monitoring period is concluded, and will involve a more in-depth assessment than regular resettlement monitoring activities, including at a minimum a review of all mitigation

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16. Where the exact nature or magnitude of the land acquisition or restrictions on land use related to a project with potential to cause physical and/or economic displacement is unknown due to the stage of project development, the client will develop a Resettlement and/or Livelihood Restoration Framework outlining general principles compatible with this Performance Standard. Once the individual project components are defined and the necessary information becomes available, such a framework will be expanded into a specific Resettlement Action Plan or Livelihood Restoration Plan and procedures in accordance with paragraphs 19 and 25 below.

Displacement

17. Displaced persons may be classified as persons (i) who have formal legal rights to the land or assets they occupy or use; (ii) who do not have formal legal rights to land or assets, but have a claim to land that is recognized or recognizable under national law;¹⁹ or (iii) who have no recognizable legal right or claim to the land or assets they occupy or use. The census will establish the status of the displaced persons.

18. Project-related land acquisition and/or restrictions on land use may result in the physical displacement of people as well as their economic displacement. Consequently, requirements of this Performance Standard in respect of physical displacement and economic displacement may apply simultaneously.²⁰

Physical Displacement

19. In the case of physical displacement, the client will develop a Resettlement Action Plan that covers, at a minimum, the applicable requirements of this Performance Standard regardless of the number of people affected. This will include compensation at full replacement cost for land and other assets lost. The Plan will be designed to mitigate the negative impacts of displacement; identify development opportunities; develop a resettlement budget and schedule; and establish the entitlements of all categories of affected persons (including host communities). Particular attention will be paid to the needs of the poor and the vulnerable. The client will document all transactions to acquire land rights, as well as compensation measures and relocation activities.

20. If people living in the project area are required to move to another location, the client will (i) offer displaced persons choices among feasible resettlement options, including adequate replacement housing or cash compensation where appropriate; and (ii) provide relocation assistance suited to the needs of each group of displaced persons. New resettlement sites built for displaced persons must offer improved living conditions. The displaced persons' preferences with respect to relocating in preexisting communities and groups will be taken into consideration. Existing social and cultural institutions of the displaced persons and any host communities will be respected.

21. In the case of physically displaced persons under paragraph 17 (i) or (ii), the client will offer the choice of replacement property of equal or higher value, security of tenure, equivalent or better characteristics, and advantages of location or cash compensation where appropriate. Compensation

measures with respect to the physical and/or economic displacement implemented by the Client, a comparison of implementation outcomes against agreed objectives, a conclusion as to whether the monitoring process can be ended and, where necessary, a Corrective Action Plan listing outstanding actions necessary to met the objectives.

¹⁹ Such claims could be derived from adverse possession or from customary or traditional tenure arrangements.

²⁰ Where a project results in both physical and economic displacement, the requirements of paragraphs 25 and 26 (Economic Displacement) should be incorporated into the Resettlement Action Plan or Framework (i.e., there is no need to have a separate Resettlement Action Plan and Livelihood Restoration Plan).

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in kind should be considered in lieu of cash. Cash compensation levels should be sufficient to replace the lost land and other assets at full replacement cost in local markets.²¹

22. In the case of physically displaced persons under paragraph 17 (iii), the client will offer them a choice of options for adequate housing with security of tenure so that they can resettle legally without having to face the risk of forced eviction. Where these displaced persons own and occupy structures, the client will compensate them for the loss of assets other than land, such as dwellings and other improvements to the land, at full replacement cost, provided that these persons have been occupying the project area prior to the cut-off date for eligibility. Based on consultation with such displaced persons, the client will provide relocation assistance sufficient for them to restore their standard of living at an adequate alternative site.²²

23. The client is not required to compensate or assist those who encroach on the project area after the cut-off date for eligibility, provided the cut-off date has been clearly established and made public.

24. Forced evictions²³ will not be carried out except in accordance with law and the requirements of this Performance Standard.

Economic Displacement

25. In the case of projects involving economic displacement only, the client will develop a Livelihood Restoration Plan to compensate affected persons and/or communities and offer other assistance that meet the objectives of this Performance Standard. The Livelihood Restoration Plan will establish the entitlements of affected persons and/or communities and will ensure that these are provided in a transparent, consistent, and equitable manner. The mitigation of economic displacement will be considered complete when affected persons or communities have received compensation and other assistance according to the requirements of the Livelihood Restoration Plan and this Performance Standard, and are deemed to have been provided with adequate opportunity to reestablish their livelihoods.

26. If land acquisition or restrictions on land use result in economic displacement defined as loss of assets and/or means of livelihood, regardless of whether or not the affected people are physically displaced, the client will meet the requirements in paragraphs 27–29 below, as applicable.

27. Economically displaced persons who face loss of assets or access to assets will be compensated for such loss at full replacement cost.

- In cases where land acquisition or restrictions on land use affect commercial structures, affected business owners will be compensated for the cost of reestablishing commercial activities elsewhere, for lost net income during the

²¹ Payment of cash compensation for lost assets may be appropriate where (i) livelihoods are not land-based; (ii) livelihoods are land-based but the land taken for the project is a small fraction of the affected asset and the residual land is economically viable; or (iii) active markets for land, housing, and labor exist, displaced persons use such markets, and there is sufficient supply of land and housing.

²² Relocation of informal settlers in urban areas may involve trade-offs. For example, the relocated families may gain security of tenure, but they may lose advantages of location. Changes in location that may affect livelihood opportunities should be addressed in accordance with the principles of this Performance Standard (see in particular paragraph 25).

²³ The permanent or temporary removal against the will of individuals, families, and/or communities from the homes and/or lands which they occupy without the provision of, and access to, appropriate forms of legal and other protection.

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period of transition, and for the costs of the transfer and reinstallation of the plant, machinery, or other equipment.

- In cases affecting persons with legal rights or claims to land which are recognized or recognizable under national law (see paragraph 17 (i) and (ii)), replacement property (e.g., agricultural or commercial sites) of equal or greater value will be provided, or, where appropriate, cash compensation at full replacement cost.
- Economically displaced persons who are without legally recognizable claims to land (see paragraph 17 (iii)) will be compensated for lost assets other than land (such as crops, irrigation infrastructure and other improvements made to the land), at full replacement cost. The client is not required to compensate or assist opportunistic settlers who encroach on the project area after the cut-off date for eligibility.

28. In addition to compensation for lost assets, if any, as required under paragraph 27, economically displaced persons whose livelihoods or income levels are adversely affected will also be provided opportunities to improve, or at least restore, their means of income-earning capacity, production levels, and standards of living:

- For persons whose livelihoods are land-based, replacement land that has a combination of productive potential, locational advantages, and other factors at least equivalent to that being lost should be offered as a matter of priority.
- For persons whose livelihoods are natural resource-based and where project-related restrictions on access envisaged in paragraph 5 apply, implementation of measures will be made to either allow continued access to affected resources or provide access to alternative resources with equivalent livelihood-earning potential and accessibility. Where appropriate, benefits and compensation associated with natural resource usage may be collective in nature rather than directly oriented towards individuals or households.
- If circumstances prevent the client from providing land or similar resources as described above, alternative income earning opportunities may be provided, such as credit facilities, training, cash, or employment opportunities. Cash compensation alone, however, is frequently insufficient to restore livelihoods.

29. Transitional support should be provided as necessary to all economically displaced persons, based on a reasonable estimate of the time required to restore their income-earning capacity, production levels, and standards of living.

Private Sector Responsibilities Under Government-Managed Resettlement

30. Where land acquisition and resettlement are the responsibility of the government, the client will collaborate with the responsible government agency, to the extent permitted by the agency, to achieve outcomes that are consistent with this Performance Standard. In addition, where government capacity is limited, the client will play an active role during resettlement planning, implementation, and monitoring, as described below.

31. In the case of acquisition of land rights or access to land through compulsory means or negotiated settlements involving physical displacement, the client will identify and describe²⁴ government resettlement measures. If these measures do not meet the relevant requirements of this Performance Standard, the client will prepare a Supplemental Resettlement Plan that, together with

²⁴ Government documents, where available, may be used to identify such measures.

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the documents prepared by the responsible government agency, will address the relevant requirements of this Performance Standard (the General Requirements and requirements for Physical Displacement and Economic Displacement above). The client will need to include in its Supplemental Resettlement Plan, at a minimum (i) identification of affected people and impacts; (ii) a description of regulated activities, including the entitlements of displaced persons provided under applicable national laws and regulations; (iii) the supplemental measures to achieve the requirements of this Performance Standard as described in paragraphs 19–29 in a way that is permitted by the responsible agency and implementation time schedule; and (iv) the financial and implementation responsibilities of the client in the execution of its Supplemental Resettlement Plan.

32. In the case of projects involving economic displacement only, the client will identify and describe the measures that the responsible government agency plans to use to compensate Affected Communities and persons. If these measures do not meet the relevant requirements of this Performance Standard, the client will develop an Environmental and Social Action Plan to complement government action. This may include additional compensation for lost assets, and additional efforts to restore lost livelihoods where applicable.

Introduction

1. Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. The requirements set out in this Performance Standard have been guided by the Convention on Biological Diversity, which defines biodiversity as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.”

2. Ecosystem services are the benefits that people, including businesses, derive from ecosystems. Ecosystem services are organized into four types: (i) provisioning services, which are the products people obtain from ecosystems; (ii) regulating services, which are the benefits people obtain from the regulation of ecosystem processes; (iii) cultural services, which are the nonmaterial benefits people obtain from ecosystems; and (iv) supporting services, which are the natural processes that maintain the other services.¹

3. Ecosystem services valued by humans are often underpinned by biodiversity. Impacts on biodiversity can therefore often adversely affect the delivery of ecosystem services. This Performance Standard addresses how clients can sustainably manage and mitigate impacts on biodiversity and ecosystem services throughout the project’s lifecycle.

Objectives

- To protect and conserve biodiversity.
- To maintain the benefits from ecosystem services.
- To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.

Scope of Application

4. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client’s Environmental and Social Management System (ESMS), the elements of which are outlined in Performance Standard 1.

5. Based on the risks and impacts identification process, the requirements of this Performance Standard are applied to projects (i) located in modified, natural, and critical habitats; (ii) that potentially impact on or are dependent on ecosystem services over which the client has direct management control or significant influence; or (iii) that include the production of living natural resources (e.g., agriculture, animal husbandry, fisheries, forestry).

¹ Examples are as follows: (i) provisioning services may include food, freshwater, timber, fibers, medicinal plants; (ii) regulating services may include surface water purification, carbon storage and sequestration, climate regulation, protection from natural hazards; (iii) cultural services may include natural areas that are sacred sites and areas of importance for recreation and aesthetic enjoyment; and (iv) supporting services may include soil formation, nutrient cycling, primary production.

Requirements

General

6. The risks and impacts identification process as set out in Performance Standard 1 should consider direct and indirect project-related impacts on biodiversity and ecosystem services and identify any significant residual impacts. This process will consider relevant threats to biodiversity and ecosystem services, especially focusing on habitat loss, degradation and fragmentation, invasive alien species, overexploitation, hydrological changes, nutrient loading, and pollution. It will also take into account the differing values attached to biodiversity and ecosystem services by Affected Communities and, where appropriate, other stakeholders. Where paragraphs 13–19 are applicable, the client should consider project-related impacts across the potentially affected landscape or seascape.

7. As a matter of priority, the client should seek to avoid impacts on biodiversity and ecosystem services. When avoidance of impacts is not possible, measures to minimize impacts and restore biodiversity and ecosystem services should be implemented. Given the complexity in predicting project impacts on biodiversity and ecosystem services over the long term, the client should adopt a practice of adaptive management in which the implementation of mitigation and management measures are responsive to changing conditions and the results of monitoring throughout the project's lifecycle.

8. Where paragraphs 13–15 are applicable, the client will retain competent professionals to assist in conducting the risks and impacts identification process. Where paragraphs 16–19 are applicable, the client should retain external experts with appropriate regional experience to assist in the development of a mitigation hierarchy that complies with this Performance Standard and to verify the implementation of those measures.

Protection and Conservation of Biodiversity

9. Habitat is defined as a terrestrial, freshwater, or marine geographical unit or airway that supports assemblages of living organisms and their interactions with the non-living environment. For the purposes of implementation of this Performance Standard, habitats are divided into modified, natural, and critical. Critical habitats are a subset of modified or natural habitats.

10. For the protection and conservation of biodiversity, the mitigation hierarchy includes biodiversity offsets, which may be considered only after appropriate avoidance, minimization, and restoration measures have been applied.² A biodiversity offset should be designed and implemented to achieve measurable conservation outcomes³ that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity; however, a net gain is required in critical habitats. The design of a biodiversity offset must adhere to the “like-for-like or better” principle⁴ and must be carried out in

² Biodiversity offsets are measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development and persisting after appropriate avoidance, minimization and restoration measures have been taken.

³ Measurable conservation outcomes for biodiversity must be demonstrated in situ (on-the-ground) and on an appropriate geographic scale (e.g., local, landscape-level, national, regional).

⁴ The principle of “like-for-like or better” indicates that biodiversity offsets must be designed to conserve the same biodiversity values that are being impacted by the project (an “in-kind” offset). In certain situations, however, areas of biodiversity to be impacted by the project may be neither a national nor a local priority, and there may be other areas of biodiversity with like values that are a higher priority for conservation and sustainable use and under imminent threat or need of protection or effective management. In these situations, it may be appropriate to consider an “out-of-kind” offset that involves “trading up” (i.e., where the offset targets biodiversity of higher

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alignment with best available information and current practices. When a client is considering the development of an offset as part of the mitigation strategy, external experts with knowledge in offset design and implementation must be involved.

Modified Habitat

11. Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition.⁵ Modified habitats may include areas managed for agriculture, forest plantations, reclaimed⁶ coastal zones, and reclaimed wetlands.

12. This Performance Standard applies to those areas of modified habitat that include significant biodiversity value, as determined by the risks and impacts identification process required in Performance Standard 1. The client should minimize impacts on such biodiversity and implement mitigation measures as appropriate.

Natural Habitat

13. Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

14. The client will not significantly convert or degrade⁷ natural habitats, unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified habitat;
- Consultation has established the views of stakeholders, including Affected Communities, with respect to the extent of conversion and degradation;⁸ and
- Any conversion or degradation is mitigated according to the mitigation hierarchy.

15. In areas of natural habitat, mitigation measures will be designed to achieve no net loss⁹ of biodiversity where feasible. Appropriate actions include:

- Avoiding impacts on biodiversity through the identification and protection of set-asides;¹⁰

priority than that affected by the project) that will, for critical habitats, meet the requirements of paragraph 17 of this Performance Standard.

⁵ This excludes habitat that has been converted in anticipation of the project.

⁶ Reclamation as used in this context is the process of creating new land from sea or other aquatic areas for productive use.

⁷ Significant conversion or degradation is (i) the elimination or severe diminution of the integrity of a habitat caused by a major and/or long-term change in land or water use; or (ii) a modification that substantially minimizes the habitat's ability to maintain viable populations of its native species.

⁸ Conducted as part of the stakeholder engagement and consultation process, as described in Performance Standard 1.

⁹ No net loss is defined as the point at which project-related impacts on biodiversity are balanced by measures taken to avoid and minimize the project's impacts, to undertake on-site restoration and finally to offset significant residual impacts, if any, on an appropriate geographic scale (e.g., local, landscape-level, national, regional).

¹⁰ Set-asides are land areas within the project site, or areas over which the client has management control, that are excluded from development and are targeted for the implementation of conservation enhancement measures. Set-asides will likely contain significant biodiversity values and/or provide ecosystem services of significance at the local, national and/or regional level. Set-asides should be defined using internationally recognized approaches or methodologies (e.g., High Conservation Value, systematic conservation planning).

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- Implementing measures to minimize habitat fragmentation, such as biological corridors;
- Restoring habitats during operations and/or after operations; and
- Implementing biodiversity offsets.

Critical Habitat

16. Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered¹¹ species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

17. In areas of critical habitat, the client will not implement any project activities unless all of the following are demonstrated:

- No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical;
- The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values;¹²
- The project does not lead to a net reduction in the global and/or national/regional population¹³ of any Critically Endangered or Endangered species over a reasonable period of time;¹⁴ and
- A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program.

18. In such cases where a client is able to meet the requirements defined in paragraph 17, the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve net gains¹⁵ of those biodiversity values for which the critical habitat was designated.

¹¹ As listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The determination of critical habitat based on other listings is as follows: (i) If the species is listed nationally / regionally as critically endangered or endangered, in countries that have adhered to IUCN guidance, the critical habitat determination will be made on a project by project basis in consultation with competent professionals; and (ii) in instances where nationally or regionally listed species' categorizations do not correspond well to those of the IUCN (e.g., some countries more generally list species as "protected" or "restricted"), an assessment will be conducted to determine the rationale and purpose of the listing. In this case, the critical habitat determination will be based on such an assessment.

¹² Biodiversity values and their supporting ecological processes will be determined on an ecologically relevant scale.

¹³ Net reduction is a singular or cumulative loss of individuals that impacts on the species' ability to persist at the global and/or regional/national scales for many generations or over a long period of time. The scale (i.e., global and/or regional/national) of the potential net reduction is determined based on the species' listing on either the (global) IUCN Red List and/or on regional/national lists. For species listed on both the (global) IUCN Red List and the national/regional lists, the net reduction will be based on the national/regional population.

¹⁴ The timeframe in which clients must demonstrate "no net reduction" of Critically Endangered and Endangered species will be determined on a case-by-case basis in consultation with external experts.

¹⁵ Net gains are additional conservation outcomes that can be achieved for the biodiversity values for which the critical habitat was designated. Net gains may be achieved through the development of a biodiversity offset and/or, in instances where the client could meet the requirements of paragraph 17 of this Performance Standard without a biodiversity offset, the client should achieve net gains through the implementation of programs that could be implemented in situ (on-the-ground) to enhance habitat, and protect and conserve biodiversity.

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19. In instances where biodiversity offsets are proposed as part of the mitigation strategy, the client must demonstrate through an assessment that the project's significant residual impacts on biodiversity will be adequately mitigated to meet the requirements of paragraph 17.

Legally Protected and Internationally Recognized Areas

20. In circumstances where a proposed project is located within a legally protected area¹⁶ or an internationally recognized area,¹⁷ the client will meet the requirements of paragraphs 13 through 19 of this Performance Standard, as applicable. In addition, the client will:

- Demonstrate that the proposed development in such areas is legally permitted;
- Act in a manner consistent with any government recognized management plans for such areas;
- Consult protected area sponsors and managers, Affected Communities, Indigenous Peoples and other stakeholders on the proposed project, as appropriate; and
- Implement additional programs, as appropriate, to promote and enhance the conservation aims and effective management of the area.¹⁸

Invasive Alien Species

21. Intentional or accidental introduction of alien, or non-native, species of flora and fauna into areas where they are not normally found can be a significant threat to biodiversity, since some alien species can become invasive, spreading rapidly and out-competing native species.

22. The client will not intentionally introduce any new alien species (not currently established in the country or region of the project) unless this is carried out in accordance with the existing regulatory framework for such introduction. Notwithstanding the above, the client will not deliberately introduce any alien species with a high risk of invasive behavior regardless of whether such introductions are permitted under the existing regulatory framework. All introductions of alien species will be subject to a risk assessment (as part of the client's environmental and social risks and impacts identification process) to determine the potential for invasive behavior. The client will implement measures to avoid the potential for accidental or unintended introductions including the transportation of substrates and vectors (such as soil, ballast, and plant materials) that may harbor alien species.

23. Where alien species are already established in the country or region of the proposed project, the client will exercise diligence in not spreading them into areas in which they have not already been established. As practicable, the client should take measures to eradicate such species from the natural habitats over which they have management control.

Management of Ecosystem Services

24. Where a project is likely to adversely impact ecosystem services, as determined by the risks and impacts identification process, the client will conduct a systematic review to identify priority

¹⁶ This Performance Standard recognizes legally protected areas that meet the IUCN definition: "A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values." For the purposes of this Performance Standard, this includes areas proposed by governments for such designation.

¹⁷ Exclusively defined as UNESCO Natural World Heritage Sites, UNESCO Man and the Biosphere Reserves, Key Biodiversity Areas, and wetlands designated under the Convention on Wetlands of International Importance (the Ramsar Convention).

¹⁸ Implementing additional programs may not be necessary for projects that do not create a new footprint.

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ecosystem services. Priority ecosystem services are two-fold: (i) those services on which project operations are most likely to have an impact and, therefore, which result in adverse impacts to Affected Communities; and/or (ii) those services on which the project is directly dependent for its operations (e.g., water). When Affected Communities are likely to be impacted, they should participate in the determination of priority ecosystem services in accordance with the stakeholder engagement process as defined in Performance Standard 1.

25. With respect to impacts on priority ecosystem services of relevance to Affected Communities and where the client has direct management control or significant influence over such ecosystem services, adverse impacts should be avoided. If these impacts are unavoidable, the client will minimize them and implement mitigation measures that aim to maintain the value and functionality of priority services. With respect to impacts on priority ecosystem services on which the project depends, clients should minimize impacts on ecosystem services and implement measures that increase resource efficiency of their operations, as described in Performance Standard 3. Additional provisions for ecosystem services are included in Performance Standards 4, 5, 7, and 8.¹⁹

Sustainable Management of Living Natural Resources

26. Clients who are engaged in the primary production of living natural resources, including natural and plantation forestry, agriculture, animal husbandry, aquaculture, and fisheries, will be subject to the requirements of paragraphs 26 through 30, in addition to the rest of this Performance Standard. Where feasible, the client will locate land-based agribusiness and forestry projects on unforested land or land already converted. Clients who are engaged in such industries will manage living natural resources in a sustainable manner, through the application of industry-specific good management practices and available technologies. Where such primary production practices are codified in globally, regionally, or nationally recognized standards, the client will implement sustainable management practices to one or more relevant and credible standards as demonstrated by independent verification or certification.

27. Credible globally, regionally, or nationally recognized standards for sustainable management of living natural resources are those which (i) are objective and achievable; (ii) are founded on a multi-stakeholder consultative process; (iii) encourage step-wise and continual improvements; and (iv) provide for independent verification or certification through appropriate accredited bodies for such standards.²⁰

28. Where relevant and credible standard(s) exist, but the client has not yet obtained independent verification or certification to such standard(s), the client will conduct a pre-assessment of its conformity to the applicable standard(s) and take actions to achieve such verification or certification over an appropriate period of time.

29. In the absence of a relevant and credible global, regional, or national standard for the particular living natural resource in the country concerned, the client will:

¹⁹ Ecosystem service references are located in Performance Standard 4, paragraph 8; Performance Standard 5, paragraphs 5 and 25–29; Performance Standard 7, paragraphs 13–17 and 20; and Performance Standard 8, paragraph 11.

²⁰ A credible certification system would be one which is independent, cost-effective, based on objective and measurable performance standards and developed through consultation with relevant stakeholders, such as local people and communities, Indigenous Peoples, and civil society organizations representing consumer, producer and conservation interests. Such a system has fair, transparent and independent decision-making procedures that avoid conflicts of interest.



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- Commit to applying good international industry operating principles, management practices, and technologies; and
- Actively engage and support the development of a national standard, where relevant, including studies that contribute to the definition and demonstration of sustainable practices.

Supply Chain

30. Where a client is purchasing primary production (especially but not exclusively food and fiber commodities) that is known to be produced in regions where there is a risk of significant conversion of natural and/or critical habitats, systems and verification practices will be adopted as part of the client's ESMS to evaluate its primary suppliers.²¹ The systems and verification practices will (i) identify where the supply is coming from and the habitat type of this area; (ii) provide for an ongoing review of the client's primary supply chains; (iii) limit procurement to those suppliers that can demonstrate that they are not contributing to significant conversion of natural and/or critical habitats (this may be demonstrated by delivery of certified product, or progress towards verification or certification under a credible scheme in certain commodities and/or locations); and (iv) where possible, require actions to shift the client's primary supply chain over time to suppliers that can demonstrate that they are not significantly adversely impacting these areas. The ability of the client to fully address these risks will depend upon the client's level of management control or influence over its primary suppliers.

