Environmental Impact Assessment

Project Number: 51036-002
June 2021

Pakistan: Khyber Pakhtunkhwa Cities Improvement Project

Mingora Solid Waste Management Facility Development

Annexures

Prepared by Project Management Unit, Planning and Development Department, Government of Khyber Pakhtunkhwa for the Asian Development Bank.

ANNEXURES

Annexure A
REA Checklist

Rapid Environmental Assessment (REA) Checklist

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: Pakistan/Mingora Landfill Site

Sector Division: Solid Waste Management in Urban Environment

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area…			
▪ Densely populated?	√		The proposed project site is located in an area with a high concentration of individual and clusters of residential settlements.
▪ Heavy with development activities?		√	Not applicable
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site		√	Not applicable
• Protected Area		√	Not applicable
• Wetland		√	Not applicable
• Mangrove		√	Not applicable
• Estuarine		√	Not applicable
• Buffer zone of protected area		√	Not applicable
• Special area for protecting biodiversity		√	Not applicable
• Bay		√	Not applicable

Screening Questions	Yes	No	Remarks
B. Potential Environmental Impacts Will the Project cause…			
▪ **impacts associated with transport of wastes to the disposal site or treatment facility**	√		Although the specific route for transport of the wastes to the landfill site is yet to be finalized, however, considering the proximity of the site to the populated areas, it is expected that the vehicles will collect and transport the wastes by moving through highly populated areas and result in significant community health and nuisance impacts such as odor, vector generation along with traffic congestion, accident risks from heavy vehicle movement etc.
▪ **impairment of historical/cultural monuments/areas and loss/damage to these sites?**		√	No historically and/or culturally significant monuments/areas are located in the project area and thus no loss/damage to them is expected.
▪ degradation of aesthetic and property value loss?	√		The development of the proposed landfill site is expected to significantly affect the aesthetics of the project area as well as significantly diminish the property value of the land in this area considering the nuisance effects such as odor as well as possible health impacts from disease vector generation, groundwater contamination etc.
▪ nuisance to neighboring areas due to foul odor and influx of insects, rodents, etc.?	√		The proposed landfill site is expected to result in high levels of foul odor in the project area along with the generation of disease vectors such as mosquitoes, flies, rodents etc.
▪ dislocation or involuntary resettlement of people?		√	No dislocation or involuntary resettlement of people is expected as per now.
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		√	No such impacts are expected on the poor while no indigenous peoples are located in the project area that would get affected.
▪ risks and vulnerabilities related occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	√		Significant occupational health and safety hazards will exist at the site considering the waste and toxic gases present at the site during the landfill site operation.

Screening Questions	Yes	No	Remarks
▪ public health hazards from odor, smoke from fire, and diseases transmitted by flies, insects, birds and rats?	√		These public heath hazards do exist from the operation of the landfill site such as odor, generation of disease vectors etc.
▪ deterioration of water quality as a result of contamination of receiving waters by leacheate from land disposal system?		√	No surface water bodies are located in the project area and thus no contamination in this regard is possible.
▪ contamination of ground and/or surface water by leachate from land disposal system?	√		A high risk exists of contamination of ground water by production of leachate from landfill site operation.
▪ land use conflicts?	√		Land use conflicts are expected since the communities residing in the proximity of the proposed site will particularly prefer to move the site to an alternate location.
▪ pollution of surface and ground water from leachate coming form sanitary landfill sites or methane gas produced from decomposition of solid wastes in the absence of air, which could enter the aquifer or escape through soil fissures at places far from the landfill site?	√		A high risk exists of contamination of ground water by production of leachate from landfill site operation.
▪ inadequate buffer zone around landfill site to alleviate nuisances?	√		Based on the sensitive receptor mapping of the site that has been conducted, no suitable buffer around the landfill site has been demarcated, resulting in further increase in expected nuisances once the landfill operation commences.
▪ road blocking and/or increased traffic during construction of facilities?	√		While no road blocks are expected, however, a significant increase in heavy vehicles/trucks transporting the waste to the landfill site is expected.
▪ noise and dust from construction activities?	√		During development of the infrastructure at the site during the construction phase, significant noise and dust emissions are expected from the movement of construction vehicles and equipment.
▪ temporary silt runoff due to construction?		√	No silt run off is expected.
▪ hazards to public health due to inadequate management of landfill site caused by inadequate institutional and financial capabilities for the management of the landfill operation?	√		A high risk exists considering the limited institutional and financial capacities in the country along with limited experience and expertise with regards to operation and management of landfill sites.

Screening Questions	Yes	No	Remarks
▪ emission of potentially toxic volatile organics from land disposal site?	√		Toxic emissions such as landfill gas from the site are possible.
▪ surface and ground water pollution from leachate and methane gas migration?	√		A high risk exists of contamination of ground water by production of leachate from landfill site operation.
▪ loss of deep-rooted vegetation (e.g. trees) from landfill gas?	√		It is possible that over time, the land fill gas generated could damage and cause loss of trees etc.
▪ explosion of toxic response from accumulated landfill gas in buildings?	√		Accumulation of landfill gas over time from landfill site operation could result in explosions of toxic gas.
▪ contamination of air quality from incineration?		√	In case incineration is conducted at site, the air shed appears to be generally of good quality since the proposed site is located in the suburbs of Mingora city and thus significant degradation of air quality is not expected due to the landfill site operation.
▪ health and safety hazards to workers from toxic gases and hazardous materials in the site?	√		Significant occupational health and safety hazards will exist at the site considering the waste and toxic gases present at the site during the landfill site operation.
▪ large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	No such impacts are expected.
▪ social conflicts if workers from other regions or countries are hired?		√	No such conflicts are expected since local labor will be utilized as far as possible.
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	√		The risks to community health and safety exist, particularly during the construction phase, considering the proximity of the project site to the residential settlements in the project area.
▪ community safety risks due to both accidental and natural hazards, especially where the structural elements or components (e.g., landfill or incinerator) of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	√		The risks to community exist, particularly during operation of the landfill site, considering the proximity of the site to residential settlements.

Annexure B

Questionnaires for Conducting FGDs & Surveys

Focal Group Discussion (FGDs)

Project Name:

Venue:

Sr no ____ Date:

Sr no	Name	Profession	CNIC	Moza/Village UC, Tehsil & District	Signature/Thumb
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

SOCIO ECONOMIC AND BENEFICIARY SURVEY PROFORMA

Date: Sr No.

1. Identification

1.1 Name of Respondent 1.2 Father's Name

1.3 Respondent CNIC No: 1.4 Tribe

1.5 Address: Village: Town:

Tehsil: District: Province:

1.6 Demographic Profile of Respondent (Children up to 10 yrs (#): M FM =T)

Sr. No.	Relationship with Respondent (See codes)	Sex Male=1 Female= 2	Age (Yrs.)	Education (See Codes)	Name of Business/ Occupation (See Codes)		Income From Business/ Occupation (Rs./ Annum)		Diseases During Last Year (See codes)
					Main	Secondary	Main	Secondary	
1	SELF								
2									
3									
4									
5									
6									
7									
8									
9									
10									

*Other: Rent from properly, remittances, net sale of items during a year, net income from agriculture etc.

Demographic Codes:

Relationship: 1=Self, 2=Wife, 3=Son, 4=Daughter, 5=Father, 6=Mother, 7=Brother, 8=Sister, 9=Grand Father, 10=Grand Mother, 11=Bhabhi, 12=Nephew, 13=Father-in-Law, 14=Mother- in-Law, 15=Others

Sex: 1=Male, 2=Female

Education: 1= Primary 2= Middle 3= Matric, 4= Intermediate, 5= BA/BSc, 6= MA/MSc, 7=LLB, 8=Engineer, 9=MBBS, 10=Technical Diploma, 11=Dars-e-Nizami, 12=CanRead Quran, 13=Can Insert Signatures, 14= Illiterate,

Occupations: 1=Agriculturist, 2=Shopkeeper, 3= Trader, 4= Govt. Servant, 5=Private Servant, 6=Timber Labour, 7=General Labour, 8=Livestock, 9=Fishing, 10= 8=Driver, 11=Health Related, 12=Educator/Teacher, 13=House-Maid, 14= House Wife, 15=Gone Abroad, 16=Gone out City within Pakistan

Diseases: 1=Diarrhea, 2=Measles, 3=Hepatitis, 4=Typhoid, 5=HIV/AIDS, 6=Polio, 7=Cholera, 8=Tuberculosis, 9=Heart Disease, 10=No Disease,

1.7 Are you member of any village Community organization ____ 1. Yes ☐ 2. No ☐

1.8 If yes, which of the following organizations?

i. Religious ii. Political iii. Law & Order
iv. Educational (formal/informal)
v. Community Organization vi. Local Jirga
vii. Youth Organization viii. Any other

7. Land Utilization

Land	Acre	Kanal	Marla
Total Area owned			
Total Cultivated Area			
Area Under Rabi(winter) Crops			
Area Under Khanf (summer) Crops			
Uncultivated Area			
Waste land			
Area Under Farm Houses			
Barren Land			

2.1 Cropping Pattern, Yield and Cost

Sr. No.	Major Crops	Area Sown		Average. Production (Kgs)	Price/40 kgs (Rs.)	Total Cost Incurred (Rs.)
		Acre	Kanal			
1.	Wheat					
2	Maize					
3	Cotton					
4	Rice					
5	Sugarcane					
6	Orchards					
7	Other (_____)					
8	Grand Total:					

2.2 Land Tenure Status: ☐ Owner ☐ Leaser ☐ Tenant ☐ Share Cropper ☐

2.3 Land Rent (Rs. / acre) _____

3. **Possession of Household Goods**

Item	No.	Value (Rs.)	Item	No.	Value (Rs.)
Television			Car		
Washing machine			Van/Pickup		
Geyser			Gas Cylinder		
Electric fan			VCR/DVD Player		
Electric iron			Dish Antenna/Cable Connection		

Item	No.	Value (Rs.)	Item	No.	Value (Rs.)
Sewing machine			Telephone/Mobile		
Radio/tape recorder			Electric Water Pump		
Motor cycle/ scooter			Computer		
Other			Other		
Total:			Total:		

4. Average Monthly Expenditure on Food and Non-Food Items

4.1 Monthly Expenditure on Food & Non-Food Items (Rs.)

a) Expenditures on Food Items

Sr. No.	Item	Qty. / Month	Expenditure (Rs.)
1.	Wheat / Atta (Flour)		
2.	Maize Flour		
3.	Ghee		
4.	Sugar		
5.	Legumes		
6.	Vegetables		
7.	Tea Leaves		
8.	Milk		
9.	Other Specify		
10.	Total:		

b) Exp. On Non-Food Items:

1.	Fire wood		
2.	Gas Cylinder		
3.	Kerosene Oil		
4.	Washing Material		
5.	Other Specify		
6.	Total:		

4.2	Expenditure on clothes and shoes during last year:	Rs.
4.3	Occasional expenses during last year (such as meeting social obligation expenditure)	Rs.
4.4	Av. Monthly utility bills for:	Electricity (Rs.)
	Communication (Rs.)	Water (Rs.)
4.5	Annual Expenditure on Health Care (Rs.):	

5. Social Organizations

5.1 Specify the existing village/social organizations in your area and state their functional status?

Sr. No.	Name of Organization	Category	Registered/ Unregistered	Functions
1		Religious		
2		Educational		
3		Skill Development		
4		Social Welfare		
5		Women Organization		
6		Other		

6. Leadership Pattern

6.1 Which type of people is influential in village matters and how they decide these matters?

Sr.#	Person / Status	Decision Pattern
1	MPA / MNAs	
2	Head of Tribe	
3	Spiritual / Religious Leader	
4	Land Lord / Lumber Dar	
5	School Teacher	
6	Community Leader	
7	Government Official	
8	Retd. Government Official	
9	Any other (specify)	

6.2 Were their decisions considered final and implemented successfully? ☐ 1. Yes ☐ 2. No

i) Level of acceptability (%) _____ ii) Successful implementation (%) _____

6.3 Are the general relationship among people in the locality essentially based upon?

1. Competition _____ 2. Conflict _____
3. Co-operation _____ 4. Don't Know _____

6.4 Were you involved in any dispute in the past 5 years? ☐ 1. Yes ☐ 2. No

6.5 If yes, what was the nature of dispute and how was it resolved

	Nature of Dispute	Method of Resolution
1.	_____	_____
2.	_____	_____
3.	_____	_____

7. **Credit**

7.1 Have you obtained credit during last year? Yes [ ], No. [ ], if yes, source of credit.

Formal [ ], Informal [ ]

7.2 Please write the name of relevant source

Formal source (s) _____

Informal source (s) _____

Percentage of interest _____

7.3 Purpose of Loan (Tick)

Purchase House	[ ]	Rs. _____
Business	[ ]	Rs. _____
Repair of House	[ ]	Rs. _____
Medicare of Family Member	[ ]	Rs. _____
Family/ Social matters	[ ]	Rs. _____
Farm inputs	[ ]	Rs. _____
Livestock	[ ]	Rs. _____
Other (specify)	[ ]	Rs. _____

7.4 Mode of repayment (Tick the relevant)

1) One time [ ] 2) Through installments [ ],

i) Quarterly installments [ ] ii) Six monthly [ ],
iii) Annual [ ] iv) Other (specify) _____

7.5 How much repayment has been made so far? a) 100%[ ], b)75% [ ], c) 50% [ ], d) 25% [ ], Less than 25 % [ ]

8. **Housing Conditions**

8.1 Do you have your own house?

1) Yes ____ 2) No. ____

If yes then

8.2 Total Area of the house: square ft. Present Value (Rs)_____.

Type of Room	No. of Room	Katcha (tick)	Pacca (tick)	Semi Pacca (tick)
Living rooms				
Animal shed				
Other shed				
Bathroom				
Latrine				
- Open				
- Flush				

[- Other

8.3 Other Assets Area (F.T.)

Shop(Sq. ft): L W
Khokha:
Electric Pump / Hand Pump (No.):
Hydropower Generator:
Other ( ) (No.):

8.4 Trees

- Mature Fruit Trees (No.):
- Mature Shade Trees (No.)

9. Access to Social Amenities (Tick)

Social Amenities	Available	Satisfactory	Non-Satisfactory	No Access
Electricity				
Sui Gas				
Water Supply				
Telephone				
Sewerage/Drainage				
BHU				
School				
Others				

10. Livestock Inventory

Livestock	No.	Present Value (Rs.)
Buffaloes		
Cows		
Horse		
Donkey		
Mule		
Sheep		
Goat		
Poultry		
Other		

11. Women's Participation and Decision Making in Different Activities

11.1 Women participation in different household activities:

Activities	Participation (%)	Decision Making (%)
Household activities		

Child caring	[ ]	[ ]
Farm/Crop activities	[ ]	[ ]
Livestock rearing	[ ]	[ ]
Sale & Purchase of properties	[ ]	[ ]
Social obligations (marriage, birthday & other functions)	[ ]	[ ]
Local representation (councilor/ political gathering)	[ ]	[ ]
Others	[ ]	[ ]

11.2 Women issues in the project area

_____

_____

11.3 Women views about the project

_____

_____

12. Perceptions of Respondents for Action Associated with the Project

	Increase	Decrease
Employment opportunities	[ ]	[ ]
Marketing facilities opportunities	[ ]	[ ]
Living standard	[ ]	[ ]
Unemployment	[ ]	[ ]
Income generating activities	[ ]	[ ]
Mobility (Access to Resources)	[ ]	[ ]
Quality of drinking water	[ ]	[ ]
Agriculture water	[ ]	[ ]
Trend of fish farm	[ ]	[ ]

Other specify_____

13. **General Remarks of the Respondents**

14. **Resettlement Part**

14.1 Do you feel any [illegible] impact? Yes No

If yes then

Category	Area Acre	Kanal	Value of Land (Rs.)	Remarks
Cultivated				
Uncultivated				
Grazing				
Barren Land				
Waste Land				
Other				
Total				

14.2 Affected Cropping Area

Yes _____ No _____

If yes then

Name of Crop	Acre	Kanal	Value (Rs.)
Rabi			
Kharif			
Total:			

14.3 Affected residential structures

Name of Structure	Types of Structures			Area		Value of Structure
	Kacha	Pacca	Semi Pacca	Sq. ft.	Rft.	
Houses						
Boundary Wall						
Other						

14.4 Impact on Farm House

Yes _____ No _____

If yes then

Name	Type of Farm House			Area		Value (Rs.)
	Kacha	Pacca	Semi Pacca	Sq.ft	Rft.	
Rooms						
Cattle Shed						
Boundary Wall						
Other						

14.5 Impact of Tube wells

Yes _____ No _____

If yes then

Types of Tube wells	No.	Value (Rs.)
Electric		
Diesel		
Turbine		
Other		
Total:		

14.6 Impact on Utility

Yes ..... No .....

If yes then

Types	Nos. / Area
Electric poles	
Transformer	
Transmission line	
Telephone	
Other	
Total:	

14.7 Impact on Community Structure

Name	Yes	No	Value (Rs.)
Schools			
Mosque			
Graveyard			
Health Centre			
Shrine			
Others			
Total:			

14.8 How to shift shrines / graveyards?

14.9 Miscellaneous Impacts of the Project

14.10 Do you have any alternate residence place?

Yes [ ] No [ ]

If yes then (tick relevant)

Own Land / House	Yes/No	Location	Distance from current residence (km)
Tenancy			
Relative			
Other			

14.11 Mode of Payment

Land for land _____
Cash compensation _____
Kind _____
Other _____

15. Project

_____

_____

16. Views / Comments of Interviewers

_____

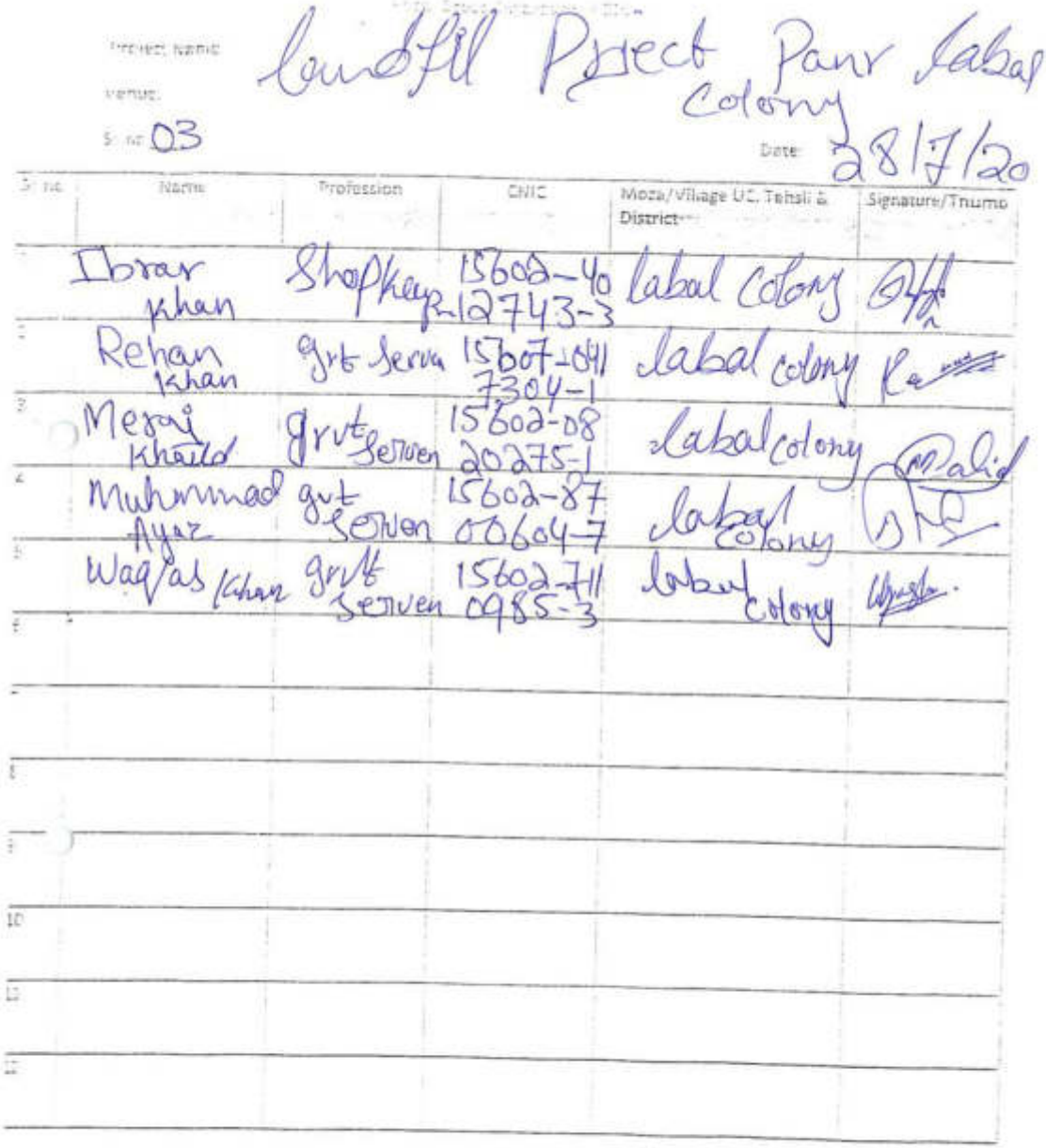
_____

Name & Signature of Interviewer: _____ Date: _____

Scavenging Activity Questionnaire

1) Name:
2) Occupation:
3) Age:
4) Residence City:
    - ----------
5) How much waste do you normally collect in a day?
6) Is all of the waste you collect useful, or do you have to sort it after collection as well?
7) What is the procedure you normally follow in your waste collection activity?
8) What is the usual cost (money) and time (man-hours) you put in the waste collection activity every day or every month?
9) What is the amount of (daily or monthly) income you generate from your activity?
10) Is this your only income source?
11) If no to Q10, what is your other occupation?
12) If no to Q10, what is your total income, and what percentage income is from waste collection?
13) Where does the waste go after you have processed it?
14) What is your motivation (reason) to do this activity?
15) Do you feel a sense of satisfaction that your work makes a positive difference to the cleanliness of the area?
16) What is your working relationship, if any, with any government department or authority (WSSC / PDA etc.) of your city?
17) What kind of improvements would you like to see in your work? Any kind of assistance from government?

Annexure C
Details of public consultations



Project Name: Landfill Project Panr Jabal Colony

Venue:

S. no: 03

Date: 28/7/20

S. no	Name	Profession	CNIC	Moza/Village UC, Tehsil & District	Signature/Thumb
1	Ibrar khan	Shopkeeper	15602-4012743-3	Jabal Colony	
2	Rehan khan	Govt Servant	15607-0417304-1	Jabal colony	
3	Meraj Khalid	Govt Servant	15602-0820275-1	Jabal colony	Khalid
4	Muhammad Ayaz	Govt Servant	15602-8700604-7	Jabal Colony	
5	Waqas khan	Govt Servant	15602-7110985-3	Jabal Colony	
6					
7					
8					
9					
10					
11					
12					

Project Name: Land fill (Solid waste) SWAT

Venue: Jamila's house

S. no 2

Date: 28.7.2020

S. no	Name	Profession	CNIC	Moza/Village UC, Tehsil & District	Signature/Thumb
1	Jamila	Teacher	15602-2710598-8	Labor colony	
2	Abeera	Student	N/A	" "	Abeera
3	Malaika	Student	N/A	" "	Malaika Salim
4	Naseem Akhter	Housewife	N/A	" "	
5	Rawasit	Housewife	15602-5577233-6	" "	
6	Hafsa Khan	Student	N/A	" "	Hafsa Khan
7					
8					
9					
10					
11					
12					

Project Name: land fill Project labal colony Pano

Venue:

Sr. no: 02

Date:

Sr. no	Name	Profession	CNIC	Moza/Village UC, Tensil & District	Signature/Thumb
1	Sohail Ahmad	Rescue 1122	15602-85 62364-3	labal colony	
2	umar zai	Shop keeper	15602 - 1743555-7	〃	
3	Muhammad Rehman	〃	15602 - 8191472-7	〃	
4	Ahmad Ali	Electrician	15602-7838 468-9	〃	
5	Abdullah	Shop Keeper	15602 - 7637097	〃	
6	Bakht afsar khan	〃	15602 - 1024503-3	〃	
7	Mujahid	Labor	15602 - 1521644-7	〃	
8					
9					
10					
11					
12					

Project Name: landfill (Solid waste) SWAT

Venue: Bahadar Shah's house Kataro Mera.

