

I/154168/2023(2)

**HARYANA STATE POLLUTION CONTROL BOARD**  
**C-11 Sector-6, Panchkula**  
**Website – www.hspcb.gov.in E-Mail :hspcb-solidwaste@gmail.com**  
**Ph:0172-2577870-873**

To

The Member Secretary,  
State Environment Impact Assessment Authority, Haryana  
Bays No. 55-58, 1st Floor, Prayatan Bhawan,  
Sector-2, Panchkula.

**Sub: Proceeding of the Public Hearing for project requiring clearance under Environmental Impact Assessment Notification, 14th September, 2006 (as amended) for Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of "Sanitary Landfill" at Village Meghpur Palwal Haryana by Municipal Council Palwal on dt. 04.01.2023 at 11:30 AM.**

Kindly refer to the subject noted above.

In this connection, I have been directed to enclose herewith the proceeding of the Public Hearing (in original) conducted on dt. 04.01.2023 at the project site under Environment Impact Assessment Notification dated 14.09.2006 for the purpose of obtaining Environment Clearance under the provision of EIA notification dated 4.09.2006 proposed for Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of "Sanitary Landfill" at Village Meghpur Palwal Haryana by Municipal Council Palwal alongwith pen drive of video recording, photographs, attendance sheet and project report for information and further necessary action please.

**DA/As above.**

**Sr. Env. Engineer (HQ)**  
**For Member Secretary**

**Endst.**

A copy of the above is forwarded to the following for information & further necessary action please:-

1. Sr. EE (IT) HSPCB, for uploading the proceeding on website of the Board.
2. Regional Officer, Palwal w.r.t his letter no. HSPCB/PAL/2022/1764 dated 30.01.2023 . Further, He is advised not to repeat the delay in future for sending the proceeding of public hearing, as in this case the time schedule of 08 days as prescribed in EIA notification dated 14.09.2006 has not been followed by you.
3. M/s Patheya RZA-15/9 Gurudwara Road, Mahavir Enclave Dabri Palam Road, New Delhi-110045.

**DA/as above**

I/154168/2023(2)

Sr. Env. Engineer (HQ)  
For Member Secretary

Signed by Satinder Pal  
Date: 22-02-2023 13:26:29  
Reason: Approved



Regional Office, Palwal Region  
 Haryana State Pollution Control Board  
 II- Floor, HSVP Office Complex, Near  
 Gymkhana Club, Sector-12, Palwal  
 Website – [www.hspcb.gov.in](http://www.hspcb.gov.in) E-Mail - [hspcbropal@gmail.com](mailto:hspcbropal@gmail.com)



No. HSPCB/PAL/2022/1764

Dated: 30/01/2023

To

The Chairman,  
 Haryana State Pollution Control Board,  
 Panchkula, Haryana

Kind Attention: Sr. Environment Engineer- Coordination Cell (HQ)


**Sub: Proceedings of the Public Hearing for Project requiring clearance under Environmental Impact Assessment Notification, 14<sup>th</sup> September, 2006 (as amended) for Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of "Sanitary Landfill" at Village Meghpur Palwal Haryana by Municipal Council Palwal on 4/01/2023 at 11:30 AM.**

Kindly refer to the subject noted above.

In this regard, please find enclosed herewith the duly signed proceedings of the Public Hearing for Project requiring clearance under Environmental Impact Assessment Notification, 14th September, 2006 (as amended) for Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of "Sanitary Landfill" at Village – Meghpur, Palwal, Haryana by Municipal Council, Palwal on 04/01/2023 at 11:30 AM, under chairmanship of Smt. Neha Singh, IAS, Deputy Commissioner, Palwal on 04.01.2023 at 11:30 AM. The original proceedings with two photo copies, two sets video recording (Pen drive), two sets of Photo albums, copies of attendance register and Annexure's are also attached for further submission to Competent Authority for approval.

Submitted for kind information, and further necessary action, please.

DA: As Above

  
 Regional Officer  
 Palwal Region

(R)

2661790/2023/Estt.Br

Proceedings of the Public Hearing for Project requiring clearance under Environmental Impact Assessment Notification, 14<sup>th</sup> September, 2006 (as amended) for Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of "Sanitary Landfill" at Village Meghpur Palwal Haryana by Municipal Council Palwal on 4/01/2023 at 11:30 AM.

Please find enclosed herewith the Proceedings of the Public Hearing for Project requiring clearance under Environmental Impact Assessment Notification, 14<sup>th</sup> September, 2006 (as amended) for Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of "Sanitary Landfill" at Village Meghpur Palwal Haryana by Municipal Council Palwal, for kind approval please.

1/24/01/2023  
Regional Officer, HSPCB

Ld Deputy Commissioner, Palwal

  
30/01/2023

RO, HSPCB



Proceedings of the Public Hearing

**Proceedings of the Public Hearing for Project requiring clearance under Environmental Impact Assessment Notification, 14<sup>th</sup>September, 2006 (as amended Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of "Sanitary Landfill" at Village Meghpur Palwal Haryana by Municipal Council Palwal on 4/01/2023 at 11:30 AM.**

It is submitted for your kind information and further necessary action please.