²¹ Primary suppliers are those suppliers who, on an ongoing basis, provide the majority of living natural resources, goods, and materials essential for the core business processes of the project.

Introduction

1. Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded. Their languages, cultures, religions, spiritual beliefs, and institutions may also come under threat. As a consequence, Indigenous Peoples may be more vulnerable to the adverse impacts associated with project development than non-indigenous communities. This vulnerability may include loss of identity, culture, and natural resource-based livelihoods, as well as exposure to impoverishment and diseases.

2. Private sector projects can create opportunities for Indigenous Peoples to participate in, and benefit from project-related activities that may help them fulfill their aspiration for economic and social development. Furthermore, Indigenous Peoples may play a role in sustainable development by promoting and managing activities and enterprises as partners in development. Government often plays a central role in the management of Indigenous Peoples' issues, and clients should collaborate with the responsible authorities in managing the risks and impacts of their activities.¹

Objectives

- To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples.
- To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts.
- To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner.
- To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle.
- To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present.
- To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.

Scope of Application

3. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System, the elements of which are outlined in Performance Standard 1.

¹ In addition to meeting the requirements under this Performance Standard, clients must comply with applicable national law, including those laws implementing host country obligations under international law.

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4. There is no universally accepted definition of “Indigenous Peoples.” Indigenous Peoples may be referred to in different countries by such terms as “Indigenous ethnic minorities,” “aboriginals,” “hill tribes,” “minority nationalities,” “scheduled tribes,” “first nations,” or “tribal groups.”
5. In this Performance Standard, the term “Indigenous Peoples” is used in a generic sense to refer to a distinct social and cultural group possessing the following characteristics in varying degrees:
 - Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
 - Collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
 - Customary cultural, economic, social, or political institutions that are separate from those of the mainstream society or culture; or
 - A distinct language or dialect, often different from the official language or languages of the country or region in which they reside.
6. This Performance Standard applies to communities or groups of Indigenous Peoples who maintain a collective attachment, i.e., whose identity as a group or community is linked, to distinct habitats or ancestral territories and the natural resources therein. It may also apply to communities or groups that have lost collective attachment to distinct habitats or ancestral territories in the project area, occurring within the concerned group members’ lifetime, because of forced severance, conflict, government resettlement programs, dispossession of their lands, natural disasters, or incorporation of such territories into an urban area.
7. The client may be required to seek inputs from competent professionals to ascertain whether a particular group is considered as Indigenous Peoples for the purpose of this Performance Standard.

Requirements

General

Avoidance of Adverse Impacts

8. The client will identify, through an environmental and social risks and impacts assessment process, all communities of Indigenous Peoples within the project area of influence who may be affected by the project, as well as the nature and degree of the expected direct and indirect economic, social, cultural (including cultural heritage²), and environmental impacts on them.
9. Adverse impacts on Affected Communities of Indigenous Peoples should be avoided where possible. Where alternatives have been explored and adverse impacts are unavoidable, the client will minimize, restore, and/or compensate for these impacts in a culturally appropriate manner commensurate with the nature and scale of such impacts and the vulnerability of the Affected Communities of Indigenous Peoples. The client’s proposed actions will be developed with the ICP of the Affected Communities of Indigenous Peoples and contained in a time-bound plan, such as an Indigenous Peoples Plan, or a broader community development plan with separate components for Indigenous Peoples.³

² Additional requirements on protection of cultural heritage are set out in Performance Standard 8.

³ The determination of the appropriate plan may require the input of competent professionals. A community development plan may be appropriate in circumstances where Indigenous Peoples are a part of larger Affected Communities.

Participation and Consent

10. The client will undertake an engagement process with the Affected Communities of Indigenous Peoples as required in Performance Standard 1. This engagement process includes stakeholder analysis and engagement planning, disclosure of information, consultation, and participation, in a culturally appropriate manner. In addition, this process will:

- Involve Indigenous Peoples' representative bodies and organizations (e.g., councils of elders or village councils), as well as members of the Affected Communities of Indigenous Peoples; and
- Provide sufficient time for Indigenous Peoples' decision-making processes.⁴

11. Affected Communities of Indigenous Peoples may be particularly vulnerable to the loss of, alienation from or exploitation of their land and access to natural and cultural resources.⁵ In recognition of this vulnerability, in addition to the General Requirements of this Performance Standard, the client will obtain the FPIC of the Affected Communities of Indigenous Peoples in the circumstances described in paragraphs 13–17 of this Performance Standard. FPIC applies to project design, implementation, and expected outcomes related to impacts affecting the communities of Indigenous Peoples. When any of these circumstances apply, the client will engage external experts to assist in the identification of the project risks and impacts.

12. There is no universally accepted definition of FPIC. For the purposes of Performance Standards 1, 7 and 8, "FPIC" has the meaning described in this paragraph. FPIC builds on and expands the process of ICP described in Performance Standard 1 and will be established through good faith negotiation between the client and the Affected Communities of Indigenous Peoples. The client will document: (i) the mutually accepted process between the client and Affected Communities of Indigenous Peoples, and (ii) evidence of agreement between the parties as the outcome of the negotiations. FPIC does not necessarily require unanimity and may be achieved even when individuals or groups within the community explicitly disagree.

Circumstances Requiring Free, Prior, and Informed Consent

Impacts on Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use

13. Indigenous Peoples are often closely tied to their lands and related natural resources.⁶ Frequently, these lands are traditionally owned or under customary use.⁷ While Indigenous Peoples may not possess legal title to these lands as defined by national law, their use of these lands, including seasonal or cyclical use, for their livelihoods, or cultural, ceremonial, and spiritual purposes that define their identity and community, can often be substantiated and documented.

⁴ Internal decision making processes are generally but not always collective in nature. There may be internal dissent, and decisions may be challenged by some in the community. The consultation process should be sensitive to such dynamics and allow sufficient time for internal decision making processes to reach conclusions that are considered legitimate by the majority of the concerned participants.

⁵ Natural resources and natural areas with cultural value referred to in this Performance Standard are equivalent to ecosystem provisioning and cultural services as described in Performance Standard 6.

⁶ Examples include marine and aquatic resources timber, and non-timber forest products, medicinal plants, hunting and gathering grounds, and grazing and cropping areas. Natural resource assets, as referred to in this Performance Standard, are equivalent to provisioning ecosystem services as described in Performance Standard 6.

⁷ The acquisition and/or leasing of lands with legal title is addressed in Performance Standard 5: Land Acquisition and Involuntary Resettlement.

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14. If the client proposes to locate a project on, or commercially develop natural resources on lands traditionally owned by, or under the customary use of, Indigenous Peoples, and adverse impacts⁸ can be expected, the client will take the following steps:

- Document efforts to avoid and otherwise minimize the area of land proposed for the project;
- Document efforts to avoid and otherwise minimize impacts on natural resources and natural areas of importance⁹ to Indigenous People;
- Identify and review all property interests and traditional resource uses prior to purchasing or leasing land;
- Assess and document the Affected Communities of Indigenous Peoples' resource use without prejudicing any Indigenous Peoples' land claim.¹⁰ The assessment of land and natural resource use should be gender inclusive and specifically consider women's role in the management and use of these resources;
- Ensure that Affected Communities of Indigenous Peoples are informed of their land rights under national law, including any national law recognizing customary use rights; and
- Offer Affected Communities of Indigenous Peoples compensation and due process in the case of commercial development of their land and natural resources, together with culturally appropriate sustainable development opportunities, including:
 - Providing land-based compensation or compensation-in-kind in lieu of cash compensation where feasible.¹¹
 - Ensuring continued access to natural resources, identifying the equivalent replacement resources, or, as a last option, providing compensation and identifying alternative livelihoods if project development results in the loss of access to and the loss of natural resources independent of project land acquisition.
 - Ensuring fair and equitable sharing of benefits associated with project usage of the resources where the client intends to utilize natural resources that are central to the identity and livelihood of Affected Communities of Indigenous People and their usage thereof exacerbates livelihood risk.
 - Providing Affected Communities of Indigenous Peoples with access, usage, and transit on land it is developing subject to overriding health, safety, and security considerations.

Relocation of Indigenous Peoples from Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use

15. The client will consider feasible alternative project designs to avoid the relocation of Indigenous Peoples from communally held¹² lands and natural resources subject to traditional ownership or

⁸ Such adverse impacts may include impacts from loss of access to assets or resources or restrictions on land use resulting from project activities.

⁹ "Natural resources and natural areas of importance" as referred to in this Performance Standard are equivalent to priority ecosystem services as defined in Performance Standard 6. They refer to those services over which the client has direct management control or significant influence, and those services most likely to be sources of risk in terms of impacts on Affected Communities of Indigenous Peoples.

¹⁰ While this Performance Standard requires substantiation and documentation of the use of such land, clients should also be aware that the land may already be under alternative use, as designated by the host government.

¹¹ If circumstances prevent the client from offering suitable replacement land, the client must provide verification that such is the case. Under such circumstances, the client will provide non land-based income-earning opportunities over and above cash compensation to the Affected Communities of Indigenous Peoples.

under customary use. If such relocation is unavoidable the client will not proceed with the project unless FPIC has been obtained as described above. Any relocation of Indigenous Peoples will be consistent with the requirements of Performance Standard 5. Where feasible, the relocated Indigenous Peoples should be able to return to their traditional or customary lands, should the cause of their relocation cease to exist.

Critical Cultural Heritage

16. Where a project may significantly impact on critical cultural heritage¹³ that is essential to the identity and/or cultural, ceremonial, or spiritual aspects of Indigenous Peoples lives, priority will be given to the avoidance of such impacts. Where significant project impacts on critical cultural heritage are unavoidable, the client will obtain the FPIC of the Affected Communities of Indigenous Peoples.

17. Where a project proposes to use the cultural heritage including knowledge, innovations, or practices of Indigenous Peoples for commercial purposes, the client will inform the Affected Communities of Indigenous Peoples of (i) their rights under national law; (ii) the scope and nature of the proposed commercial development; (iii) the potential consequences of such development; and (iv) obtain their FPIC. The client will also ensure fair and equitable sharing of benefits from commercialization of such knowledge, innovation, or practice, consistent with the customs and traditions of the Indigenous Peoples.

Mitigation and Development Benefits

18. The client and the Affected Communities of Indigenous Peoples will identify mitigation measures in alignment with the mitigation hierarchy described in Performance Standard 1 as well as opportunities for culturally appropriate and sustainable development benefits. The client will ensure the timely and equitable delivery of agreed measures to the Affected Communities of Indigenous Peoples.

19. The determination, delivery, and distribution of compensation and other benefit sharing measures to the Affected Communities of Indigenous Peoples will take account of the laws, institutions, and customs of these communities as well as their level of interaction with mainstream society. Eligibility for compensation can either be individually or collectively-based, or be a combination of both.¹⁴ Where compensation occurs on a collective basis, mechanisms that promote the effective delivery and distribution of compensation to all eligible members of the group will be defined and implemented.

20. Various factors including, but not limited to, the nature of the project, the project context and the vulnerability of the Affected Communities of Indigenous Peoples will determine how these communities should benefit from the project. Identified opportunities should aim to address the goals

¹² Typically, Indigenous Peoples claim rights and access to, and use of land and resources through traditional or customary systems, many of which entail communal property rights. These traditional claims to land and resources may not be recognized under national laws. Where members of the Affected Communities of Indigenous Peoples individually hold legal title, or where the relevant national law recognizes customary rights for individuals, the requirements of Performance Standard 5 will apply, rather than the requirements under paragraph 17 of this Performance Standard.

¹³ Includes natural areas with cultural and/or spiritual value such as sacred groves, sacred bodies of water and waterways, sacred trees, and sacred rocks. Natural areas with cultural value are equivalent to priority ecosystem cultural services as defined in Performance Standard 6.

¹⁴ Where control of resources, assets and decision making are predominantly collective in nature, efforts will be made to ensure that, where possible, benefits and compensation are collective, and take account of intergenerational differences and needs.

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and preferences of the Indigenous Peoples including improving their standard of living and livelihoods in a culturally appropriate manner, and to foster the long-term sustainability of the natural resources on which they depend.

Private Sector Responsibilities Where Government is Responsible for Managing Indigenous Peoples Issues

21. Where the government has a defined role in the management of Indigenous Peoples issues in relation to the project, the client will collaborate with the responsible government agency, to the extent feasible and permitted by the agency, to achieve outcomes that are consistent with the objectives of this Performance Standard. In addition, where government capacity is limited, the client will play an active role during planning, implementation, and monitoring of activities to the extent permitted by the agency.

22. The client will prepare a plan that, together with the documents prepared by the responsible government agency, will address the relevant requirements of this Performance Standard. The client may need to include (i) the plan, implementation, and documentation of the process of ICP and engagement and FPIC where relevant; (ii) a description of the government-provided entitlements of affected Indigenous Peoples; (iii) the measures proposed to bridge any gaps between such entitlements, and the requirements of this Performance Standard; and (iv) the financial and implementation responsibilities of the government agency and/or the client.

Performance Standard 8 Cultural Heritage

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Introduction

1. Performance Standard 8 recognizes the importance of cultural heritage for current and future generations. Consistent with the Convention Concerning the Protection of the World Cultural and Natural Heritage, this Performance Standard aims to ensure that clients protect cultural heritage in the course of their project activities. In addition, the requirements of this Performance Standard on a project's use of cultural heritage are based in part on standards set by the Convention on Biological Diversity.

Objectives

- To protect cultural heritage from the adverse impacts of project activities and support its preservation.
- To promote the equitable sharing of benefits from the use of cultural heritage.

Scope of Application

2. The applicability of this Performance Standard is established during the environmental and social risks and impacts identification process. The implementation of the actions necessary to meet the requirements of this Performance Standard is managed through the client's Environmental and Social Management System (ESMS), the elements of which are outlined in Performance Standard 1. During the project life-cycle, the client will consider potential project impacts to cultural heritage and will apply the provisions of this Performance Standard.

3. For the purposes of this Performance Standard, cultural heritage refers to (i) tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values; (ii) unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls; and (iii) certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

4. Requirements with respect to tangible forms of cultural heritage are contained in paragraphs 6–16. For requirements with respect to specific instances of intangible forms of cultural heritage described in paragraph 3 (iii) see paragraph 16.

5. The requirements of this Performance Standard apply to cultural heritage regardless of whether or not it has been legally protected or previously disturbed. The requirements of this Performance Standard do not apply to cultural heritage of Indigenous Peoples; Performance Standard 7 describes those requirements.

Requirements

Protection of Cultural Heritage in Project Design and Execution

6. In addition to complying with applicable law on the protection of cultural heritage, including national law implementing the host country's obligations under the Convention Concerning the Protection of the World Cultural and Natural Heritage, the client will identify and protect cultural heritage by ensuring that internationally recognized practices for the protection, field-based study, and documentation of cultural heritage are implemented.

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7. Where the risk and identification process determines that there is a chance of impacts to cultural heritage, the client will retain competent professionals to assist in the identification and protection of cultural heritage. The removal of nonreplicable cultural heritage is subject to the additional requirements of paragraph 10 below. In the case of critical cultural heritage, the requirements of paragraphs 13–15 will apply.

Chance Find Procedures

8. The client is responsible for siting and designing a project to avoid significant adverse impacts to cultural heritage. The environmental and social risks and impacts identification process should determine whether the proposed location of a project is in areas where cultural heritage is expected to be found, either during construction or operations. In such cases, as part of the client's ESMS, the client will develop provisions for managing chance finds¹ through a chance find procedure² which will be applied in the event that cultural heritage is subsequently discovered. The client will not disturb any chance find further until an assessment by competent professionals is made and actions consistent with the requirements of this Performance Standard are identified.

Consultation

9. Where a project may affect cultural heritage, the client will consult with Affected Communities within the host country who use, or have used within living memory, the cultural heritage for long-standing cultural purposes. The client will consult with the Affected Communities to identify cultural heritage of importance, and to incorporate into the client's decision-making process the views of the Affected Communities on such cultural heritage. Consultation will also involve the relevant national or local regulatory agencies that are entrusted with the protection of cultural heritage.

Community Access

10. Where the client's project site contains cultural heritage or prevents access to previously accessible cultural heritage sites being used by, or that have been used by, Affected Communities within living memory for long-standing cultural purposes, the client will, based on consultations under paragraph 9, allow continued access to the cultural site or will provide an alternative access route, subject to overriding health, safety, and security considerations.

Removal of Replicable Cultural Heritage

11. Where the client has encountered tangible cultural heritage that is replicable³ and not critical, the client will apply mitigation measures that favor avoidance. Where avoidance is not feasible, the client will apply a mitigation hierarchy as follows:

- Minimize adverse impacts and implement restoration measures, in situ, that ensure maintenance of the value and functionality of the cultural heritage, including maintaining or restoring any ecosystem processes⁴ needed to support it;
- Where restoration in situ is not possible, restore the functionality of the cultural heritage, in a different location, including the ecosystem processes needed to support it;

¹ Tangible cultural heritage encountered unexpectedly during project construction or operation.

² A chance find procedure is a project-specific procedure that outlines the actions to be taken if previously unknown cultural heritage is encountered.

³ Replicable cultural heritage is defined as tangible forms of cultural heritage that can themselves be moved to another location or that can be replaced by a similar structure or natural features to which the cultural values can be transferred by appropriate measures. Archeological or historical sites may be considered replicable where the particular eras and cultural values they represent are well represented by other sites and/or structures.

⁴ Consistent with requirements in Performance Standard 6 related to ecosystem services and conservation of biodiversity.

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- The permanent removal of historical and archeological artifacts and structures is carried out according to the principles of paragraphs 6 and 7 above; and
- Only where minimization of adverse impacts and restoration to ensure maintenance of the value and functionality of the cultural heritage are demonstrably not feasible, and where the Affected Communities are using the tangible cultural heritage for long-standing cultural purposes, compensate for loss of that tangible cultural heritage.

Removal of Non-Replicable Cultural Heritage

12. Most cultural heritage is best protected by preservation in its place, since removal is likely to result in irreparable damage or destruction of the cultural heritage. The client will not remove any nonreplicable cultural heritage,⁵ unless all of the following conditions are met:

- There are no technically or financially feasible alternatives to removal;
- The overall benefits of the project conclusively outweigh the anticipated cultural heritage loss from removal; and
- Any removal of cultural heritage is conducted using the best available technique.

Critical Cultural Heritage

13. Critical cultural heritage consists of one or both of the following types of cultural heritage: (i) the internationally recognized heritage of communities who use, or have used within living memory the cultural heritage for long-standing cultural purposes; or (ii) legally protected cultural heritage areas, including those proposed by host governments for such designation.

14. The client should not remove, significantly alter, or damage critical cultural heritage. In exceptional circumstances when impacts on critical cultural heritage are unavoidable, the client will use a process of Informed Consultation and Participation (ICP) of the Affected Communities as described in Performance Standard 1 and which uses a good faith negotiation process that results in a documented outcome. The client will retain external experts to assist in the assessment and protection of critical cultural heritage.

15. Legally protected cultural heritage areas⁶ are important for the protection and conservation of cultural heritage, and additional measures are needed for any projects that would be permitted under the applicable national law in these areas. In circumstances where a proposed project is located within a legally protected area or a legally defined buffer zone, the client, in addition to the requirements for critical cultural heritage cited in paragraph 14 above, will meet the following requirements:

- Comply with defined national or local cultural heritage regulations or the protected area management plans;
- Consult the protected area sponsors and managers, local communities and other key stakeholders on the proposed project; and
- Implement additional programs, as appropriate, to promote and enhance the conservation aims of the protected area.

⁵ Nonreplicable cultural heritage may relate to the social, economic, cultural, environmental, and climatic conditions of past peoples, their evolving ecologies, adaptive strategies, and early forms of environmental management, where the (i) cultural heritage is unique or relatively unique for the period it represents, or (ii) cultural heritage is unique or relatively unique in linking several periods in the same site.

⁶ Examples include world heritage sites and nationally protected areas.

Project's Use of Cultural Heritage

16. Where a project proposes to use the cultural heritage, including knowledge, innovations, or practices of local communities for commercial purposes,⁷ the client will inform these communities of (i) their rights under national law; (ii) the scope and nature of the proposed commercial development; and (iii) the potential consequences of such development. The client will not proceed with such commercialization unless it (i) enters into a process of ICP as described in Performance Standard 1 and which uses a good faith negotiation process that results in a documented outcome and (ii) provides for fair and equitable sharing of benefits from commercialization of such knowledge, innovation, or practice, consistent with their customs and traditions.

⁷ Examples include, but are not limited to, commercialization of traditional medicinal knowledge or other sacred or traditional technique for processing plants, fibers, or metals.

ANNEXURE-VII

LABORATORY REPORTS

[Click Here](#)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
	Project Sponsor: Zorlu Solar Pakistan (Pvt.) Ltd	Document Issue 02	Page Number 168

ENVIRONMENTAL MONITORING REPORT

Draft Report

SGS Ref.: EHS – LHR –112/2017
Monitoring Dates: February 17, 2017 to February 18, 2017

SUBMITTED TO



**RENEWABLE RESOURCES (PVT) LIMITED
ZORLU SOLAR PAKISTAN PVT. LTD
(QASP BAHAWALPUR)**

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February, 2017

PREPARED BY



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- Annexure III: Noise Level Monitoring
- Annexure IV: Water Analysis Report
- Annexure V: Photographs

1. Introduction

Renewable Resources (RE2) is a private organization, which is providing consultancy services in the fields of renewable energy. RE2 hired the services of SGS Pakistan (Pvt.) Ltd. to conduct an environmental monitoring at Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur).

A comprehensive environmental monitoring was conducted at mutually agreed sampling points. This report is prepared on the basis of monitoring conducted at project site. Field survey was carried out on February 17, 2017 to February 18, 2017 for ambient air quality monitoring, meteorological conditions, and sampling & analysis of water samples.

1.1 Study Objective

The objective of the study is to:

- To assess the baseline conditions of the site before start of the project.
- Monitor air, water and noise level at periodic intervals in project area.

1.2 Scope of Services

Scope of services covered following main components:

- Ambient Air Quality Monitoring
- Weather Conditions
- Noise Level Monitoring
- Water Sampling & Analysis

1.2.1 Ambient Air Quality Monitoring

In accordance to USEPA National Ambient Air Quality standards (NAAQS) the following priority pollutants were monitored in the ambient air.

- Carbon Monoxide (CO)
- Oxides of Nitrogen (NO, NO₂)
- Sulphur Dioxide (SO₂)
- Particulate Matter (PM₁₀)
- Particulate Matter (PM_{2.5})
- Suspended Particulate Matter (SPM)

In addition to above mentioned parameters, the metrological conditions were also monitored in order to interpret ambient air quality. For the purpose following parameters would be monitored:

- Ambient Temperature
- Relative Humidity
- Barometric Pressure
- Wind Direction
- Wind Velocity

1.2.2 Noise Level Monitoring

Noise levels were monitored on hourly basis for 14 hrs continuously at single location. Total ten locations were monitored. Sound level meter for noise measurement was utilized, a set of three readings were collected from identified point average of which was reported, for noise measurement.

1.2.3 Water Sampling

One Ground water & one surface water sample was collected from mutually agreed sampling points and submitted to SGS labs for analysis according to parameters as per contract.

The collected water sample was microbiologically and chemically analyzed according to following APHA/USEPA methods.