Sr no: 1

Date: 28-7-2020

Sr no	Name	Profession	CNIC	Moza/Village UC, Tehsil & District	Signature/Thumb
1	Shehnaz	Vocational Teacher	15602-2756860-6	Pand Kataro Colony	Shehnaz ✓
2	Naseem Begum	House wife	15602-8810888-2	〃 〃	
3	Jan Sardara	House wife	N/A	〃 〃	
4	Hanifa	〃 〃	N/A	〃 〃	Hanifa.
5	Aysha	〃 〃	15602-2954756-6	〃 〃	Aisha
6	Hafsa Rahman	Student	N/A	〃 〃	Hafsa
7	Rukhsar	Student	N/A	〃 〃	Rukhsar
8					
9					
10					
11					
12					

Project Name: landfill Project labal Colony Pang Pang

Venue:

S. no 01

Date 28/7/20

Sr no	Name	Profession	CNIC	Moza/Village UC, Tehsil & District	Signature/Thumb
1	Bahadar Sher	Indistiyal worker	15602-180 4503[illegible]-5	labal colony	[signature]
2	Muhammad Rafiq	Chairman	15602-889 8042-9	labal colony	Rafiq/[illegible]
3	Mir Rehman	labal	15602-03 11050-7	labal colony	[signature]
4	Zakirullah	trader	15602-49 30814-7	labal Colony	[signature]
5	waqas Ahmad	Health department	15607-035 1861-9	labal colony	waqas
6	Irfan khan	Shopkeeper	15602-46 77368-7	labal Colony	[signature]
7					
8					
9					
10					
11					
12					

Annexure D
Environmental Baseline Monitoring

Air Quality

Integrated Environment Laboratory

EPA Accredited

AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	18-08-2020	Reporting Date:	31-08-2020
Source:	Ambient Air	Monitoring Instrument:	AQMS65, Serial # 1310
Location:	Land fill Site		
GPS Coordinates:	72.394821 34.766096		

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
		Units			
	Hours	($\mu g/m^3$)	($\mu g/m^3$)		
1.	10:00 AM	23.01	80.4	21.17 ($\mu g/m^3$)	77.8 ($\mu g/m^3$)
2.	11:00 AM	24.62	86.9		
3.	12:00 PM	22.18	90		
4.	01:00 PM	23.47	91.7		
5.	02:00 PM	22.6	92.6		
6.	03:00 PM	21.48	99.1		
7.	04:00 PM	22.71	101		
8.	05:00 PM	23.87	106.4		
9.	06:00 PM	24.69	97		
10.	07:00 PM	22.72	95.1		
11.	08:00 PM	21.93	90.9		
12.	09:00 PM	21.5	87.2		
13.	10:00 PM	20.76	85.6		
14.	11:00 PM	20.94	79		
15.	12:00 AM	21.08	76.7		
16.	01:00 AM	20.47	72		
17.	02:00 AM	19.65	70.5		
18.	03:00 AM	20.19	68		
19.	04:00 AM	19.33	66.1		
20.	05:00 AM	19.89	59		
21.	06:00 AM	18.54	57		
22.	07:00 AM	18.29	54.2		
23.	08:00 AM	17.94	59. 3		
24.	09:00 AM	16.27	61.5		
NEQSAA				35 ($\mu g/m^3$)	150 ($\mu g/m^3$)
WHO				25 ($\mu g/m^3$)	50 ($\mu g/m^3$)

NEQSAA: National Environmental Quality Standards for Ambient Air

Note:

- Selected measurement units were $\mu g/m^3$ otherwise stated.
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- The report is not valid for court.

Integrated Environment Laboratory

Signature of Analyst

Signature of Chief Chemist

FOR ENVIRONMENTAL MONITORING, ANALYSIS & SURVEYS

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AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	19-08-2020	Reporting Date:	31-08-2020
Source:	Ambient Air	Monitoring Instrument:	AQMS65, Serial # 1310
Location:	Landfill Site		
GPS Coordinates:	72.39515 34.76361		

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}		
		Units		$PM_{2.5}$	PM_{10}
	Hours	($\mu g/m^3$)	($\mu g/m^3$)		
1	09:30 AM	25.04	82.43		
2	10:30 AM	26.65	88.93		
3	11:30 AM	24.21	92.03		
4	12:30 PM	25.5	93.73		
5	01:30 PM	24.63	94.63		
6	02:30 PM	23.51	101.13		
7	03:30 PM	24.74	103.03		
8	04:30 PM	25.9	108.43		
9	05:30 PM	26.72	99.03		
10	06:30 PM	24.75	97.13		
11	07:30 PM	23.96	92.93		
12	08:30 PM	23.53	89.23		
13	09:30 PM	22.79	87.63	23.02 ($\mu g/m^3$)	82.3 ($\mu g/m^3$)
14	10:30 PM	22.97	81.03		
15	11:30 PM	23.11	78.73		
16	12:30 AM	22.5	74.03		
17	01:30 AM	21.68	72.53		
18	02:30 AM	22.22	70.03		
19	03:30 AM	21.36	68.13		
20	04:30 AM	21.92	61.03		
21	05:30 AM	20.57	59.03		
22	06:30 AM	20.32	56.23		
23	07:30 AM	19.97	61.33		
24	08:30 AM	18.3	63.53		
NEQSAA				35 ($\mu g/m^3$)	150 ($\mu g/m^3$)
WHO				25 ($\mu g/m^3$)	50 ($\mu g/m^3$)

NEQSAA: National Environmental Quality Standards for Ambient Air

Note:

- Selected measurement units were $\mu g/m^3$ otherwise stated.
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AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	20-08-2020	Reporting Date:	31-08-2020
Source:	Ambient Air	Monitoring Instrument:	AQMS65, Serial # 1310
Location:	Landfill Site		
GPS Coordinates:	72.39378 34.76453		

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
		Units			
	Hours	($\mu g/m^3$)	($\mu g/m^3$)		
1	09:30 AM	24.48	81.87	22.6 ($\mu g/m^3$)	81.49 ($\mu g/m^3$)
2	10:30 AM	26.09	88.37		
3	11:30 AM	23.65	91.42		
4	12:30 PM	24.94	93.19		
5	01:30 PM	24.07	94.00		
6	02:30 PM	22.95	100.5		
7	03:30 PM	24.18	102.47		
8	04:30 PM	25.34	107.81		
9	05:30 PM	26.16	98.43		
10	06:30 PM	24.19	96.57		
11	07:30 PM	23.4	92.3		
12	08:30 PM	22.97	88.06		
13	09:30 PM	22.23	87.1		
14	10:30 PM	22.41	80.45		
15	11:30 PM	22.55	78.16		
16	12:30 AM	21.94	73.47		
17	01:30 AM	21.12	71.97		
18	02:30 AM	21.66	69.47		
19	03:30 AM	20.8	67.57		
20	04:30 AM	21.36	60.47		
21	05:30 AM	20.01	58.47		
22	06:30 AM	19.76	55.67		
23	07:30 AM	19.41	60.77		
24	08:30 AM	17.74	62.97		
NEQSAA				35 ($\mu g/m^3$)	150 ($\mu g/m^3$)
WHO				25 ($\mu g/m^3$)	50 ($\mu g/m^3$)

NEQSAA: National Environmental Quality Standards for Ambient Air

Note:

- Selected measurement units were $\mu g/m^3$ otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monito ing hours.
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AMBIENT PARTICULATE MATTERS MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	21-08-2020	Reporting Date:	31-08-2020
Source:	Ambient Air	Monitoring Instrument:	AQMS 65, Serial # 1310
Location	Landfill Site		
GPS Coordinates:	72.39347 34.76533		

Sr. No	Time	Parameters		Results (Average 24 Hrs)	
		$PM_{2.5}$	PM_{10}	$PM_{2.5}$	PM_{10}
		Units			
	Hours	($\mu g/m^3$)	($\mu g/m^3$)		
1	09:00 AM	21.12	78.51		
2	10:00 AM	22.73	85.01		
3	11:00 AM	20.29	88.11		
4	12:00 PM	21.58	89.81		
5	01:00 PM	20.71	90.71		
6	02:00 PM	19.59	97.21		
7	03:00 PM	20.82	99.11		
8	04:00 PM	21.98	104.51		
9	05:00 PM	22.8	95.11		
10	06:00 PM	20.83	93.21		
11	07:00 PM	20.04	89.01		
12	08:00 PM	19.61	85.31		
13	09:00 PM	18.87	83.71	19.28 ($\mu g/m^3$)	78.4 ($\mu g/m^3$)
14	10:00 PM	19.05	77.11		
15	11:00 PM	19.19	74.81		
16	12:00 AM	18.58	70.11		
17	01:00 AM	17.76	68.61		
18	02:00 AM	18.3	66.11		
19	03:00 AM	17.44	64.21		
20	04:00 AM	18	57.11		
21	05:00 AM	16.65	55.11		
22	06:00 AM	16.4	52.31		
23	07:00 AM	16.05	57.41		
24	08:00 AM	14.38	59.61		
NEQSAA				35 ($\mu g/m^3$)	150 ($\mu g/m^3$)
WHO				25 ($\mu g/m^3$)	50 ($\mu g/m^3$)

NEQSAA: National Environmental Quality Standards for Ambient Air

Note:

- Selected measurement units were $\mu g/m^3$ otherwise stated.
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AMBIENT GASEOUS MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	18-08-2020	Reporting Date:	31-08-2020
Source:	Ambient Air (Gaseous)	Monitoring Instrument:	AQMS 65, Serial # 1310
Location:	Landfill Site		
GPS Coordinates:	72.394821 34.766096		

Sr. No	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	Hours	(mg/m^3)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
1.	10:00 AM	0.98	11.66	13.97	15.88
2.	11:00 AM	0.93	11.97	13.74	16.01
3.	12:00 PM	1.02	12.84	14.47	16.51
4.	01:00 PM	1.01	12.79	15.01	16.35
5.	02:00 PM	1.09	13.02	14.65	16.97
6.	03:00 PM	1.07	11.78	13.81	16.63
7.	04:00 PM	1.09	12.81	14.01	16.29
8.	05:00 PM	1.07	12.69	14.39	16.01
9.	06:00 PM	1.02	12.83	14.02	15.77
10.	07:00 PM	1.01	11.88	13.61	14.91
11.	08:00 PM	0.92	11.56	12.86	14.72
12.	09:00 PM	0.71	11.77	11.77	15.86
13.	10:00 PM	0.75	10.57	11.72	15.62
14.	11:00 PM	0.84	10.65	11.54	14.81
15.	12:00 AM	0.71	10.85	12.65	14.48
16.	01:00 AM	0.66	11.01	12.34	15.22
17.	02:00 AM	0.69	11.29	12.53	14.57
18.	03:00 AM	0.63	11.63	12.79	15.01
19.	04:00 AM	0.69	12.16	12.54	15.16
20.	05:00 AM	0.71	11.85	13.37	15.26
21.	06:00 AM	0.87	11.66	12.78	14.94
22.	07:00 AM	0.88	11.94	12.01	15.36
23.	08:00 AM	0.89	12.15	12.52	15.11
24.	09:00 AM	0.97	12.01	12.33	15.71
Average Concentration		**0.88**	**11.89**	**13.14**	**15.55**
NEQSAA		05 (24 hr)	40 (24 hr)	80 (24 hr)	120 (24 hr)
WHO		---	---	200 (24 hrs)	20 (24 hrs)

NEQSAA: National Environmental Quality Standards for Ambient Air

Note:

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Reference Number	KPCIP/ENV/141-2020		
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Monitoring Date:	19-08-2020	Reporting Date:	31-08-2020
Source:	Ambient Air (Gaseous)	Monitoring Instrument:	AQMS 65, Serial # 1310
Location:	Landfill Site		
GPS Coordinates:	72.39515 34.76361		

Sr. No	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	Hours	(mg/m^3)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
1	09:30 AM	0.94	10.68	12.52	14.69
2	10:30 AM	0.89	10.99	12.29	14.82
3	11:30 AM	0.98	11.86	13.02	15.32
4	12:30 PM	0.97	11.81	13.56	15.16
5	01:30 PM	1.05	12.04	13.2	15.78
6	02:30 PM	1.03	10.8	12.36	15.44
7	03:30 PM	1.05	11.83	12.56	15.1
8	04:30 PM	1.03	11.71	12.94	14.82
9	05:30 PM	0.98	11.85	12.57	14.58
10	06:30 PM	0.97	10.9	12.16	13.72
11	07:30 PM	0.88	10.58	11.41	13.53
12	08:30 PM	0.67	10.79	10.32	14.67
13	09:30 PM	0.71	9.59	10.27	14.43
14	10:30 PM	0.8	9.67	10.09	13.62
15	11:30 PM	0.67	9.87	11.2	13.29
16	12:30 AM	0.62	10.03	10.89	14.03
17	01:30 AM	0.65	10.31	11.08	13.38
18	02:30 AM	0.59	10.65	11.34	13.82
19	03:30 AM	0.65	11.18	11.09	13.97
20	04:30 AM	0.67	10.87	11.92	14.07
21	05:30 AM	0.83	10.68	11.33	13.75
22	06:30 AM	0.84	10.96	10.56	14.17
23	07:30 AM	0.85	11.17	11.07	13.92
24	08:30 AM	0.93	11.03	10.88	14.52
Average Concentration		**0.84**	**10.91**	**11.69**	**14.35**
NEQSAA		**05 (24 hr)**	**40 (24 hr)**	**80 (24 hr)**	**120 (24 hr)**
WHO		---	---	**200 (24 hrs)**	**20 (24 hrs)**

NEQSAA: National Environmental Quality Standards for Ambient Air

Note:

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AMBIENT GASEOUS MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	20-08-2020	Reporting Date:	31-06-2020
Source:	Ambient Air (Gaseous)	Monitoring Instrument:	AQMS 65, Serial # 1310
Location:	Landfill Site		
GPS Coordinates:	72.39378 34.76453		

Sr. No	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	Hours	(mg/m^3)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
1	09:30 AM	1.01	10.58	11.28	13.51
2	10:30 AM	0.96	10.89	11.05	13.64
3	11:30 AM	1.05	11.76	11.78	14.14
4	12:30 PM	1.04	11.71	12.32	13.98
5	01:30 PM	1.12	11.94	11.96	14.6
6	02:30 PM	1.1	10.7	11.12	14.26
7	03:30 PM	1.12	11.73	11.32	13.92
8	04:30 PM	1.1	11.61	11.7	13.64
9	05:30 PM	1.05	11.75	11.33	13.4
10	06:30 PM	1.04	10.8	10.92	12.54
11	07:30 PM	0.95	10.48	10.17	12.35
12	08:30 PM	0.74	10.69	9.08	13.49
13	09:30 PM	0.78	9.49	9.03	13.25
14	10:30 PM	0.87	9.57	8.85	12.44
15	11:30 PM	0.74	9.77	9.96	12.11
16	12:30 AM	0.69	9.93	9.65	12.85
17	01:30 AM	0.72	10.21	9.84	12.2
18	02:30 AM	0.66	10.55	10.1	12.64
19	03:30 AM	0.72	11.08	9.85	12.79
20	04:30 AM	0.74	10.77	10.68	12.89
21	05:30 AM	0.9	10.58	10.09	12.57
22	06:30 AM	0.91	10.86	9.32	12.99
23	07:30 AM	0.92	11.07	9.83	12.74
24	08:30 AM	0.87	10.93	9.64	13.34
Average Concentration		**0.87**	**10.8**	**10.45**	**13.17**
NEQSAA		**05 (24 hr)**	**40 (24 hr)**	**80 (24 hr)**	**120 (24 hr)**
WHO		---	---	**200 (24 hrs)**	**20 (24 hrs)**

NEQSAA: National Environmental Quality Standards for Ambient Air

Note:

- Selected measurement units were mg/m^3 and $\mu g/m^3$ otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
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AMBIENT GASEOUS MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	**Site Address:**	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	21-08-2020	**Reporting Date:**	31-08-2020
Source:	Ambient Air (Gaseous)	**Monitoring Instrument:**	AQMS 65, Serial # 1310
Location:	Landfill Site		
GPS Coordinates:	72.39347 34.76533		

Sr. No	Time	Parameters			
		CO	NO	NO_2	SO_2
		Units			
	Hours	(mg/m^3)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
1	10:00 AM	0.82	10.42	11.82	12.93
2	11:00 AM	0.77	10.73	11.59	13.06
3	12:00 PM	0.86	11.6	12.32	13.56
4	01:00 PM	0.85	11.55	12.86	13.4
5	02:00 PM	0.93	11.78	12.5	14.02
6	03:00 PM	0.91	10.54	11.66	13.68
7	04:00 PM	0.93	11.57	11.86	13.34
8	05:00 PM	0.91	11.45	12.24	13.06
9	06:00 PM	0.86	11.59	11.87	12.82
10	07:00 PM	0.85	10.64	11.46	11.96
11	08:00 PM	0.76	10.32	10.71	11.77
12	09:00 PM	0.55	10.53	9.62	12.91
13	10:00 PM	0.59	9.33	9.57	12.67
14	11:00 PM	0.68	9.41	9.39	11.86
15	12:00 AM	0.55	9.61	10.5	11.53
16	01:00 AM	0.5	9.77	10.19	12.27
17	02:00 AM	0.53	10.05	10.38	11.62
18	03:00 AM	0.47	10.39	10.64	12.06
19	04:00 AM	0.53	10.92	10.39	12.21
20	05:00 AM	0.55	10.61	11.22	12.31
21	06:00 AM	0.71	10.42	10.63	11.99
22	07:00 AM	0.72	10.7	9.86	12.41
23	08:00 AM	0.73	10.91	10.37	12.16
24	09:00 AM	0.81	10.77	10.18	12.76
Average Concentration		**0.72**	**10.65**	**10.99**	**12.59**
NEQSAA		**05 (24 hr)**	**40 (24 hr)**	**80 (24 hr)**	**120 (24 hr)**
WHO		---	---	**200 (24 hrs)**	**20 (24 hrs)**

NEQSAA: National Environmental Quality Standards for Ambient Air

Note:

- Selected measurement units were mg/m^3 and $\mu g/m^3$ otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monito.in, hours.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for court.

Integrated Environment Laboratory

Signature of Analyst

Signature of Chief Chemist

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Ambient Noise Level Monitoring

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NOISE LEVEL MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	18-08-2020	Reporting Date:	31-08-2020
Source:	Ambient Noise	Monitoring Instrument:	Noise Meter-IEC651-Type-2
Location:	North Side		

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	10:00 AM	dB(A)	47.55	50.45	49
2.	11:00 AM		47.35	50.25	48.8
3.	12:00 PM		47.15	50.05	48.6
4.	01:00 PM		46.95	49.85	48.4
5.	02:00 PM		46.65	49.55	48.1
6.	03:00 PM		46.45	49.35	47.9
7.	04:00 PM		46.25	49.15	47.7
8.	05:00 PM		46.05	48.95	47.5
9.	06:00 PM		45.85	48.75	47.3
10.	07:00 PM		45.65	48.55	47.1
11.	08:00 PM		45.35	48.25	46.8
12.	09:00 PM		45.15	48.05	46.6
13.	10:00 PM		44.95	47.85	46.4
14.	11:00 PM		44.75	47.65	46.2
15.	12:00 AM		44.55	47.45	46
16.	01:00 AM		44.25	47.15	45.7
17.	02:00 AM		44.05	46.95	45.5
18.	03:00 AM		43.85	46.75	45.3
19.	04:00 AM		43.65	46.55	45.1
20.	05:00 AM		43.45	46.25	44.85
21.	06:00 AM		43.15	46.05	44.6
22.	07:00 AM		42.95	45.85	44.4
23.	08:00 AM		42.75	45.65	44.2
24.	09:00 AM		42.55	45.45	44

NEQS limit : 65 dB

WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization

Leq: Log Equivalent Continuous Sound Level

Note:

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- Quality was assured through self calibration of the instrument.
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Signature of Analyst

Signature of Technical Manager

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NOISE LEVEL MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	19-08-2020	Reporting Date:	31-08-2020
Source:	Ambient Noise	Monitoring Instrument:	Noise Meter-IEC651-Type-2
Location:	South Side		

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	09:30 AM	dB(A)	48.89	51.79	50.34
2.	10:30 AM		48.69	51.59	50.14
3.	11:30 AM		48.49	51.39	49.94
4.	12:30 PM		48.29	51.19	49.74
5.	01:30 PM		47.99	50.89	49.44
6.	02:30 PM		47.79	50.69	49.24
7.	03:30 PM		47.59	50.49	49.04
8.	04:30 PM		47.39	50.29	48.84
9.	05:30 PM		47.19	50.09	48.64
10.	06:30 PM		46.99	49.89	48.44
11.	07:30 PM		46.69	49.59	48.14
12.	08:30 PM		46.49	49.39	47.94
13.	09:30 PM		46.29	49.19	47.74
14.	10:30 PM		46.09	48.99	47.54
15.	11:30 PM		45.89	48.79	47.34
16.	12:30 AM		45.59	48.49	47.04
17.	01:30 AM		45.39	48.29	46.84
18.	02:30 AM		45.19	48.09	46.64
19.	03:30 AM		44.99	47.89	46.44
20.	04:30 AM		44.79	47.59	46.19
21.	05:30 AM		44.49	47.39	45.94
22.	06:30 AM		44.29	47.19	45.74
23.	07:30 AM		44.09	46.99	45.54
24.	08:30 AM		43.89	46.79	45.34

NEQS limit : 65 dB

WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization

Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
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NOISE LEVEL MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	20-08-2020	Reporting Date:	31-08-2020
Source:	Ambient Noise	Monitoring Instrument:	Noise Meter-IEC651-Type-2
Location:	East Side		

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	09:30 AM	dB(A)	45.28	48.18	46.73
2.	10:30 AM		45.08	47.98	46.53
3.	11:30 AM		44.88	47.78	46.33
4.	12:30 PM		44.68	47.58	46.13
5.	01:30 PM		44.38	47.28	45.83
6.	02:30 PM		44.18	47.08	45.63
7.	03:30 PM		43.98	46.88	45.43
8.	04:30 PM		43.78	46.68	45.23
9.	05:30 PM		43.58	46.48	45.03
10.	06:30 PM		43.38	46.28	44.83
11.	07:30 PM		43.08	45.98	44.53
12.	08:30 PM		42.88	45.78	44.33
13.	09:30 PM		42.68	45.58	44.13
14.	10:30 PM		42.48	45.38	43.93
15.	11:30 PM		42.28	45.18	43.73
16.	12:30 AM		41.98	44.88	43.43
17.	01:30 AM		41.78	44.68	43.23
18.	02:30 AM		41.58	44.48	43.03
19.	03:30 AM		41.38	44.28	42.83
20.	04:30 AM		41.18	43.98	42.58
21.	05:30 AM		40.88	43.78	42.33
22.	06:30 AM		40.68	43.58	42.13
23.	07:30 AM		40.48	43.38	41.93
24.	08:30 AM		40.28	43.18	41.73

NEQS limit : 65 dB

WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization

Leq: Log Equivalent Continuous Sound Level

Note:

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Signature of Analyst

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NOISE LEVEL MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	21-08-2020	Reporting Date:	31-08-2020
Source:	Ambient Noise	Monitoring Instrument:	Noise Meter-IEC651-Type-2
Location:	West Side		

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	10:00 AM	dB(A)	47.55	50.45	49
2.	11:00 AM		47.35	50.25	48.8
3.	12:00 PM		47.15	50.05	48.6
4.	01:00 PM		46.95	49.85	48.4
5.	02:00 PM		46.65	49.55	48.1
6.	03:00 PM		46.45	49.35	47.9
7.	04:00 PM		46.25	49.15	47.7
8.	05:00 PM		46.05	48.95	47.5
9.	06:00 PM		45.85	48.75	47.3
10.	07:00 PM		45.65	48.55	47.1
11.	08:00 PM		45.35	48.25	46.8
12.	09:00 PM		45.15	48.05	46.6
13.	10:00 PM		44.95	47.85	46.4
14.	11:00 PM		44.75	47.65	46.2
15.	12:00 AM		44.55	47.45	46
16.	01:00 AM		44.25	47.15	45.7
17.	02:00 AM		44.05	46.95	45.5
18.	03:00 AM		43.85	46.75	45.3
19.	04:00 AM		43.65	46.55	45.1
20.	05:00 AM		43.45	46.25	44.85
21.	06:00 AM		43.15	46.05	44.6
22.	07:00 AM		42.95	45.85	44.4
23.	08:00 AM		42.75	45.65	44.2
24.	09:00 AM		42.55	45.45	44

NEQS limit : 65 dB

WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization

Leq: Log Equivalent Continuous Sound Level

Note:

- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The values were representing of monitoring conditions prevailing during the monitoring hours.
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NOISE LEVEL MONITORING REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Monitoring Date:	22-08-2020	Reporting Date:	31-08-2020
Source:	Ambient Noise	Monitoring Instrument:	Noise Meter-IEC651-Type-2
Location:	Near Graveyard, village Kwataro Maira		

Sr. No.	Monitoring Time	Unit	Minimum	Maximum	Leq
1.	10:00 AM	dB(A)	57.9	60.8	59.35
2.	11:00 AM		57.7	60.6	59.15
3.	12:00 PM		57.5	60.4	58.95
4.	01:00 PM		57.3	60.2	58.75
5.	02:00 PM		57	59.9	58.45
6.	03:00 PM		56.8	59.7	58.25
7.	04:00 PM		56.6	59.5	58.05
8.	05:00 PM		56.4	59.3	57.85
9.	06:00 PM		56.2	59.1	57.65
10.	07:00 PM		56	58.9	57.45
11.	08:00 PM		55.7	58.6	57.15
12.	09:00 PM		55.5	58.4	56.95
13.	10:00 PM		55.3	58.2	56.75
14.	11:00 PM		55.1	58	56.55
15.	12:00 AM		54.9	57.8	56.35
16.	01:00 AM		54.6	57.5	56.05
17.	02:00 AM		54.4	57.3	55.85
18.	03:00 AM		54.2	57.1	55.65
19.	04:00 AM		54	56.9	55.45
20.	05:00 AM		53.8	56.6	55.2
21.	06:00 AM		53.5	56.4	54.95
22.	07:00 AM		53.3	56.2	54.75
23.	08:00 AM		53.1	56	54.55
24.	09:00 AM		52.9	55.8	54.35

NEQS limit : 65 dB

WHO limit: 70 dB

NEQS: National Environmental Quality Standards WHO: World Health Organization

Leq: Log Equivalent Continuous Sound Level

Note:

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Ground Water Quality Monitoring

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WATER ANALYSIS REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project.	**Site Address:**	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Sampling Date:	19-08-2020	**Reporting Date:**	31-08-2020
Source:	Ground Water	**Sampling Done by:**	Analyst
Location:	Sensitive Receptor, Village Kwataro Maira	**Analysis Method:**	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	NDWQS	Results
1	pH	APHA-4500H+ B	--	6.5-8.5	7.3
2	Taste & Odor	In-house	--	Non Objectionable	Non Objectionable
3	Color	APHA-2120 B/C	TCU	<15	5
4	Turbidity	APHA-2130 B	NTU	<5	4
5	Total Coliform	APHA-9222 B	0 Number/100 mL	0 Number/100 mL	0
6	E-Coli	APHA-9222 D	0 Number/100 mL	0 Number/100 mL	0
7	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	≤1000	217
8	Total Hardness	APHA-2340 C	mg/L	≤500	43
9	Nitrate	APHA-4500 NO3 B	mg/L	≤50	2.6
10	Nitrite	APHA-4500 NO2 B	mg/L	≤3	0.03
11	Ammonia	APHA-4500-NH3-B	mg/L	----	N.D
12	Arsenic	APHA-3500 As B	mg/L	<0.05	N.D.
13	Antimony	APHA-3500 Sb B	mg/L	<0.005	N.D.
14	Barium	APHA-3500 Ba B	mg/L	0.7	N.D
15	Chloride	APHA-4500 Cl- B	mg/L	250	98
16	Fluoride	APHA-4500 F-C	mg/L	<1.5	0.79
17	Aluminum	APHA-3500 Al B	mg/L	≤0.2	N.D.
18	Manganese	APHA-3500-Mn B	mg/L	≤0.5	N.D.
19	Mercury	APHA-3500-Hg B	mg/L	0.001	N.D.
20	Iodine	-	mg/L	----	0.05
21	Zinc	APHA-3500-Zn B	mg/L	5	0.86
22	Boron	APHA-4500 B-C	mg/L	0.7	N.D.
23	Chromium	APHA-3500 Cr B	mg/L	≤0.05	N.D
24	Selenium	APHA-3500 Se C	mg/L	≤0.5	

NDWQS: National Drinking Water Quality Standards

Signature of Analyst

Signature of Chief Chemist

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WATER ANALYSIS REPORT

Reference Number	KPCIP/ENV/141-2020		
Project Name:	Khyber Pakhtunkhwa Cities Improvement Project.	Site Address:	Landfill Site Near Village Kwataro Maira, Mingora, Swat, Kpk
Sampling Date:	19-08-2020	Reporting Date:	31-08-2020
Source:	Ground Water	Sampling Done by:	Analyst
Location:	Sensitive Receptor, Village Kwataro Maira	Analysis Method:	APHA/USEPA Standard Methods

Sr. No.	Parameters	Standard Methods	Units	NDWQS	Results
1	pH	APHA-4500H+ B	--	6.5-8.5	7.4
2	Taste & Odor	In-house	--	Non Objectionable	Non Objectionable
3	Color	APHA-2120 B/C	TCU	<15	3
4	Turbidity	APHA-2130 B	NTU	<5	5
5	Total Coliform	APHA-9222 B	0 Number/100 mL	0 Number/100 mL	0
6	E-Coli	APHA-9222 D	0 Number/100 mL	0 Number/100 mL	0
7	Total Dissolved Solids (TDS)	APHA-2540 C	mg/L	≤1000	251
8	Total Hardness	APHA-2340 C	mg/L	≤500	57
9	Nitrate	APHA-4500 NO3 B	mg/L	≤50	2.4
10	Nitrite	APHA-4500 NO2 B	mg/L	≤3	0.01
11	Ammonia	APHA-4500-NH3-B	mg/L	----	N.D
12	Arsenic	APHA-3500 As B	mg/L	<0.05	N.D.
13	Antimony	APHA-3500 Sb B	mg/L	<0.005	N.D.
14	Barium	APHA-3500 Ba B	mg/L	0.7	N.D
15	Chloride	APHA-4500 Cl- B	mg/L	250	86
16	Fluoride	APHA-4500 F-C	mg/L	<1.5	0.83
17	Aluminum	APHA-3500 Al B	mg/L	≤0.2	N.D.
18	Manganese	APHA-3500-Mn B	mg/L	≤0.5	N.D.
19	Mercury	APHA-3500-Hg B	mg/L	0.001	N.D.
20	Iodine	-	mg/L	----	0.07
21	Zinc	APHA-3500-Zn B	mg/L	5	0.74
22	Boron	APHA-4500 B-C	mg/L	0.7	N.D.
23	Chromium	APHA-3500 Cr B	mg/L	≤0.05	N.D
24	Selenium	APHA-3500 Se C	mg/L	≤0.5	N.D

NDWQS: National Drinking Water Quality Standards

Signature of Analyst

Signature of Chief Chemist

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Annexure E

Occupational Health and Safety Plan

General

Occupational Health and Safety covers all personnel working under the project and will be in line with the World Bank/IFC EHS guidelines on health and safety.

The Occupational Health and Safety program will aim to ensure that the workplace is safe and healthy by: addressing the hazards and risks at the workplace; outlining the procedures and responsibilities for preventing, eliminating and minimizing the effects of those hazards and risks; identifying the emergency management plans for the workplace or workplaces; and, specifying how consultation, training and information are to be provided to employees at various workplaces.

Some of the risks/hazards associated with workplaces are due to working close to or at sites associated with the various project construction activities. Other risks associated with the project construction phase include risk of increase of vector borne and other different diseases.

The following sections will be implemented during the construction phase to address and ensure workers' health and safety.

a. Screening and regular unannounced checking of workers

As per the procedure for hiring workers, all contractors and labor agencies are required to make all prospective workers undergo medical tests to screen for diseases and sicknesses, prior to selection and employment of any worker. The contractor is also responsible for ensuring that no worker who has a criminal record is employed at the project site. It will be ensured that all workers undergo medical tests to screen diseases at source and at sites in consultation with the designated Health Officer.

In addition to this, the Project Management will also undertake sudden, unannounced checks on workers to look for diseases such as HIV, STDs, and hepatitis and take necessary steps as mandated by the Contractual agreement between the Contractor and the Worker(s).

b. Minimizing hazards and risks at the workplace.

To ensure safety at all work sites, the following will be carried out:

i. Installation of signboards and symbols in risky and hazardous areas, to inform workers to be careful.

ii. Construction of barricades around construction sites and deep excavated pits, to cordon off and deter entry of unauthorized personnel and workers into these areas.

iii. Providing a safe storage site/area for large equipment such as power tools and chains, to prevent misuse and loss.

iv. Proper Housekeeping: Ensuring that materials are all stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling, or collapse. Brick stacks will not be more than 7 feet in height and for concrete blocks they will not be more than 6 feet high.

v. Removing all scrap timber, waste material and rubbish from the immediate work area as the work progresses.

vi. Where scaffolds are required, ensuring that each scaffold or its components shall be capable of supporting its own weight and at least 4 times the maximum intended load applied

or transmitted to it. The platform/scaffold plank shall be at least 15 inches wide and 1.5 inches thick. The rope should be capable of supporting at least 6 times the maximum intended load applied or transmitted to that rope. Pole scaffolds over 60 feet in height shall be designed by a registered professional engineer and shall be constructed and loaded in accordance with that design. Where scaffolds are not provided, safety belts/safety nets shall be provided;

vii. Ensure that all ramps or walkways are at least 6 feet wide, having slip resistance threads and not inclined at more than a slope of 1 vertical and 3 horizontal.

viii. Stacking away all excavated earth at least 2 feet from the pit to avoid material such as loose rocks from falling back into the excavated area and injuring those working inside excavated sites.

ix. Constructing support systems, such as bracing to adjoining structures that may be endangered by excavation works nearby.

x. Only a trained electrician to construct, install and repair all electrical equipment to prevent risks of electrical shocks and electrocution.

xi. Install fire extinguishers and/or other fire-fighting equipment at every work site to prepare for any accidental fire hazards.

c. Provision of Personal Protective Equipment

Risks to the health and safety of workers can be prevented by provision of Personal Protective Equipment (PPEs) to all workers. This will be included in the construction cost for each Contractor. Depending on the nature of work and the risks involved, contractors must provide without any cost to the workers, the following protective equipment:

i. High visibility clothing for all personnel during road works must be mandatory.

ii. Helmet shall be provided to all workers, or visitors visiting the site, for protection of the head against impact or penetration of falling or flying objects.

iii. Safety belt shall be provided to workers working at heights (more than 20 ft.) such as roofing, painting, and plastering.

iv. Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet.

v. Ear protecting devices shall be provided to all workers and will be used during the occurrence of extensive noise.

vi. Eye and face protection equipment shall be provided to all welders to protect against sparks.

vii. Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxic gas/vapor.

viii. Safety nets shall be provided when workplaces are more than 25 feet (7.5 m) above the ground or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors or safety belts is impractical.

The specific PPE requirements for each type of work are summarized below.

Table E.1 PPE Requirement List

Type of Work	PPE
Elevated work	Safety helmet, safety belt (height greater than 20 ft.), footwear for elevated work.
Handling work safety	Helmet, leather safety shoes, work gloves.
Welding and cutting work	Eye protectors, shield and helmet, protective gloves.
Grinding work	Dust respirator, earplugs, and eye protectors.
Work involving handling of chemical substances	Dust respirator, gas mask, chemical-proof gloves. Chemical proof clothing, air-lined mask, eye protectors.
Wood working	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Blasting	Hard hat, eye and hearing protection.
Concrete and masonry work	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Excavation, heavy equipment, motor graders, and bulldozer operation	Hard hat, safety boots, gloves, hearing protection.
Quarries	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.

d. Procedures to Deal with Emergencies such as Accidents, Sudden Illness and Death of Workers

First aid kits will be made available at all times throughout the entire construction period by the respective contractors. This is very important, because most work sites will be at some distance from the nearest hospital. In addition to the first aid kits, the following measures should be in place:

i. Provision of dispensaries by the individual EPC contractor.

ii. A vehicle shall be on standby from the Project Office so that emergency transportation can be arranged to take severely injured/sick workers to the nearest hospital for immediate medical attention.

iii. A designated Health Officer/worker for the Project will be identified as a focal person to attend to all health and safety related issues. This employee's contact number will be posted at all work sites for speedy delivery of emergency services. The focal person shall be well versed with the medical system and facilities available at the hospital.

iv. Communication arrangements, such a provision of radios or mobile communication for all work sites, for efficient handling of emergencies, will be made.

e. Record Maintenance and Remedial action

The Project Management will maintain a record of all accidents and injuries that occur at the work site. This work will be delegated by the contractor to the site supervisor and regularly reviewed every quarter by project management. Reports prepared by the contractor shall include information on the place, date and time of the incident, name of persons involved, cause of incident, witnesses present and their statements. Based on such reports, the management can jointly identify any unsafe conditions, acts or procedures and recommend for the contractor to undertake certain mitigate actions to change any unsafe or harmful conditions.

f. Compensation for Injuries and Death

Any casualty or injury resulting from occupational activities should be compensated as per the local labor laws. Where compensation is sought by the injured party, proper procedures for documentation of the case will be followed, including a detailed report on the accident, written reports from witnesses, report of the examining doctor and his/her recommendation for treatment. Each individual contractor will be responsible for ensuring compensation for the respective workers.

g. Awareness Programs

The Project management will undertake awareness programs through posters, talks, and meetings with the contractors to undertake the following activities:

i. Dissemination sessions will clarify the rights and responsibilities of the workers regarding interactions with local people (including communicable disease risks, such as HIV/AIDS), work site health and safety, waste management (waste separation, recycling, and composting), and the illegality of poaching.

ii. Make workers aware of procedures to be followed in case of emergencies such as informing the focal health person who in turn will arrange the necessary emergency transportation or treatment.

h. Nomination of a Health and Safety Focal Person

Within each site (especially if different sites are being implemented by different contractors), a Health and Safety Focal Person will be appointed. The Terms of Reference for the focal person will mainly be as follows:

i. Function as the focal person/representative for all health and safety matters at the workplace;

ii. Responsible for maintaining records of all accidents and all health and safety issues at each site, the number of accidents and its cause, actions taken and remedial measures undertaken in case of safety issues;

iii. Be the link between the contractor and all workers and submit grievances of the workers to the contractor and instructions/directives on proper health care and safety from the contractors back to the workers;

iv. Ensure that all workers are adequately informed on the requirement to use Personal Protective Equipment and its correct use;

v. Also responsible for the first aid kit and making sure that the basic immediate medicines are readily available.

Annexure F
Emergency Response Plan

F.1 PURPOSE

The purpose of this Emergency Response Procedure is to provide measures and guidance for the establishment and implementation of emergency preparedness plans for the project. The aim of the Emergency Response Procedure is to:

(i) Ensure all personnel and visitors to the office/job sites are given the maximum protection from unforeseen events.

(ii) Ensure all personnel are aware of the importance of this procedure to protection of life and property.

F.2 EMERGENCY PREPARATION AND RESPONSE MEASURE SCOPE

The emergency management program is applied to all Project elements and intended for use throughout the Project life cycle. The following are some emergencies that may require coordinated response.

(i) Construction Accident

(ii) Road & Traffic Accident

(iii) Hazardous material spills

(iv) Structure collapse or failure

(v) Trauma or serious illness

(vi) Sabotage

(vii) Fire

(viii) Environmental Pollution

(ix) Loss of person

(x) Community Accident

F.3 RESPONSIBILITIES

The detailed roles and responsibilities of certain key members of the Emergency Response team available to assist in emergency are provided in **Table G.1** below.

Table F.1 Emergency Response Team

Action Group	Responsibility
Emergency Coordinator	Overall control of personnel and resources. The Emergency Coordinator will support and advise the Site Safety Supervision as necessary. Serves as public relations spokes persons, or delegates to some staff member the responsibility for working with news media regarding any disaster or emergency. Also assure proper coordination of news release with appropriate corporate staff or other designated people.
Site Safety Supervision (Emergency Commander)	Overall responsibility for activating emergency plan and for terminating emergency actions. Be alternative of emergency response chairpersons. Disseminates warnings and information as required to ensure all people in the immediate area have been warned and evacuated either by alarms or by word of mouth. Supervise the actions of the Emergency Response Team to ensure all persons are safe from the danger. Notify outside authorities if assistance is required. Carries the responsibility for coordinating actions including other organizations in accordance with the needs of the situation. Ensure maximum co-operation and assistance is provided to any outside groups called to respond to an emergency. Establish and appoint all emergency organization structure and team. Assures adequate delegation of responsibilities for all key positions of assistants on the Project to assist with any foreseeable emergency. Ensure resources available to purchase needed emergency response equipment and supplies. Assures that all persons on the Emergency Response Team aware and fully understand their individual responsibilities for implementing and supporting the emergency plan. Establish the emergency drill schedule of all identified emergency scenarios, track the status and evaluate the emergency.

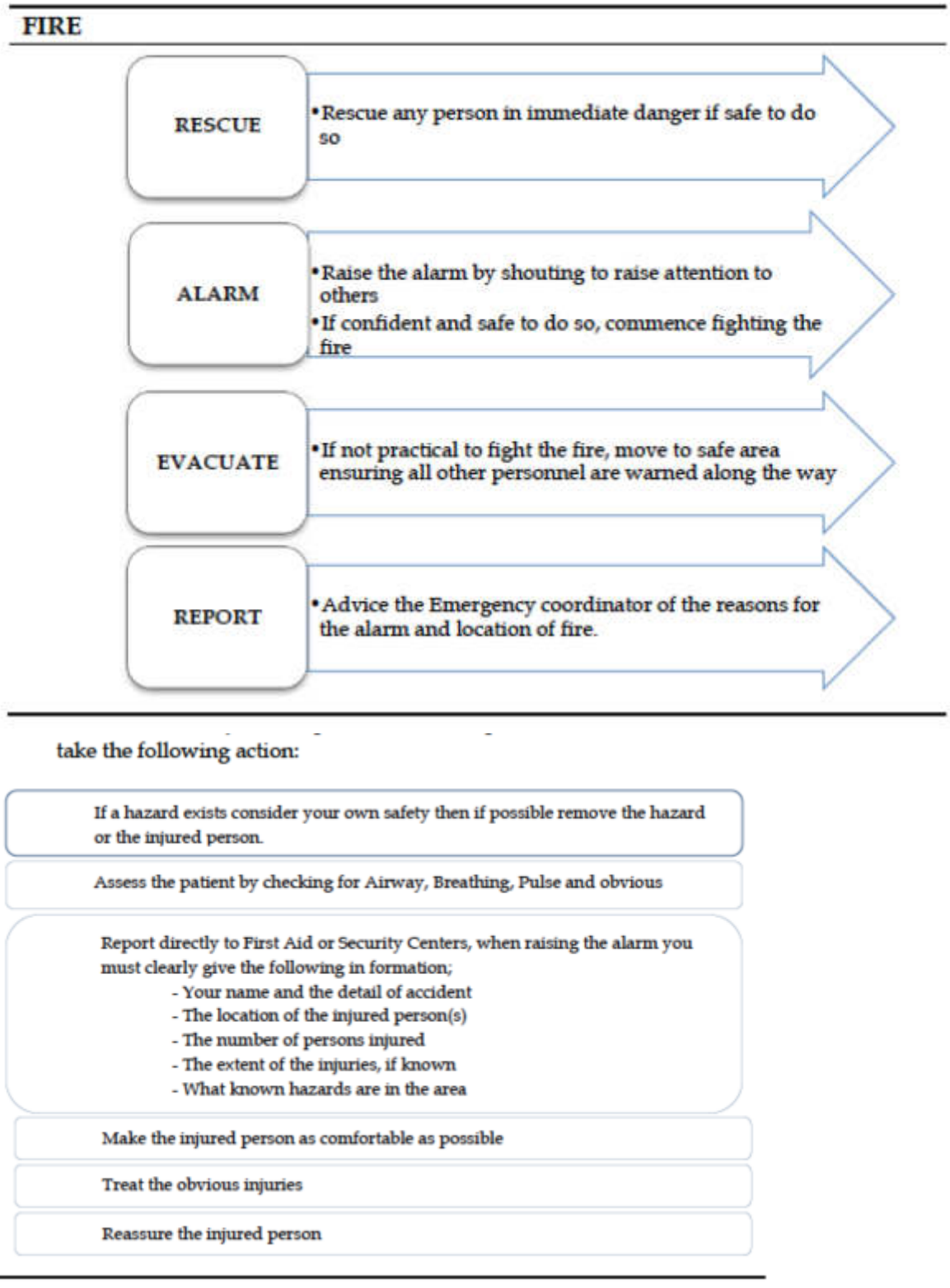
	The Emergency Commander shall ensure that senior management personnel have been reported of the emergency as soon as practical after the event.
Security Team	Ensure that the exit route is regularly tested and maintained in good working order. Maintain station at the security gate or most suitable location to secure the area during any emergency such that only authorized personnel and equipment may enter, prevent access to the site of unauthorized personnel. Assist with strong/activation of services during an emergency. Ensure vehicles and obstructions are moved to give incoming emergency vehicles access to the scene, if ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct any incoming emergency service to the site of emergency.
Rescue & Medical Team	Protect the injured from further danger and weather. Provide treatment to the victim(s) to the best of their ability by first aid and then transfer to hospital. Remain familiar with the rescue activities and rescue apparatus. Assist outside medical services personnel when they arrive
General Administration Team	▪ Response to support any requested general facilities for assisting Emergency Response Team in their work.
Government Relation Team	Coordinate with local government on a matter of concerned in the emergency response plan to liaise with local officers in their affair for support Emergency Response Team. Coordinate emergency plan with the government authorities, local community.
Environment Team	▪ In case of emergency related to the environmental pollution such as the chemical spill, oil spill into the ambient, the environment team will support the technical advice to control and mitigate the pollution until return to the normal situation.
Department Heads	Call up of personnel into the safe location for protective life and property. Take immediate and appropriate action while Emergency Response Team is being mobilized. Keep in touch with the Emergency Commander

	Control and supervise operators and contractors on the implementation of this procedure, with consultation with Safety Team as necessary. Provide and maintain emergency equipment of their responsible areas.
Other Staff and Employees	All other staff and employees will remain at their workstations or assembly point unless directed otherwise from Emergency Response Team. Each supervisor will ensure that all members of his work group are accounted for and keep in touch with each of their Department Head.