Table-1: Microbiological Analysis of Water

Sr. No.	Parameters	Procedure Reference
01	Total Coli form	APHA – 9222 B
02	Faecal E. Coli	APHA – 9222 D

Table-2: Chemical Analysis of Water

Sr. No.	Parameter	Method	
		Technique	Reference
1.	pH	Electrometric	APHA-4500H+ B
2.	Temperature	Thermometer	-
3.	Solids, Total Suspended (TSS)	Gravimetric	APHA-2540 D
4.	Total Dissolved Solids (TDS)	Gravimetric	APHA-2540 C
5.	Hardness, Total as CaCO ₃	EDTA Titration/ Calculated	APHA-2340 C/B
6.	Taste	Physical	In House
7.	Chloride (Cl)	Titration	APHA-4500Cl- B
8.	Color	Spectrophotometric	APHA-2120 C
9.	Odor	Physical	In-house
10.	Biochemical Oxygen Demand(BOD)	Manometric	APHA-5210 B
11.	Chemical Oxygen Demand(COD)	Digestion, Colorimetric	APHA-5220 D
12.	Total Solids , TS	Gravimetric	APHA-2540 B
13.	Sulfate	Gravimetric	APHA-4500-SO4 C
14.	Sulfide	Iodometric Titration	APHA-4500S2- F
15.	Turbidity	Nephelometric	APHA-2130 B

*Analysis conducted by a sub-contracted lab (SGS Karachi Lab).
APHA= American Public Health Association

1.3 Schedule

Detailed Environmental monitoring was conducted at the mutually agreed site from February 17, 2017 to February 18, 2017. The environmental monitoring is conducted at following locations.

Table-3: Sampling Location Coordinates

Ambient Air Monitoring Locations	Northing	Easting
Zorlu Energy Quaid-E-Azam Solar Park (Bahawalpur)	29°16'27.82"N	71°47'42.26"E

Noise Level Monitoring Locations	Northing	Easting
Point # 01 Zorlu Energy Quaid-E-Azam Solar Park (Bahawalpur)	29°16'44.65"N	71°47'25.61"E
Point # 02 Zorlu Energy Quaid-E-Azam Solar Park (Bahawalpur)	29°16'44.59"N	71°47'25.61"E
Point # 03 Zorlu Energy Quaid-E-Azam Solar Park (Bahawalpur)	29°16'44.48"N	71°48'6.12"E
Point # 04 Zorlu Energy Quaid-E-Azam Solar Park (Bahawalpur)	29°16'37.56"N	71°48'15.82"E
Point # 05 Zorlu Energy Quaid-E-Azam Solar Park (Bahawalpur)	29°16'28.18"N	71°47'25.20"E
Point # 06 Zorlu Energy Quaid-E-Azam Solar Park (Bahawalpur)	29°16'3.74"N	71°47'35.16"E
Point # 07 Zorlu Energy Quaid-E-Azam Solar Park (Bahawalpur)	29°16'9.27"N	71°47'51.92"E
Point # 08 Zorlu Energy Quaid-E-Azam Solar Park (Bahawalpur)	29°16'26.07"N	71°48'1.96"E
Point # 09 Zorlu Energy Quaid-E-Azam Solar Park (Bahawalpur)	29°16'11.04"N	71°47'20.79"E
Point # 10 Zorlu Energy Quaid-E-Azam Solar Park (Bahawalpur)	29°16'30.45"N	71°47'47.79"E
Water Sampling Locations	Northing	Easting
Ground Water	29°18'53.57"N	71°49'52.47"E
Surface Water Canal Near 30BC Village	29°38'66.24"N	71°80'1.85"E



2. Methodology

Following is the brief description of methodology adopted for this environmental assessment:

2.1 Ambient Air Quality Monitoring

Ambient air quality of the selected locations was monitored for the estimation of carbon monoxide, nitrogen dioxide, sulphur dioxide and particulate matter concentrations.

1.3.1 Carbon Monoxide

Carbon monoxide monitoring was carried out using gas filter Correlation CO . Measurement range of the analyzer is 0-100 ppm. Continuous data was recorded for duration of 24 hrs and hourly average is reported. US EPA Designated Method RFCA-0981-054 was used to measure CO concentration.

1.3.2 Nitrogen Dioxide

Nitrogen Dioxide at the project site was measured using chemiluminescent analyzer. Measurement range of the analyzer is 0-50 ppb and 0-1000 ppm. Reference method used for detection of NO₂ is USEPA Method RFNA-1289-074.

1.3.3 Sulphur Dioxide

Concentration of Sulphur dioxide in ambient air of the project site is measured by using Pulsed Fluorescent Analyzer. Measurement range of the analyzer is 0-50ppb and 0-1000 ppm. USEPA Designated Method EQSA-0486-060 was used to measure SO₂ concentrations.

1.3.4 Particulate Matter (PM)

Particulate matter concentration in terms of SPM was monitored in the ambient air with the help of high Volume Sampler. Reference method used for determination in ambient air is 40 CFR Part 50, Appendix J (USEPA).

Air sample for detection of SPM concentration was drawn on fiber glass filter paper and then the collected sample was preserved in protective holder which was transported to SGS lab for further analysis calculation under standard environmental conditions. The methodology for all the ambient air parameters is provided in the following table.

1.3.5 Particulate Matter (PM₁₀)

Particulate matter concentration in terms of PM₁₀ was monitored in the ambient air with the help of AEROCET 531. PM₁₀ sampling was conducted for 24 hours at mutually agreed sampling locations. This method is applicable to measure ambient Particulate Matter PM₁₀ concentration from 0 to 1000 µg/m³.

1.3.6 Particulate Matter (PM_{2.5})

Particulate matter concentration in terms of PM_{2.5} was monitored in the ambient air with the help of AEROCET 531. PM_{2.5} sampling was conducted for 24 hours at mutually agreed sampling locations. This method is applicable to measure ambient Particulate Matter PM_{2.5} concentration from 0 to 1000 µg/m³.

Table-4: Methodology of Ambient Air Quality Monitoring

Air Pollutant	Monitoring Technique	Method	Measurement Range	Lowest Detection Limit
Carbon monoxide (CO)	Automatic Potable Analyzer	40 CFR 50, App. C (US-EPA)	1 – 100 ppm	1 ppm
Sulfur Dioxide (SO₂)	Calorimetric Improved West & Gaeke (Sod. Tetrachloro Mercurate) Method	40 CFR 50, App. A (US-EPA)	0.01– 0.4 ppm 25 µg/m ³ to 1000 µg/m ³	0.01 ppm
Nitrogen Dioxide (NO₂)	Chemiluminescent Analyzer	US EPA Designated Method RFNA-1289-074	0 – 1000 ppb 0 – 100 ppm	0.001 ppm
Particulate Matter (PM₁₀)	Laser Light	(USEPA)/ISO 21501-4:2007	1-1000µg/m ³	1 µg/m ³
Particulate Matter (PM_{2.5})	Laser Light	(USEPA)/ISO 21501-4:2007	1-1000µg/m ³	1 µg/m ³

Air Pollutant	Monitoring Technique	Method	Measurement Range	Lowest Detection Limit
Suspended Particulate Matter (SPM)	High volume Sampler	(USEPA) 40 CFR 50 APPB	2-750 $\mu\text{g}/\text{m}^3$	2 $\mu\text{g}/\text{m}^3$
Ozone (O₃)	UV Fluorescence	GSS	1 – 25ppm	0.001ppm
Lead (Pb)	High volume Sampler	(USEPA) 40 CFR 50 APPB	-	0.01 $\mu\text{g}/\text{m}^3$

2.2 Meteorological Conditions

In addition to the mutually agreed parameters for ambient air quality, weather conditions were also monitored continuously for 24 hours with the help of mobile weather station. Selection of sampling points was made considering the wind direction at the mutually agreed sampling site.

1.4 Noise Level Monitoring

Sound level meter for noise measurement was utilized, a set of three readings were collected from identified point average of which was reported, for noise measurement. The sound level meter was utilized, having level range from 35 dB to 135dB with minimum detection limit of 0.1 dB.

1.5 Water Sampling

Following methodology was adopted for water sampling and analysis:

1.5.1 Sample Collection and Preservation

Four water samples were collected from mutually agreed sampling points based on the sampling technique in accordance to the SOP based on the recognized methods of United State Environmental Protection Agency (USEPA) and American Public Health Association (APHA) for water sampling and analysis. The collected water samples were preserved in appropriate containers as per APHA Guidelines. A shipping container (Ice box with eutectic cold packs instead of ice) with maintained temperature of 4° C \pm 5 °C was used for transporting the samples from the collection site to the SGS environmental laboratory.



1.5.2 Sample Identification and Chain of Custody

The collected samples were labeled and assigned a unique sample identification number, sampling date and time of collection. All the relevant information (sample location, time of collection, sample identification, temperature, pH, collected by, preservation techniques etc) was recorded immediately on the Chain of Custody form signed by SGS field Analyst.

1.5.3 Analysis Methods

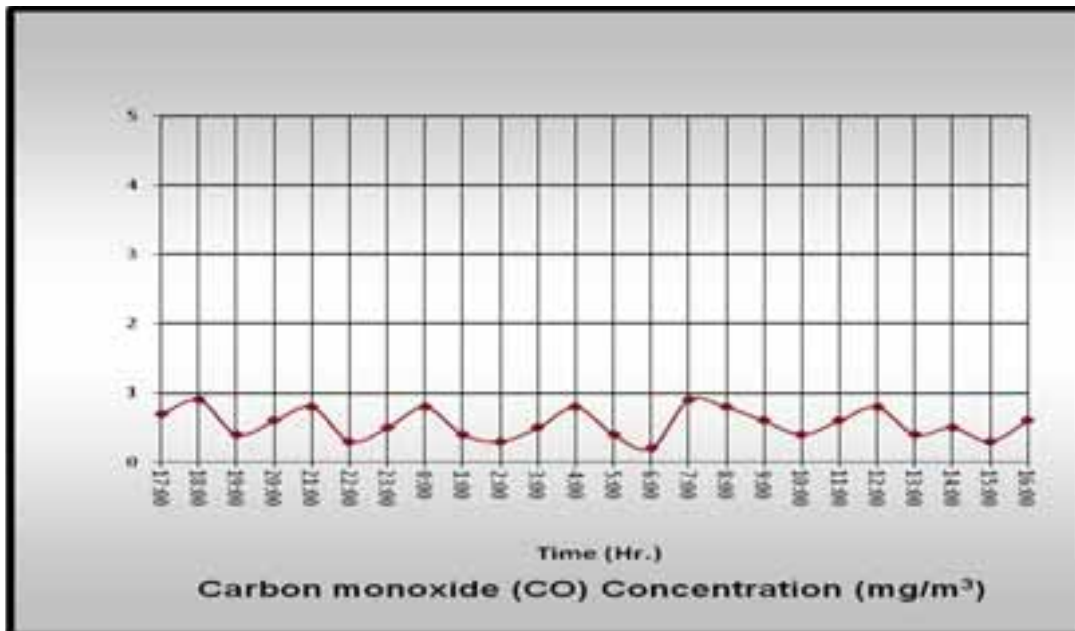
Water samples were collected from mutually agreed locations and were analyzed for parameters using standard methods for water analysis. Detail of analysis methods are described in Table-1 & 2 of the report.

3. Results and Discussion

SGS Pakistan (Pvt.) Ltd. conducted a comprehensive environmental monitoring at mutually agreed sampling points. Scope of this assessment covered monitoring of ambient air quality, weather conditions and sampling and analysis of water. The monitoring and analysis results are given as **Annexure I to IV**.

Punjab Environmental Quality Standards (PEQS) for Ambient Air are used for comparison. The average concentration of carbon monoxide (CO) for 08 hrs according to the Punjab Environmental Quality Standards (PEQS) for Ambient Air should not exceed from 5.0mg/m³. The average values obtained at monitoring site were 0.562mg/m³ at monitoring Site. **Graph-1** show prevailing concentrations of CO in mg/m³ at project sites during 24 hrs of monitoring.

Graph-1: CO Concentration during 24 Hrs Monitoring at Zorlu Solar Pak (Pvt.) Ltd.



Average 24 hrs concentrations in Punjab Environmental Quality Standards (PEQS) for Ambient Air for Nitrogen Dioxide (NO₂) is 80 µg/m³ and average concentrations of Nitrogen Dioxide (NO₂) measured during monitoring at Site, was found 7.687µg/m³. According to standard the 24 hrs concentration of Sulphur Dioxide (SO₂) in ambient air should not exceed from 120µg/m³ while concentration obtained at Site was 5.745µg/m³.

The ambient particulate matter PM₁₀ was found in the range of 19.74µg/m³ at monitoring Site.

The ambient particulate matter PM_{2.5} was found in the range of 8.50µg/m³ at monitoring Site.

The Total Suspended Particulate PM_{TSP} was found in the range of 24.97µg/m³ at monitoring Site.

The summary of the results for all parameters monitored at Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur) are provided in the following Table-5.

The average concentration of all the ambient air parameters was found within the limits defined in PEQS for Ambient Air Quality.

Total two water samples were collected from project area.

The analysis results for ground & surface water are attached as **Annexure-IV** of the report.

Table-5: Summary of the Results of Ambient Air Monitoring

Parameter	Unit	Monitoring Duration	LDL	Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)	PEQS
Nitrogen Dioxide (NO ₂)	µg/m ³	24Hours	1.00	7.687	80 (µg/ m ³) For 24 Hrs
Nitrogen Oxide (NO)	µg/m ³	24Hours	1.00	5.033	40 (µg/ m ³) For 24 Hrs
Sulphur Dioxide (SO ₂)	µg/m ³	24 Hours	1.00	5.745	120 (µg/ m ³) For 24 Hrs
Carbon Monoxide (CO)	mg/m ³	24 Hours	0.01	0.562	05 (mg/m ³) For 08 Hrs
Particulate Matter (PM ₁₀)	µg/m ³	24 Hours	1.00	19.74	150 (µg/ m ³) For 24 Hrs
Particulate Matter (PM _{2.5})	µg/m ³	24 Hours	1.00	8.50	35 (µg/ m ³) For 24 Hrs
Ozone (O ₃)	ppm	1 Hour	0.001	<0.001	130 (µg/ m ³) For 01 Hr
Total Suspended Particulate (TSP)	µg/m ³	24 Hours	2.00	24.97	500 (µg/ m ³) For 24 Hrs
Lead (Pb)	µg/m ³	24 Hours	0.01	<0.01	1.5 (µg/ m ³) For 24 Hours



Annexure – I

Meteorological Data



Meteorological Data

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'27.82
: E 71°47'42.26

Time	Temperature	Wind Direction	Wind Speed	Humidity	Barometric Pressure
	°C		m/s	%	mm of Hg
17:00	29	SW	2.4	21	754.8
18:00	27	SW	2.1	27	754.9
19:00	24	SW	2.7	31	754.7
20:00	22	SW	2.5	35	754.5
21:00	21	SW	2.6	38	754.7
22:00	19	SW	2.4	39	754.2
23:00	17	SW	2.8	39	754.6
00:00	16	NW	1.4	40	755.4
01:00	16	NW	1.7	44	755.3
02:00	15	NW	1.3	48	755.9
03:00	14	NW	1.9	52	755.3
04:00	13	NW	1.7	54	755.7
05:00	12	NW	3.4	56	755.2
06:00	11	NW	3.1	60	755.8
07:00	13	N	3.8	62	755.3
08:00	15	N	3.6	59	755.9
09:00	16	SW	2.4	57	755.4
10:00	19	SW	2.8	54	755.9
11:00	21	SW	2.7	52	755.2
12:00	23	SW	2.9	48	755.6
13:00	25	SW	2.2	46	755.7
14:00	27	SW	2.5	44	755.2
15:00	28	SW	2.4	42	755.8
16:00	28	SW	2.6	39	755.5

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Annexure – II

Ambient Air Quality Monitoring Data



Ambient Air Quality

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'27.82
: E 71°47'42.26

Time	CO (mg/m ³)	NO (µg/m ³)	NO ₂ (µg/m ³)	SO ₂ (µg/m ³)
17:00	0.7	5.4	9.6	3.8
18:00	0.9	5.9	9.4	3.6
19:00	0.4	7.4	10.7	4.8
20:00	0.6	7.4	9.7	5.4
21:00	0.8	7.5	8.6	6.2
22:00	0.3	4.6	6.9	6.8
23:00	0.5	5.6	9.5	3.8
0:00	0.8	4.8	6.9	5.3
1:00	0.4	4.4	5.4	2.5
2:00	0.3	3.7	7.5	4.7
3:00	0.5	3.3	6.4	4.2
4:00	0.8	3.7	5.3	6.2
5:00	0.4	3.6	7.8	5.2
6:00	0.2	3.5	6.8	3.7
7:00	0.9	5.7	8.9	5.3
8:00	0.8	5.3	7.4	6.9
9:00	0.6	2.8	4.8	8.5
10:00	0.4	3.7	6.2	7.2
11:00	0.6	3.8	5.9	8.2
12:00	0.8	3.2	6.3	6.2
13:00	0.4	3.8	6.9	7.3
14:00	0.5	6.8	9.4	8.3
15:00	0.3	7.5	8.9	9.3
16:00	0.6	7.4	9.3	4.5
Average Concentration	0.562	5.033	7.687	5.745

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Ambient Air Quality

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'27.82
: E 71°47'42.26

Parameter	Unit	Monitoring Duration	LDL	Average Obtained Concentration	PEQS
Nitrogen Dioxide (NO ₂)	µg/m ³	24Hours	1.00	7.687	80 (µg/ m ³) For 24 Hrs
Nitrogen Oxide (NO)	µg/m ³	24Hours	1.00	5.033	40 (µg/ m ³) For 24 Hrs
Sulphur Dioxide (SO ₂)	µg/m ³	24 Hours	1.00	5.745	120 (µg/ m ³) For 24 Hrs
Carbon Monoxide (CO)	mg/m ³	24 Hours	0.01	0.562	05 (mg/m ³) For 08 Hrs
Particulate Matter (PM ₁₀)	µg/m ³	24 Hours	2.00	19.74	150 (µg/ m ³) For 24 Hrs
Particulate Matter (PM _{2.5})	µg/m ³	24 Hours	2.00	8.50	35 (µg/ m ³) For 24 Hrs
Ozone (O ₃)	ppm	1 Hour	0.001	<0.001	130 (µg/ m ³) For 01 Hr
Total Suspended Particulate (TSP)	µg/m ³	24 Hours	-	24.97	500 (µg/ m ³) For 24 Hrs
Lead (Pb)	µg/m ³	24 Hours	0.01	<0.01	1.5 (µg/ m ³) For 24 Hours

µg/m³: micrograms per cubic meter
mg/m³: milligram per cubic meter
LDL: Lowest Detection Limit
PEQS: Punjab Environmental Quality Standards

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Annexure – III

Noise Level Monitoring



Noise Level Monitoring

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'44.65
: E 71°47'25.61

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1st Set of Readings				
1.	07:00	23.4	23.9	23.6
2.	08:00	25.2	26.4	25.8
3.	09:00	24.6	25.9	25.2
4.	10:00	24.4	24.8	24.6
5.	11:00	30.2	31.4	30.8
6.	11:59	30.9	31.7	31.3
2nd Set of Readings				
7.	13:30	27.5	28.3	27.9
8.	14:30	26.2	26.8	26.5
9.	15:30	28.2	28.9	28.5
10.	16:30	32.4	32.9	32.6
3rd Set of Readings				
11.	21:30	29.4	30.4	29.9
12.	22:30	31.6	32.4	32.0
13.	23:30	26.5	26.9	26.7
14.	23:59	28.4	28.9	28.6

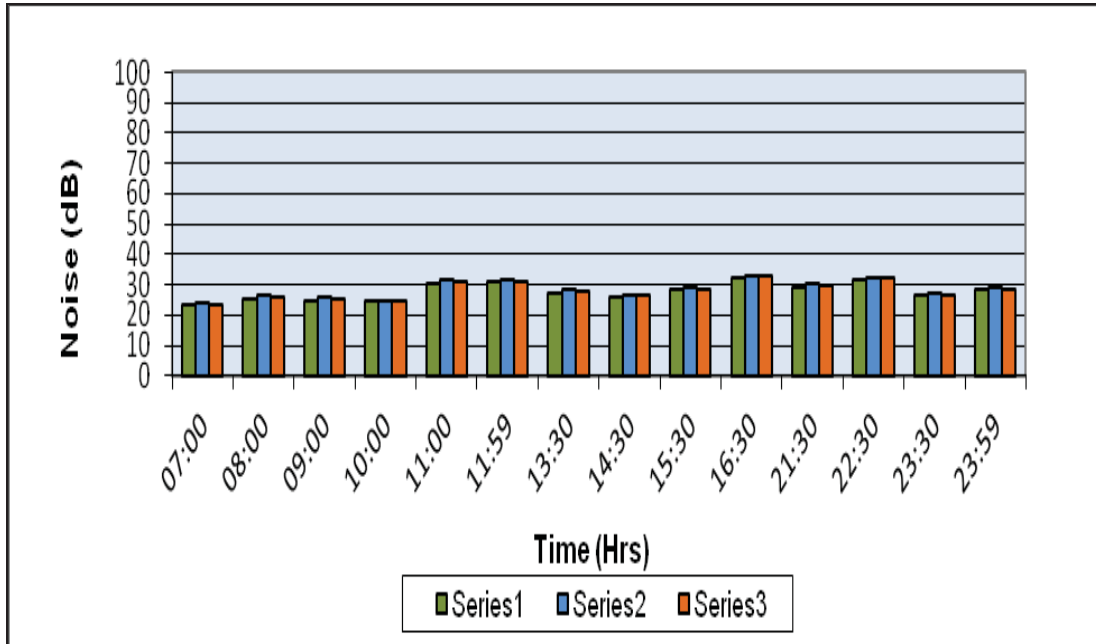
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Graph for Noise Level



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Noise Level Monitoring

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'44.59
: E 71°47'25.61

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1st Set of Readings				
1.	07:00	33.2	33.5	33.9
2.	08:00	29.4	29.6	29.6
3.	09:00	26.6	26.8	26.7
4.	10:00	28.3	28.9	28.5
5.	11:00	30.7	30.9	30.8
6.	11:59	32.2	32.9	32.7
2nd Set of Readings				
7.	13:30	27.4	27.9	27.6
8.	14:30	26.3	26.9	26.5
9.	15:30	25.1	26.7	25.9
10.	16:30	29.2	29.9	29.6
3rd Set of Readings				
11.	21:30	20.4	29.2	28.7
12.	22:30	24.7	25.2	24.9
13.	23:30	25.8	26.2	25.4
14.	23:59	23.6	23.9	23.7

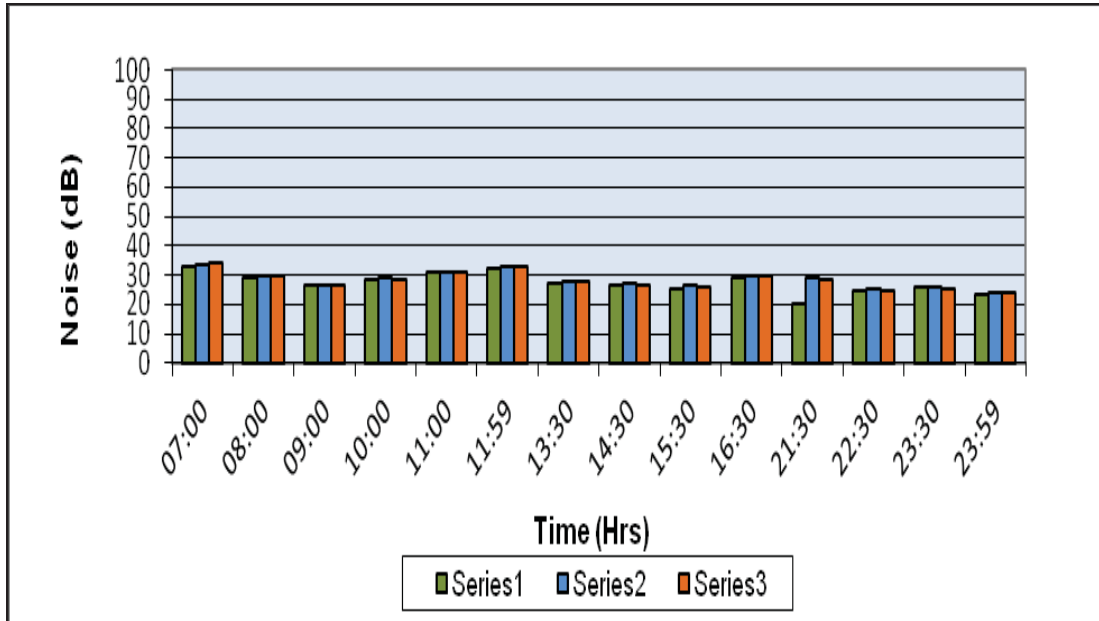
SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Graph for Noise Level



SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Noise Level Monitoring

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'44.48
: E 71°48'6.12

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1st Set of Readings				
1.	07:00	26.7	26.9	26.8
2.	08:00	22.2	23.9	22.8
3.	09:00	25.4	25.9	25.6
4.	10:00	24.3	24.8	24.5
5.	11:00	27.9	28.1	27.9
6.	11:59	23.8	24.2	23.9
2nd Set of Readings				
7.	13:30	25.4	25.9	25.7
8.	14:30	26.7	26.9	26.8
9.	15:30	28.3	28.9	28.7
10.	16:30	29.2	29.8	29.7
3rd Set of Readings				
11.	21:30	30.1	30.9	30.5
12.	22:30	28.5	28.9	28.7
13.	23:30	25.7	26.2	25.5
14.	23:59	26.6	27.3	26.9

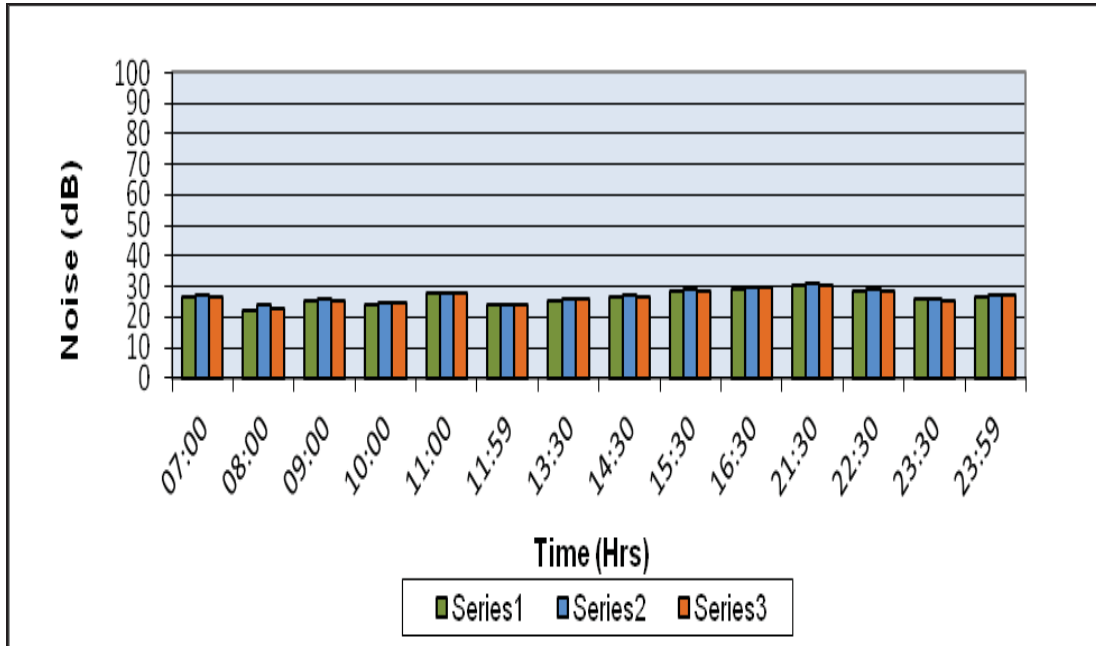
SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Graph for Noise Level



SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Noise Level Monitoring

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'37.56
: E 71°48'15.82

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1st Set of Readings				
1.	07:00	26.9	27.3	27.1
2.	08:00	28.3	28.9	28.5
3.	09:00	27.8	28.4	28.1
4.	10:00	29.1	30.4	30.2
5.	11:00	24.7	24.9	24.8
6.	11:59	28.4	28.9	28.6
2nd Set of Readings				
7.	13:30	25.8	26.9	26.4
8.	14:30	29.6	30.4	30.1
9.	15:30	24.2	24.9	24.6
10.	16:30	24.9	25.4	25.1
3rd Set of Readings				
11.	21:30	28.4	28.9	28.1
12.	22:30	27.7	27.9	27.8
13.	23:30	26.4	26.9	26.5
14.	23:59	28.3	28.7	28.5

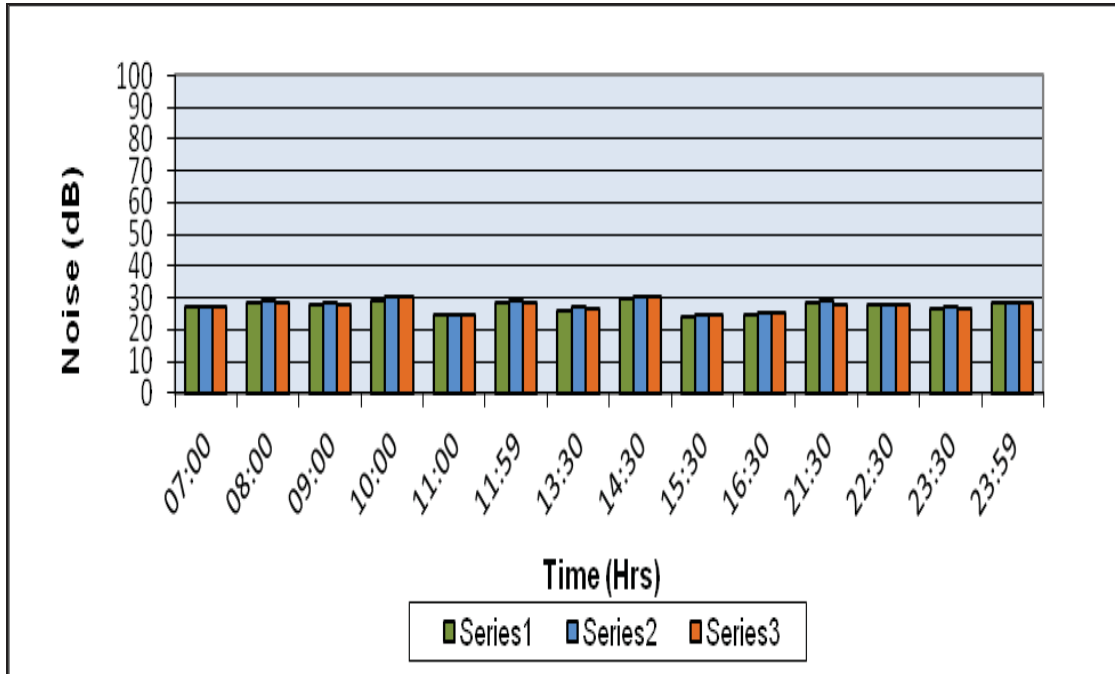
SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Graph for Noise Level



SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Noise Level Monitoring

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'28.18
: E 71°47'25.20

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1st Set of Readings				
1.	07:00	27.4	24.9	27.6
2.	08:00	24.8	24.9	24.9
3.	09:00	25.1	25.8	25.6
4.	10:00	25.6	26.4	25.9
5.	11:00	27.7	28.2	27.9
6.	11:59	24.2	24.9	24.6
2nd Set of Readings				
7.	13:30	27.4	27.8	27.5
8.	14:30	28.3	29.4	29.1
9.	15:30	26.2	26.8	26.4
10.	16:30	24.8	25.2	24.9
3rd Set of Readings				
11.	21:30	23.1	24.5	23.7
12.	22:30	24.6	24.9	24.8
13.	23:30	26.7	27.5	26.9
14.	23:59	23.4	24.2	23.2

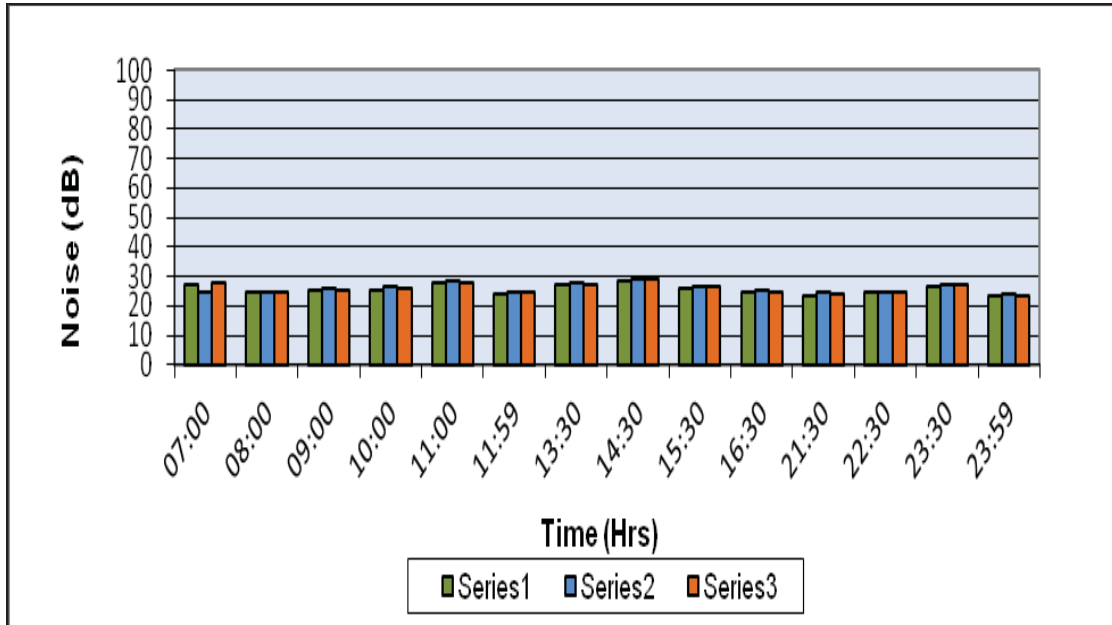
SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Graph for Noise Level



SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Noise Level Monitoring

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'3.74
: E 71°47'35.16

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1st Set of Readings				
1.	07:00	26.7	26.9	26.8
2.	08:00	28.1	28.5	28.4
3.	09:00	24.8	24.9	24.9
4.	10:00	28.9	29.2	29.1
5.	11:00	24.6	24.8	24.7
6.	11:59	28.7	28.9	28.9
2nd Set of Readings				
7.	13:30	24.5	24.7	24.6
8.	14:30	26.4	27.8	27.6
9.	15:30	27.3	28.9	28.4
10.	16:30	28.2	28.8	28.6
3rd Set of Readings				
11.	21:30	31.1	32.7	32.3
12.	22:30	33.8	34.2	33.9
13.	23:30	26.4	26.9	26.6
14.	23:59	28.7	29.2	28.9

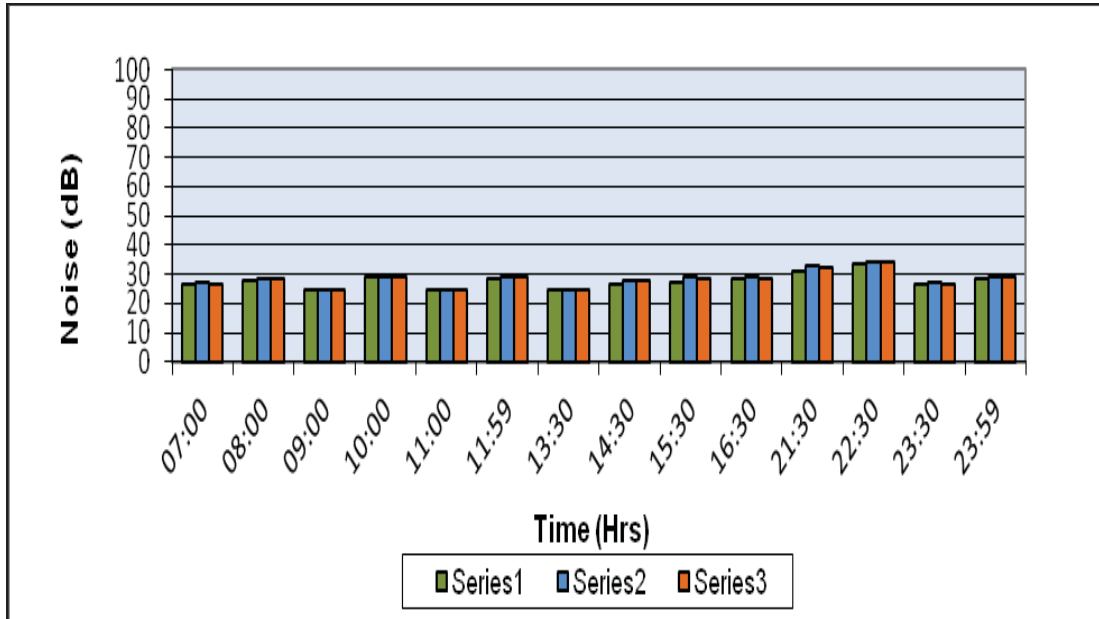
SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Graph for Noise Level



SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Noise Level Monitoring

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'9.27
: E 71°47'51.92

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1st Set of Readings				
1.	07:00	34.7	34.9	34.8
2.	08:00	31.8	31.9	31.9
3.	09:00	29.9	29.6	29.9
4.	10:00	33.4	33.4	33.8
5.	11:00	27.3	27.9	27.9
6.	11:59	28.9	29.2	28.9
2nd Set of Readings				
7.	13:30	24.7	24.9	24.9
8.	14:30	29.6	30.4	30.1
9.	15:30	32.4	32.9	32.6
10.	16:30	28.1	28.9	28.6
3rd Set of Readings				
11.	21:30	27.9	28.4	28.1
12.	22:30	28.4	28.9	28.1
13.	23:30	26.7	27.4	27.1
14.	23:59	27.6	27.9	27.7

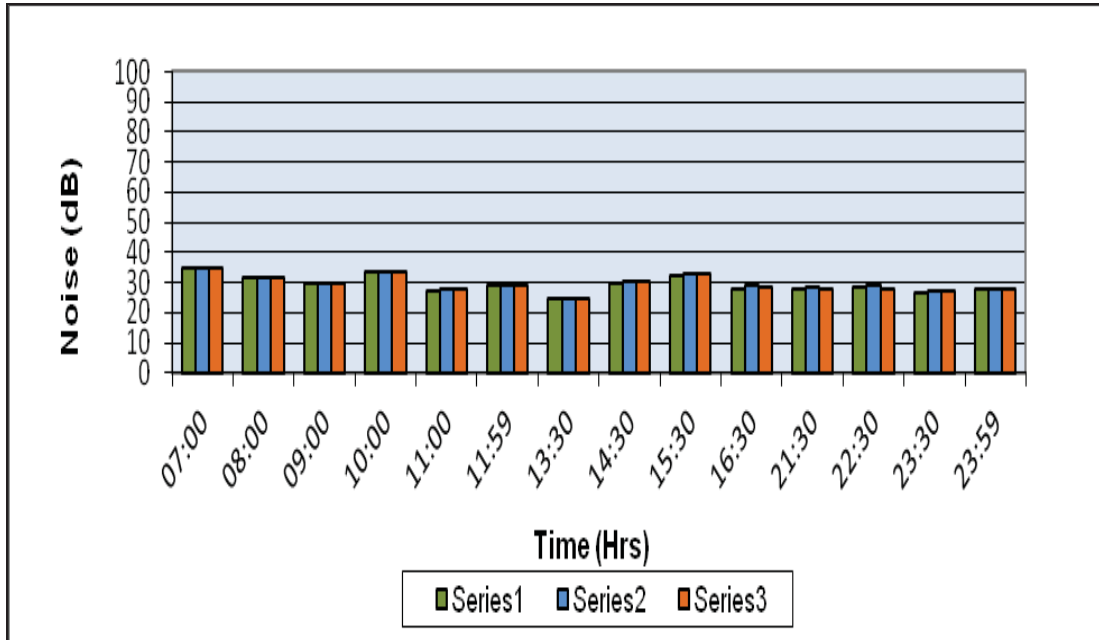
SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Graph for Noise Level



SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Noise Level Monitoring

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'26.07
: E 71°48'1.96

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1st Set of Readings				
1.	07:00	30.9	31.6	31.3
2.	08:00	27.4	27.9	27.4
3.	09:00	29.7	30.1	29.9
4.	10:00	24.4	24.9	24.6
5.	11:00	28.3	28.9	28.5
6.	11:59	26.1	26.9	26.7
2nd Set of Readings				
7.	13:30	31.8	32.5	32.1
8.	14:30	27.6	28.6	28.1
9.	15:30	29.7	30.2	30.1
10.	16:30	32.9	33.5	33.2
3rd Set of Readings				
11.	21:30	25.2	25.8	25.5
12.	22:30	27.9	28.4	28.1
13.	23:30	29.4	29.8	29.6
14.	23:59	27.7	27.7	27.9

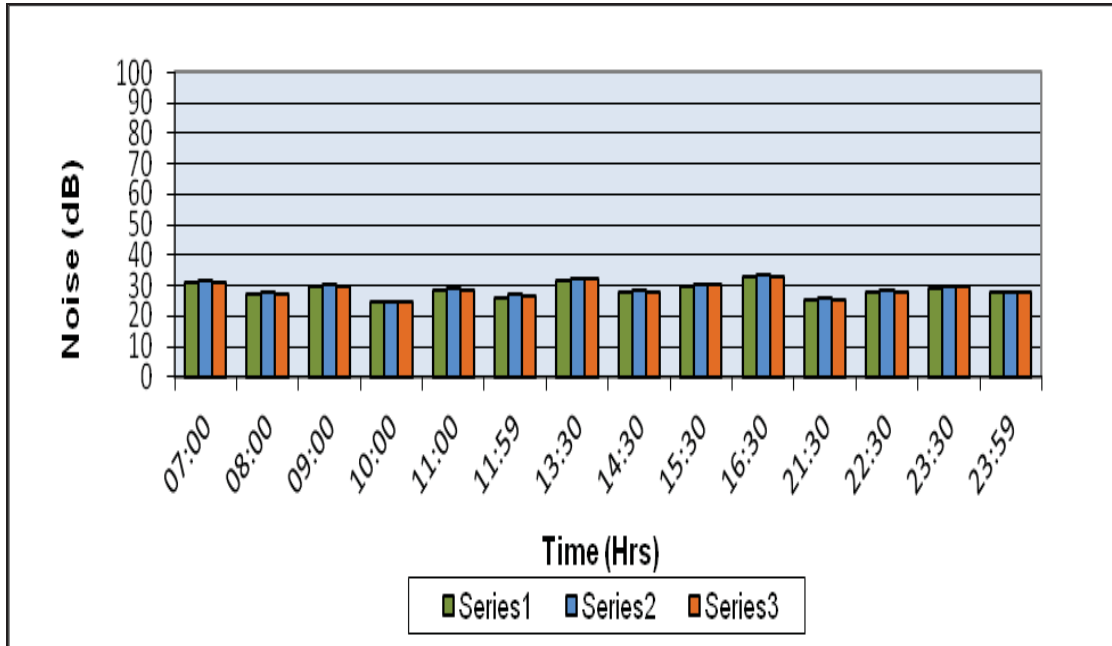
SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Graph for Noise Level



SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Noise Level Monitoring

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'11.04
: E 71°47'20.79

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1st Set of Readings				
1.	07:00	27.8	28.6	28.1
2.	08:00	24.1	24.9	24.6
3.	09:00	29.6	30.6	30.1
4.	10:00	26.4	26.9	26.3
5.	11:00	28.9	28.9	29.5
6.	11:59	31.3	31.8	31.5
2nd Set of Readings				
7.	13:30	33.5	33.7	33.6
8.	14:30	36.7	36.9	36.8
9.	15:30	31.9	32.5	32.2
10.	16:30	29.3	30.5	29.8
3rd Set of Readings				
11.	21:30	32.8	33.6	33.1
12.	22:30	25.4	26.8	26.1
13.	23:30	28.6	28.9	28.7
14.	23:59	26.1	26.9	26.8

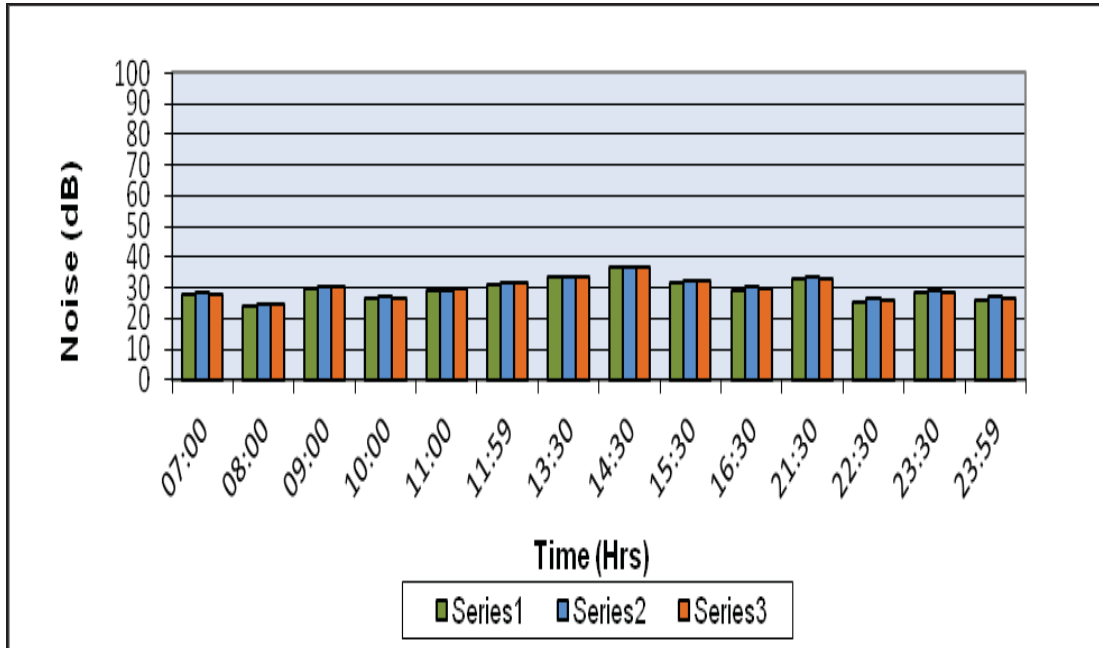
SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Graph for Noise Level



SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Noise Level Monitoring

Client : Renewable Resources
Sampling Point : Zorlu Solar Pakistan (Pvt.) Ltd. (QASP Bahawalpur)
Date of Intervention : February 17-18, 2017
Coordinates : N 29°16'30.45
: E 71°47'47.79

Sr. #	Time (Hrs)	Noise Level (Reading-1)	Noise Level (Reading-2)	Noise Level (Reading-3)
1st Set of Readings				
1.	07:00	30.6	30.9	30.7
2.	08:00	27.5	27.8	27.6
3.	09:00	25.1	25.7	25.4
4.	10:00	29.6	29.7	29.7
5.	11:00	24.7	24.9	24.8
6.	11:59	26.9	27.3	27.1
2nd Set of Readings				
7.	13:30	29.4	29.9	29.7
8.	14:30	27.7	28.4	27.9
9.	15:30	26.8	27.4	27.1
10.	16:30	28.9	29.6	29.3
3rd Set of Readings				
11.	21:30	24.3	24.9	24.7
12.	22:30	26.8	27.9	27.6
13.	23:30	28.1	28.9	28.7
14.	23:59	27.7	28.2	27.9

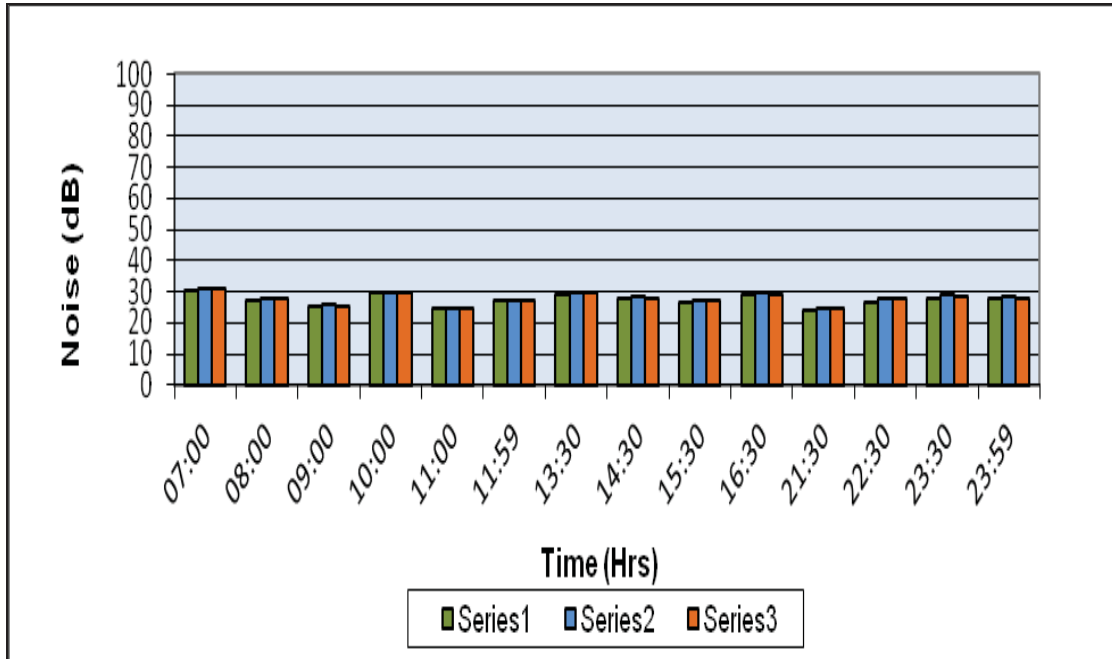
SGS PAKISTAN (PVT.) LTD

E(QA)

SH



Graph for Noise Level



SGS PAKISTAN (PVT.) LTD

E(QA)

SH

Annexure – IV

Water Analysis



[ANALYTICAL REPORT]

[WATER ANALYSIS]

[MULTIPLE PARAMETER ANALYSIS / EHS-ISB-Q-023/2017]

PREPARED FOR:

[RENEWABLE RESOURCES]



ANALYTICAL REPORT

CLIENT DETAILS

Client Renewable Resources
Address Green Tower, Blue Area.
Contact Mr. Irfan Parvaiz
Telephone +92 311 5000285
Fax -
Email irfan.parvez@renewableresources.com.pk
Project (not specified)
Order Number (RE2/WO/202/01)
Samples Water Samples

LABORATORY DETAILS

Deputy Manager Ali Hashim
Laboratory Chemical, Environmental & Microbiological Laboratory
Address Plot No. 07, Din Muhammad Town, 19-KM Off Multan Road, Lahore.
Telephone +92 42 38104135-40
Fax +92 42 37515420
Email ali.hashim@sgs.com
SGS Reference EHS-LHR-112/2017
Sample Collected 18-02-2017
Report Number -----
Date Reported 27-02-2017

COMMENTS

This report is not valid for any negotiation.
The remaining portion of the chemical sample (s) will be disposed off after one week unless otherwise instructed. (Conditions Apply)
Uncertainty of the test can be provided upon request.