F.4 PROCEDURE

Emergency situation and injuries to person can occur at any time or place either on Project site or elsewhere. The most two common types of emergencies on site are fire and serious accident.

Figure F.1 Emergency Procedure for Fire



F.5 COMMUNICATION WITH AUTHORITIES / PRESS AT SITE

In the event of an accident or incident, only senior staff is permitted to give factual information to the authorities for resource of liability exposure. The press must be avoiding politely, at all

costs, with the terse comment that “the matter is under investigation and relevant information when available will be provided by our Head Office” Do not ever give your opinion or story.

First Aid Persons

Upon advice of medical emergency, make immediate assessment to response required and if necessary, advise security to summon ambulance or medical assistance, the qualified first aid attendant should also,

Provide treatment to the victim(s) to the best of his/her ability.

Ensure the safety of victims by ceasing any work activity in the area.

Protect the injured from further danger and weather.

Assist medical services personnel when they arrive.

General Administration Team

Upon advice of medical emergency, maintain contact with first aid personnel and summon ambulance if required.

Security Team

If ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct vehicle closest to the scene.

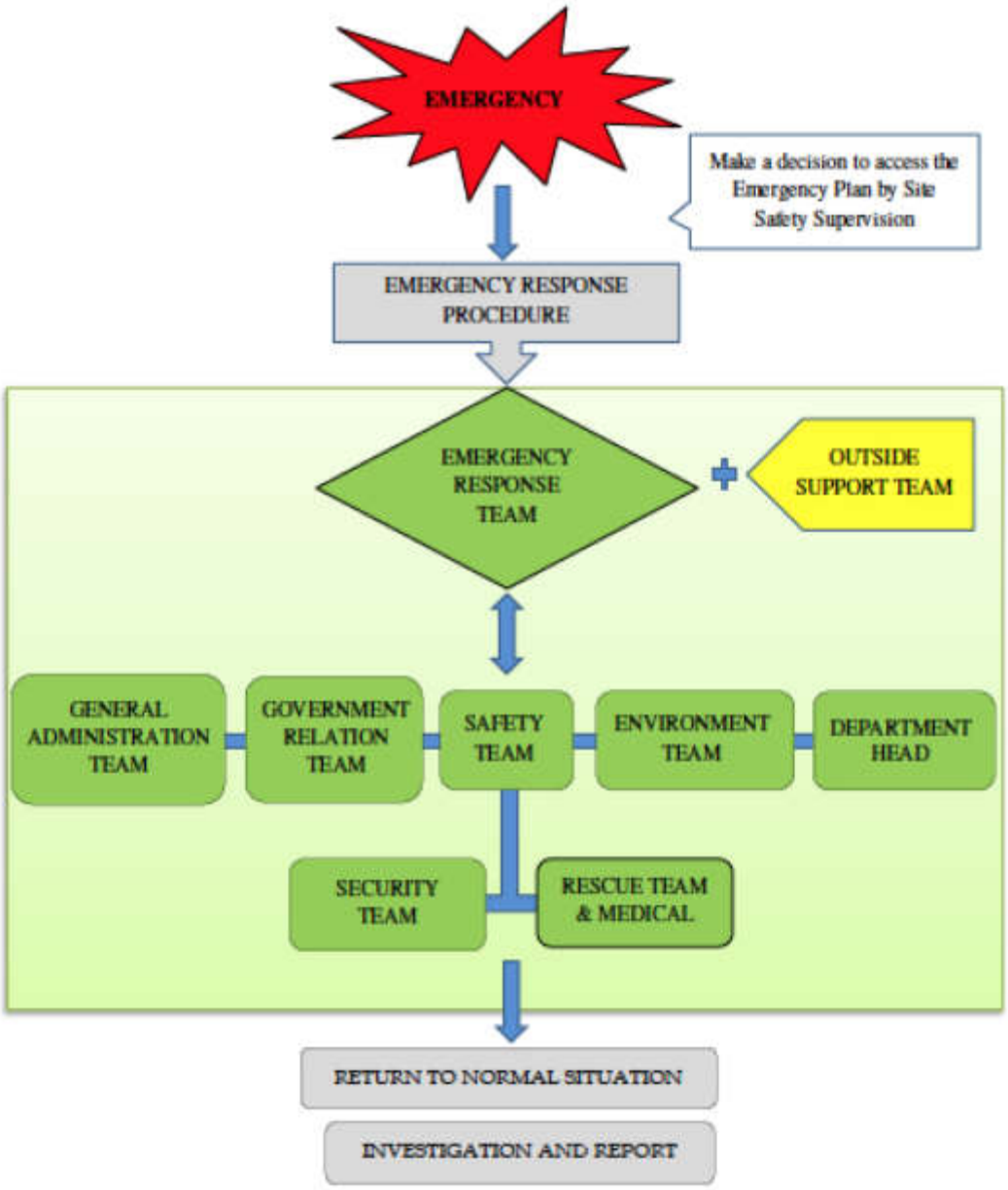
Prevent access to the site of unauthorized personnel (press, etc.).

Emergency Coordinator

The Emergency Coordinator shall assist emergency personnel at the scene as required through allocation of company resources.

The Emergency Coordinator shall ensure next-of-kin are properly notified as soon as possible and give whatever company support and assistance is necessary to assist them bundle the situation

The Emergency Coordinator shall ensure that senior management personnel are advised of the emergency as soon as practical after the event.



Note: Name of contact person and call number from Owner/Contractor to be determined.

F.5 INCIDENT AND ACCIDENT REPORT

Section A: Identification Data

Report No:	Date of Reported:	Reporter:	Sign:
Job Title:		Company Name:	

Section B: Violence Rate

Accident Violence: ☐ 01-Death ☐ 02-Serious Injury ☐ 03-Lost Time Injury ☐ 04-First Aid ☐ 05- Not Injury ☐ 06-Near Miss

Property Damage Cost: ☐ 1-2,000 USD ☐ 2,001-10,000 USD ☐ 10,001-50,000 ☐ > 50,001

Section C: Environmental Impact

Affected area	☐ Construction area	☐ Public area	
Receptor	☐ None	☐ Workers	☐ Community
Type of pollution	☐ Physical	☐ Chemical	☐ Biological
Toxicity	☐ Non-toxic	☐ Low - toxic	☐ High - toxic
Return to Normal	☐ 1 day	☐ 1 day to 1 week	☐ ≥ 1 week
Cumulative impact	☐ Non-cumulative	☐ Cumulative	

Section D: Injured/Illness Employee

1.Name:	Sex:	Date of Birth:			Age:	Regular Job Title:	Experience:	
	☐ Male ☐ Female	Month	Day	Year			In this job title Years Weeks	In this Project Years Weeks

Site:	Company:	Reference:	Phone No:	Social Security Number

Part of Body Injured or Affected:

☐ Head ☐ Hands ☐ Face ☐ Nose
☐ Eyes ☐ Legs ☐ Teeth ☐ Neck
☐ Trunk ☐ Toes ☐ Elbow ☐ Shoulder
☐ Back ☐ Ankle ☐ Wrist ☐ Foot
☐ Arms ☐ Thump ☐ Fingers ☐ Internal

Remark: .....

Nature of Injury or Illness:

☐ Laceration ☐ Amputation ☐ Puncture ☐ Fracture
☐ Strain & Sprain ☐ Burns ☐ Contusion ☐ Dry Heat Friction
☐ Hernia ☐ Foreign Body ☐ Chemical ☐ Contamination
☐ Skin (Occupationnel) ☐ Rash ☐ Irritation

Remark: .....

2.Name:	Sex:	Date of Birth:			Age:	Regular Job Title:	Experience:	
	☐ Male ☐ Female	Month	Day	Year			In this job title Years Weeks	In this Project Years Weeks

Site:	Company:	Reference:	Phone No:	Social Security Number

Part of Body Injured or Affected:

☐ Head ☐ Hands ☐ Face ☐ Nose
☐ Eyes ☐ Legs ☐ Teeth ☐ Neck
☐ Trunk ☐ Toes ☐ Elbow ☐ Shoulder
☐ Back ☐ Ankle ☐ Wrist ☐ Foot
☐ Arms ☐ Thump ☐ Fingers ☐ Internal

Remark: .....

Nature of Injury or Illness:

☐ Laceration ☐ Amputation ☐ Puncture ☐ Fracture
☐ Strain & Sprain ☐ Burns ☐ Contusion ☐ Dry Heat Friction
☐ Hernia ☐ Foreign Body ☐ Contamination ☐ Chemical
☐ Skin (Occupationnel) ☐ Rash ☐ Irritation

Remark: .....

Section E: Accidents/incident Details

Date Accident/Incident Occurred:	Time Accident/Incident Occurred:	Exact Location of the Accident / Incident:

Details of the actual Job Being done at the time:

Details of Accident / Incident / What actually happened?

Section F: Accident Cause (Basic cause mark X / Contributing cause, if any mark O)

UNSAFE CONDITIONS		UNSAFE ACTS	
1	☐ Inadequately Guarded	1	☐ Operating Without Authority / Training
2	☐ Unguarded	2	☐ Operating at Unsafe Speed
3	☐ Defective Tools, Equipment, or Substance	3	☐ Marking SHE Device Inoperative
4	☐ Unsafe Design or Construction	4	☐ Using Unsafe Equipment or Equipment Unsafely
5	☐ Hazardous Arrangement	5	☐ Unsafe Loading, Placing, Mixing
6	☐ Unsafe Illumination	6	☐ Taking Unsafe Position
7	☐ Unsafe Ventilation	7	☐ Working on Moving or Dangerous Equipment
8	☐ Unsafe Clothing	8	☐ Distraction, Teasing, Horse Play
9	☐ Insufficient Instruction	9	☐ Failure to use Personal Protective Devices
10	☐ Lack of system of work	10	☐ Lack of effective instruction or supervision

Why was the unsafe act committed? _____ Why did the unsafe condition exist? _____

Section G: Guide to Corrective Action (Base on the cause checked above, I am taking the following corrective action)

UNSAFE ACT	UNSAFE CONDITION	If Supervisor can't handle, then recommend to
☐ Stop the Behaviour	☐ Remove	☐ Site Engineer, or
☐ Study the job	☐ Guard	☐ Site Manager, or
☐ Instruct (tell-show-try-check)	☐ Warn	☐ Project Manager, or
☐ Follow Up	☐ Supervisory Training	☐ Safety Committee
☐ Enforce		

Detail below any immediate remedial actions that have been taken:

Detail below any corrective and preventative actions that could be taken to prevent future re-occurrence:	Responsible	Completion Date

Section H: Witness Statement	
Witness Name	**Interviewer Name**

Section I: Reviewed & Recommend by			
Recommendation:			
Reviewed By:	Position:	Signature:	Date:

Remarks : If Accident or Incident happened with lost time injury and affected to the publicity must further report to Safety Department;
: First Aid Cases will not applicable to this form;
: The accident report shall submit to Safety Department within 3 days
: Attached the photograph or sketch the location of accident / incident;

Annexure G

Archaeological 'Chance Find' procedure

Background

The purpose of this document is to address the possibility of archaeological deposits becoming exposed during ground altering activities within the project area and to provide protocols to follow in the case of a chance archaeological find to ensure that archaeological sites are documented and protected as required.

Archaeological sites are an important resource that is protected for their historical, cultural, scientific and educational value to the general public and local communities. Impacts to archaeological sites must be avoided or managed by development proponents. The objectives of this 'Archaeological Chance Find Procedure' are to promote preservation of archaeological data while minimizing disruption of construction scheduling/ It is recommended that due to the moderate to high archaeological potential of some areas within the project area, all on site personnel and contractors be informed of the Archaeological Chance Find Procedure and have access to a copy while on site.

Potential Impacts to Archaeological Sites

Developments that involve excavation, movement, or disturbance of soils have the potential to impact archaeological materials, if present. Activities such as road construction, land clearing, and excavation are all examples of activities that may adversely affect archaeological deposits.

Archaeological 'Chance Find' Procedure

If you believe that you may have encountered any archaeological materials, stop work in the area and follow the procedure below:

The following 'chance-find' principles will be implemented by the contractor throughout the construction works to account for any undiscovered items identified during construction works:

(i) Workers will be trained in the location of heritage zones within the construction area and in the identification of potential items of heritage significance.

(ii) Should any potential items be located, the site supervisor will be immediately contacted and work will be temporarily stopped in that area.

(iii) If the site supervisor determines that the item is of potential significance, an officer from the department of Archaeology (DoA) will be invited to inspect the site and work will be stopped until DoA has responded to this invitation.

(iv) Work will not re-commence in this location until agreement has been reached

between DoA and proponent as to any required mitigation measures, which may include excavation and recovery of the item.

(v) A precautionary approach will be adopted in the application of these procedures.

Detailed Procedural Steps

If the Director, department of Archaeology receives any information or otherwise has the knowledge of the discovery or existence of an antiquity of which there is no owner, he shall, after satisfying himself as to the correctness of the information or knowledge, take such steps with the approval of the Government, as he may consider necessary for the custody, preservation and protection of the antiquity.

Whoever discovers, or finds accidentally, any movable antiquity shall inform forth with the Directorate within seven days of its being discovered or found.

If, within seven days of his being informed, the Director decides to take over the antiquity for purposes of custody, preservation and protection, the person discovering or finding it shall hand it over to the Director or a person authorized by him in writing.

Where the Director decides to take over an antiquity, he may pay to the person by whom it is handed over to him such cash reward as may be decided in consultation with the Advisory Committee.

The Director or any officer authorized by him with police assistance may, after giving reasonable notice, enter into, inspect and examine any premises, place or area which or the sub-soil of which he may have reason to believe to be, or to contain an antiquity and may cause any site, building, object or any antiquity or the remains of any antiquity in such premises, place or area to be photographed, copied or reproduced by any process suitable for the purpose.

The owner or occupier of the premises, place or area shall afford all reasonable opportunity and assistance to the Director.

No photograph, copy of reproduction taken or made shall be sold or offered for sale except by or with the consent of the owner of the object of which the photograph, copy or the reproduction has been taken or made.

Where substantial damage is caused to any property as a result of the inspection, the Director shall pay to the owner thereof reasonable compensation for the damage in consultation with the Advisory Committee.

If the Director after conducting an inquiry, has reasonable grounds to believe that any land contains any antiquity, he may approach the Government to direct the Revenue Department to acquire such land or any part thereof and the Revenue Department shall thereupon acquire such land or part as for a public purpose.

Annexure H
Dust Management Plan

General

The purpose of this plan is to describe the measures that the project shall take to ensure that the risk of emissions from dust generated by site operations during construction are minimized and that best practice measures are implemented.

Dust emissions from construction can cause ill health effects to Contractor staff along with nuisance and annoyance to members of the local community. Dust will be controlled through:

Elimination

Reduction/Minimisation

Control

This dust management plan shall be implemented based on the measures already provided in the Environmental Management Plan (EMP) relating to controlling dust emissions.

Methodology

The following methodology will be undertaken for each project section:

Step 1 – Identify the dust generating activities

Construction activities that are likely to produce dust will be identified. The activities that will be taken into account are:

Haulage Routes, Vehicles and Asphalt/Concrete Batching Plant

Roads, surfaces and public highways

Static and mobile combustion plant emissions

Tarmac laying, bitumen surfacing and coating

Materials Handling, Storage, Spillage and Disposal

Storage of material

Stockpiles

Spillages

Storage of Waste

Site Preparation and Restoration after Completion

Earthworks, excavation and digging

Storage of spoil and topsoil

Demolition

Construction and Fabrication Processes

Step 2 – Identify Sensitive Receptors

Sensitive receptors have already been identified. The nature and location of the sensitive receptors will be taken into account when implementing control measures.

Step 3 – Implement Best Practice Measures to Control

Based on the nature of the activity producing the dust, the likelihood of dust being produced and the possible consequence of dust based on the sensitive receptors, the most effective control measure will be identified and implemented.

Step 4 – Monitor effectiveness of control

Construction Supervision Staff (CSC) will have the responsibility to ensure that dust control measures are being implemented and are effective.

Step 5 – Record and report result of monitoring

All inspections, audits and results of monitoring will be recorded and kept as part of the site filing system.

Method Statements and Risk Assessments

The Contractor's Risk Assessments and Method Statements will be required to be approved by the CSC prior to commencing work and will be required to contain environmental aspects of the task, including dust control measures where required.

Where dust has been identified within the risk assessment as a significant issue, the method statement will be required to cover the following:

Methods and materials that will be used to ensure that dust generation is minimized.

The use of pre-fabricated materials where possible.

Optimum site layout:

Dust generating activities to be conducted away from sensitive receptors

Supply of water for damping down.

Good housekeeping and management

All employees will be briefed on the Risk Assessment and Method Statement before starting work.

Training

All Contractor staff will be required to attend training seminars as already mentioned in the EMP document. A site-specific induction will also be required before being allowed to work on site. These will include site-specific sensitive receptors and details regarding dust control measures to be taken.

Toolbox talks on air pollution and minimizing dust emissions will be provided on a regular basis to Contractor staff.

Identification of Dust Generating Sources and Control Methods

Haulage Routes, Vehicles and Asphalt/Concrete Batching Plant	
Dust Source	Dust Control Methods
Major haul roads and traffic routes	Haul roads will be dampened down via a mobile bowser, as required.
Public Roads	Road sweeper will be used to clean public roads as required.
Site traffic management	Site traffic will be restricted to constructed access roads as far as possible. Site speed limit will be set at 10 mph as this will minimize the production of dust.
Road Cleaning	A mechanical road sweeper will be readily available and used.
Handling, Storage, Stockpiling and Spillage of Dusty materials	
Material handling operations	The number of times a material will have to be handled will be kept to a minimum to prevent double handling and ensure dusty materials are not handled unnecessarily.
Transport of fine dusty materials and aggregates.	Closed tankers will be used or sheeted vehicles.
Vehicle loading/unloading materials on to vehicles and conveyors.	Dusty materials will be dampened down Drop heights will be kept to a minimum and enclosed where possible.
Storage of Materials	
Bulk cement, bentonite etc.	Bentonite will be delivered in tankers and stored in dedicated enclosed areas. Bulk cement will be transported through tractor trollies or trailers.
Fine dry materials	These will be protected from the weather and by storing in appropriate containers and indoors, where necessary.
Storage location	Material will be stored in dedicated lay-down areas.

Storage of Stockpiles	
Stockpile location	Stockpiles will be placed so as to minimize double handling and facilitate the site restoration.
Building stockpiles	Stockpiles, tips and mounds will not be stored at an angle greater than an angle of repose of the material.
Small and temporary stockpiles	Where possible, stockpiles will be placed under sheeting. Dusty material will be damped down. Wind barriers (protective fences) of a similar height to the stockpile will be erected, if required.
Large and long term stockpiles	Long-term stockpiles will be vegetated and stabilized as soon as possible. Stock plies will be dampened down until stabilized, where necessary. Wind barriers (protective fences) of a similar height to the stockpile will be erected, if required.
Waste Material from Construction	
Disposal method	A dedicated lay-down area will be available for waste. Waste will not be allowed to build up and will be disposed off at the designated locations as per EMP.
Site Preparation and Restoration	
Earthworks, excavation and digging	These activity areas will be kept damp where required and if possible, will be avoided during dry and windy periods.
Completed earthworks	Surfaces will be stabilized by re-vegetation as soon as possible, where applicable.
Construction and Fabrication Process	
Crushing of material for reuse, transportation and disposal	Authorization will be obtained from PMU and ADB before using any mobile plant on site for activities such as crushing and screening. Any crushing or screening activities will be located away from sensitive receptors.

Cutting, grinding, drilling, sawing, trimming, planning, sanding	These activities will be avoided wherever possible. Equipment and techniques that minimize dust will be implemented. Water will be used to minimize dust.
Cutting roadways, pavements, blocks	Water sprinkling to be used.
Angle grinders and disk cutters	Best practice measures will be used such as dust extraction.

Monitoring Arrangements

Monitoring will be conducted at sensitive receptor locations in the project area as provided in the EMP. Furthermore, at locations where PM levels are exceeding applicable guidelines, additional stringent measures will be implemented at the respective location(s) in the project area to ensure dust levels are controlled as far as possible.

ANNEXURE I

Site Specific EMP (SSEMP) Guide & Template for Guidance to Contractor

Guide for Development of SSEMP

Step 1: Define Boundaries

Step 2: Identify Sensitive Receptors

Step 3: Specify construction activities

Step 4: Conduct Risk Assessment

Step 5: Assign Environment Management measures

Step 6: Prepare Site Plans

Step 7: Prepare Environment Work Plans (if required)

Step 8: Monitoring

Step 1: The project area needs to be clearly defined.

Step 2: The mapping of sensitive receptors has already been conducted and needs to be presented clearly in a map.

Step 3: The tentative construction activities to be conducted are as follows:

Site Surveying and Vegetation (Trees and plants) Clearance

Establishment of Work Camp, Batching and Asphalt plant and access roads

Dismantling of Asphalt and existing structures including Utilities

Preparation of ground for Asphalting

Asphalting

Landscaping

Step 4: The Risk Assessment matrix template is provided in the table below.

Risk is assessed as the likelihood that the activity will have an effect on the environment as well as the consequence of the effect occurring. It is often described like this:

Risk = Likelihood × Consequence

Likelihood Scale

Likelihood	Definition	Scale
Certain	Will certainly occur during the activity at a frequency greater than every week if preventative measures are not applied	5
Likely	Will occur more than once or twice during the activity but less than weekly if preventative measures are not applied	3
Unlikely	May occur once or twice during the activity if preventative measures are not applied	2
Rare	Unlikely to occur during the project	1

Consequence Scale

Consequence	Definition	Score
Catastrophic	The action will cause unprecedented damage or impacts on the environment or surrounding community e.g. extreme loss of soil and water resources and quality from stormwater runoff extreme pollution of soil and water resources including major contamination from hazardous materials widespread effects on ecosystems with deaths of fauna/flora widespread community impacts resulting in illness, injury or inconvenience loss or destruction of archaeological or historical sites Occurrence will almost certainly result in the work being halted and a significant fine.	5
Major	The action will cause major adverse damage on the environment or surrounding communities' e.g. major loss of soil and water resources and quality from stormwater runoff major pollution of soil and water resources including contamination from hazardous materials significant effects on ecosystems with isolated deaths of non-vulnerable flora and fauna significant annoyance or nuisance to communities major damage to or movement required to archaeological or historical sites Occurrence may result in work being halted and a fine	3
Moderate	No or minimal adverse environmental or social impacts e.g. no measurable or noticeable changes in stormwater quality. Water quality remains within tolerable limits little noticeable effect on ecosystems	2

	no or isolated community complaints no or unlikely damage to archaeological or historical sites no likelihood of being fined	
Minor	No or minimal adverse environmental or social impacts e.g. no measurable or noticeable changes in stormwater quality. Water quality remains within tolerable limits little noticeable effect on ecosystems no or isolated community complaints no or unlikely damage to archaeological or historical sites no likelihood of being fined	1

Risk Score Table

Likelihood	Consequence				
		Catastrophic	Major	Moderate	Minor
	Certain	25	15	10	5
	Likely	15	9	6	3
	Unlikely	10	6	4	2
	Rare	5	3	2	1

Risk: Significant: 15-25

Medium: 6-10

Low 1-5

Any Medium to Significant risk requires an environmental management measure to manage the potential environmental risk. Judgement will be required concerning the application of an environmental management measure to mitigate low risk situations.

The higher the risk the more intensive the required mitigation measure will need to be; e.g. where site sedimentation is deemed to be low risk, then silt fences may be needed but as the risk increases, then sediment traps may be required. The selection of the appropriate mitigation measure will require judgement based on the level of risk and the specific site parameters.

Step 5: The Environmental Management measures are to be extracted from the EIA study for the project and should be added in the last column of the table below.

No.	Construction Activity	Hazards to Consider	Likelihood that the site or sensitive receptors will be affected?	Consequence of the site or sensitive receptors being affected?	Risk Score (consequence x likelihood)	Environmental Management Measures
i	Site Surveying & vegetation clearance	Damage to vegetation beyond project footprint				These can be taken from the EMP provided in the EIA report (If Risk Score is 6 or more)
		Erosion of exposed areas and sediment				
		Loss of topsoil				
		Dust generation				
		Noise				
ii	Establishment of Work Camp, Batching plant etc.	Soil deposited onto roads from tires				
		Stockpile erosion				
		Noise & Vibration				
		Traffic congestion				
		Fuel spills				

iii	Dismantling of Asphalt and existing structures including Utilities	Noise and vibration				
		Dust generation				
		Community safety				
		Worker safety				
		Traffic Congestion				
iv	Preparation of Sub-Base	Noise and vibration				
		Dust generation				
		Traffic Congestion				
v	Asphalting	Noise and vibration				
		Dust generation				
		Traffic Congestion				
		Community safety				

		Labor safety (PPEs)				
vi	Landscaping	Dust generation				
		Sediment runoff				
		Failure of vegetation to take root				

Step 6: The Site plans are a critical part of the SSEMP and will need to be prepared, otherwise the ADB will consider the document as incomplete.

The site plan will need to provide the following:

Indication of North and scale

Existing and planned supporting infrastructure (e.g. access roads, water supplies and electricity supplies)

Location of planned work

Contours

Drainage systems

Locations of sensitive receptors

Step 7 (if required)[29]: The completed SSEMP provides details of all the environmental management requirements for all stages of the construction process. For individual work teams who are responsible for only a small part of the overall construction works it can be confusing as to what is required for their particular work component. For example, the work team responsible for stripping soil for the construction areas are not going to be interested in the requirements for pouring concrete for footings and foundations. However, it is essential that the soil stripping team knows exactly what to clear and what to leave and where to put stockpiles of soil for later use.

In situations where different work activities are required at different times or at different locations, environmental work plans can be prepared. These are similar to the work method statements that are often produced for major construction projects.

Step 8: A detailed monitoring plan will be provided along with frequency and responsibilities to ensure all key environmental parameters are monitored to ensure compliance with both national and ADB requirements.

Template for SSEMP

Introduction

Project Overview

Scope of SSEMP

Objectives of SSEMP

Map of Sensitive Receptors

Construction Activities

Activities

[29] ADB, Safeguards Unit for Central & West Asia Department, *Environmental Management for Construction Handbook.*

Risk Assessment

Risk Assessment Matrix & Mitigation Measures

Site Plan(s)

Environmental Monitoring Plan

Instrumental Monitoring of Environmental Parameters by Contractor as per EMP

In-house monitoring

Third Party environmental monitoring

Visual monitoring of Environmental Parameters by Contractor as per EMP

Responsibilities

Organizational Responsibilities and Communication

Responsibility of EA

Responsibility of Construction Supervision Consultant (CSC)

Responsibility of Contractor

Responsibility of EPA

ANNEXURE J
ToRs of Third Party Monitor

i). Develop specific monitoring indicators for undertaking monitoring and evaluation of EMP and RAP implementation including the Community Participation, consultation and disclosure;

ii). Review results of internal monitoring and verify claims through random checking at the field level to assess whether EMP and resettlement objectives have been met. Involve the affected people and community groups in assessing the impacts of EMP implementation and resettlement measures for monitoring and evaluation purposes.

iii). Review monitoring reports and conduct field inspections and verify the progress in EMP and RAP implementation of the project and prepare reports for the PMU and the ADB.

iv). Evaluate and assess the adequacy of compensation given to the PAPs and the livelihood opportunities and incomes as well as the quality of life of PAPs of project-induced changes.

v). Evaluate and assess the adequacy and effectiveness of the consultative process with PAPs, including the adequacy and effectiveness of grievance procedures and legal redress available to the affected parties, and dissemination of information about these.

vi). Socioeconomic conditions of the PAPs in the post-resettlement / rehabilitation period;

vii). Communications and reactions from PAPs on entitlements, compensation;

viii). Grievance procedures; its recording, reporting and processing time and its redressal;

ix). Institutional arrangements and effectiveness and efficiency of PMU, and Supervision Consultants in EMP and RAP Implementation;

x). Evaluation and assessment of the adequacy of compensation given to the PAPs and the livelihood opportunities and incomes as well as the quality of life of PAPs of project-induced changes.

xi). Level of satisfaction of PAPs in the post resettlement period.

xii). Assessment of the resettlement efficiency, effectiveness, impact and sustainability for drawing lessons for future resettlement policy formulation and planning.

ANNEXURE K
Traffic Management Plan

K.1 Need for Plan

The construction of the SWMF will take over 24 months and in this period, huge vehicular movement carrying large amount of material and machinery is expected. This will definitely interrupt the local traffic and is therefore important to manage the traffic to avoid the nuisance to local residents in terms of noise, dust, congestion and inconvenience.

K.2 The plan

The Objective of Traffic Management Plan (TMP) is to define the requirements that should be implemented to mitigate any potential negative risks to the environment, workers or the community resulting from construction traffic.

The TMP will advise and inform site Contractors and external suppliers of equipment and materials of access and entry points along with other key information such tipping areas and wash-out areas. It is intended to compliment and work alongside relevant ESMMP. The TMP will be classed as “live” and therefore be subjected to updates as required.

Contractor, at the time of the execution of the project will prepare a comprehensive TMP in coordination with local traffic police department, PMU, emergency services and local administrative department. The PMU and CSC will review and approve contractors TMP. The contractor’s TMP shall include following mitigation measures during its preparation:

Undertake a road conditions assessment prior to and following the peak construction period, to assess any damage to road infrastructure that can be attributed to Project construction.

Repair damage as appropriate or enter into a voluntary agreement with the relevant roads authority to reimburse the cost of any repairs required to the public road network as a result of the Project.

Spoil dumpsites located close to Project site to minimise journey distance and limit movements to site access roads.

Concrete mixing plant located at Project site limiting traffic movements associated with concrete delivery to site access roads

Construction of worker accommodation on site to reduce light vehicle movements relating to travel to/ from the site

Provision of bus/minibus services for personnel living in nearby settlements

Movements of construction workers will be planned to avoid the busiest roads and times of day when traffic is at its greatest.

Schedule deliveries and road movements to avoid peak periods

Road maintenance fund to leave a useful asset for communities after the construction phase.

Driver training for HGV drivers and refresher course every six months for Project drivers

Speed restrictions for project traffic travelling through communities (to be agreed with Traffic Manangement Authority)

Run a safety campaign to improve the people’s knowledge of the traffic hazard on their roads, public information and other activities to address the issues.

Run a pedestrian awareness programme

Temporary signage

The traffic management plan is provided below.

K.3 Other Recommendations

It is important to manage public access routes during construction because it can cause delay to local traffic and create a safety hazard both on and offsite. People working and living near the project site would be annoyed by the emissions, noise and visual intrusion of queuing vehicles. Some important factors involved in access routes and site traffic are as follows:

K.3.1 Public Access Routes

The use of public road for site access may be restricted in terms of:

Vehicle size, width and type of load

Time limits

Parking

Pedestrian conflicts

Contractor should have consultation with the local police or local authority to address these issues and to effectively manage them before the beginning of the construction.

K.3.2 Site Workers Traffic

Site personnel should not be permitted to park vehicles near the site boundary; this will lead to disruption in material deliveries. Designated parking area with appropriate parking space will be needed for this purpose; any plain area near construction site can be used for this purpose.

K.3.3 Site Rules

Access to and from the site must be only via the specified entrance.

On leaving the site, vehicles must be directed to follow the directions given.

Drivers must adhere to the site speed limits.

All material deliveries to site must keep allocated time limits.

No material or rubbish should be left in the loading-unloading area.

Develop a map for alternate routes showing material delivery services.

Assign designated personnel on site to receive deliveries and to direct the vehicles.

Monitor vehicle movement to reduce the likelihood of queuing or causing congestion in and around the area.

Project vehicles should have a unanimous badge or logo on windscreen displaying that they belong to the SWMF project.

K.4 Contractor's Obligation

The traffic management plan of the Contractor should be safe enough and widening of access roads and construction of the detours must be completed before start of project construction activities so that heavy vehicular transportation for construction activities do not hinder the normal course of traffic lanes. While widening the access roads, the safe movement of the vehicles, people, animals and wildlife must be ensured. It will be sole responsibility of Contractor. The roads widening should be designed on the basis of the traffic survey, summarized and estimated site traffic. Contractor must ensure that road closures are carried out by a competent person. The Contractor obligation must include the display of traffic signs according to the need to divert the traffic volume and to guide the road users in advance. The traffic sign, traffic light should be placed from any diverting route or road marking.

The Contractor should consider the environmental and social impacts of the traffic during construction. It will be sole responsibility of the Contractor to implement a plan which produces minimum nuisance to the local people and to the environment. Safety of the people should be given due importance. It will be under Contractor obligation to notify the traffic management plan and its later changes to CSC, PMU, emergency services and Traffic Police, and also publish weekly programme in local newspapers.

ANNEXURE L
NEQS Guidelines

Parameter	Unit	Standards (maximum allowable limit)
Temperature increase	^{o}C	<3
pH value (acidity / basicity)	pH	6-9
5-day biochemical oxygen demand (BOD) AT 20 ^{O}C	mg/l	80
Chemical oxygen demand (COD)	mg/l	150
Total dissolved solids	mg/l	200
Total dissolved solids	mg/l	3,500
Grease and oil	mg/l	10
Phenolic compounds (as phenol)	mg/l	0.1
Chloride (as Cl)	mg/l	1.0
Fluoride (as F)	mg/l	10
Sulfate (SO_4)	mg/l	600
Ammonia (NH_3)	mg/l	40
Cadmium	mg/l	0.1
Chromium (trivalent and hexavalent)	mg/l	1.0
Copper	mg/l	1.0
Lead	mg/l	0.5
Mercury	mg/l	0.01
Selenium	mg/l	0.5
Nickel	mg/l	1.0
Silver	mg/l	1.0
Total toxic metals	mg/l	2.0
Zinc	mg/l	5
Arsenic	mg/l	1.0
Barium	mg/l	1.5
Iron	mg/l	8.0
Manganese	mg/l	1.5
Boron	mg/l	6.0
Chlorine	mg/l	1.0

Notes:

1. The standard assumes that dilution of 1:10 on discharge is available. That is, for each cubic meter of treated effluent, the recipient water body should have 10 m^3 of water for dilution of this effluent.

2. Toxic metals include cadmium, chromium, copper, lead, mercury, selenium, nickel and silver. The effluent should meet the individual standards for these metals as well as the standard for total toxic metal concentration.

Source: Government of Pakistan (2000) (SRO 549(I)/2000).

Pollutants	Time-Weighted Average	Concentration in Ambient Air		Method of Measurement
		Effective from 1st July 2010	Effective from 1st January 2013	
Sulfur Dioxide ($SO_{2)}$	Annual Average *	80 µg/m3	80 µg/m3	Ultraviolet Fluorescence
	24 hours**	120 µg/m3	120 µg/m3	
Oxides of Nitrogen as (NO)	Annual Average*	40 µg/m3	40 µg/m3	Gas Phase Chemiluminescence
	24 hours**	80 µg/m3	80 µg/m3	
Ozone ($O_{3)}$	1 hour	180 µg/m3	130 µg/m3	Non dispersive UV absorption
Suspended Particulate Matter (SPM)	Annual Average*	400 µg/m3	360 µg/m3	High Volume Sampling, (Average flow rate not less than 1.1 m3/minute).
	1 hour	180 µg/m3	130 µg/m3	
Respirable Particulate Matter. PM_{10}	Annual Average*	200 µg/m3	120 µg/m3	β Ray absorption
	24 hours**	250 µg/m3	150 µg/m3	
Respirable Particulate Matter. $PM_{2.5}$	Annual Average*	25 µg/m3	15 µg/m3	β Ray absorption
	24 hours**	40 µg/m3	35 µg/m3	
	1 hour	25 µg/m3	15 µg/m3	
Lead (Pb)	Annual Average*	1.5 µg/m3	1.0 µg/m3	ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2.0 µg/m3	1.5 µg/m3	
Carbon Monoxide (CO)	8 hours**	5 µg/m3	5 µg/m3	Non dispersive Infra-Red (NDIR)
	1 hour	10 µg/m3	10 µg/m3	

* 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. 20% of the time, it may exceed but not on two consecutive days.

Source: Government of Pakistan (2010) (SRO 1062 (I)/ 2010).

National Environmental Quality Standards for Noise[1]

S/No.	Category of Area/Zone	Limit in dB(A) Leq	
		Day Time	Night Time
1	Residential area (A)	55	45
2	Commercial area (B)	65	55
3	Industrial area (C)	75	65
4	Silence zone (D)	50	45

1: Effective from 1st July, 2012.

Note: 1. Day time hours: 6 am to 10 pm

2. Night time hours: 10 pm to 6 am

3. Silence zone: Zones that 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.

National Environmental Quality Standards for Motor Vehicle Exhaust and Noise

(A) For In-use Vehicles

Sr. No.	Parameter	Standard (Maximum permissible Limit)	Measuring Method	Applicability
1	Smoke	40% or 2 on the Ringlemann Scale during engine acceleration mode	To be compared with Ringlemann Chart at a distance 6 or more.	Immediate effect
2	Carbon Monoxide	6%	Under idling conditions: Non-dispersive infrared detection through gas analyzer.	
3	Noise	85 db (A).	Sound meter at 7.5 meters from the source.	

(B) For New Vehicles

(i) Emission Standards for Diesel Vehicles

(a) For Passenger Cars and Light Commercial Vehicles (g/Km)

Type of Vehicle	Category/Class	Tiers	CO	HC+ NOX	PM	Measuring Method	Applicability
Passenger Cars	M 1: with reference mass (RW) upto 2500 kg. Cars with RW over 2500 kg to meets NI category standards.	Pak-II IDI	1.00	0.70	0.08	NEDC (ECE 15+ EUDCL)	All imported and local manufactured diesel vehicles with effect from 01-07-2012
		Pak-II DI	1.00	0.90	0.10		
Light Commercial Vehicles	NI-I (RW<1250 kg)	Pak-II IDI	1.00	0.70	0.08		
		Pak-II DI	1.00	0.90	0.10		
	NI-I (1250 kg< RW< 1700 kg0	Pak-II IDI	1.25	1.00	0.12		
		Pak-II DI	1.25	1.30	0.14		
	NI-III (RW>1700 kg)	Pak-II IDI	1.50	1.20	0.17		
		Pak-II DI	1.50	1.60	0.20		
Parameter	Standard **(maximum permissible limit**				Measuring **Method**		
Noise	85 db (A)				Sound meter at 7.5 meters from the source.		

(ii) Emission Standards for Petrol Vehicles (g/km)

Type of Vehicle	Category/Class	Tiers	CO	HC+ NOX	Measuring Method	Applicability
Passenger	M 1: with reference mass (RW) upto 2500 kg. Cars with RW over 2500 kg to meets NI category standards.	Pak-II	2.20	0.50	NEDC (ECE 15+ EUDCL)	All imported and new models* locally manufactured petrol vehicles with effect from 1st July, 2009**
Light Commercial Vehicles	NI-I (RW<1250 kg)	Pak-II	2.20	0.50		
	NI-I (1250 kg> RW< 1700 kg0	Pak-II	4.00	0.65		
	NI-III (RW>1700 kg)	Pak-II	5.00	0.80		
Motor Rickshaws and motor Cycles	2.4 strokes < 150 cc	Pak-II	5.50	1.50	ECER 40	
	2.4 strokes < 150 cc	Pak-II	5.50	1.30		
Parameter	**Standard (maximum** permissible **limit**				Measuring Method	
Noise	85 db (A)				Sound meter at 7.5 meters from the source.	

Explantations:

DI: Direct Injection
IDI: Indirect Injection
EUDCL: Extra Urban Driving Cycle
NEDC: New Urban Driving Cycle
M: Vehicles designed and constructed for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat.
N: Motor vehicles with at least four wheels designed and constructed for the carriages of goods.
* New model means both model and engine type change
** The existing models of petrol driven vehicles locally manufactured will immediately switch ever to Pak-II emission standards but not later than 30th June, 2012.

Source: Government of Pakistan (2009) (SRO 72 (KE)/ 2009).

National Standards for Drinking Water Quality

Properties/Parameters	Standard Values for Pakistan
Bacterial	
All water intended for drinking (E.Coli or Thermo tolerant Coliform bacteria)	Must not be detectable in any 100 ml samples
Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml samples
Treated water in the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml samples 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.
Physical	
Color	≤ 15 TCU
Taste	Non objectionable/ Accept able
Odor	Non objectionable/Accept able
Turbidity	< 5 NTU
Total hardness as $CaCO_3$	< 500 mg/l
TDS	< 1000
pH	6.5-8.5
Chemical	
Essential Inorganic	*mg/Litre*
Aluminum (Al)	≤ 0.005(P)
Antimony	≤ 0.05(P)
Arsenic (As)	≤ 0.05(P)
Barium (Ba)	0.7
Boron (B)	0.3
Cadmium (Cd)	0.01
Chloride (Cl)	<250
Chromium (Cr)	≤ 0.05
Copper (Cu)	2
Toxic Inorganic	**Mg/Litre**
Cyanide (Cn)	≤ 0.05
Fluoride (F)*	≤ 1.5
Lead (Pb)	≤ 0.05
Manganese (Mn)	≤ 0.5
Mercury (Hg)	≤ 0.001
Nickel (Ni)	≤ 0.02
Nitrate (NO_3)*	≤ 50
Nitrate (NO_2)*	≤ 3 (P)
Selenium (Se)	0.01 (P)
Residual chlorine	0.2-0.5 at consumer end; 0.5-1.5 at source
Zinc (Zn)	5.0
Organic	
Pesticides mg/l	PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20-58 may be consulted.**
Phenolic compound (as phenols) mg/l	WHO standards: ≤ 0.002
Polynuclear Aromatic hydrocarbon (as PAH) g/L	WHO standards: ≤ 0.01v (by GC/MS method)
Radioactive	
Alpha Emitters bq/L or pCi	0.1
Beta Emitters	1

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

** PSQCA: Pakistan Standards Quality Control Authority.

Source: Government of Pakistan (2010) (SRO 1063(I)/2010).

ANNEXURE M

WHO Guidance on Laboratory Biosafety

Laboratory biosafety guidance related to coronavirus disease 2019 (COVID-19)

Interim guidance
12 February 2020

World Health Organization

1. Introduction

The purpose of this document is to provide interim guidance on laboratory biosafety related to the testing of clinical specimens of patients that meet the case definition of the novel pathogen identified in Wuhan, China, that is, 2019 novel coronavirus (2019-nCoV), now known as the virus responsible for coronavirus disease 2019 (COVID-19).

As our understanding of COVID-19 is limited but rapidly growing, the World Health Organization (WHO) continues to monitor developments and will revise these recommendations as necessary.

Highlights of COVID-19 laboratory biosafety

- All procedures must be performed based on risk assessment and only by personnel with demonstrated capability, in strict observance of any relevant protocols at all times.
- Initial processing (before inactivation) of all specimens should take place in a validated biological safety cabinet (BSC) or primary containment device.
- Non-propagative diagnostic laboratory work (for example, sequencing, nucleic acid amplification test [NAAT]) should be conducted at a facility using procedures equivalent to Biosafety Level 2 (BSL-2)
- Propagative work (for example, virus culture, isolation or neutralization assays) should be conducted at a containment laboratory with inward directional airflow (BSL-3).
- Appropriate disinfectants with proven activity against enveloped viruses should be used (for example, hypochlorite [bleach], alcohol, hydrogen peroxide, quaternary ammonium compounds and phenolic compounds).
- Patient specimens from suspected or confirmed cases should be transported as UN3373, "Biological Substance Category B". Viral cultures or isolates should be transported as Category A, UN2814, "infectious substance, affecting humans".

2. Laboratory biosafety

It is essential to ensure that health laboratories adhere to appropriate biosafety practices. Any testing for the presence of the virus responsible for COVID-19 or of clinical specimens from patients meeting the suspected case definition *(1)* should be performed in appropriately equipped laboratories, by staff trained in the relevant technical and safety procedures. National guidelines on the laboratory biosafety should be followed in all circumstances. For general information on laboratory biosafety guidelines, see the WHO *Laboratory biosafety manual*, 3rd edition *(2)* in the interim before the 4th edition is released.

Key points

- Each laboratory should conduct a local (that is, institutional) risk assessment to ensure it is competent to safely perform the intended testing with appropriate risk control measures in place.
- When handling and processing specimens, including blood for serological testing, laboratory practices and procedures that are basic to good microbiological practices and procedures (GMPP) should be followed.
- The handling and processing of specimens from cases with suspected or confirmed COVID-19 infection that are intended for additional laboratory tests, such as haematology or blood gas analysis, should follow local guidelines for processing potentially infectious material.
- Non-propagative diagnostic laboratory work, including sequencing and NAAT, on clinical specimens from patients who are suspected or confirmed to be infected with COVID-19, should be conducted adopting the practices and procedures of "core requirements",[1] as detailed in **Annex 1**, and an appropriate selection of "heightened control measures",[2] as informed by the local risk assessment. In the interim, BSL-2 in the WHO *Laboratory biosafety manual*, 3rd edition *(2)* remains appropriate until the 4th edition replaces it.
- Handling of material with high concentrations of live virus (such as when performing virus propagation, virus isolation or neutralization assays) or large volumes of infectious materials should be performed **only by**

[1] **Core requirements:** A set of minimum requirements defined in the 4th edition of the WHO *Laboratory biosafety manual* to describe a combination of risk control measures that are both the foundation for, and an integral part of, laboratory biosafety. These measures reflect international standards and best practice in biosafety that are necessary to work safely with biological agents, even where the associated risks are minimal.

[2] **Heightened control measures:** A set of risk control measures that may need to be applied in a laboratory facility because the outcome of a risk assessment indicates that the biological agents being handled and/or the activities to be performed with them are associated with a relatively high risk that cannot be acceptable solely with the core requirements.

properly trained and competent personnel in laboratories capable of meeting additional essential containment requirements and practices, that is, BSL-3.

- Initial processing (before inactivation) of all specimens, including those for sequencing and NAAT, should take place in an appropriately maintained and validated BSC or primary containment device.
- Appropriate disinfectants with proven activity against enveloped viruses should be used for the recommended contact time, at the correct dilution and within the expiry date after the working solution is prepared.
- All technical procedures should be performed in a way that minimizes the generation of aerosols and droplets.
- Appropriate personal protective equipment (PPE), as determined by a detailed risk assessment, should be worn by all laboratory personnel handling these specimens.
- Patient specimens from suspected or confirmed cases should be transported as UN3373, "Biological Substance Category B". Viral cultures or isolates should be transported as Category A UN2814, "infectious substance, affecting humans" *(3)*.