SIGNATORIES

Laboratory In-Charge QA/QC

Deputy Manager



ANALYTICAL REPORT

Sample No.	EHS-LHR-112/2017-01		
Client ID	Ground Water 29°17'34.82"N 71°46'45.26"E		
Sample Matrix	Ground Water Sample		
Sample Date / Time	18-02-17 12:30		
Sample Receipt Date / Time	20-02-17 14:15		
Sampled By	SGS		
Parameter	Units	LOR	Results

Temperature Thermometer			
Temperature (at the time of sampling)	°C	-	18
Turbidity based on APHA 2130 B 22nd Edition			
Turbidity	NTU	1.0	<1.0
pH based on APHA 4500H+ B 22nd Edition			
*pH	pH unit	0.1	7.41
Color based on APHA-2120 B/C 22nd Edition			
Color	Pt-Co	5.0	<5.0
Odour In House (Organoleptic)			
Odour	-	-	Non Objectionable
Taste In House (Organoleptic)			
Taste	-	-	Salty
Total Suspended Solid based on APHA 2540 D 22nd Edition			
*Solids, Total Suspended (TSS)	mg/L	5.0	<5.0
Total Dissolved Solid based on APHA 2540 C 22nd Edition			
*Solids, Total Dissolved (TDS)	mg/L	5.0	2450
Total, Hardness based on APHA 2340 A, C & B 22nd Edition			
*Hardness, Total as CaCO ₃	mg/L	1.0	360
Biochemical Oxygen Demand (BOD₅) Based on APHA-5210 D 22nd Edition			
*(BOD ₅) @ 20 °C	mg/L	3.0	12.5
Chemical Oxygen Demand(COD) Based on APHA-5220 D 22nd Edition			
*COD	mg/L	5.0	26
Total Solids Based on APHA 2540 B 22nd Edition			
Solids, Total	mg/L	5.0	2450
Chloride based on APHA-4500Cl- B 22nd Edition			
*Chloride	mg/L	0.5	547.68
Sulphide based on APHA 4500 S⁻² F 22nd Edition			
Sulphide (S ⁻²)	mg/L	1.0	<1.0
Sulfate based on APHA 4500 SO₄⁻² C 22nd Edition			
*Sulfate (SO ₄ ⁻²)	mg/L	5.0	664.87
Total Coliforms Membrane Filtration Technique APHA 9222 B 22nd Edition			
*Total Coliforms	CFU / 100ml	-	65
Fecal Coliforms (E.coli) Membrane Filtration Technique APHA 9222 D 22nd Edition			
* Fecal Coliforms (E.coli)	CFU / 100ml	-	Absent



ANALYTICAL REPORT

Sample No.	EHS-LHR-112/2017-02		
Client ID	Surface Water 29°38'66.24" N 71°80'1.85" E		
Sample Matrix	Surface Water Sample		
Sample Date / Time	18-02-17 15:55		
Sample Receipt Date / Time	20-02-17 14:15		
Sampled By	SGS		
Parameter	Units	LOR	Results

Temperature Thermometer			
Temperature (at the time of sampling)	°C	-	17
Turbidity based on APHA 2130 B 22nd Edition			
Turbidity	NTU	1.0	Over range
pH based on APHA 4500H+ B 22nd Edition			
*pH	pH unit	0.1	7.10
Color based on APHA-2120 B/C 22nd Edition			
Color	Pt-Co	5.0	28
Odour In House (Organoleptic)			
Odour	-	-	Non Objectionable
Taste In House (Organoleptic)			
Taste	-	-	Non Objectionable
Total Suspended Solid based on APHA 2540 D 22nd Edition			
*Solids, Total Suspended (TSS)	mg/L	5.0	2367.5
Total Dissolved Solid based on APHA 2540 C 22nd Edition			
*Solids, Total Dissolved (TDS)	mg/L	5.0	436
Total, Hardness based on APHA 2340 A, C & B 22nd Edition			
*Hardness, Total as CaCO ₃	mg/L	1.0	170
Biochemical Oxygen Demand (BOD₅) Based on APHA-5210 D 22nd Edition			
*(BOD ₅) @ 20 °C	mg/L	3.0	16
Chemical Oxygen Demand(COD) Based on APHA-5220 D 22nd Edition			
*COD	mg/L	5.0	43
Total Solids Based on APHA 2540 B 22nd Edition			
Solids, Total	mg/L	5.0	2803.5
Chloride based on APHA-4500Cl- B 22nd Edition			
*Chloride	mg/L	0.5	88.71
Sulphide based on APHA 4500 S⁻² F 22nd Edition			
Sulphide (S ⁻²)	mg/L	1.0	<1.0
Sulfate based on APHA 4500 SO₄⁻² C 22nd Edition			
*Sulfate (SO ₄ ⁻²)	mg/L	5.0	58.06



ANALYTICAL REPORT

FOOTNOTE

IS	Insufficient sample for analysis.
LOR	Limits of Reporting
TCC	Total Colony Count
P/A	Present / Absent
MPN	Most Probable Number
TPC	Total Plate Count
HPC	Heterotrophic Plate count
APC	Aerobic Plate Count
TVA	Total Viable Count & Total Bacteria
FDA	Food & Drug Administration of USA
BAM	Bacteriological Analytical Manual
LNR	Sample Listed, but not received
CFU	Colony Forming Unit
*	This analysis is covered by the scope of accreditation.
**	Effluent Temperature should not increase ≤ 3 °C from receiving body Temperature Effluent Temperature = 37 °C Receiving Body Temperature = Not Available
^	Performed by the outside laboratory reporting limit
#	Result will follow soon.

Sample analyzed as received.

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Annexure – V

Pictorial Record

Pictorial Record for Ambient Air



Monitoring at Zorlu Solar Pakistan (Pvt.) Ltd.



Monitoring at Zorlu Solar Pakistan (Pvt.) Ltd.



Monitoring at Zorlu Solar Pakistan (Pvt.) Ltd.



Monitoring at Zorlu Solar Pakistan (Pvt.) Ltd.

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Pictorial Record for Water Sampling



Sampling at Zorlu Solar Pakistan (Pvt.) Ltd.
Ground Water Sample



Sampling at Zorlu Solar Pakistan (Pvt.) Ltd.
Ground Water Sample



Sampling at Zorlu Solar Pakistan (Pvt.) Ltd.
Surface Water Sample Near 30BC Village



Sampling at Zorlu Solar Pakistan (Pvt.) Ltd.
Surface Water Sample Near 30BC Village

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ANNEXURE-VIII

SOCIAL SURVEY FORMS

[Click Here](#)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
	Project Sponsor: Zorlu Solar Pakistan (Pvt.) Ltd	Document Issue 02	Page Number 169

Social Survey Form

Project Title:		Date of Survey (DD/MM/YYYY) <u>17/02/2017</u>	
<u>100 MW Solar Power Project of Zorlu Solar Power Pakistan Pvt. Ltd</u>		Contact No: <u>0343-1737196</u>	
Person Name: <u>Abdul Majeed</u>		NIC No: <u>31205-8948106-3</u>	
Location/ Address: <u>Chak 411, D.B P.O Box Khas, Tehsil Yazman District Bahawalpur</u>			
Education Level		Post Graduate	<input type="checkbox"/>
		Graduate	<input type="checkbox"/>
		Secondary	<input type="checkbox"/>
		Metric	<input type="checkbox"/>
		Middle	<input type="checkbox"/>
		Primary	<input checked="" type="checkbox"/>
		Illiterate	<input type="checkbox"/>
Marital Status	Married <input checked="" type="checkbox"/> Unmarried <input type="checkbox"/>	No of Family Members	<u>8</u>
Employment	<u>Labour</u>	Monthly Income	<u>8500/-</u>
What is the status of education facilities in the area?			
<u>Primary & high school is present in the area.</u>			
How far is the nearby health facility (Hospital/ Health Care Center) available to you?			
<u>No health facility is available nearby is in Bahawalpur city.</u>			
Is electricity or sui gas fs available in your area? If No, What is the source of fuel used at your homes?			
<u>Electricity is available & No gas is present, wood is used at if.</u>			
Do you have any idea about the solar power energy? If Yes, give your view about the need of a power project in your area?			
<u>No Idea</u>			
What are the current socio-economic conditions in the project area?			
<u>No Idea</u>			
Do you think that this project create employment and business opportunities for local community?			
<u>This will improve the job opportunities & businesses as well for local community.</u>			

Do you think that this project will improve the quality of life of the people in that area?
<i>yes, it will improve the quality of life</i>
Do you think that this project will improve the level of general awareness of the people about different aspects of life in that area?
<i>Yes it will improve the general awareness among the people</i>
What would be the likely socio-economic and environmental impacts of a solar power project (e.g on land, water, fauna and flora)?
<i>No Idea.</i>
Overall response (from the surveyor point of view)
Positive <input checked="" type="checkbox"/> Negative <input type="checkbox"/> No Response <input type="checkbox"/>
Name and Signature of Surveyor
<i>Johan Parvez / (D) / a Q</i> <i>M. S. G. M. S.</i>

Social Survey Form

Project Title: <u>100 MW Solar Power Project of Zorlu Solar Power Pakistan Pvt. Ltd</u>		Date of Survey (DD/MM/YYYY) <u>17/02/2017</u>	
		Contact No: <u>0346-6597031</u>	
Person Name: <u>M. Mushtaq</u>		NIC No: <u>31205-7127809-1</u>	
Location/ Address: <u>Chuk 411, P.O. Bon Khas, Tehsil Yagman District Bahawalpur</u>			
Education Level		Post Graduate <input type="checkbox"/>	
		Graduate <input type="checkbox"/>	
		Secondary <input type="checkbox"/>	
		Metric <input type="checkbox"/>	
		Middle <input type="checkbox"/>	
		Primary <input type="checkbox"/>	
		Illiterate <input checked="" type="checkbox"/>	
Marital Status	Married <input checked="" type="checkbox"/> Unmarried <input type="checkbox"/>	No of Family Members <u>6</u>	
Employment	<u>Labour</u>	Monthly Income <u>8000/-</u>	
What is the status of education facilities in the area?			
<u>High school is present in the area</u>			
How far is the nearby Health facility (Hospital/ Health Care Center) available to you?			
<u>No hospital is available nearby is in Bahawalpur city.</u>			
Is electricity or sui gas is available in your area? If No, What is the source of fuel used at your homes?			
<u>Electricity is Present and No gas is available, wood is used as a fuel.</u>			
Do you have any idea about the solar power energy? If Yes, give your view about the need of a power project in your area?			
<u>No Idea</u>			
What are the current socio-economic conditions in the project area?			
<u>No Idea</u>			
Do you think that this project create employment and business opportunities for local community?			
<u>This will create jobs in business opportunities for local community.</u>			

Do you think that this project will improve the quality of life of the people in that area?

Yes, it will improve the quality of life in that area.

Do you think that this project will improve the level of general awareness of the people about different aspects of life in that area?

Yes it will improve the level of general awareness among people.

What would be the likely socio-economic and environmental impacts of a solar power project (e.g on land, water, fauna and flora)?

No idea

Overall response (from the surveyor point of view)

Positive Negative No Response

Name and Signature of Surveyor

Afsan Parvez / Afzal

Social Survey Form

Project Title: <u>100 MW Solar Power Project of Zorlu Solar Power Pakistan Pvt. Ltd</u>		Date of Survey (DD/MM/YYYY) <u>17/02/2017</u>	
Person Name: <u>Akhtar Hussain</u>		Contact No: <u>0343-7176398</u>	
Location/ Address: <u>Chuk 40, D.B, P.O Box Chuk 46, B.B Tehsil. Yarman, Distt Bahawal Pur.</u>		NIC No: <u>31205-1144215-7</u>	
Education Level		Post Graduate	<input type="checkbox"/>
		Graduate	<input type="checkbox"/>
		Secondary	<input type="checkbox"/>
		Metric	<input type="checkbox"/>
		Middle	<input type="checkbox"/>
		Primary	<input type="checkbox"/>
		Illiterate	<input checked="" type="checkbox"/>
Marital Status	Married <input checked="" type="checkbox"/> Unmarried <input type="checkbox"/>	No of Family Members	<u>4</u>
Employment	<u>Labour</u>	Monthly Income	<u>8000</u>
What is the status of education facilities in the area?			
<u>Primary school is present in the area.</u>			
How far is the nearby Health facility (Hospital/ Health Care Center) available to you?			
<u>No health facility is present, nearby hospital is in Bahawal Pur city.</u>			
Is electricity or sui gas is available in your area? If No, What is the source of fuel used at your homes?			
<u>Electricity is present su No Gas is available, wood is used as a fuel.</u>			
Do you have any idea about the solar power energy? If Yes, give your view about the need of a power project in your area?			
<u>Yes, it will produce electricity.</u>			
What are the current socio-economic conditions in the project area?			
<u>No Idea</u>			
Do you think that this project create employment and business opportunities for local community?			
<u>This will create new jobs su business opportunities for local communities.</u>			

Do you think that this project will improve the quality of life of the people in that area?

Yes, it will improve the quality of life

Do you think that this project will improve the level of general awareness of the people about different aspects of life in that area?

The project will create the awareness.

What would be the likely socio-economic and environmental impacts of a solar power project (e.g on land, water, fauna and flora)?

No idea

Overall response (from the surveyor point of view)

Positive Negative No Response

Name and Signature of Surveyor

Infan Parvez / @ / all 

Social Survey Form

Project Title: <u>100 MW Solar Power Project of Zorlu Solar Power Pakistan Pvt. Ltd</u>		Date of Survey (DD/MM/YYYY) <u>17/02/2017</u>	
Person Name: <u>Muhammad Maghbool</u>		Contact No: <u>0342-999881</u>	
Location/ Address: <u>Chuk 46, D.B P.O Box Chuk 46, Tehsil Yazman, District Bahawalpur</u>		NIC No: <u>31255-709190-3</u>	
Education Level		Post Graduate	<input type="checkbox"/>
		Graduate	<input type="checkbox"/>
		Secondary	<input type="checkbox"/>
		Metric	<input type="checkbox"/>
		Middle	<input checked="" type="checkbox"/>
		Primary	<input type="checkbox"/>
		Illiterate	<input type="checkbox"/>
Marital Status	Married <input checked="" type="checkbox"/> Unmarried <input type="checkbox"/>	No of Family Members 3	
Employment	<u>Labor</u>	Monthly Income 	
What is the status of education facilities in the area?			
<u>Only Primary School is present in the area.</u>			
How far is the nearby Health facility (Hospital/ Health Care Center) available to you?			
<u>No health facility is available, nearby hospital is in Bahawalpur city.</u>			
Is electricity or sui gas is available in your area? If No, What is the source of fuel used at your homes?			
<u>Electricity is present, sui gas is not available, wood is used as a fuel.</u>			
Do you have any idea about the solar power energy? If Yes, give your view about the need of a power project in your area?			
<u>Yes, it will generate electricity.</u>			
What are the current socio-economic conditions in the project area?			
<u>No idea</u>			
Do you think that this project create employment and business opportunities for local community?			
<u>This will create new business opportunities & jobs for the local community.</u>			

Do you think that this project will improve the quality of life of the people in that area?

This will improve the quality of life in that area

Do you think that this project will improve the level of general awareness of the people about different aspects of life in that area?

Yes, it will create & improve the awareness among the people

What would be the likely socio-economic and environmental impacts of a solar power project (e.g on land, water, fauna and flora)?

No Idea

Overall response (from the surveyor point of view)

Positive

Negative

No Response

Name and Signature of Surveyor

Arfan Parvez / Arfan

Arfan

Social Survey Form

Project Title: <u>100 MW Solar Power Project of Zorlu Solar Power Pakistan Pvt. Ltd</u>		Date of Survey (DD/MM/YYYY) <u>17/02/2017</u>	
		Contact No: <u>0345-87 28124</u>	
Person Name: <u>Amir Hussain</u>		NIC No: <u>31205-112805-5</u>	
Location/ Address: <u>Chuk 40, D.B, P.O Box Chuk 46, Tehsil Yazman, District Bahawalpur</u>			
Education Level		Post Graduate <input type="checkbox"/>	
		Graduate <input type="checkbox"/>	
		Secondary <input type="checkbox"/>	
		Metric <input type="checkbox"/>	
		Middle <input type="checkbox"/>	
		Primary <input checked="" type="checkbox"/>	
		Illiterate <input type="checkbox"/>	
Marital Status	Married <input type="checkbox"/> Unmarried <input checked="" type="checkbox"/>	No of Family Members <u>5</u>	
Employment	<u>Labour</u>	Monthly Income <u>8000/-</u>	
What is the status of education facilities in the area?			
<u>Primary school is present in the area.</u>			
How far is the nearby Health facility (Hospital/ Health Care Center) available to you?			
<u>No health facility is available, nearby hospital is in Bahawalpur city.</u>			
Is electricity or sui gas is available in your area? If No, What is the source of fuel used at your homes?			
<u>Electricity is present, sui gas is not available, wood is used as a fuel.</u>			
Do you have any idea about the solar power energy? If Yes, give your view about the need of a power project in your area?			
<u>No idea</u>			
What are the current socio-economic conditions in the project area?			
<u>No idea</u>			
Do you think that this project create employment and business opportunities for local community?			
<u>It will create new business opportunities.</u>			

Do you think that this project will improve the quality of life of the people in that area?

This will improve the quality of life of the local people.

Do you think that this project will improve the level of general awareness of the people about different aspects of life in that area?

Yes, this will improve the awareness level among the local people.

What would be the likely socio-economic and environmental impacts of a solar power project (e.g on land, water, fauna and flora)?

No idea

Overall response (from the surveyor point of view)

Positive Negative No Response

Name and Signature of Surveyor

Arfan Parveq / (A) / [Signature]

عمر حسین

Social Survey Form

Project Title: 100 MW Solar Power Project of Zorlu Solar Power Pakistan Pvt. Ltd		Date of Survey (DD/MM/YYYY) <u>17/02/2017</u>	
		Contact No: <u>0300 6803983</u>	
Person Name: <u>Munees Ahmed</u>		NIC No: <u>31202-1266445-5</u>	
Location/ Address: <u>Basti Kaseerabad, Chuk No. 9 B.C P.O. Box Khas</u> <u>Tehsil/District Bahawal Pur.</u>			
Education Level		Post Graduate <input type="checkbox"/> Graduate <input type="checkbox"/> Secondary <input type="checkbox"/> Metric <input type="checkbox"/> Middle <input checked="" type="checkbox"/> Primary <input checked="" type="checkbox"/> Illiterate <input type="checkbox"/>	
Marital Status	Married <input checked="" type="checkbox"/> Unmarried <input type="checkbox"/>	No of Family Members <input type="text" value="7"/>	
Employment	<u>Farmer</u>	Monthly Income <input type="text" value="15000"/>	
What is the status of education facilities in the area?			
<u>Primary school is present in the area</u>			
How far is the nearby Health facility (Hospital/ Health Care Center) available to you?			
<u>NARSP Dispensary is available in the area, nearby hospital is in BWP.</u>			
Is electricity or sui gas is available in your area? If No, What is the source of fuel used at your homes?			
<u>Electricity is present & no gas is available, wood is used as fuel.</u>			
Do you have any idea about the solar power energy? If Yes, give your view about the need of a power project in your area?			
<u>Yes, it will provide & generate electricity</u>			
What are the current socio-economic conditions in the project area?			
<u>No Idea</u>			
Do you think that this project create employment and business opportunities for local community?			
<u>This project will create jobs & new business opportunities for local communities.</u>			

Do you think that this project will improve the quality of life of the people in that area?
<i>Yes, this will improve the quality of life of the people</i>
Do you think that this project will improve the level of general awareness of the people about different aspects of life in that area?
<i>This will improve the level of general awareness among the locals.</i>
What would be the likely socio-economic and environmental impacts of a solar power project (e.g on land, water, fauna and flora)?
<i>No Idea</i>
Overall response (from the surveyor point of view)
Positive <input checked="" type="checkbox"/> Negative <input type="checkbox"/> No Response <input type="checkbox"/>
Name and Signature of Surveyor
<i>Irfan Parvez / [Signature]</i>

Social Survey Form

Project Title: 100 MW Solar Power Project of Zorlu Solar Power Pakistan Pvt. Ltd		Date of Survey (DD/MM/YYYY) 17/02/2017	
Person Name: Muhammad Imran		Contact No: 0300-6792124	
Location/ Address: Bresti Maseer abad, Chak - 9 BC, P.O Box Khas, Tehsil / District Bahawalpur		NIC No:	
Education Level		Post Graduate	<input type="checkbox"/>
		Graduate	<input type="checkbox"/>
		Secondary	<input type="checkbox"/>
		Metric	<input type="checkbox"/>
		Middle	<input type="checkbox"/>
		Primary	<input checked="" type="checkbox"/>
		Illiterate	<input type="checkbox"/>
Marital Status	Married <input type="checkbox"/> Unmarried <input checked="" type="checkbox"/>	No of Family Members	3
Employment	Farmer	Monthly Income	15000
What is the status of education facilities in the area?			
Only Primary school is present in the area.			
How far is the nearby Health facility (Hospital/ Health Care Center) available to you?			
Only digensay is available, nearby hospital is in Bahawalpur.			
Is electricity or sui gas is available in your area? If No, What is the source of fuel used at your homes?			
Electricity is Present, Sui gas is not available, wood is used as a fuel.			
Do you have any idea about the solar power energy? If Yes, give your view about the need of a power project in your area?			
Yes, it will generate electricity.			
What are the current socio-economic conditions in the project area?			
No Idea.			
Do you think that this project create employment and business opportunities for local community?			
This will create new job opportunities & also create new business opportunities			

Do you think that this project will improve the quality of life of the people in that area?
<i>Yes it will improve the quality of life</i>
Do you think that this project will improve the level of general awareness of the people about different aspects of life in that area?
<i>Yes it will improve the quality of life & create awareness</i>
What would be the likely socio-economic and environmental impacts of a solar power project (e.g on land, water, fauna and flora)?
<i>No idea</i>
Overall response (from the surveyor point of view)
Positive <input checked="" type="checkbox"/> Negative <input type="checkbox"/> No Response <input type="checkbox"/>
Name and Signature of Surveyor
<i>Nazan Parvez / <u>Dr. Nazan Parvez</u></i> <i>(Signature)</i>

ANNEXURE-IX

SITE SURVEY AND CONSULTATION SNAPSHOTS

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
	Project Sponsor: Zorlu Solar Pakistan (Pvt.) Ltd	Document Issue 02	Page Number 170

List of Public and Stakeholders consultation were conducted on 17th February 2017 and the consultants were able to consult with residents from Chak 41 and Chak 40 last 04th May 2017 with E&S teams from ADB and IFC. Below is the attendance sheet of the consultation undertaken last February 2017.