3. Recommendations addressing minimal/essential working conditions associated with specific manipulations in laboratory settings

The additional recommendations provided in this section address the minimal/essential working conditions associated with specific manipulations in laboratory settings.

a. Risk assessment

Risk assessment is a systematic process of gathering information and evaluating the likelihood and consequences of exposure to or release of workplace hazard(s) and determining the appropriate risk control measures to reduce the risk to an acceptable level. It is important to note that hazards alone do not pose a risk to humans or animals. Consideration therefore must also be given to the types of equipment used and the procedure(s) that will be performed with the biological agent.

It is highly recommended to start with performing a local risk assessment for each process step, that is, from sample collection, sample reception, clinical testing, polymerase chain reaction (PCR) to virus isolation (only when and where applicable). Certain hazards will then be considered for each process step, such as aerosol exposure during sample processing; eye splash during sample processing; infectious culture material spill; and leaking sample (in the case of sample reception), with an assessed grade of risk. For each identified risk, appropriate risk control measures, including but not limited to the following recommendations, should be selected and implemented, in order to mitigate the residual risks to an acceptable level.

A risk assessment template is provided in **Annex 2;** this is intended to serve as an example and to facilitate the process.

b. Routine laboratory procedures, including non-propagative diagnostic work and PCR analysis

Non-culture-based diagnostic laboratory work, and PCR analysis on clinical specimens from patients who are suspected or confirmed to be infected with the virus responsible for COVID-19, should be conducted adopting practices and procedures described for conventional clinical and microbiology laboratories as described in the "core requirements" (see **Annex 1**).

However, all manipulations of potentially infectious materials, including those that may cause splashes, droplets or aerosols of infectious materials (for example, loading and unloading of sealed centrifuge cups, grinding, blending, vigorous shaking or mixing, sonic disruption, opening of containers of infectious materials whose internal pressure may be different from the ambient pressure), should be performed in appropriately maintained and validated BSCs or primary containment devices, by personnel with demonstrated capability.

Examples of routine laboratory procedures include:

• diagnostic testing of serum; blood (including haematology and clinical chemistry); respiratory specimens such as nasopharyngeal and oropharyngeal swabs, sputum and/or endotracheal aspirate or bronchoalveolar lavage; stool; or other specimens;

• routine examination of mycotic and bacterial cultures developed from respiratory tract specimens. When handling and processing specimens, "core requirements" (see **Annex 1**), including GMPP, should be followed at all times, including but not limited to those under the following subheadings. More details are explained and demonstrated in the WHO Biosafety video series *(4)*.

c. Use of appropriate disinfectants

• While little is known about this novel virus, the comparable genetic characteristics between the virus responsible for COVID-19 and MERS-CoV suggest that the COVID-19 virus may be susceptible to disinfectants with proven activity against enveloped viruses, including sodium hypochlorite (bleach; for example, 1000 parts per million [ppm] (0.1%) for general surface disinfection and 10 000 ppm (1%) for disinfection of blood spills);

62–71% ethanol; 0.5% hydrogen peroxide; quaternary ammonium compounds; and phenolic compounds, if used according to the manufacturer's recommendations. Other biocidal agents such as 0.05–0.2% benzalkonium chloride or 0.02% chlorhexidine digluconate can be less effective.

• Particular attention should be paid not only to the selection of the disinfectant but also the contact time (for example, 10 minutes), dilution (that is, concentration of the active ingredient) and expiry date after the working solution is prepared.

• Human coronaviruses in general are known to persist on inanimate surfaces such as metal, glass or plastic for up to 9 days *(5)*.

d. Viral isolation

Unless a country decides otherwise, considering the newly acquired knowledge and effective preventive measures described above, viral isolation on clinical specimens from patients who are suspected or confirmed to be infected with the virus responsible for COVID-19 should be performed only in laboratories capable of meeting the following additional containment criteria:

• a controlled ventilation system maintains inward directional airflow into the laboratory room;

• exhaust air from the laboratory room is not recirculated to other areas within the building. Air must be HEPA (high-efficiency particulate air) filtered, if reconditioned and recirculated within the laboratory. When exhaust air from the laboratory is discharged to the outdoors, it must be dispersed away from occupied buildings and air intakes. This air should be discharged through HEPA filters;

• a dedicated hand-wash sink is available in the laboratory;

• all manipulations of infectious or potentially infectious materials must be performed in appropriately maintained and validated BSCs;

• laboratory workers should wear protective equipment, including disposable gloves; solid-front or wrap-around gowns, scrub suits, or coveralls with sleeves that fully cover the forearms; head coverings; shoe covers or dedicated shoes; and eye protection (goggles or face shield). Risk assessment should inform the use of respiratory protection (fit-tested particulate respirator, for example, EU FFP2, US 6 NIOSH-certified N95 or equivalent, or higher protection);

• centrifugation of specimens should be performed using sealed centrifuge rotors or sample cups. These rotors or cups should be loaded and unloaded in a BSC.

e. Additional risks associated with virus isolation studies

Certain experimental procedures may carry additional risks of virus mutations with possible increased pathogenicity and/or transmissibility, or viruses with altered antigenicity or drug susceptibility. Specific risk assessments should be conducted, and specific risk-reduction measures adopted, before any of the following procedures are conducted:

• coinfection of cell cultures with different coronaviruses, or any procedures that may result in a coinfection;

• culture of viruses in the presence of antiviral drugs;

• deliberate genetic modification of viruses.

f. Work with animals infected with the virus responsible for COVID-19

The following activities require an animal facility – BSL-3 facilities and work practices, as detailed in the WHO *Laboratory biosafety manual*, 3rd edition *(2)*:

• inoculation of animals for potential recovery of the agent from specimens of the virus responsible for COVID-19;

• any protocol involving animal inoculation for confirmation and/or characterization of putative agents of the COVID-19 virus.

g. Referral of specimens to laboratories with appropriate containment measures in place

Laboratories that are not able to meet the above biosafety recommendations should consider transferring specimens to national, regional or international referral laboratories with COVID-19-detection capacity that can meet the biosafety requirements.

4. Packaging and shipment

All materials transported within and between laboratories should be placed in a secondary container, to minimize the potential for breakage or a spill. An example includes transfer of materials from the BSC to an incubator and vice versa. Specimens leaving the BSC should be surface decontaminated. Detailed guidance is provided in the WHO Biosafety video series *(4)*, in particular *Good microbiological practices and procedures (GMPP) 7: transport.*

Transport of specimens within national borders should comply with applicable national regulations. Cross-boundary transport of specimens of the virus responsible for COVID-19 should follow the United Nations model regulations, *Technical instructions for the safe transport of*

dangerous goods by air (Doc 9284) of the International Civil Aviation Organization *(6)*, for airlifted transport, and any other applicable regulations depending on the mode of transport being used. More information may be found in the WHO *Guidance on regulations for the transport of infectious substances 2019-2020* (applicable as from 1 January 2019) *(3)*. A summary on transport of infectious substances can also be found in Tool box 4 of the WHO handbook, *Managing epidemics: key facts about deadly diseases (7)*.

Patient specimens from suspected or confirmed cases should be transported as UN3373, "Biological Substance Category B", when they are transported for diagnostic or investigational purposes. Viral cultures or isolates should be transported as Category A UN2814, "infectious substance, affecting humans" *(3)*. All specimens being transported (whether UN3373 or UN2814) should have appropriate packaging, labelling and documentation, as described in the documents mentioned earlier.

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ANNEXURE N

WHO advice on Use of Masks for the COVID-19 Virus

masks away from those in health care who need them most, especially when masks are in short supply.

Persons with symptoms should:

- wear a medical mask, self-isolate, and seek medical advice as soon as they start to feel unwell. Symptoms can include fever, fatigue, cough, sore throat, and difficulty breathing. It is important to note that early symptoms for some people infected with COVID-19 may be very mild;
- follow instructions on how to put on, take off, and dispose of medical masks;
- follow all additional preventive measures, in particular, hand hygiene and maintaining physical distance from other persons.

All persons should:

- avoid groups of people and enclosed, crowded spaces;
- maintain physical distance of at least 1 m from other persons, in particular from those with respiratory symptoms (e.g., coughing, sneezing);
- perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- cover their nose and mouth with a bent elbow or paper tissue when coughing or sneezing, dispose of the tissue immediately after use, and perform hand hygiene;
- refrain from touching their mouth, nose, and eyes.

In some countries masks are worn in accordance with local customs or in accordance with advice by national authorities in the context of COVID-19. In these situations, best practices should be followed about how to wear, remove, and dispose of them, and for hand hygiene after removal.

Advice to decision makers on the use of masks for healthy people in community settings

As described above, the wide use of masks by healthy people in the community setting is not supported by current evidence and carries uncertainties and critical risks. WHO offers the following advice to decision makers so they apply a risk-based approach.

Decisions makers should consider the following:

1. **Purpose** of mask use: the rationale and reason for mask use should be clear– whether it is to be used for source control (used by infected persons) or prevention of COVID-19 (used by healthy persons)
2. Risk of **exposure** to the COVID-19 virus in the local context:
   - The population: current epidemiology about how widely the virus is circulating (e.g., clusters of cases versus community transmission), as well as local surveillance and testing capacity (e.g., contact tracing and follow up, ability to carry out testing).
   - The individual: working in close contact with public (e.g., community health worker, cashier)
3. **Vulnerability** of the person/population to develop severe disease or be at higher risk of death, e.g. people with comorbidities, such as cardiovascular disease or diabetes mellitus, and older people
4. **Setting** in which the population lives in terms of population density, the ability to carry out physical distancing (e.g. on a crowded bus), and risk of rapid spread (e.g. closed settings, slums, camps/camp-like settings).
5. **Feasibility**: availability and costs of the mask, and tolerability by individuals
6. **Type** of mask: medical mask versus nonmedical mask (see below)

In addition to these factors, potential advantages of the use of mask by healthy people in the community setting include reducing potential exposure risk from infected person during the "pre-symptomatic" period and stigmatization of individuals wearing mask for source control.

However, the following potential risks should be carefully taken into account in any decision-making process:

- self-contamination that can occur by touching and reusing contaminated mask
- depending on type of mask used, potential breathing difficulties
- false sense of security, leading to potentially less adherence to other preventive measures such as physical distancing and hand hygiene
- diversion of mask supplies and consequent shortage of mask for health care workers
- diversion of resources from effective public health measures, such as hand hygiene

Whatever approach is taken, it is important to develop a strong communication strategy to explain to the population the circumstances, criteria, and reasons for decisions. The population should receive clear instructions on what masks to wear, when and how (see mask management section), and on the importance of continuing to strictly follow all other IPC measures (e.g., hand hygiene, physical distancing, and others).

Type of Mask

WHO stresses that it is critical that medical masks and respirators be prioritized for health care workers.

The use of masks made of other materials (e.g., cotton fabric), also known as nonmedical masks, in the community setting has not been well evaluated. There is no current evidence to make a recommendation for or against their use in this setting.

WHO is collaborating with research and development partners to better understand the effectiveness and efficiency of nonmedical masks. WHO is also strongly encouraging countries that issue recommendations for the use of masks in healthy people in the community to conduct research on this critical topic. WHO will update its guidance when new evidence becomes available.

In the interim, decision makers may be moving ahead with advising the use of nonmedical masks. Where this is the case, the following features related to nonmedical masks should be taken into consideration:

- Numbers of layers of fabric/tissue
- Breathability of material used
- Water repellence/hydrophobic qualities
- Shape of mask
- Fit of mask

Home care

For COVID-19 patients with mild illness, hospitalization may not be required. All patients cared for outside hospital (i.e. at home or non-traditional settings) should be instructed to follow local/regional public health protocols for home isolation and return to designated COVID-19 hospital if they develop any worsening of illness.[7]

Home care may also be considered when inpatient care is unavailable or unsafe (e.g. capacity is limited, and resources are unable to meet the demand for health care services). Specific IPC guidance for home care should be followed.[3]

Persons with suspected COVID-19 or mild symptoms should:

- Self-isolate if isolation in a medical facility is not indicated or not possible
- Perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- Keep a distance of at least 1 m from other people;
- Wear a medical mask as much as possible; the mask should be changed at least once daily. Persons who cannot tolerate a medical mask should rigorously apply respiratory hygiene (i.e. cover mouth and nose with a disposable paper tissue when coughing or sneezing and dispose of it immediately after use or use a bent elbow procedure and then perform hand hygiene.)
- Avoid contaminating surfaces with saliva, phlegm, or respiratory secretions.
- Improve airflow and ventilation in their living space by opening windows and doors as much as possible.

Caregivers or those sharing living space with persons suspected of COVID-19 or with mild symptoms should:

- Perform hand hygiene frequently, using an alcohol-based hand rub if hands are not visibly dirty or soap and water when hands are visibly dirty;
- Keep a distance of at least 1 meter from the affected person when possible;
- Wear a medical mask when in the same room as the affected person;
- Dispose of any material contaminated with respiratory secretions (disposable tissues) immediately after use and then perform hand hygiene.
- Improve airflow and ventilation in the living space by opening windows as much as possible.

Health care settings

WHO provides guidance for the use of PPE, including masks, by health care workers in the guidance document: Rational use of PPE in the context of COVID-19.[24] Here we provide advice for people visiting a health care setting:

Symptomatic people visiting a health care setting should:

- Wear a medical mask while waiting in triage or other areas and during transportation within the facility;
- Not wear a medical mask when isolated in a single room, but cover their mouth and nose when coughing or sneezing with disposable paper tissues. Tissues must be disposed of appropriately, and hand hygiene should be performed immediately afterwards.

Health care workers should:

- Wear a medical mask when entering a room where patients with suspected or confirmed COVID-19 are admitted.
- Use a particulate respirator at least as protective as a US National Institute for Occupational Safety and Health-certified N95, European Union standard FFP2, or equivalent, when performing or working in settings where aerosol-generating procedures, such as tracheal intubation, non-invasive ventilation, tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, and bronchoscopy are performed.
- Full infection prevention and control guidance for health care workers is provided here.

One study that evaluated the use of cloth masks in a health care facility found that health care workers using cotton cloth masks were at increased risk of infection compared with those who wore medical masks.[25] Therefore, cotton cloth masks are not considered appropriate for health care workers. As for other PPE items, if production of cloth masks for use in health care settings is proposed locally in situations of shortage or stock out, a local authority should assess the proposed PPE according to specific minimum standards and technical specifications.

Mask management

For any type of mask, appropriate use and disposal are essential to ensure that they are effective and to avoid any increase in transmission.

The following information on the correct use of masks is derived from practices in health care settings:

- Place the mask carefully, ensuring it covers the mouth and nose, and tie it securely to minimize any gaps between the face and the mask.
- Avoid touching the mask while wearing it.
- Remove the mask using the appropriate technique: do not touch the front of the mask but untie it from behind.
- After removal or whenever a used mask is inadvertently touched, clean hands using an alcohol-based hand rub or soap and water if hands are visibly dirty.
- Replace masks as soon as they become damp with a new clean, dry mask.
- Do not re-use single-use masks.
- Discard single-use masks after each use and dispose of them immediately upon removal.

WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

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ANNEXURE O

Solid Waste Management Framework

Framework for Solid Waste Management

1. INTRODUCTION

Framework Solid Waste Management Plan for the development of Mingora SWMF is provided. Construction contractors may use this framework as guiding document for preparation of site specific solid waste management plan. The purpose of this Framework Solid Waste Management Plan is to ensure that wastes arising from the proposed construction works at Mingora SWMF are managed, reused, recovered or disposed of by a method that ensures the provisions of the KP EPA Act, 2014 and Pakistan Environmental Protection, 1997 and ADB SPS, 2009. It also ensures that the optimum levels of waste reduction, re-use and recycling are achieved.

Waste management priorities for project are based on following waste management hierarchy.

- Prevent material wastage
- Minimise the quantity of waste
- Reuse of site materials
- Recycling of waste
- Energy recovery
- Disposal

2. WASTE MANAGEMENT AT Mingora SWMF

2.1 National Level

Waste management of the project will be carried as per national rules including:

- Solid Waste Management Policy, 2000
- Requirements of KP EPA, 2014
- Draft Guidelines on Solid Waste Management, 2005.
- Section 11 of PEPA, 1997 prohibits discharge of waste in amount that violates the NEQS.
- Draft Hazardous Substances rule of 1999
- Section 132 of Cantonment Act, 1942
- Provision Contains in the Local Government Ordinance, 2001

2.2 Regional Level

- Asian Development Bank (ADB) SPS, 2009
- IFC guidelines for Solid Waste Management
- Best practices of waste management on construction sites

3. DESCRIPTION OF THE PROJECT

The proposed SWMF will be developed at Katwaro Maira, Mingora located at a distance of 4.4 km from the city center and 3.0 km away from National Highway at an elevation of approximately 3050 ft. (990m) above mean sea level (AMSL). The SWMF site is accessible from Mingora city via Haji Baba road then Katwaro Maira Road. The proposed SWMF will be developed on 8.25 acres of vacant land comprising of hilly patches. Mingora Landfill site is accessible through metaled road which is passing from congested and populated areas.

The development of the proposed SWMF is designed to support the WSSC Swat and other involved agencies, so as to completely transform the SWM system in Mingora., The project includes institutional strengthening of WSSCS, installation/upgradation of primary and secondary Municipal Solid Waste (MSW) collection systems and the development of an international standard MSW management facility that will accommodate Mingora's MSW for at least 10 years.

3.1 Details of the wastes to be produced

During construction/civil works potential sources of waste will include spoils generated during excavation, concrete and construction waste, domestic wastes (solid & wastewater), fuel or oil leakages or spills, onsite effluents from vehicle wash & cleaning, and cement spills. It is the responsibility of all personnel on site including Contractors, Sub-Contractors and their Employees to ensure compliance with this Waste Management Plan.

3.2 Main Waste Categories

Contractors are required to develop inventory of main waste categories that will be generated during construction phase of the project. Anticipated main waste categories include construction debris, concrete waste, scrap wood, bricks, concrete, asphalt, plumping fixtures, piping, insulation (asbestos and non-asbestos), metal scraps, oil, electrical wiring and components, chemicals, paints, solvents.

3.3 Anticipated Hazardous Waste Arising

Fuels stored on site that will be used during the construction phase are classed as hazardous. There will be fuel stored on site for machinery and construction vehicles. All fuel tanks and draw off points will be bunded. If the fuel is correctly contained and bunded, it is not expected that there will be any fuel wastage at the site. Other sources of hazardous waste include used paints, used oil/lubricants, electrical waste and chemicals. Project contractors are required to develop SOPs for handling, storage and disposal of hazardous waste arising from the project.

4. ESTIMATED WASTE GENERATION

4.1 Construction Waste Generation

Project contractors are required to develop and maintain waste inventory clearly showing the type, amount and location of waste generated from different activities at the site. Waste record keeping is key to successful implementation of waste management plan.

4.2 Proposed Waste Management Options

Waste will be segregated on site. Contractor will ensure that sufficient number of waste drums are placed at site with appropriate color coding. All recyclable waste will be handed over to recycling contractor. The appointed waste contractor will collect and transfer the recyclable wastes as receptacles are filled. The non-recyclable waste will be transferred by an authorized waste collector to an appropriate facility. Project contractors will identify both recycling and non-recycling contractor working in the project area. Contractors through bidding documents will be bound to hire such waste contractors for efficient waste management at project sites. A successful Waste Management Plan is largely dependent on how readily it can be integrated in to normal site operations by the person responsible. It is recognized that the plan should not be obstructive to site operations and the construction program by placing the responsibility of construction waste management with the Manager, all reuse, recycling, wastage and necessary disposal can be monitored as close to the source as possible. An Environmental Representative from each Works Sub-Contractor will also be nominated responsible for all waste management in their own operations. In this way, it is possible to identify where the greatest material wastage occurs, with a view to implementing better management.

The site Construction Manager will be designated as the Responsible Person and have overall responsibility for the implementation of the on-site Waste Management Plan. The Responsible Person will be assigned the authority to instruct all site personnel to comply with the specific provisions of the plan. At the operational level, a nominated Environmental Representative from each sub-contractor company on the site shall be assigned the direct responsibility to

ensure that the discrete operations stated in this framework for solid waste management are performed on an on-going basis.

4.3 Tracking and documentation procedures for off-site waste

The site construction Manager will maintain a copy of all waste collection permits. If waste (soil & stone) is being accepted on-site, a waste docket must be issued to the collector. If the waste is being transported to another site, a copy of the waste permit for that site must be provided to the manager. Record of waste collection docket, a receipt from the final destination of the material will be kept as part of the on-site waste management records. All information will be entered in a waste management system to be maintained on-site.

4.4 Disposal Waste

Contractors are required to develop SOP for disposal of recyclable, non-recyclable and hazardous waste generated at site. Food waste will be disposed at food waste pit which will be fenced. Recycling waste will be handed over to recycling waste contractor. Hazardous waste will be disposed through incineration facility available in close proximity of the project area. Workers on the site will be encouraged to recycle as much municipal waste as possible i.e. cardboard, plastic, metals and glass. Prior to removal, the municipal waste will be examined to determine if recyclable materials have been placed in other containers. If this is the case, effort will be made to determine the cause of the waste not being segregated correctly.

5. ESTIMATED COST OF WASTE MANAGEMENT

Contractors are required to estimate and budget cost for waste management through BOQ items. Such waste management cost should include cost of waste drums, cost of waste handling crew, cost of waste transportation, cost of EPA approved waste contractor services and associated incineration costs if any. By reusing materials on site, there will be reduction in transport and disposal costs for a waste contractor taking the material away.

6. TRAINING PROVISIONS FOR WASTE MANAGER AND SITE CREW

A waste manager will be appointed or designated by construction contractors to ensure commitment, operational efficiency and accountability during the project execution.

6.1 Site Manager Training and Responsibility

The waste manager will be given responsibility and authority to select a waste team if required i.e. members of the site crew that will aid him in the organization, operation and recording the waste management system implemented on-site. The waste manager will have overall responsibility to oversee record and provide feedback to the CSC on everyday waste management at the site. Authority will be given to the waste manager to delegate responsibility to sub-contractors where necessary and to co-ordinate with suppliers, service providers and sub-contractors to prioritize waste prevention and salvage. The waste manager will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on-site. He will also be trained in the best method for segregation and storage of recyclable materials, have information on the materials that can be reused on-site and know how to implement this Framework for Solid Waste Management.

6.2 Site Crew Waste Management Training

Training of the site crew is the responsibility of the waste manager and as such, a waste training program should be organized. A basic awareness course will be held for all crew to outline the construction waste management plan and to detail the segregation of waste at

source. This may be incorporated with other training needs (e.g. general site induction, safety training etc.). This basic course will describe the materials to be segregated, the storage methods and the location of the waste storage areas. A subsection on hazardous wastes will be incorporated and the particular dangers of each hazardous waste will be explained.

7. RECORD KEEPING

Records will be kept for each waste material which leaves the site, either for reuse on another site, recovery, recycling or disposal. A system will be put in place to record the construction waste arising on-site. The waste manager or delegate will record the following:

- Waste taken off-site for reuse
- Waste taken off-site for recovery
- Waste taken off-site for recycling
- Waste taken off-site for disposal
- Waste (soil & stone) accepted on-site for recovery

For each movement of waste off-site, a signed waste collection docket will be obtained by the waste manager (or delegate) from the contractor. This will be carried out for each material type. This system will also be linked with the delivery records. A signed waste acceptance docket will be issued for each movement of waste on-site.

8. OUTLINE WASTE AUDIT PROCEDURE

Contractors are required to develop SOP for waste auditing at the construction sites. Such SOP should reflect frequency and types of waste audits, audit criteria and way forward to close non-compliances.

8.1 Responsibility for Waste Audit

The appointed waste manager will be responsible for conducting a waste audit at the site during project execution.

8.2 Review of Records and Identification of Corrective Actions

A review of all the records for the waste generated and transported off-site, as well as waste accepted, should be undertaken. If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. Each material type will be examined in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved. Waste management costs will also be reviewed. Upon completion of the construction phase a final report will be prepared summarizing the outcomes of waste management processes adopted and the total recycling/reuse/recovery figures for the development.

9. CONSULTATION WITH RELEVANT BODIES

9.1 Local Authority

Project contractors are required to maintain close coordination with PMU, WSSC Swat and KP EPA to ensure that all available waste reduction, re-use and recycling opportunities are identified and utilized.

9.2 EPA Approved Waste Contractors

Companies that specialize waste management will be contacted to determine their suitability for engagement. If used, each company will be audited in order to ensure that relevant and

up-to-date waste collection permits and/or license are held. In addition, information regarding individual materials will be obtained including the feasibility of recycling each material, the costs of recycling/reclamation and the means by which the wastes will be collected and transported off-site, and the recycling/reclamation process each material will undergo off-site.

ANNEXURE P

Integrated Biodiversity Assessment Tool (IBAT) Screening Report

IBAT

Integrated Biodiversity Assessment Tool

PROXIMITY REPORT
MINGORA LANDFILL, KPCIP

Country: Pakistan

Location: [34.8, 72.4]

Date of analysis: 22 December 2020 (GMT)

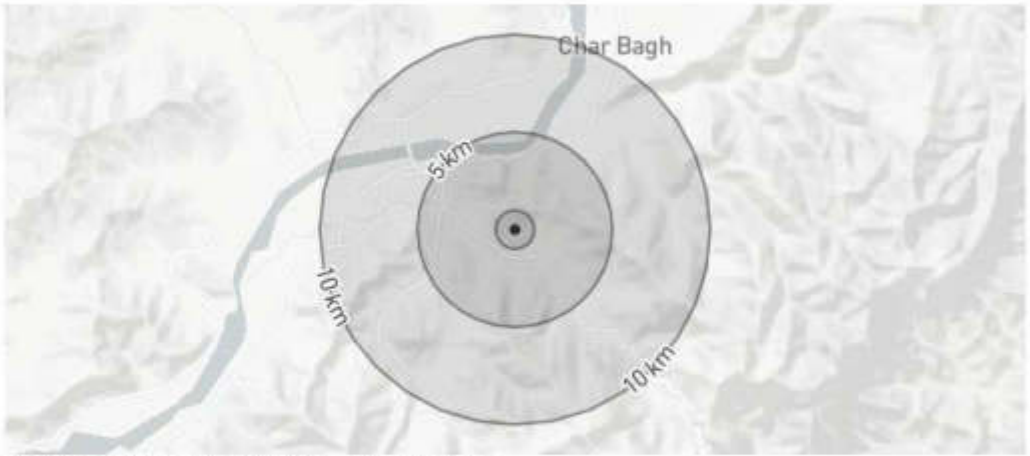
Buffers applied: 1 km | 5 km | 10 km

Generated by: Shazia Shahid

Organisation: ADB

Overlaps with:

Protected Areas	0
Key Biodiversity Areas	0
IUCN Red List	27



Displaying project location and buffers: 1 km, 5 km, 10 km

IBAT

About this report

This report presents the results of [1400-13062] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 1 km, 5 km, 10 km.

This report is one part of a package generated by IBAT on 22 December 2020 (GMT) that includes full list of all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a 'How to read IBAT reports' document.

Data used to generate this report

- UNEP-WCMC and IUCN, 2020. Protected Planet: The World Database on Protected Areas (WDPA)[On-line], Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net - December 2020.
- BirdLife International (on behalf of the KBA Partnership), 2020. Key Biodiversity Areas - October 2020.
- IUCN, 2020. IUCN Red List of Threatened Species - July 2020.

IBAT

Protected Areas

The following protected areas are found within 1 km, 5 km, 10 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

No protected areas within buffer distance

Key Biodiversity Areas

The following key biodiversity areas are found within 1 km, 5 km, 10 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

No KBAs within buffer distance

IUCN Red List of Threatened Species

The following threatened species are potentially found within 50km of the area of interest.

For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Vanellus gregarius	Sociable Lapwing	AVES	CR	Decreasing	Terrestrial
Gyps bengalensis	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
Sarcogyps calvus	Red-headed Vulture	AVES	CR	Decreasing	Terrestrial
Manis crassicaudata	Indian Pangolin	MAMMALIA	EN	Decreasing	Terrestrial
Moschus cupreus	Kashmir Muskdeer	MAMMALIA	EN	Decreasing	Terrestrial
Oxyura leucocephala	White-headed Duck	AVES	EN	Decreasing	Terrestrial, Freshwater

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Haliaeetus leucoryphus	Pallas's Fish-eagle	AVES	EN	Decreasing	Terrestrial, Freshwater
Neophron percnopterus	Egyptian Vulture	AVES	EN	Decreasing	Terrestrial, Freshwater
Aquila nipalensis	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
Falco cherrug	Saker Falcon	AVES	EN	Decreasing	Terrestrial, Marine, Freshwater
Tor putitora		ACTINOPTERYGII	EN	Decreasing	Freshwater
Panthera pardus	Leopard	MAMMALIA	VU	Decreasing	Terrestrial
Panthera uncia	Snow Leopard	MAMMALIA	VU	Decreasing	Terrestrial
Ursus thibetanus	Asiatic Black Bear	MAMMALIA	VU	Decreasing	Terrestrial
Wallago attu		ACTINOPTERYGII	VU	Decreasing	Freshwater
Bagarius yarrelli		ACTINOPTERYGII	VU	Decreasing	Freshwater
Anacyclus pyrethrum	Atlas Daisy	MAGNOLIOPSIDA	VU	Decreasing	Terrestrial
Catreus wallichii	Cheer Pheasant	AVES	VU	Decreasing	Terrestrial
Marmaronetta angustirostris	Marbled Teal	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Aythya ferina	Common Pochard	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Rynchops albicollis	Indian Skimmer	AVES	VU	Decreasing	Terrestrial, Freshwater
Clanga clanga	Greater Spotted Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
Aquila rapax	Tawny Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
Aquila heliaca	Eastern Imperial Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
Saxicola macrorhynchus	White-browed Bushchat	AVES	VU	Decreasing	Terrestrial
Ciconia episcopus	Asian Woollyneck	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Ovis vignei	Urial	MAMMALIA	VU	Decreasing	Terrestrial

IBAT

Recommended citation

IBAT Proximity Report. Generated under licence 1400-13062 from the Integrated Biodiversity Assessment Tool on 22 December 2020 (GMT). www.ibat-alliance.org

How to use this report

This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a "first-step", providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.

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ANNEXURE Q

Estimation of Leachate Leaking Effect on Ground Water Quality

Contents

Part 1: Problem statement

Sanitary landfills generally are constructed by placing wastes in excavations and covering the material daily with soil--thus the term "sanitary" to indicate that garbage and other materials are not left exposed to produce odours or smoke or attract vermin and insects. Even though a landfill is covered, leachate may be generated by the infiltration of precipitation and surface runoff. Fortunately, many substances are removed from the leachate as it filters through the unsaturated zone, but leachate may contaminate groundwater and even streams if it discharges at the surface as springs and seeps. This study aims at estimating the possible pathways through which the contamination may travel and contaminate ground water and identify the probably targets and estimates of contamination reaching those targets.

In the case of Mingora Landfill site (LFS), as per geotechnical investigation, the ground comprises of Lean Clay to Silty Clay up to a depth of 9m underlain by Poorly graded Sand to Silty sand with occasional Layers of Clayey Sand up to maximum investigated depth of 25.0 m below existing ground level. The groundwater table was encountered at the shallowest depth of 24 m below EGL in borehole 2 during site investigation in June 2020. However, one borehole revealed exceptionally shallow water table at 0.78 m possibly due to presence a small water pond.

Overall the soil can be considered as Silty Clay (CL-ML) up to 9m depth followed by Silty Sand (SM) up to the saturated strata (Groundwater) as a conservative estimate of Geology. Soil profile for different boreholes carried out during the geotechnical investigation is shown below in **Figure 1**.

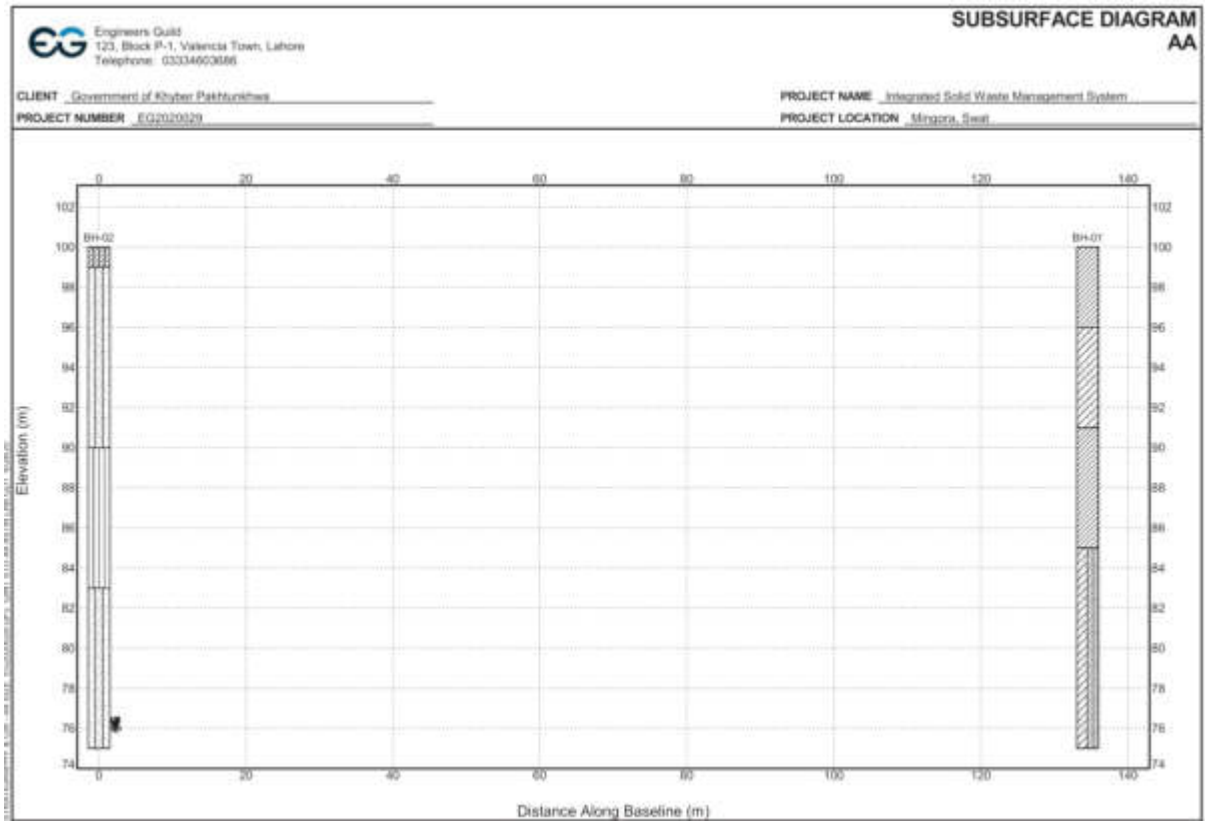


Figure 2: Soil Profile from Borehole logs

Two (2) storage cells are proposed by the designer of LFS in Mingora. A leachate leak from any of the storage cells may result in the contamination of the water table below the LFS. The

geology of the site is Silty Clay (Moderate to high permeability) overlaying Silty-Sand aquifer with high permeability. The water table, based on actual data from site as well as the surroundings of LFS, shows that the water table is sloping towards nearby tube wells and passes underneath the Labour Colony, Gulkada community and Waliabad Community. **Figure 2** below shows the location and water table depths at existing water tube wells at the site and in the surrounding of the LFS. The figure also shows the water table sloping from LFS towards the nearby tube wells i.e. Labour Colony Tube well, Gulkada No: 3 Tube well and Waliabad Hand pump site.

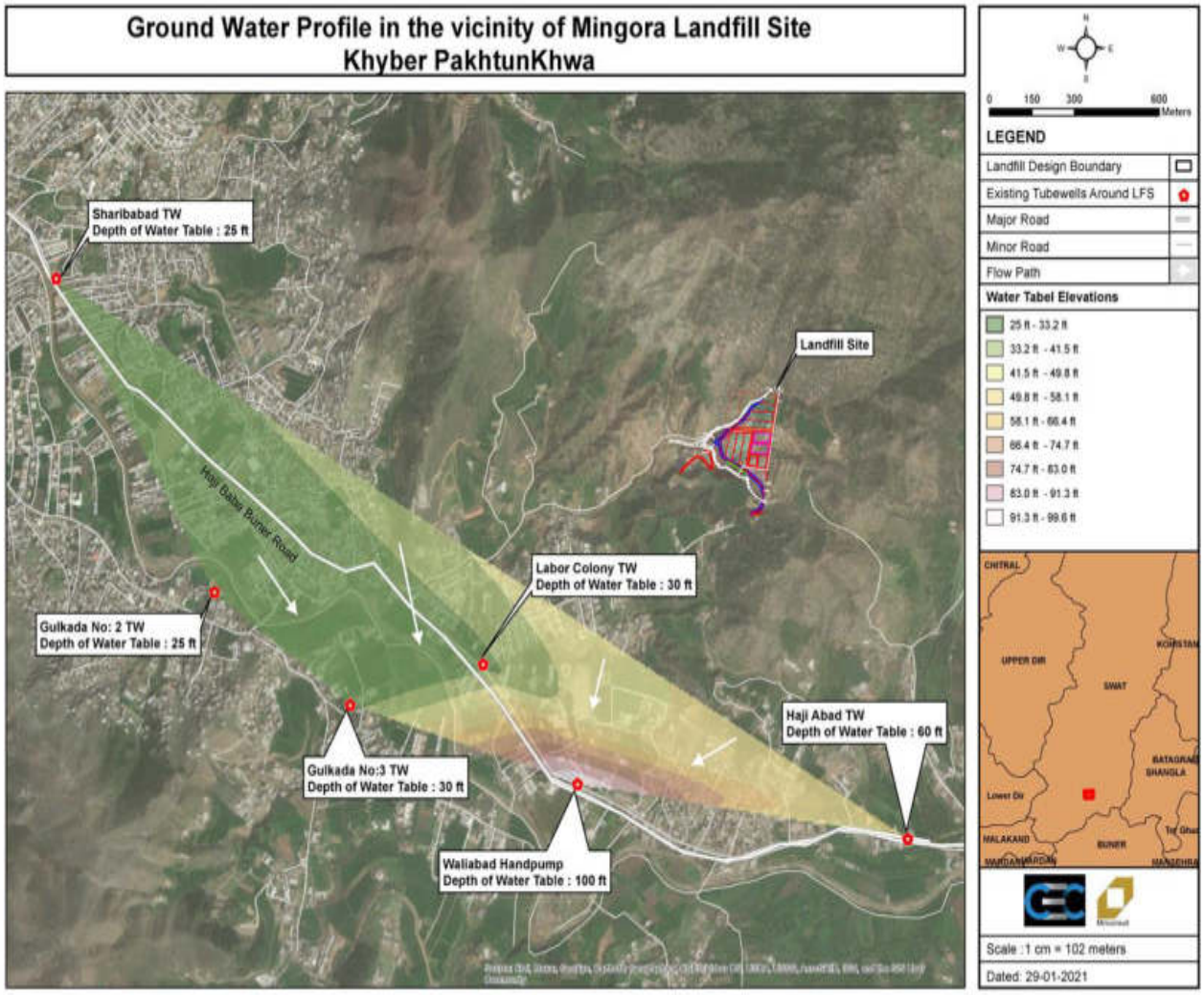


Figure 3: Location of tube wells and groundwater levels showing underground flow direction

Table 5: Data of existing water sources at and near LFS

S.No	Name of TW	Depth of Water Table (ft)	X	Y
1	Sharibadad TW	25	34.7691	72.368
2	Gulkada number 2 TW	25	34.7607	72.3743
3	Gulkada number 3 TW	30	34.7578	72.3797
4	Labour colony TW	30	34.759	72.3847
5	Waliabad Handpump	100	34.7558	72.3885
6	Haji Abad TW	60	34.7546	72.4013

As per **Figure 2** above, the nearest communities with respect to the proposed LFS is at risk in the direction of the flow are about 1000 Residential houses (Distance 750 to 1200m), Labour Colony (Distance 800m), and Jammi Masjid Rashagatta (Distance 1200m), Madina Public School (Distance 1275m) and AlAzher Educational Institute (Distance 1215m) all supplied by various tube well identified as Labour colony TW (Distance 1200m), Gulkada number 3 TW (Distance 1680m) and Waliabad Hand pump (Distance 1270m). The conceptual model as well as the pathway of the groundwater flow is shown below in **Figure 3** also. There are surface water sources within the reasonable distance in the direction of flow however the depth of water table is greater and they may remain largely unaffected unless there is spring flow due to the steep gradient of ground.

The schools and community taking water from the Labour colony TW (Distance 1200m), Gulkada number 3 TW (Distance 1680m) and Waliabad Hand pump (Distance 1270m) identified as target of possible breach in the case due to the direction of the groundwater flow. The water is also used to supply water for household use (including drinking) to nearby houses. Also, the water level is very deep in this case and contamination by Plant/vegetation uptake is unlikely in this case.

This report focuses on checking the source, identify transport mechanisms and potential targets affected by the contamination using a qualitative and quantitative risk assessment of the problem. The involve computation of contaminant concentration at the targets identified in a conceptual model, estimating the concentration at various target points. In the end, the remedial measures will be advised based on the analyses and any further data required will be identified.

Part 2: Conceptual model

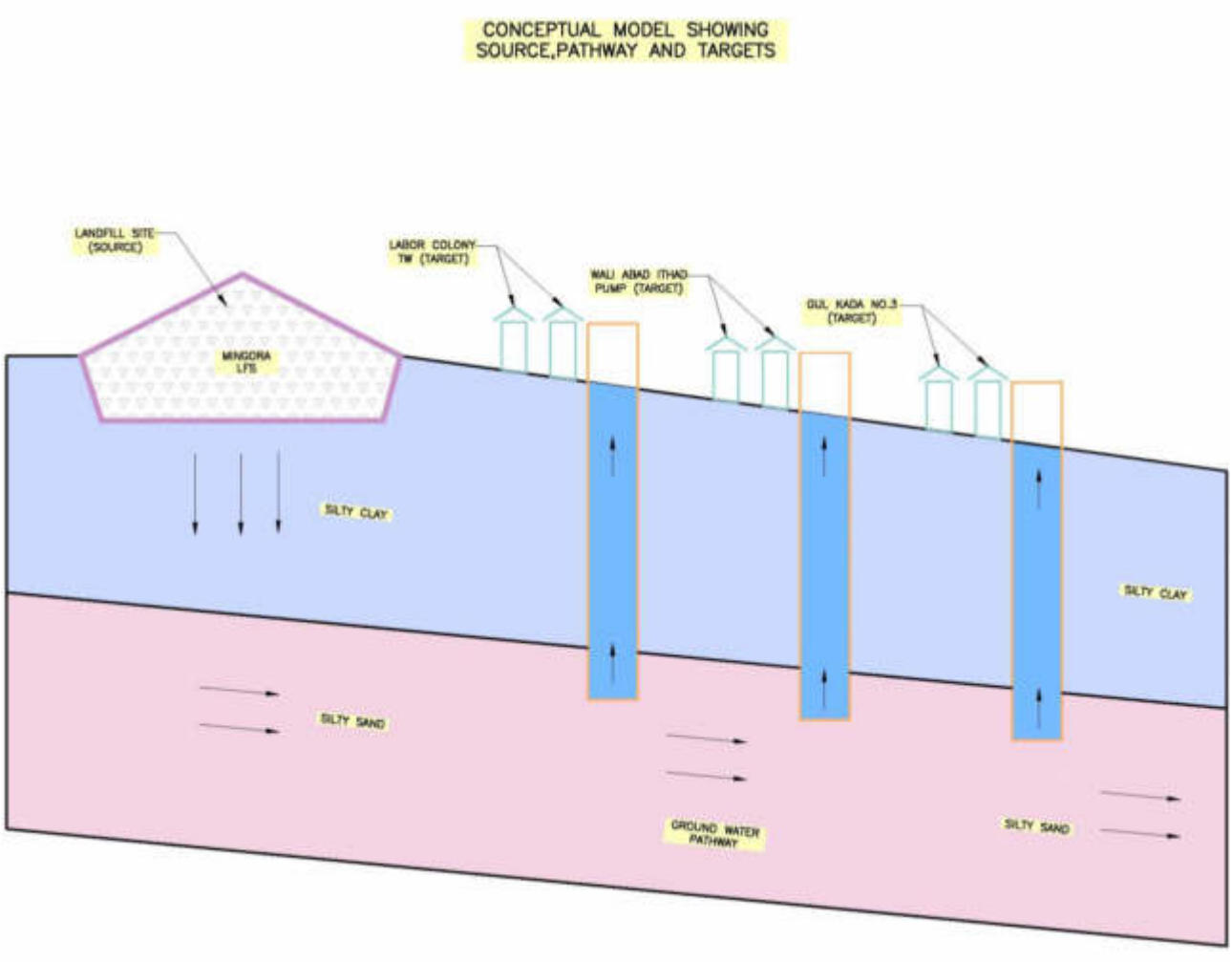


Figure 4: Conceptual model showing source, pathway, and targets

Part 3: Sources pathways and targets

The SPT (Sources, Pathway, Target) analysis of the site indicate the following Sources, Pathway and potential Targets

Source: Contamination leakage from Landfill cell in the form of leachate consisting of Biochemical contamination (details provided in landfill design document).

Pathway (s): Only one pathway was considered to be possible to carry the contamination in this case. The contamination of ground water and subsequent flow resulting in uptake by usage of water for drinking and washing by the community.

Target (s): The targets identified are the community of about 1000 Residential houses (Distance 750 to 1200m), Labour Colony (Distance 800m), and Jammi Masjid Rashagatta (Distance 1200m), Madina Public School (Distance 1275m) and AlAzher Educational Institute (Distance 1215m) all supplied by various tube well identified as Labour colony TW (Distance 1200m), Gulkada number 3 TW (Distance 1680m) and Waliabad Hand pump (Distance 1270m).