S.NO	NAME	OCCUPATION	LOCATION
1	Abdul Majeed	Labour	Chak # 41-DB
2	Muhammad Mushtaq	Labour	Chak # 41-DB
3	Akhtar Hussain	Labour	Chak # 40-DB
4	Abdul Razzaq	Labour	Chak # 40-DB
5	Amjad Ali	Labour	Chak # 40-DB
6	Mohsin	Labour	Chak # 40-DB
7	Muhammad Shahid	Labour	Chak # 40-DB
8	Muhammad Mushtaq	Labour	Chak # 40-DB
9	Ghulam Dastageer	Farmer	Chak # 40-DB
10	Abid Hussain	Farmer	Chak # 40-DB
11	Abid Hussain	Farmer	Chak # 40-DB
12	HafeezUllah	Labour	Chak # 40-DB
13	Muhammad Lateef	Labour	Chak # 40-DB
14	Muhammad Asghar	Farmer	Chak # 40-DB
15	Muammad Maqbool	Labour	Chak # 40-DB
16	Amir Hussain	Labour	Chak # 40-DB
17	Muneer Ahmed	Farmer	Basti Naseerabad, Chak 9-BC
18	Muhammad Imran	Farmer	Basti Naseerabad, Chak 9-BC

Below is the list of stakeholders consultation (February 2017)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Name of Stakeholder Representative	Type of Stakeholder	Department / Occupation/ Designation
Mr. Muhammad Amir Irshad	District Office EPA-Bahawalpur	District Government, Assistant Director EPA, Bahawalpur
Mr. Ansar Abbas	District Office EPA-Bahawalpur	Environment Inspector, EPA, Bahawalpur
Mr. Nadeem	District Office EPA-Bahawalpur	Environment Inspector, EPA, Bahawalpur
Rasheed Ahmed	District Office EPA-Bahawalpur	Field Assistant, EPA, Bahawalpur
Mr. Anwar Maan	Wildlife Department Bahawalpur	Deputy Director/ Regional Head Wildlife Department, Bahawalpur
Mr. Khursheed Azam	Wildlife Department Bahawalpur	Assistant Director/ Wildlife Department, Bahawalpur
Mr. Tajamal Hussain	Bahawalpur Forest department	Divisional Forest Officer, Bahawalpur
Mr. Syed Jawad Hassan	Lal-Sohanra Forest department	Divisional Forest Officer, Lal-Sohanra
Mr. Asad Imran	WWF, Pakistan	Senior Manager WWF, Bahawalpur
Mr. Liaqat Ali Khan	WWF, Pakistan	Manager WWF, Bahawalpur

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Main Bahawalpur road for the Transportation



Canal Road near to the project site



Hasilpur Road



QASP Road

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QASP Road



QASP Entry Point



Road inside the Solar Park



220kv NTDC Grid in QASP

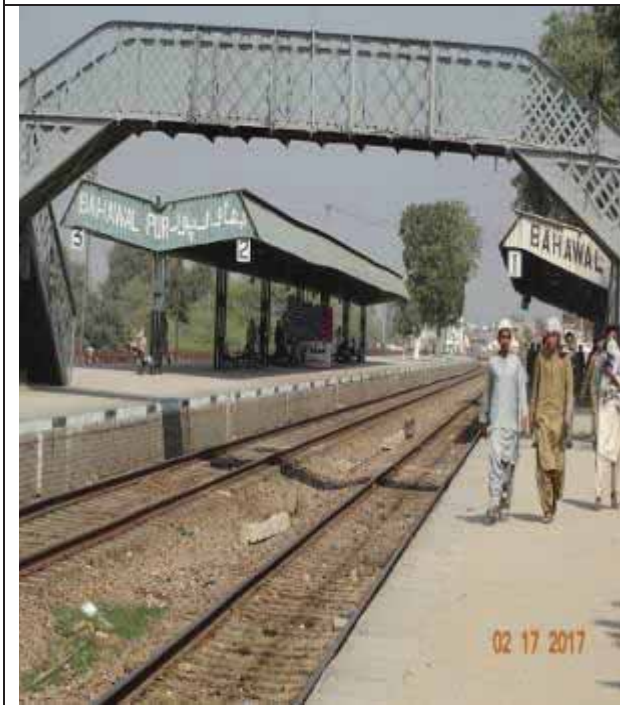
Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Grid Station



Grid Station



Bahawalpur Railway Station



Bahawalpur Railway Station

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Project Site



Project Site



Project Area



Project Area

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Site survey for Geotechnical Investigation



Site Visit with Client



Individual Social Survey



Near to the project site

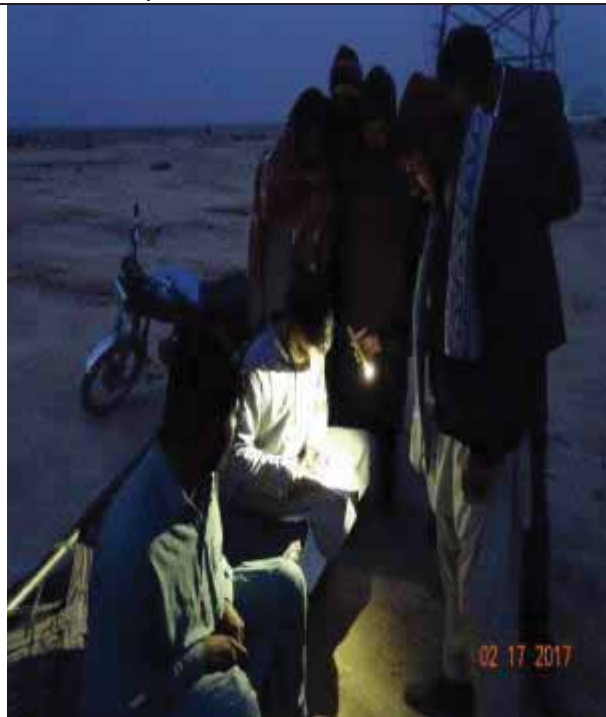
Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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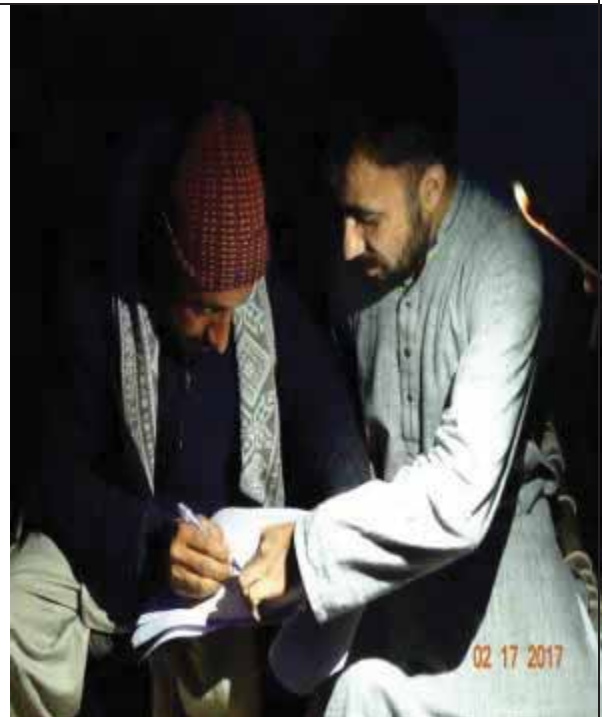
Community Consultation



Community Consultation



Community Consultation

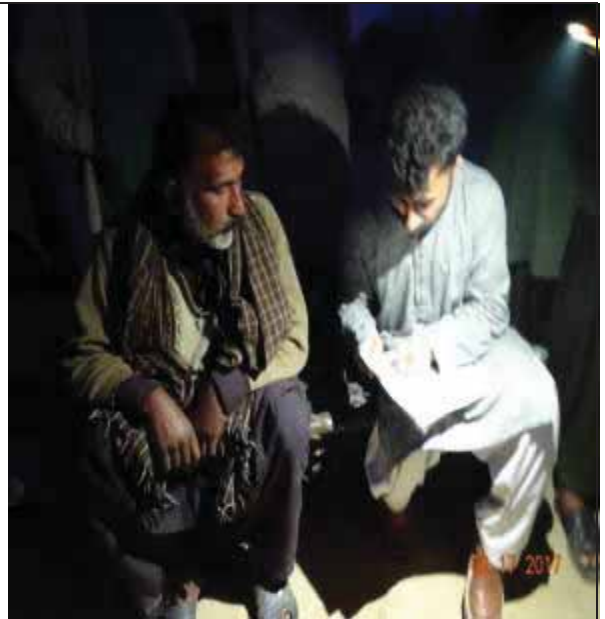


Community Consultation

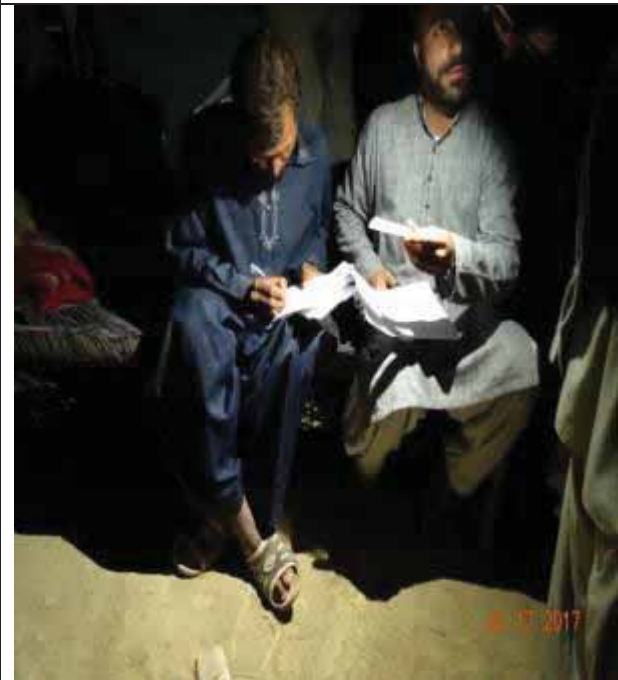
Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October, 2017
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Community Consultation



Community Consultation



Group Community Consultation



Group Community Consultation

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Snapshots of Onsite monitoring



Snapshots of Onsite monitoring



Snapshots of Onsite Noise monitoring



Snapshots of Onsite Ambient Air monitoring

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ANNEXURE-X

SNAPSHOTS OF STAKEHOLDERS CONSULTATION

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Consultation with District Office EPA-Bahawalpur

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Consultation in Wildlife Department, Bahawalpur

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Consultation in Forest Department, Bahawalpur



Consultation in Forest Department, Lal Suhanra

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Consultation in Forest Department, Lal Suhanra



Consultation in WWF-Pakistan

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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ANNEXURE-XI

Letter of Acquisition of Land (Leasing Document)

[Click Here](#)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
	Project Sponsor: Zorlu Solar Pakistan (Pvt.) Ltd	Document Issue 02	Page Number 187

ALLOCATION LETTER

This Allocation Letter No 444 is issued at Bahawalpur on this 25th day of Jan 2017

BY

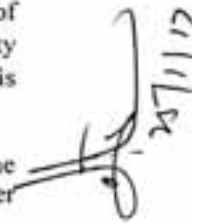
The Collector, Government of the Punjab, (hereinafter referred to as "Collector" which expression shall, wherever the context requires or permits, include its successors in interest and assigns)

IN FAVOR OF

M/s Zorlu Solar Pakistan (Pvt.) Ltd., a company incorporated under the laws of Pakistan (hereinafter referred to as the "Company", which expression shall, wherever the context so requires or permits, include its successors in interest and permitted assigns), having its registered office at C-117, Clifton Block-2, Karachi.

WHEREAS

- A. Pursuant to the Notification No.90(S)-2016/1669-CS(III), dated 30th December 2016 on Land Lease for Solar Power Projects, and Government's policy to develop generation of Solar Energy, the Company has proposed to establish a solar power generation facility PPDB has issued to the Company the Letter of Interest (as hereinafter defined) in this behalf;
- B. For the purpose mentioned in Recital A, the Collector has agreed, subject to fulfilling the terms and conditions set in the said Notification, to allocate, the Site (as hereinafter defined) to the Company;
- C. In the interim period, the Company would require access to the Site to undertake feasibility study and other preparatory works, and the Collector has agreed to grant such access to the Company upon terms and conditions set out herein.

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CLAUSE I-AUTHORITY OF THE DEPARTMENT

- 1.1 The Collector has valid right, title and interest in all that piece and parcel of land, measuring 500 acres of land situated in Quaid-e-Azam Solar Park (extension), Cholistan, Lal Sohanra, Bahawalpur, Punjab and more particularly described in Annex A and is entitled under the Laws of Pakistan to grant the rights therein to the Company for purposes of establishment of 100 MW Solar Power Project in accordance with the terms of the Notification, and this Allocation Letter.

CLAUSE II-EFFECTIVE TERM AND TERMINATION

- 3.1 This Allocation Letter shall commence and be operative from the date hereof and, subject to Article 3.2 below, shall continue to be effective until the date of validity of LOI unless cancelled or revoked otherwise.
- 3.2 This Allocation Letter shall stand revoked and terminated forthwith, in the event (i) the LOI is cancelled or revoked by PPDB (ii) the Company is unable to secure a Tri -Partite Letter of Support from AEDB and PPDB jointly within ____ months, or such other additional period which PPDB may specify, or (iii) land is being used for any purpose other than expressly permitted.
- 3.3 Moreover, all terms and conditions of the Notification are part of this Allocation Letter and any breach of the terms and conditions of the Notification by the Company shall result in cancellation of this Allocation Letter by the Collector.

CLAUSE III-ACCESS AND RIGHTS

- 4.1 The Collector hereby grants the Company the rights to:
- a- Access to the Site for purposes of undertaking the required feasibility study of the Project, and other associated activities /studies thereof;
 - b- Set up and / or install, at its own cost and expense, (without any claim for reimbursement of any kind at any time whatsoever) the project feasibility related equipment(s) at the allocated land. The Parties agree that the Company shall duly record related data and provide the same to the PPDB on quarterly basis; and
 - c- Erect fencing and/or security related equipment at the Site with the prior approval of the Collector at its own cost and expense (without any claim for reimbursement of any kind whatsoever).
 - d- This Allocation Letter is subject to the conditions in the Notification and does not create or purport to operate to create, in present or future, any proprietary right of use or ownership, interest or title in or over the Site in favour of the Company.
 - e- In the event of revocation or cancellation of this Allocation Letter, the Collector shall allow the Company, thirty(30) days, after the cancellation, to remove their equipment at Site, at the Company's own cost and expense, without causing any damage or harm to the Site and clear any debris created by its activities.

CLAUSE IV-MISCELLANEOUS

- 5.1 The Company shall not assign or transfer any of its rights under this Allocation Letter, to any other company or party whatsoever.
- 5.2 This Allocation Letter shall be governed by and construed in accordance with the Laws of Pakistan.

SIGNED, SEALED AND DELIVERED.

On behalf of Department

By:

Title: The Collector, Government of the Punjab, Board of Revenue

Signature:



Annex A-DESCRIPTION OF SITE

Details of the land

500 acres land in Quaid-e-Azam Solar Park (extension), Cholistan, Lal Sohanra, Bahawalpur whose coordinates are given as below: (to be filled in consultation with Company)

100 MW Solar Project by M/s Zorlu Solar Pakistan (Pvt.) Ltd.							
Project Land Coordinates							
WGS-84							
Longitude [E]				Latitude [N]			
Deg.		Min.	Sec.	Deg.		Min.	Sec.

Measurement and plan of land bounded by: -

- ON THE NORTH [•]
- ON THE SOUTH [•]
- ON THE EAST [•]
- ON THE WEST [•]

ANNEXURE-XII

Letter of LOI

[Click Here](#)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
	Project Sponsor: Zorlu Solar Pakistan (Pvt.) Ltd	Document Issue 02	Page Number 188



To:

✓ **M/s. Zorlu Enerji Elektrik Uretim A.S.**
Levent 199 Buyukdere Cad. No:199 34394 Sisli / Istanbul
C-117, Clifton Block-2, Karachi, Pakistan

SPV
M/s Zorlu Solar Pakistan (Pvt.) Ltd.

Subject: **LETTER OF INTEREST (LOI) FOR THE DEVELOPMENT OF 100 MW SOLAR POWER PROJECT AT QUAID-E-AZAM SOLAR PARK (EXTENSION) LAL SOHANRA, BAHAWALPUR AS IPP UNDER PUNJAB POWER GENERATION POLICY 2006 – REVISED 2009**

Reference: Your Statement of Qualification SOQ dated April 19, 2016 for the development of 100 MW Solar Power Project, PPDB Board in its 39th meeting dated August 11, 2016 accorded principal approval for award of LOI of 100 MW solar power project, advertisement for award of land at Quaid-e-Azam Solar Park (extension) Lal Sohamra, Bahawalpur and Energy Department letter No. SO(EC/ED)3-1/2014 dated January 17, 2017. Bank Guarantee No.IGT078600379816 dated January 10, 2017 amounting to PKR 10,500,000/- issued by Habib Bank Limited, HBL plaza branch, Karachi (0786).

2. Now, this letter of interest (hereinafter referred to as "LOI") is being issued on behalf of the Government of the Punjab, in terms of the provisions of the Policy. The Government of Punjab hereby confirms its interest in your proposal for conducting feasibility study (hereinafter referred to as the "Feasibility Study") for establishing 100 MW private solar power project to be located at Quaid-e-Azam Solar Park (extension) Lal Sohamra, Bahawalpur subject to the following:

- a. You are required to complete Project Feasibility Study for the subject Project, at no risk and cost to, and without any obligation on the part of, the Govt. of the Punjab and its agencies, within a maximum period of three (03) months from the date of this LOI. There would be no adverse claim towards any of the Government of Punjab entities in case the project is declared non-feasible. You are further required to submit the monthly progress report of the Feasibility Study to PPDB failing which PPDB may proceed against your Company for cancellation of this LOI.
- b. You are required to carry out the Project Feasibility Study; complete and get approved, at internationally acceptable standards and in accordance with the terms and conditions stipulated in the Policy. The Feasibility Study must include an Initial Environment Examination (IEE) Study, detailed design of power house, load flow and stability studies, design of interconnection / transmission lines, details pertaining to infrastructure, project cost, financing and, financing terms, tariff calculations and assumptions of financial calculations including economic / financial analysis. You are advised to liaise with the power purchaser while determining your plant size and site, project layout, transmission line and interconnection arrangements, etc.
- c. You will carry out the Feasibility Study according to the specific milestones appended herewith at **Annex-A**, and submit monthly progress reports showing progress against these milestones.
- d. M/s Zorlu Elektrik Uretim A.S. (Project Main Sponsor) already established the Special Purpose Vehicle (SPV) company M/s Zorlu Solar Pakistan (Pvt.) Ltd. shall maintain the shares in this company in accordance with Para 39 & 40 of Punjab Power Generation Policy 2006 (revised 2009) and submit a copy of Memorandum of Articles &

Association as well the Form 29 duly attested by the Security Exchange Commission of Pakistan (SECP).

- e. PPDB will appoint a Panel of Experts to monitor the conduct of the Feasibility Study and its progress, to verify attainment of the aforesaid milestones and to ensure implementation of the project consistent with national and provincial needs.
- f. The Main Sponsor will be liable for all obligations and liabilities of and on behalf of other Sponsors. Further processing of the Feasibility Study is subject to Govt. of the Punjab acceptance in accordance with the Policy.
- g. The validity of this LOI is for a maximum period of three (03) months from the date of its issuance, where after or before it, if found otherwise, violating the Policy will automatically lapse immediately. Issuance of this LOI or the lapsing of its validity, or your conducting a Feasibility Study there under, cannot form the basis of any claim for compensation or damages by the Sponsors or the project company or any party claiming through them against the Government or Punjab / PPDB or any of its agencies, employees or consultants on any grounds whatsoever, during or after the expiration of its validity.
- h. You are, therefore, required to complete the Feasibility Study for the Subject Project within the validity of this LOI. In case there is delay in completion of the Feasibility Study within the validity of this LOI, a one-time extension by the PPDB Committee referred in Section 2.2 Para 34 may be granted up to a maximum period of ninety (90) days, provided the Panel of Experts is satisfied that the Feasibility Study is being conducted in a satisfactory manner and is likely to be completed shortly. Furthermore, extension in validity of the LOI will only be provided upon submission of a bank guarantee in double the original amount and valid beyond 180-days of the extended LOI period.
- i. In case, if you fail to meet the relevant milestones and standards, PPDB will terminate this LOI and encash the Bank Guarantee.
- j. This LOI has been issued in duplicate on the date hereof, and it shall come into effect when one copy hereof is received by PPDB after having been duly countersigned by you. Nevertheless, this LOI shall lapse if the countersigned copy is not received at PPDB within thirty (30) days of its issuance.

(SANIYA AWAIS)
MANAGING DIRECTOR
PUNJAB POWER DEVELOPMENT BOARD

Accepted and agreed
for & on behalf of

Date: _____

Encl: As stated above

C.C:

1. Secretary, Ministry of Water & Power, Islamabad
2. Chairman, NEPRA, Islamabad
3. Chairman Board PPDB
4. Chairman, P & D, Govt. of the Punjab, Lahore
5. Additional Chief Secretary Energy Department, Govt. of the Punjab, Lahore
6. Chairman WAPDA, Lahore
7. Secretary, Energy Department, Govt. of the Punjab, Lahore
8. Chief Executive Officer, MEPCO
9. Chief Executive Officer Alternate Energy Development Board, Islamabad
10. DG, Environment Protection Agency, Govt. of the Punjab, Lahore

Annex-A

Timelines for conduct of Feasibility Study of 100 MW Solar PV Power Project at Qalid-e-Azam Solar Park (extension) Lal Sohanra, Bahawalpur

Sr. No.	Activities	Target Days	Final Target Date
1.	Issuance of LOI by PPDB	Max 03 months	17.04.2017
2.	Return of the duly signed LOI & formation of SPV company registered with SECP		
3.	Procurement of Consultancy Service and Award of Contract		
4.	Mobilized Consultant		
5.	Data Collection		
6.	Geo-Technical investigation		
7.	Topographic Survey, Environment and related studies		
8.	Electrical & Grid Interconnection Study		
9.	IEE, Social and resettlement Studies		
10.	Selection of Final Layout and Sizing of Power Plant		
11.	Optimization of Selected Layout		
12.	Draft Feasibility Design		
13.	Financial Model Includes: Unit rate Analysis, Costing, Economic & Financial Analysis and Ultimate Tariff		
14.	Draft Feasibility Study report submission		
15.	Review comments and Presentation to POE		
16.	Incorporation of POE Comments & Final Review		
17.	Final Feasibility Report Submission and Approval of POE		

Handwritten signature

ANNEXURE-XIII

Letter of District Government EPA-Bahawalpur

[Click Here](#)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
	Project Sponsor: Zorlu Solar Pakistan (Pvt.) Ltd	Document Issue 02	Page Number 189



No. 6124 /AD/EPA/BWP
OFFICE OF THE ASSISTANT DIRECTOR
ENVIRONMENTAL PROTECTION AGENCY
SADDER PULLI BAHAWALPUR Ph: 062-9250081
Dated. 17.02.2017



To,

Mr. Irfan Parvez,

Environment Expert, Renewable Resources Pvt. Ltd.

Subject: RE-STAKEHOLDER MEETING FOR INITIAL ENVIRONMENTAL EXAMINATION (IEE) STUDY OF 100 MW ZORLU SOLAR POWER PAKISTAN PRIVATE LIMITED PROJECT LOCATED AT BAHAWALPUR-PUNJAB, PAKISTAN

With reference to your application No. RE2-01-202-000-01, you have stated that the above said project will be constructed near to the Quaid-e-Azam Solar Park and the project area contains barren land with no settlements, flora & fauna and wildlife in the boundary.

This office has no concern to construct your project at this site, however you are directed to submit complete case to EPA Punjab Lahore for Environmental Approval under section 12 of PEPA-1997(amended, 2012).


Assistant Director
Environmental Protection Agency
Bahawalpur

ANNEXURE-XIV

Letter of Wildlife Department

[Click Here](#)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
	Project Sponsor: Zorlu Solar Pakistan (Pvt.) Ltd	Document Issue 02	Page Number 190

**OFFICE OF THE DEPUTY DIRECTOR WILDLIFE
BAHAWALPUR REGION BAHAWALPUR**

No. /DDW-BWP/2017 Dated Bahawalpur, the 2017

To

The Director General,
Wildlife & Parks, Punjab,
2-Sanda Road, Lahore.

Subject:- **STAKEHOLDERS MEETING FOR INITIAL
ENVIRONMENTAL EXAMINATION (IEE) STUDY OF 100
MW SOLAR POWER PLANT LOCATED AT BAHAWALPUR**

It is submitted that on the request of M/S Renewable Resources (Pvt) Limited, Islamabad, Mr. Khurshid Azam Qaisarani, Assistant Director Wildlife, Bahawalpur was advised to visit the area of Quaid-e-Azam Solar Power Plant, Bahawalpur for environmental study. The officer visited the site on 23.02.2017 and submitted report vide letter No. 1147/ADW-BWP/2017, dated 23.02.2017. The report is self explanatory which is enclosed for kind perusal.


2. As per above mentioned report, area of the Solar Park within the boundary limits of Quaid-e-Azam Solar Power Plant, Bahawalpur is fully safe and secured. No disturbance of the biodiversity was observed within the boundary limit of the Plant. In case the project is further extended beyond the boundary limits, a comprehensive study of such area would be required.

Submitted for kind information please.

(MUHAMMAD ANWAR MAAN)
DEPUTY DIRECTOR WILDLIFE
BAHAWALPUR REGION
BAHAWALPUR

No. 570 /DDW-BWP/2017 Dated Bahawalpur, the 25-02- 2017

Copy is forwarded to Mr. Irfan Parvez, Environment Expert & Project Controller, Renewable Resources (Pvt.) Limited, Islamabad for information.


DEPUTY DIRECTOR WILDLIFE
BAHAWALPUR REGION
BAHAWALPUR 25/02/2017

ANNEXURE-XV

Letter of Meteorological Department

[Click Here](#)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Tel: + (92-51) 9250299
Email: dirnamc@yahoo.com

No. Agr -2(2) II/2016/
GOVERNMENT OF PAKISTAN
PAKISTAN METEOROLOGICAL DEPARTMENT
(NATIONAL AGROMET CENTRE)
Post Box No. 1214, Sector H-8/2
ISLAMABAD

Islamabad February 24, 2017

Mr. Irfan Parvez Khan
Environmental Expert and Project Controller Renewable Resources (Pvt) Ltd
Islamabad.

Subject: - REQUEST FOR METEOROLOGICAL DATA OF BAHAWALPUR

Dear Sir,

Reference to your office letter No. RE2-01-202-001-03 dated 20-02-2017 on the above noted subject. The requisite Met data of Rainfall (mm) and mean Air Temperature (°C) of Bahawalpur (Punjab) from January, 2016 to December, 2016 on daily basis and Coordinates of the said station is attached herewith:

Encl: (As Stated)

-----Sd-----
(KHALIDA NOUREEN)
Meteorologist
For Director

Latitude: 29° 24 N

Longitude: 71° 47 E

Elevation: 116 m

METEOROLOGICAL DATA OF RAINFALL (mm) FOR THE YEAR 2016, BAHAWALPUR												
DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	2.0	0.0	2.0	0.0	34.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
5	0.0	0.0	5.0	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0
6	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	0.0	0.0	0.1	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	0.0	0.0	21.0	0.0	0.0	29.0	0.0	0.0	0.0	0.0	0.0	0.0
13	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
19	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
25	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
26	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.1	***	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
31	0.0	***	0.0	***	0.0	***	0.1	0.0	***	0.0	***	0.0
TOTAL	0.2	4.0	31.6	4.2	2.0	33.1	34.1	4.9	0.0	0.0	0.0	0.0

Note: This is real time data and not meant for litigation.

METEOROLOGICAL DATA OF MEAN AIR TEMPERATURE (°C) FOR THE YEAR 2016, BAHAWALPUR												
DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	16.4	15.0	20.7	28.9	34.1	35.5	35.7	34.6	31.0	32.9	25.2	19.6
2	15.7	15.7	21.3	29.4	33.4	35.4	36.9	33.5	31.2	32.8	25.6	20.8
3	17.4	15.5	22.9	27.1	31.8	36.4	29.2	32.4	31.6	32.7	24.7	20.5
4	16.6	17.0	19.6	26.8	30.1	36.7	32.5	31.7	32.1	31.7	24.1	21.0
5	15.3	16.0	20.1	27.6	29.7	36.0	35.4	32.6	31.4	31.5	24.0	21.4
6	14.5	16.1	18.8	26.2	31.0	35.9	34.9	34.5	31.1	32.1	16.2	21.7
7	14.9	15.0	20.2	26.7	33.3	36.2	34.7	35.7	31.2	31.3	23.0	20.4
8	16.3	16.7	21.6	25.8	35.6	36.4	35.2	32.4	31.7	31.1	23.8	19.8
9	16.2	17.4	22.6	25.8	35.3	36.0	34.9	33.5	32.1	30.7	23.3	18.8
10	16.2	17.4	23.5	25.7	35.8	35.5	34.0	34.2	31.9	29.6	23.7	15.3
11	16.2	15.3	21.8	24.5	33.9	34.2	35.2	32.3	31.6	29.2	22.8	15.6
12	14.6	12.8	20.7	26.9	34.5	31.7	35.0	32.3	31.4	27.3	18.9	17.7
13	14.5	13.7	20.3	29.7	35.0	33.8	36.1	32.5	31.8	27.5	19.4	17.1
14	15.2	14.5	20.7	31.7	33.8	34.9	35.1	33.3	31.5	27.6	20.2	17.8
15	11.2	14.7	21.4	32.9	34.6	35.2	35.1	32.6	31.9	28.2	20.7	16.8
16	14.2	15.7	21.3	32.8	35.0	35.6	34.5	32.8	32.9	27.3	21.2	17.8
17	16.2	16.0	19.9	30.6	36.7	36.0	34.3	32.8	32.4	27.5	20.7	17.3
18	12.3	15.6	20.8	30.2	36.8	36.5	33.6	33.0	33.0	27.2	20.7	17.8
19	10.0	16.0	23.7	29.5	37.8	37.2	31.0	33.7	33.0	27.3	20.9	17.8
20	10.4	17.5	24.1	29.2	36.6	38.0	33.6	33.6	33.0	27.2	20.9	16.4
21	8.5	18.5	23.5	30.1	37.8	38.7	34.9	34.1	32.3	26.3	20.2	16.7
22	7.8	18.2	24.1	28.9	36.0	36.7	34.4	34.1	31.7	26.9	19.5	16.3
23	8.5	20.5	25.2	27.4	37.2	36.3	34.3	31.9	32.5	26.8	19.7	17.5
24	7.3	21.5	24.1	29.0	32.6	36.3	35.3	33.7	29.2	26.2	20.0	16.8
25	5.5	19.6	21.0	29.9	33.9	36.3	35.2	30.7	30.9	26.3	20.5	14.5
26	8.7	19.0	22.3	30.6	34.2	36.3	35.3	31.3	32.0	27.2	21.9	15.9
27	13.1	20.2	23.6	31.1	34.7	36.0	35.4	32.5	32.3	26.4	21.1	15.7
28	14.5	20.5	25.5	31.2	34.3	31.9	31.3	30.3	32.3	25.9	21.9	16.8
29	14.3	20.4	26.6	32.5	35.1	34.6	35.0	31.5	31.8	26.3	21.5	16.2
30	14.8	***	27.7	33.7	33.8	36.3	35.7	32.1	32.4	25.4	19.9	11.8
31	16.3	***	27.4	***	34.7	***	33.8	31.2	***	25.4	***	13.2
TOTAL	13.3	16.9	22.5	29.1	34.5	35.7	34.4	32.8	31.8	28.4	21.5	17.5

Note: This is real time data and not meant for litigation.

ANNEURE-XVIII

Social Due Diligence Report

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
	Project Sponsor: Zorlu Solar Pakistan (Pvt.) Ltd	Document Issue 02	Page Number 192

**Social Due Diligence Report
100 MW Zorlu Solar Pakistan (Private) Limited**

I. Introduction

1. Project Description

The project involves the construction, commissioning and operation of 100 MW solar power project located within the Quaid-e- Azam Solar Park in Lal-Sohanra District Bahawalpur, Province Punjab, Pakistan. The borrower is Zorlu Solar Pakistan (Pvt.) Ltd, a special purpose vehicle set up by the project sponsors, Zorlu Elektrik Uretim A.S.

The project is classified as C both for involuntary resettlement and Indigenous Peoples. The solar project will be located in 500 acres of government land (Annex-XI) which was leased to Zorlu Solar Pakistan (Pvt.) Ltd for the development of the Project. All of the solar plant components which include 869,701 panels, inverter, sub-stations and internal access roads will be located within the leased area which is uninhabited and agriculturally unproductive. The transmission line has been constructed by the National Transmission and Dispatch Company (NTDC) on government land and is not expected to impact on any individual or household. No Indigenous Peoples will be impacted by the Project.

2. Methodology

This report was prepared based on the following: (a) Initial Environmental Examination report which was also prepared by Renewable Resources (Pvt) Ltd., , Zorlu Policy and Procedures on Environment, Occupational Health and Safety, Corporate Social Responsibility, HSE, etc); (b) interview with E&S and EHS Consultants and government representatives; (c) site visit to QASP office and existing solar project, proposed project site, nearby hamlets/villages; and (d) interviews covering the following nearby villages: (i) Chak 40 DB and (ii) Chak 41 DB. Site visit and interviews were done as part of the mission activities conducted on 03rd May, 2017. (The list of people met during the DD Mission are in Annex 2.)

II. Findings

1. Meeting with QASP Management (Officers and Staff)

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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The project team also conducted the survey in the Quaid-e-Azam Solar Park and met higher officials of existing Power Plants regarding the plant information for noting their concerns about Power Plant being developed. The QASP team also briefed about the area, ongoing maintenance of the PV Plant, their security management plan and about their facilities that were provided to the locals and also the staff of QASP.

2. Review of Existing E&S Management System of ZSPPL

The report provided an overview of its existing E&S management system, existing HSE system, etc. that ZSPPL will adopt. QASP has 4 existing Solar Projects which have been operational for last two years. Since the same EPC and O&M contractor (Zorlu Industry) will be engaged by the project sponsor for the proposed project, existing E&S management system was reviewed and discussed. The practice followed on these solar PV plants are same and the existing E&S management system and existing HSE system will be implemented in Zorlu Solar Ltd. In previous projects of QASP, the proper ESMP is implemented during the operational phase of the plant and also the HSE training would be given to the staff working in the plant. Daily Inspection plans and also check the compliance of NEQ's, check the PPE's and also conduct the audits on site.

1.a Stakeholder engagement and consultation.

Public Consultation in Surrounding Villages

Two consultations were conducted and the last was done last 17th February 2017 and was carried out as part of the IEE study. The activity was primarily undertaken to inform the stakeholders about the proposed project, obtain their views, concerns and recommendations and address/incorporate them in the project design.

In addition to public consultations conducted, a questionnaire survey was conducted to the nearby villages, i.e, Chak 40DB and Chak 41DB and Chak 9-BC (12.6 km) with a total of 20 respondents (Annex 2) to closely assess how the community view the project and gauge acceptability.

During the conduct of public consultation (group and individual), the issues and concerns of the local peoples were discussed and the local peoples expressed that the installation of project is acceptable to them. They also expressed concerns related to the employment during the project construction phase. Another concern raised are the CSR activities (i.e., basic facilities) that will be implemented by the project sponsor. Snapshots of consultation is attached as Annexure 9 of the IEE.

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Community engagement will be continuously done by Project Company especially during construction and operation so that issues and concerns of the community can be timely addressed². Based on the interview with local residents (Annex 3), the villagers are supportive of the project and expect basic facilities and employment to be provided to them by Project Company.

1.b Performance of EPC in relation to compliance with national labor laws and existing monitoring system in relation to ZSPPL existing 100 MW project. Renewable Resources Pvt. Ltd conducts internal audit to monitor compliance of EPC contractor and subcontractors in relation to compliance with the national laws. There are no incompliance reported based on the internal audit conducted. This procedure will also be adapted by subcontractors for the proposed project including engagement of an independent monitoring consultant to monitor compliance.

1.c Implementation of CSR activities. For the implementation of CSR activities, The Project Company will hire a community development/Liaison Officer in the implementation of its CSR activities. ZSPPL is also planning to coordinate with other Solar Plant operators to rationalize implementation of CSR activities so that available resources can be maximized.

3. Land Acquisition and Involuntary Resettlement

The land for the proposed solar plant has been allocated by the Government of Punjab for the project sponsor. The corresponding Lease Agreements (1 agreement of land with an area of 500 with 2 kilometer buffer zone) have been executed (Annex 4).

² ZSPPL will establish an Environment & Social Management Cell (ESMC) at Corporate and Site level, headed by a Project Director to be responsible for day-to-day implementation of the Project including receipt and resolution of grievances.

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Land Lease Details

Land Area	Location	Amount Paid (PKR)*	Land Area (acres)	Lease Detail
A	Lal-Sohanra, Quaid-e-Azam Solar Park (Extension)	To be Nominated	500	(a) Lease for 25 years (extendable), commencing August 2017, lease may be renewed; (b) The Lease Agreement stipulates that (i) ZSPPL will support improvement in the livelihood of local population within their Deh in terms of supporting activities and inputs which can enhance quality of their livelihood and that (ii) there will be definite preference to locals for all unskilled jobs in the project area

*Lease Amount -100 PKR per acre per year for the 25 yrs,. Lease amount will be paid at the time of award of lease contract.

The proposed solar plant site is free from inhabitants and informal users³. The project will not entail physical or economic displacement. The solar plant area are fenced after the area has been allocated as solar park and access for occasional grazing will not be affected as vast grazing area is available outside the proposed solar plant. Transmission line (T/L) required to

³ The IEEs for the lease area indicates that at least 60% of the land area is classified as a complex of poor torrent-watered cropland and poor (loamy) grazing land. The IEE goes on to indicate that the area is fundamentally dependent on residual moisture from torrent overflows, indicating that commercial farming would be unsustainable and confirming the absence of any cropping during the visual inspection.

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evacuate power from the project site to the Zorlu substation will be constructed and funded by NTDC as part of the EPA. No individuals or households will be impacted by the T/L and it will be made available prior to operationalization of the proposed solar plant.

The lease areas including the transmission line route were found to be free of residential and business properties during visual inspection. The IEEs for lease areas indicates that at least 60% of the land area is classified as a complex of poor torrent-watered cropland and poor (loamy) grazing land. Desktop research of freely available historical satellite imagery indicates that opportunistic planting of crops has not occurred in the past, precipitated by monsoon weather. The IEE goes on to indicate that the area is fundamentally dependent on residual moisture from torrent overflows, indicating that commercial farming would be unsustainable and confirming the absence of any cropping during the visual inspection in project allocated land and its boundaries. Outside the boundary of project area, the people were using the canal water or underground tube well water for commercial farming as inspected during the social survey.

This absence of agriculture was confirmed in a meeting with households from Chak-41 DB and Chak-40 DB who further stated that opportunistic planting was for personal use and typically occurred in close proximity to their residence and not within the solar park area. Lease agreements were signed in December 2016 and the public consultation for the IEE occurred in February, 2017. Communities consulted were made aware of the potential impacts and mitigation measures for the proposed project and that these included the construction of access roads and the fencing of project boundary line.

3. Indigenous Peoples

The proposed project will be located in Qaid-e-Azam Solar Park (QASP), Bahawapur District in the province of Punjab. Bahawalpur district is bounded on the north by Lodhran district, on the east by Bahawalnagar District and India, on the south by India and on the west by West by Rahimyarkhan and Muzafar Garh district.

Bahawalpur as a whole is home to the non-immigrants, majority of which are Muslims. Punjabi and Seraiki are the two most widely spoken languages in the province of Punjab. In Bahawalpur district, however, Punjabi is spoken by the majority of the population. No Indigenous Peoples will be impacted by the project.

4. Gender

Households in the vicinity of the project area are headed by men and no women are gainfully employed as skilled or unskilled workers. Families live jointly and share all productive resources such as land, and productive assets. Women are in charge of domestic management,

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and all external matters are handled by male household heads. Since it is not common in Pakistan for women to work in construction field, ZSPPL will have no gender target in terms of employment opportunities. ZSPPL, however, expressed that it adheres to the principle of non-discrimination during recruitment of project workers.

III. Conclusions and Recommendations

Based on document review and information gathered, the following conclusions relevant to SPS SR 2 and 3 principles and requirements are made:

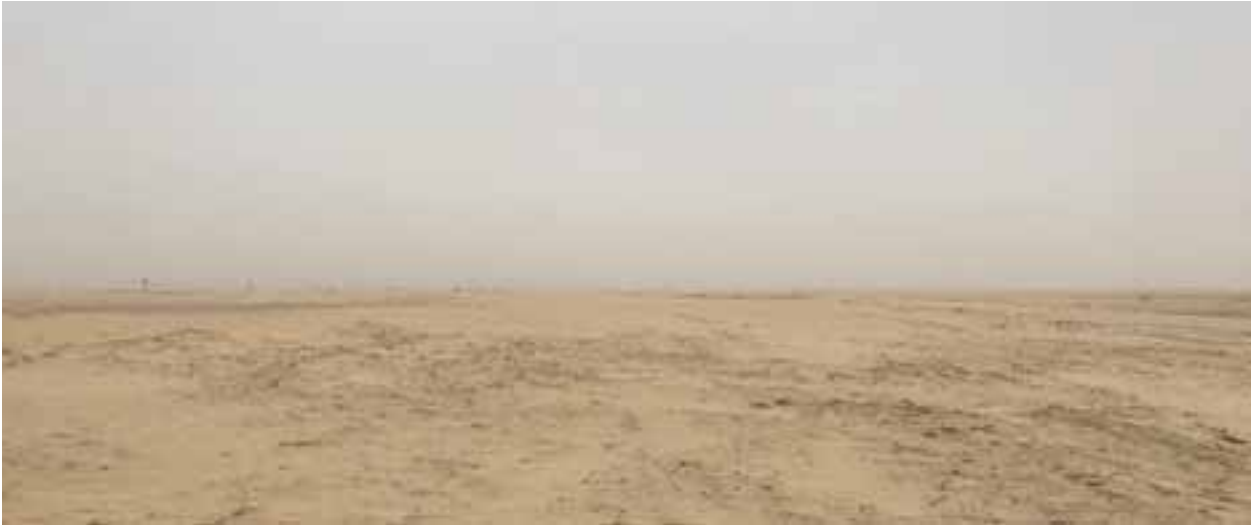
1. The site visits conducted, interviews with local communities and survey confirms that the project will not entail physical or economic displacement. A total of 500 acres of flat, rocky and unproductive land was leased to ZSPPL by the Government of Punjab for the development of the solar plant. The plant will be located inside the Qaid-e-Azam Solar Park (QASP) wherein 4 solar parks are already existing and operational. There are scattered households around the solar park, the closest of which is 5 kilometers. The closest village is around 2-5 kilometers in distance.
2. No Indigenous Peoples will be impacted by the proposed project.
4. Community engagement will be continuously done especially during construction and operation so that issues and concerns of the community can be timely addressed. The villagers are supportive of the project and expects basic facilities and employment to be provided to them by Project Company. In addition, a grievance redress mechanism (GRM) will be established by ZSPPL to handle community issues and/or workers grievances.
5. ZSPPL is committed to adopt a good procedure in terms of complying with the national labor laws and will monitor its EPC contractors and subcontractors on their compliance as well.
6. ZSPPL is also committed to implement CSR activities which also satisfies the requirement stipulated in the lease agreements, i.e., Project Company to support improvement in the livelihood of local population in terms of supporting activities and inputs which can enhance quality of their livelihood. ZSPPL will most likely engage its Community Development/Liaison Officer in the implementation of its CSR activities and will coordinate with other solar plants operators to rationalize implementation of CSR activities to maximize available resources.

Annex 1

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Project Location

The proposed project site is located in Quaid-e-Azam Solar Park (Extension) Lal Sohanra, District Bahawalpur-Punjab. It is around 37 kilometers away from Bahawalpur City. The land area of about 500 acres is leased by the Government of Punjab to Zorlu Solar Pakistan (Pvt) Ltd for the implementation of 100 MW solar PV project.



Site Location:

Annex 2

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LIST OF PERSONS MET

S.NO	NAME	OCCUPATION	LOCATION
1	Abdul Majeed	Labour	Chak # 41-DB
2	Muhammad Mushtaq	Labour	Chak # 41-DB
3	Akhtar Hussain	Labour	Chak # 40-DB
4	Muammad Maqbool	Labour	Chak # 40-DB
5	Amir Hussain	Labour	Chak # 40-DB
6	Muneer Ahmed	Farmer	Basti Naseerabad, Chak 9-BC
7	Muhammad Imran	Farmer	Basti Naseerabad, Chak 9-BC
8	Muhammad Faisal	Labor	Chak 40 DB
9	Hafeez Ullah	Labor	Chak 40 DB
10	Ghulam Dustageer	Labor	Chak 40 DB
11	Muhammad Idrees	Labor	Chak 40 DB
12	Mohsin Nadeem	Labor	Chak 40 DB
13	Muhammad Mushtaq	Farmer	Chak 40 DB
14	Muhammad Lateef	Farmer	Chak 40 DB
15	Shabeera Bibi	Housewife	Chak 41 DB
16	Sajida Bibi	Housewife	Chak 41 DB
17	Lateefa Bibi	Housewife	Chak 41 DB
18	Abid Husaan	Labor	Chak 40 DB
19	Abdul Razzaq	Farmer	Chak 40 DB
20	Muhammad Shahid	Labor	Chak 40 DB

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Annex 3

Interview with Local Residents

During the site visit and interview with the local residents, the Team was advised that as a matter of culture, only E&S Team members will be allowed to enter the villages and some houses. Most of the residents interviewed are male due to absence of woman interpreter when the team entered the villages. Women were also not allowed to leave their homes except for one female resident from Chak-41 DB and 40 DB village. It was also observed that there are limited male residents during the visit as they are working outside the villages. The villages were selected based on their proximity to the proposed solar plant.

All of the residents interviewed informed the Team that their villages are supportive of the project and expects basic facilities and employment to be provided to them. All the villages have power supply, primary school I available in the area.