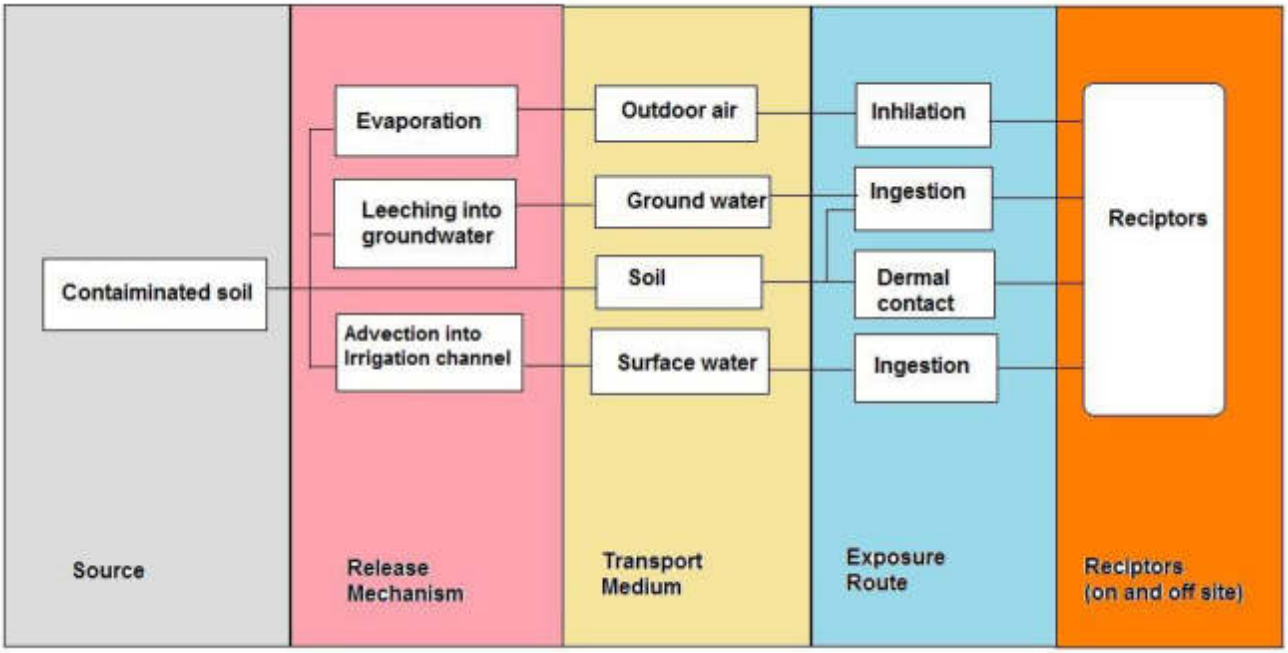


Figure 5: Transport and fate mechanisms for contaminant movement

Part 4: Qualitative risk assessment

The qualitative risk assessment for the study is described in the following steps:

- Step 1: Identification of Key Risks based on the data collection
- Step 2: Establishment of PI matrix to categorize different risks
- Step 3: Assigning PI to the agreed risks to calculate risk score from PI matrix
- Step 4: Ranking the risk scores to create a severity table and finalize ranks for different key risks

Step 1 Identification of Key Risks

Risk No	Description
1	Contamination of groundwater from leachate leaking cell
2	Contamination of surface water in the irrigation channel
3	Contamination uptake in drinking water by school and the town inhabitants
4	Evaporation of contaminant in the air to reduce air quality
5	Dermal contact while using water for washing and cleaning
6	Danger to the aquatic life in the area
7	Contamination uptake in vegetation and subsequent ingestion (eating)

Step 2 PI Matrix

Impact ↓					
Very High	Med. Risk	Med. Risk	High risk	High risk	High risk
Serious	Med. Risk	Med. Risk	Med. Risk	High risk	High risk
Moderate	Low risk	Med. Risk	Med. Risk	Med. Risk	High risk
Minor	Low risk	Low risk	Low risk	Med. Risk	Med. Risk
Insignificant	Low risk	Low risk	Low risk	Med. Risk	Med. Risk
Probability→	Very Low	Low	Medium	High	Very High

Step 3 Assigning PI to the agreed risks to calculate risk score from PI matrix

Risk No	Description	Impact	Probability	Risk score
1	Contamination of groundwater from leachate leaking cell	Serious	High	High
2	Contamination of surface water in the irrigation channel	Serious	Low	Low
3	Contamination uptake in drinking water by school and the town inhabitants	Very High	High	High
4	Evaporation of contaminant in the air to reduce air quality	Minor	Low	Low
5	Dermal contact while using water for washing and cleaning	Moderate	Medium	Medium
6	Danger to the aquatic life in the area	Minor	Low	Low
7	Contamination uptake in vegetation and subsequent ingestion (eating)	Insignificant	Low	Low

Step 4 Ranking the risk scores to create a severity table

Risk No	Description	Impact	Probability	Risk score	Rank
1	Contamination of groundwater from the leaking tank	Serious	High	High	1
3	Contamination uptake in drinking water by school and the town inhabitants	Very High	Very High	High	1
5	Dermal contact while using water for washing and cleaning	Serious	Medium	Medium	2
2	Contamination of surface water in the irrigation channel	Moderate	Medium	Low	3
4	Evaporation of contaminant in the air to reduce air quality	Minor	Low	Low	3
6	Danger to the aquatic life in the area	Minor	Medium	Low	3
7	Contamination uptake in vegetation and subsequent ingestion (eating)	Insignificant	Low	Low	3

The above risk analysis indicates that the contamination of groundwater from possible leakage of a storage cell may result in the uptake of contamination by the nearby community. Therefore, the possibility of contamination reaching the community, time taken to reach the community and the concentration at the target needs further investigation.

Part 5: Estimates of likely range of contamination at targets

The calculations for the estimates of likely range of contamination at targets and time travel are provided below:

i. Available data:

Soil conditions:

Silty Clay: 0 to 9m

Permeability K = 4.38 x 10^{-5} m/sec or 3.78 m/day,

Porosity n = 0.3 (Swiss Standard SN 670 010b, Characteristic Coefficients of soils, Association of Swiss Road and Traffic Engineers.)

Thickness = 9m from two boreholes

Silty Sand: 7m to Full depth

Permeability K = 1.39 x 10^{-4} m/sec or 12 m/day,

Porosity n = 0.49 (Das, B., Advanced Soil Mechanics. Taylor & Francis, London & New York, 2008.)

Thickness = Full depth estimated from tube well data and three boreholes

Aquifer:

Material Type = Sand

Permeability K = 30 m/day

Porosity n = 0.49

Thickness = Not determined (assumed to be greater than mixing depth on the conservative side)

Groundwater:

Water table elevations:

Name of TW	Depth of Water Table (m)
Sharibadad TW	8
Gulkada number 2 TW	8

Gulkada number 3 TW	9
Labour colony TW	9
Waliabad Handpump	30
Haji Abad TW	18

Landfill Cell:

Cell Area = 15000 m^2 (Cell 2, Max of all 2)

The base of contaminant tank = 10m below ground level

Irrigation channel:

Not identified in the area

Water supplies:

By Labour colony TW (Distance 1200m), Gulkada number 3 TW (Distance 1680m) and Waliabad Hand pump (Distance 1270m)

Population = 10000 people (Estimated) Includes Primary school, one Masjid, and Community of about 1000 Homes.

Flow rate = 0.08 m^3/sec (Estimated)

Distance from landfill site to Labour colony TW =1200m

Distance from landfill site to Gulkada number 3 TW =1680m

Distance from landfill site to Waliabad Hand pump = 1270m

Water consumption = 200 litres/person/day (includes, washing, drinking, cooking, toilets etc)

Water drinking = UNKNOWN

Boreholes locations:

Distance from landfill site to Labour colony TW =1200m

Distance from landfill site to Gulkada number 3 TW =1680m

Distance from landfill site to Waliabad Hand pump = 1270m

Calculating Co (Original Contaminant concentration at source from Leachate leak):

Rate of leakage = 592139 Kg/year

Permeability of aquifer = 30 m/day

Slope of water table

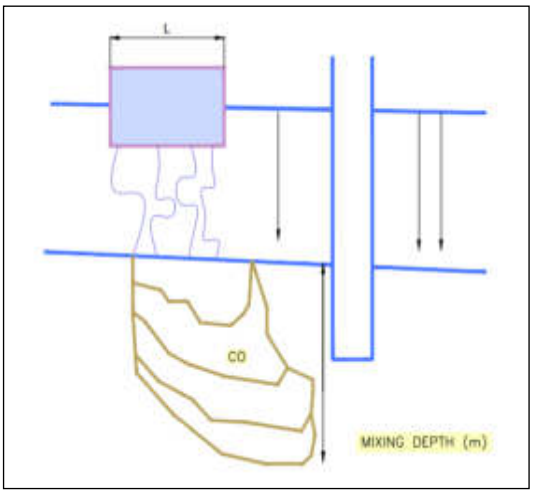
dh/dx Labour Colony TW and Waliabad handpump = 21/490 = 0.042 m/m

dh/dx Gulkada 3 TW and Waliabad handpump = 21/850 = 0.024 m/m

Average dh/dx = 0.033

Ground water flow rate Vd = -K * dh/dx = 30 * 0.033 = 0.99 m/day

Mixing depth $Z = (0.0112 * L^2)^{0.5} + b\ (1 - \exp[(-L * inf) /(K * dh/dx * b)]$ (equation 1)



Where

L = source length parallel to ground water flow = 10m

b = Aquifer thickness = 100m

inf = infiltration rate of rain = 0.0144 m/day

K = Hydraulic conductivity = 30 m/day

dh/dx = hydraulic gradient of water table = 0.033 m/m

Putting the values in equation 1 we get

Z = 12.03 m, Near 20m which is maximum usual thickness

Flow rate below the Cell Q = Vd * Z * Y m^3/day

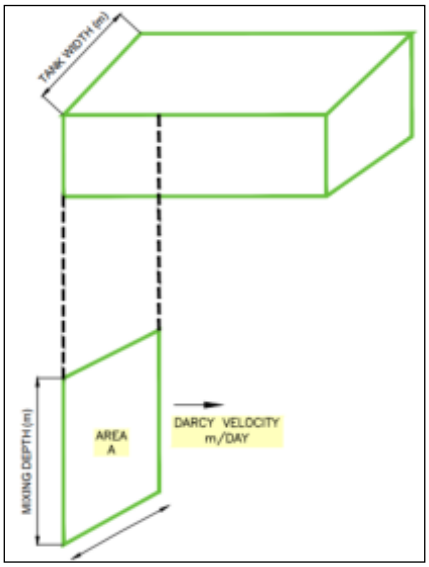
Where Y is width of the tank

Q = 0.033 * 12.03 * 100

Q = 119.09 m^3/day

Q = 43470 m^3/year

Contamination at source Co = amount lost per year / flow rate



Co = 13.62 Kg/m^3 Contamination per m^3 in water table just below source

ii. Using Ogata and banks equation to calculate contaminant concentration at various targets identified;

$C/Co = \frac{1}{2} \times ERFC [(x - (v/R_f)t)/(4(D/R_f)t)^{1/2}]$ → Ogata and banks equation with no biodecay

Note: error check was made for $[(x - vt)/(4Dt)^{1/2}] < 0$, and for negative values

ERFC (fx) = 1 + ERF (-fx) is used

Targets point identified for Ogata and banks equation is Tube wells at Labour colony TW (Distance 1200m), Gulkada number 3 TW (Distance 1680m) and Waliabad Hand pump (Distance 1270m)

First calculating dispersion coefficient for the contaminant

$D = \alpha_L \times v + D^*$

Where D^* = diffusivity of Leachate

$D^* = 0$ m^2/day (Assuming no diffusion is taking place – conservative estimate)

Flow path length L = True velocity × time

Time = 365 × 1 = 365 days

True velocity v = K × (dh/dx)/n

V = 2.03 m/day

L = 2.03 x 365 = 740 m

Therefore using equation

$\alpha_L = 0.83 (\log L)^{2.414}$

$\alpha_L = 10.57$ m

As

$D = \alpha_L \times v + D^*$

Putting the values we get

D = 21.45 m^2/day

Using Excel to solve Ogata and banks equation

Table 6: Input data for Otaga and Banks equation

Using excel to calculate the expected concentration of a contaminant at Labour colony TW (Distance 1200m), Gulkada number 3 TW (Distance 1680m) and Waliabad Hand pump (Distance 1270m) from a source I days after the source started emitting contamination based on the following data			
Inputs	Co	13.62	kg/m3
	K	30	m/day
	dh	3.33	m
	dx	100	m
	porosity	0.49	
	D, Dispersion Coefficient	21.45	

	x, Distance from Source	1200, 1270 and 1680	m
Calculations			
	Darcy Velocity	0.999	m/day
	v, True Velocity	2.03877551	m/day

Table 7: Contaminant concentration at the tube well location at Labour colony TW (Distance 1200m), Gulkada number 3 TW (Distance 1680m) and Waliabad Hand pump (Distance 1270m) from the landfill site

Time t (days)	Containment concentration C at Labour colony TW (Distance 1200m), (kg/m3)	Containment concentration C at Gulkada number 3 TW (Distance 1680m), (kg/m3)	Containment concentration C at 575m, (kg/m3)
20	0.00	0.00	0.00
40	0.00	0.00	0.00
60	0.00	0.00	0.00
80	0.00	0.00	0.00
100	0.00	0.00	0.00
120	0.00	0.00	0.00
140	0.00	0.00	0.00
160	0.00	0.00	0.00
180	0.00	0.00	0.00
200	0.00	0.00	0.00
220	0.00	0.00	0.00
240	0.00	0.00	0.00
260	0.00	0.00	0.00
280	0.00	0.00	0.00
300	0.00	0.00	0.00
320	0.00	0.00	0.00
340	0.00	0.00	0.00
360	0.00	0.00	0.00
380	0.01	0.00	0.00
400	0.02	0.00	0.00
420	0.07	0.00	0.01
440	0.19	0.00	0.05
460	0.42	0.00	0.12
480	0.84	0.00	0.29

Time t (days)	Containment concentration C at Labour colony TW (Distance 1200m), (kg/m3)	Containment concentration C at Gulkada number 3 TW (Distance 1680m), (kg/m3)	Containment concentration C at 575m, (kg/m3)
500	1.48	0.00	0.59
520	2.38	0.00	1.09
540	3.51	0.00	1.82
560	4.81	0.00	2.78
580	6.21	0.01	3.94
600	7.60	0.03	5.25
620	8.89	0.07	6.61
640	10.03	0.16	7.94
660	10.99	0.32	9.17
680	11.75	0.58	10.24
700	12.33	0.98	11.14
720	12.75	1.55	11.85
740	13.05	2.29	12.39
760	13.26	3.20	12.79
780	13.40	4.25	13.08
800	13.48	5.39	13.27
820	13.54	6.57	13.40
840	13.57	7.74	13.49
860	13.59	8.84	13.54
880	13.60	9.83	13.57
900	13.61	10.69	13.59
920	13.62	11.41	13.60
940	13.62	11.99	13.61
960	13.62	12.45	13.62
980	13.62	12.80	13.62
1000	13.62	13.05	13.62
1020	13.62	13.24	13.62
1040	13.62	13.37	13.62

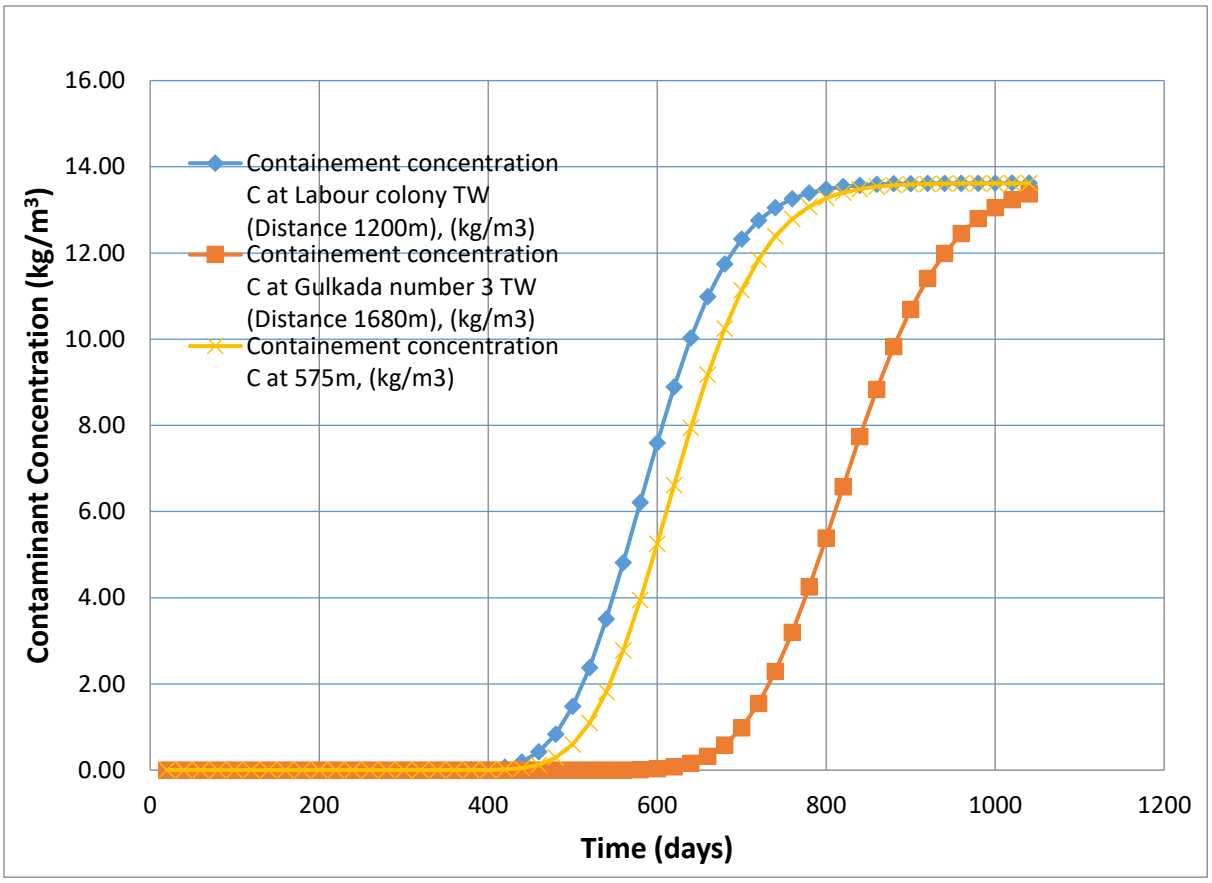


Figure 6: Contaminant concentration at Labour colony TW (Distance 1200m), Gulkada number 3 TW (Distance 1680m) and Waliabad Hand pump (Distance 1270m)

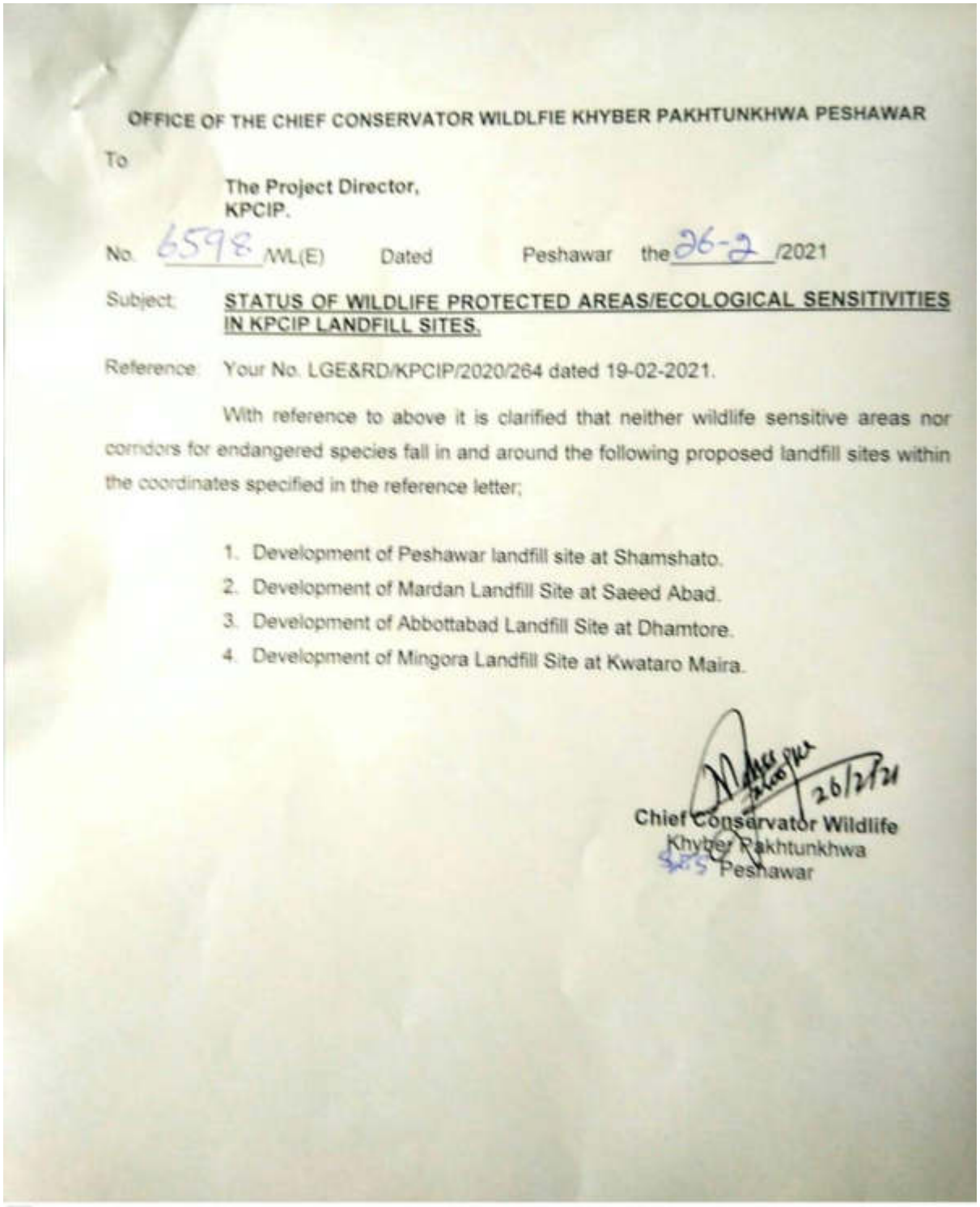
Part 6: Conclusions and Recommendations

- The hydrogeological analysis was based on a very conservative estimate of contaminant movement through strata considering no bio decay, diffusion or retardation is occurring to model worst-case scenario.
- Based on analysis, It will take a total of **380 Days** for contamination to start appearing at the nearest tube well located in the direction of flow at the Labour colony TW, Distance 1200m away from the landfill site.
- Once the contamination start appearing in the water supply from the tube well it will take about 540 more days to reach full concentration.
- Under part 2a of section 57 (Environmental Protection Act 1990, UK Guidance) as the amount of contamination is below the guidelines values for contamination the part of the land cannot be described as contaminated land here.
- However, there is a significant chance of harm if the amount of groundwater flow reduces or the contamination level increases above the current levels. Therefore it is recommended to use observation boreholes to monitor groundwater quality and also additional checks should be made on monthly basis by collecting water samples from the nearest tube well for detection of any contamination.

- The leachate discharge should be measured on regular basis to indicate barrier breach from loss of leachate.

ANNEXURE R

Letter from KPK Wildlife Department



OFFICE OF THE CHIEF CONSERVATOR WILDLFIE KHYBER PAKHTUNKHWA PESHAWAR

To

The Project Director,
KPCIP.

No. 6598 /WL(E) Dated Peshawar the 26-2 /2021

Subject: **STATUS OF WILDLIFE PROTECTED AREAS/ECOLOGICAL SENSITIVITIES IN KPCIP LANDFILL SITES.**

Reference: Your No. LGE&RD/KPCIP/2020/264 dated 19-02-2021.

With reference to above it is clarified that neither wildlife sensitive areas nor corridors for endangered species fall in and around the following proposed landfill sites within the coordinates specified in the reference letter;

1. Development of Peshawar landfill site at Shamshato.
2. Development of Mardan Landfill Site at Saeed Abad.
3. Development of Abbottabad Landfill Site at Dhamtore.
4. Development of Mingora Landfill Site at Kwataro Maira.

26/2/21

Chief Conservator Wildlife
Khyber Pakhtunkhwa
Peshawar