Summary of interviews conducted are as follows:

(a) Chak-40 DB Village

Person Interviewed - Mr. Akhtar Hussain

- This is the closest village to the project site, i.e., around 4.6 kilometers in distance from the proposed solar plant.
- There are about 50 - 60 households residing in the area, most of the men are daily wage earners.
- Households are involved in raising livestock for home consumption. Patches of land near the houses are cultivated for crop production (wheat and onion for home consumption, grass for livestock) during rainy season.
- Mr. Akhtar presently works as Labor for the proposed project. The client also engaged his other family member as a Labor, working at 8 hours per day per Labour.
- Women help in raising livestock and crop production. None of them work outside their homes.
- Mr. Akhtar attended the consultation conducted in their area.
- He is very pleased of his employment as Labor as he used to work as daily wage earner in labor earning 400-500 PKR per day. Income is not regular and depends on labor requirement for a particular period of time. He is paid 12000 - 15000 PKR per month by subcontractor and started working for the solar plant since 2014. His fellow village residents who attended the consultation also expect provision of basic facilities and employment from the project.
- Residents of Chak-40 do not use the project area for grazing and cropping

(b) Chak-41 DB Village

Person interviewed - Ms. Shabeera Bibi

- There are around 40 – 50 households in the village which is 2.7 kilometers away from the project area.

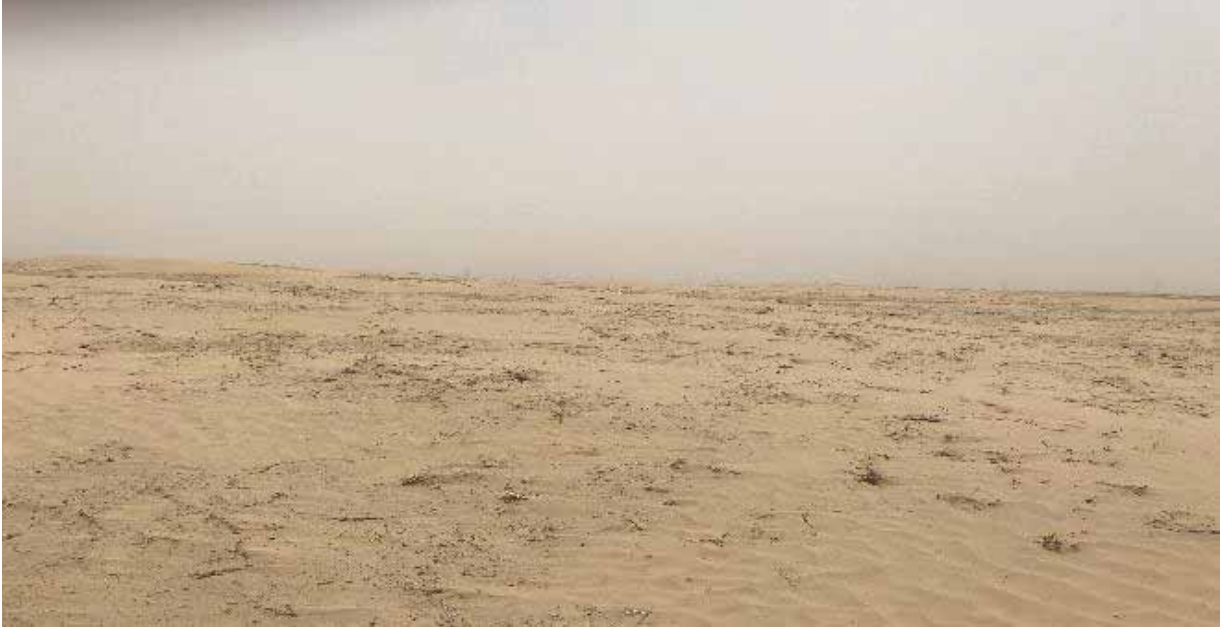
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- Residents cultivate crops during rainy season (once a year, for household consumption near their houses). Women are usually in charge of these activities as male household members earn income as daily wage earners in Bahawalpur city or Solar Park.
- The water is available to the locals by the government owned tube wells system and also the canal system which is funded by the provincial government.
- Residents of Chak-41 DB do not use the project area for grazing and cropping
- Ms. Shabeera Bibi informed the Team that villagers were invited during the consultation conducted by the project sponsor. She attended the consultation and expressed that their village members are supportive of the project. They expect health and water facilities to be provided to them including employment.

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PHOTOS

1. Project Site



Quaid-e-Azam Solar park Area



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2. Chak-40 DB Village



Chak-40 DB village is the closest village to the proposed solar plant. There are about 50 - 60 households residing in the area

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Animal shed

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The Team during its site visit with Mr. Akhtar and the local Community

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3. Chak-41 DB Village



Chak-41 DB village with 40 - 50 households is about 2.7 kilometers away from the project site



Ms. Shabeera Bibi (right)

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ANNEXURE-XVIII

***Initial Environmental, Health, Safety and Social
Audit Report for Zorlu Solar Plan 100 MW***

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ZORLU 100MW Solar PV Power Project



Bahawalpur, Punjab- Pakistan

Project Name: ZORLU 100 MW SOLAR PV POWER PROJECT

Report No: EHS-Zorlu-001

Date of Audit: 31.05.2017

Date of Corrective Action Required: 30.06.2017

Location: Site area and Camp

Joint Inspection Team:

Client: Syed Muntaz Hassan, Arif and Others

OE: Farooq Ali Khan, M.Ali Afzal and Irfan Pervez

Zorlu Industrail: Cenk, Aydin Akat, Haseeb and Sharjeel

Prepared by: Farooq Ali Khan

PERFORMANCE INDICATORS AND ASSESSMENT

Assessment: Excellent: 5, Good: 4, Average: 3, Poor: 2, Unacceptable: 1, Not Followed: 0, YES: √, NO: ×
Performance: Poor ≤40%, Below Average ≤50%, Average ≤60%, Good ≤70%, Excellent ≤80% -100%

HSE Compliance / Performance: NOs Obtained / Total NOs * 100 = 189 / 375 x 100 = 50.4%



HSE WALKTHROUGH AND INSPECTION CHECKLIST

S.No	Description	Status	S.No	Description	Status
1	Site Welfare Facilities	2	12	Waste management	2
2	Personal Protective Equipment's	2	13	Instructions & Signage	2
3	Working at height	N/A	14	Material storage & Handling	3
4	Lights & Illuminations	3	15	Hot works	N/A
5	Lifting Equipment's & Lifting Gears	3	16	Induction Training & Tool Box Talks	2
6	Excavation & Trenching	2	17	Inspections & Meetings	3
7	Step Ladders (Scaffolding etc)	N/A	18	COSHH	3
8	Fire Protection & Prevention	2	19	Power tools & tackles	3
9	Emergency Equipments and Resources	2	20	Hand tools conditions	3
10	Heavy Machineries / Operator Fitness & Certifications	3	21	Traffic Management	3
11	Edge Protection & Barricades	3	22	Confined Spaces	N/A

HSE WALKTHROUGH AND INSPECTION CHECKLIST

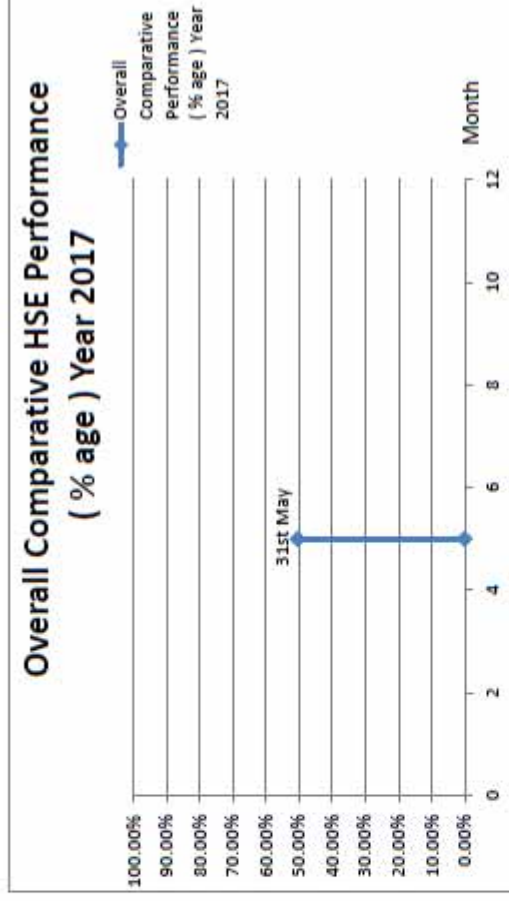
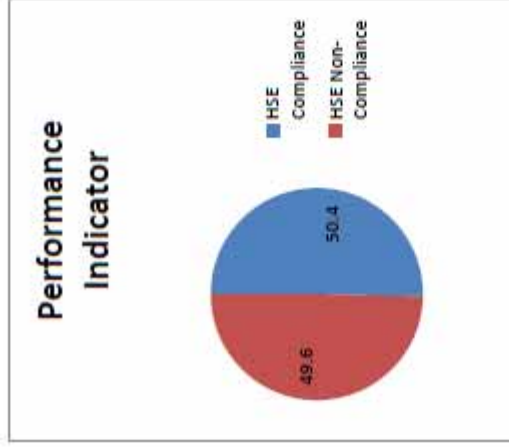
S.No	Description	Status	S.No	Description	Status
1	Are all material stack properly	3	15	Are the road safety risk perception highlighted	2
2	Is scrap debris properly stored?	3	16	Are there any frayed cords?	3
3	Is area clear from flammable solution/Solvent	3	17	Are panel box cover secured?	3
4	Are pits and floors opening guarded?	2	18	Are equipment grounded properly?	2
5	Is there any leakage problems?	3	19	Are correct tools being used?	3
6	Housekeeping of workplace. ?	3	20	Are supervisors aware of safety standards	3
7	Are there any tripping/slipping hazard?	3	21	Are speed limits by vehicle being followed?	2
8	Are emergency exits clear ?	2	22	Are basic facilities being provided to site workers	2
9	Are walkways clear from any obstruction?	3	23	Do working personnel know the hazard of Work being performed?	3
10	Are all guards in place?	2	24	Is first aid box OK?	2
11	Radiography prevention & protection	NA	25	Is communication system functioning?	3
12	Are WAH protocol followed?	N/A	26	Are material / chemical stored accordingly? a) Drums/containers in good condition b) Clearly labelled with correct hazard signs	3 3 3
13	Is work permit system being followed? (Permit is not required at this stage)	N/A			
14	Are lockout / tag out procedures being Followed?	N/A			

**ENVIRONMENT, OCCUPATIONAL HEALTH & SAFETY &
CORPORATE SOCIAL RESPONSIBILITY (Implementation against Documents & Legislations)**

Environment	Description	Status	Remarks
	Environmental Policy is in place and implemented?	2	
	Environmental Objectives achieved?	3	
	Identification and Compliance of Legal and Regulatory Requirements?	3	
	Environmental Aspect Identification and Impact Analysis are being implemented?	3	
	Development and Implementation of Environmental and Social Management Plan?	2	In progress
	Waste Collection, Identification and Disposal Management and Monitoring are in place?	2	In Progress
	Emergency Preparedness and Response Plan are prepared and complying?	2	
	Noise Monitoring is going on?	2	
	Soil and Land Erosion Monitoring?	2	Soil Management Checklist should be prepared and follow up consistently
	Emissions Monitoring? Ambient Air Monitoring Plan is implementing?	2	
	Spillage Prevention and Counter Control Measures?	3	
	Equipments, Vehicles and Construction machineries Exhaust Monitoring	2	3 rd party test for vehicle emission is required
Occupational Health & Safety	Occupational Health & Safety Policy is in place and implemented?	2	
	Occupational Health & Safety Objectives achieved?	3	
	i. Site Specific HSE Plan	2	Contractor HSE Plan is in progress
	ii. HSE Policy, Objectives in placed, Health & Safety Risk Assessment and Management (JSA / TRA) are prepared and discussed to all concerns?	2	
		1	

	Domain	Status	Remarks
	Incident and Accident are being Reported?	3	No incident happened so far
	Work Instructions and SOPs implementation is in-place?	3	
	Workers Training manual has been developed and complying	1	Contractor did not submit the training manual so far
	HSE Non-compliance Monitoring	3	
	Drinking Water Quality Monitoring?	2	
Corporate Social Responsibility	Corporate Social Responsibility Policy is in place and implementing?	3	
	Complying with Child Labor Control policy?	3	
	Controlling of Harassment and Abuse?	4	
	Controlling on Discrimination?	4	
	Grievance record and redress monitoring?	2	
	Formation and Management of Health & Safety Committees?	3	
	Skill & Capacity building Programs are in place? (Focus on education, skill growth, agricultural & commodities, women skills development etc.)	2	Community development plan is in progress
	Complying with Workers Accommodation Management plan? <ul style="list-style-type: none"> • Rooms are appropriated for living? All basic amenities are provided? • Spacing and accommodation in a room follows IFC EHS guideline? • Sufficient and hygienic food is being provided to workers? • Toilets are functional and clean? • Sufficient and clean drinking water is being provided to workers? 	2	Accommodation for workers is in progress
	Stakeholders Engagement and Community Grievance meeting?	3	Ongoing
	Social Risk Assessment and Mitigation Plan are prepared and implementing?	2	In Progress
Monitoring of STD / STI Disease of Workers, drivers and Staff of ZORLU / CONTRACTOR/ RE2 staff and any other subcontractor	1		

Graphical Representation



Note: Since the project is at initial phase of working, most of the working procedures and EHS plans are under preparation. Once the plans and procedures prepared by contractor and approved by Zorlu Energy, those will be implemented with true sprite. However, the best working practices is being applied getting along with previous experience and experts support.

Though, following are the observations noticed during site visit on dated 31st May, 2017. On basis of observations and requirements, following are mandatory to acquire,

SITE OBSERVATIONS

S. NO	OBSERVATIONS	RISK / PRIORITY (H/M/L)	CLOSE OUT DATE/ STATUS	RESPONSIBILITY	RECOMMENDATION / CORRECTIVE ACTIONS
01	HSE Plan need to be developed by contractor including SOP's and site monitoring checklists and formats	H	25.06.2017	Contractor	Make sure, the HSE Plan must obliging the IFC PS and ADB EHS guideline
02	ERP (Emergency Response Plan) ought to be prepared according to site layout, facilities and available resources	H	20.06.2017	Contractor	
03	Waste Management Plan has to be developed describing waste handling at site and final disposal. Inventory for waste collection and disposal shall be collected for record keeping and further reporting.	H	30.06.2017	Contractor	
04	Contractor internal monitoring plan should be prepared and submit to clients for follow up.	M	20.06.2017	Contractor	
05	CSR plan need to be finalized and submitted for client review. Plan should comprise of accomplishments / provisions on the basis of the community requirements, consultations and GRM (Grievance Rederessal Mechanism) fulfillments.	M	05.07.2017	Contractor	
06	EPC GRM procedure including SEP (Stakeholders Engagement Plan) should be developed in line with the GRM frame work of Zorlu	M	05.07.2017	Contractor	
07	EHS policy for contractor should be developed and implemented onsite	H	ASAP	Contractor	

S. NO	OBSERVATIONS	RISK / PRIORITY (H/M/L)	CLOSE OUT DATE/ STATUS	RESPONSIBILITY	RECOMMENDATION / CORRECTIVE ACTIONS
08	Security Management Plan should be finalized on basis of site condition, security risk and site layout. It must comprise of the numbers of security personnel, layers for protection and necessary security arrangements to be implemented on project	H	30.06.2017	Contractor	
09	Water Management Plan shall be developed describing the water collection, disposal, usage and storage for PV panel washing and other purposes of site	M	15.07.2017	Contractor	
10	Workers Accommodation should be constructed and allocated according to IFC accommodation guideline.	H	Info	Contractor	Site Office and accommodation is under construction
11	Develop an EHS organogram shall be indicating the hierarchy of EHS members, reporting flow and focal personnel to contact with. This must comprises of indicating EHS leader, Subordinates, Medical Staff, Incident reporting flow, line management coordination with EHS team and emergency numbers. It must be a single unit organogram	M	ASAP	Contractor	
12	Contractor must ensure the compliances of PPE (Personal Protective Equipment) at site.	H	Info	Contractor	
13	Make sure the appropriate first aid arrangement ought to be existed onsite in order to cope up with the emergency. Sufficient resources must be presented including site ambulance etc. Make sure the appropriate contracts (Employments Contracts) have been given to all workers either temporary or permanents. Terms and Conditions shall be briefly described and understood to employees according to labour law of Pakistan. Ensure, proper record keeping of all contracts at site with Admin and HR	H	Info	Contractor	
14		H	Info	Contractor	

S. NO	OBSERVATIONS	RISK / PRIORITY (H/M/L)	CLOSE OUT DATE/ STATUS	RESPONSIBILITY	RECOMMENDATION / CORRECTIVE ACTIONS
15	Induction Training Ought to be delivered to all workers prior working / visiting site. HR/Admin must have close coordination with EHS department in order to comply with this procedure	L	Upon anticipation	Contractor	
16	Dust emission observed at site during vehicle and construction machineries movements. Water sprinkling should be frequently carried out at workplace	H	On-going	Contractor	
17	Working shed should be provided by contractor at workplace.	M	Immediate	Contractor	
18	Biodiversity assessment / Flora & Fauna surveys should be carried out periodically by experts.	H	Info	Zorlu	

ANNEXURE-XIX

*Environmental and Social Action Plan (ESAP) -
Pakistan – ZSPL*

Document Title: IEE of 100 MW Solar PV Power Project in Bahawalpur Punjab - Pakistan	Consultant Name: Renewable Resources (Pvt.) Ltd	Document No RE2-131-202-002	Date of Approval October,2017
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Environmental and Social Action Plan (ESAP) - Pakistan – ZSPL (#39799)

(October 23, 2017)

	Description of the Action Item	Deliverables	Anticipated Completion Date
	<p>PS 1 Assessment and Management of Environmental and Social Risks and Impacts</p> <p><u>E&S Policy</u> - The company will develop and implement a project Environmental, Health Safety and Social (EHSS) policy, applicable to the company and its contractors and sub-contractors, and suppliers, defining objectives and principles for achieving sound EHSS performance per national laws and IFC Performance Standards and ADB Safeguard Policy Statement (SPS) requirements.</p>	<p>Updated EHS&S Policy</p>	<p>Condition of first disbursement</p>
2.	<p><u>EPC Contracts for Construction and O&M activities</u> - Company will ensure that EPC and O&M contract language includes explicit requirements for compliance with the project's E&S obligations including: (a) preparation of detailed contractor EHSS MPs; (b) compliance with IFC Performance Standards and ADB SPS; (c) occupational health and safety provisions (including drinking water for workers according to WHO drinking water guidelines); and (d) human resource (HR) provisions with clear guidelines on labor performance consistent with the company's HR policy</p>	<p>Certificates and accompanying documented evidence from EPC and O&M Contractors demonstrating compliance with these requirements</p>	<p>Condition of first disbursement (for EPC Contractor) One month before plant commissioning (for O&M Contractor)</p>
3.	<p><u>Management Plans (MPs)</u> – <u>Construction and operational phases</u>: - Company will ensure EPC and O&M contractors develop and implement project-specific EHSS MPs and procedures in compliance with national regulations and IFC PS and ADB SPS requirements, covering at a minimum the following aspects: (a) stakeholder engagement and grievances; (b) workers accommodations (per IFC/ADB requirements); (c) influx management; (d) local recruitment and procurement; (e) occupational health and safety; (f) dust management; (g) traffic management; (h) emergency response; (i) waste management; (j) water resource management (k) community health; and (l) monitoring and reporting.</p>	<p>EPC management plans in form and content acceptable to IFC/ADB O&M management plans in form and content acceptable to IFC/ADB</p>	<p>Condition of first disbursement One month before plant commissioning.</p>
4.	<p><u>Organizational Capacity and Competency</u> - The Company will formally create and appropriately staff an EHS&S Management Cell (ESMC) with qualified Environmental, Social, Health and Safety professionals for construction and operational activities to be supported by contractors' environmental, health and safety officers.</p>	<p>EHSS team organogram and evidence of contracting of qualified professionals by company and EPC contractor</p>	<p>Condition of second disbursement or January 31, 2018, whichever occurs first</p>
5.	<p><u>Stakeholder Engagement and Grievance</u> - The Company will develop and implement, with EPC and O&M Contractors, a project specific Stakeholders' Engagement Plan including a grievance redress mechanism (GRM) to lodge and resolve concerns from affected communities. As part of this process, the company will require its EPC and O&M contractors to appoint a qualified Community Liaison Officer (CLOs) to implement the stakeholder engagement plans.</p>	<p>Stakeholders' Engagement Plan including GRM in form and content acceptable to IFC/ADB Letter of appointment and job description for contractors' CLOs</p>	<p>November 30, 2017 December 15, 2017</p>

	PS 2: Labor and Working Conditions		
6.	<p>Human Resources (HR) Policy – Company will adopt the Sponsor’s HR to policy to meet the requirements under IFC PS 2 including such elements as recruitment, induction, contracts and terms of employment, minimum wages, working hours and overtime, training, leaves, grievance redress, performance appraisal, retirement/separation, employee welfare, disciplinary action, health and safety, accommodation and non-discrimination and equal opportunity and include a project specific procedure of association and non-discrimination and equal opportunity and include a project specific procedure related for managing grievances (by employees, workers, 3rd party service providers) per IFC PS2.</p>	Updated HR Policy in form and content acceptable to IFC/ADB	Condition of first disbursement
7.	<p>Performance Standard 3: Resource Efficiency and Pollution Prevention</p> <p>a. <u>Water Management Plans</u> - Develop and implement site specific Water Management Plan for the construction and operational phases of the project. The plan will include: (a) detailed evaluation of the sustainability of available water resources in the project area for project use; (b) quantitative evaluation of cumulative effects of water demand from the project and all other water users in and around the QAS Park and the local communities; (c) management actions for sustainable use of water resources and efficiency measures.</p> <p>b. <u>Solar PV Panel Waste Management Plan</u> – Develop and implement a solar PV panel waste management plan during operational and decommissioning phases of the project. The plan will include: (a) detailed evaluation of available and viable options to manage i) broken/damaged panels during operation, ii) operational and end-of-life panels at the end of the concession/during project decommissioning; (b) quantitative evaluation of amount of waste that will be produced during operation and during decommissioning, and (c) actions for proper management of the wastes.</p>	<p>Water Management Plan inform and content acceptable to IFC/ADB</p> <p>Solar PV Panel Waste Management Plan in form and content acceptable to IFC/ADB</p>	<p>Condition of first disbursement (water management plan)</p> <p>One month before commissioning (waste management plan)</p>
8.	<p>Performance Standard 4: Community Health, Safety, and Security</p> <p><u>Security Personnel</u> - The company will perform a Security Risk Assessment (SRA) with a qualified security risks firm and will present a Security Management Plan (SMP) to assure that employees, sub-contractors, as well as physical assets are safe, under surveillance, and in a controlled environment. The SMP will be (a) site specific and comprehensive (b) commensurate to the security risks, (c) describe security risks for the project and detailed response procedures, (d) aligned with the Voluntary Principles on Security and Human Rights (http://www.voluntaryprinciples.org), and (e) assure that all security personnel, but especially those who will bear arms, are trained and operate consistently with such principles. This plan will also include an initial awareness workshop and site briefing for all employees. The SRA will also identify any potential risks that its own private security company may pose to those within and outside the project site. As a general rule, the company’s security response will be guided by principles of proportionality, avoidance of confrontation, use of a preventive and defensive approach commensurate to the nature and extent of the threat, and respect for human life and basic human rights. The company will make reasonable inquiries to ensure that personnel providing security under the private security company are not implicated in past abuses; will train them adequately in the use of force and fire arms, and will impose a Code of Conduct toward workers and nearby communities.</p>	<p>Signed contract with qualified security risk firm to conduct SRA</p> <p>Completed SRA and prepared Security Management Plan in form and content acceptable to IFC/ADB</p>	<p>Condition of first disbursement</p> <p>January 31, 2018</p>