DA :-

1. Copy of attendance sheet of public present during the hearing.
  2. Copy of attendance sheet of officer's present during the hearing.
  3. Soft copy (CD) of proceedings of hearing.
  4. Photographs of the hearing.
- . Approved copy of proceeding of hearing by Ld. DC, Palwal.

The above project is required to obtain the Environmental Clearance as this project is covered under amended EIA Notification dated 14<sup>th</sup>September, 2006 of the Ministry of Environment and Forest, Govt. of India, New Delhi. The project proponents have applied for the Environmental Clearance to SEAC Haryana, Government of India and requested to conduct a public hearing. In this regard, an advertisement regarding public hearing notice for publication in leading Hindi and English Newspaper was published by Haryana State Pollution Control Board. The public hearing was conducted on dated 04/01/2023 under the chairmanship of Smt. Neha Singh IAS, Deputy Commissioner, Palwal, Haryana and alongwith other officers from respective departments. The attendance sheets of the officers and general public who attended the above said hearing are enclosed as Annexure-A & B. The CDs of videography of the entire public hearing are enclosed as **Annexure-C**.

**The following officers were present in the public hearing meeting.**

1. Smt. Neha Singh IAS, Deputy Commissioner, Palwal
2. Sh. Hitesh Kumar Meena, Additional Deputy Commissioner, Palwal
3. Sh. Vijay Chaudhry, Regional Officer, HSPCB, Palwal
4. Sh. MahenderSingh XEN Municipal Council Palwal
5. Sh. Satpal Singh Executive Engineer Municipal Council Palwal
6. Sh. Vinod Singh Municipal Engineer Municipal Council Palwal

Sh. Vijay Chaudhry, Regional Officer, Haryana State pollution Control Board, Palwal welcome the Deputy Commissioner, Palwal with all other officers & general public present during the hearing and thereafter sought permission from the Chairman to start the Public Hearing. He briefed about the EIA notification dated 14.09.2006 and process of Public Hearing. He also requested the public to speak one by one and put up their question after the presentation of project and assured the public that their

questions will be answered by the Project Proponents. Thereafter he asked the Project Proponent to give presentation of project.

Environmental Consultant Dr. Dharna Tiwari (EIA coordinator) presented the case and explained about the proposed Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of "Sanitary Landfill" project as detailed below:

Municipal Council the "Authority" intends for Implementation of Remediation and construction, operation and maintenance of Sanitary Landfill at Village Meghpur Palwal Dumpsite ("Sanitary Landfill Site"). As per the current estimates (2021) of the Municipal Council Palwal, about 100 tons of solid waste is generated daily in Palwal. The main solid waste generation sources are residential, commercial, food markets, religious place and street sweeping.

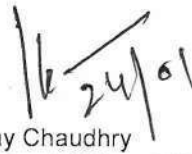
**After the completion of Presentation by Environmental Consultant Regional Officer, HSPCB asked the general public to raise their Queries/ suggestion which are given as below:**

S. No.	Name	Village	Question	Reply
1	Dr. Bhagwan Singh	Lambardar Meghpur District Palwal	Plantation should be there at the shamshan ghat which is the part of the land of the Proposed Project at Palwal.	Consultant replied that trees will be planted under prescribed area which will cover ~30% (2.7 acre) of total proposed project area under plantation. The proposed vegetative cover shall comprise trees and shrubs that improve the visual and aesthetic appearance of the site.
2	Sh. Vijay Chaudhry	RO HSPCB Palwal	What mitigation measures should be adopted to control air pollution.	Consultant replied that ❖ Regular sprinkling of water shall be done in the project area to suppress the dust. ❖ Internal roads will be concreted / asphalted to reduce dust emissions; ❖ Thick green belt will be provided along the internal roads and plant boundary which will limit the spread of dust and odour; ❖ Proper gas management plan. ❖ Post closure monitoring of ambient air quality at site should be undertaken as per the requirements of MSW Rules, 2016
3	Sh. Vijay Chaudhry	RO HSPCB Palwal	How will you manage the biodegradable waste. How the leachate will be managed at site.	The proposed project is to manage the existing legacy waste via sanitary landfill composting. MRF. Following processes will be adopted like composting for biodegradable waste,


				<p>sanitary landfill for inerts at site and handover the RDF &amp; Recycling material to the appropriate vendor.</p> <p><b>Leachate Management</b> Approx. 2 KLD leachate will be generated in the operation phase which will be treated in leachate treatment plant of 5 KLD capacity.</p>
4	Sh. Ravindra	VPO Meghpur District Palwal	What will be the measures for air and water Pollution.	<p>Consultant replied about air and water pollution.</p> <p><b>AIR QUALITY MITIGATION MEASURES</b></p> <ul style="list-style-type: none"> <li>❖ Regular sprinkling of water shall be done in the project area to suppress the dust.</li> <li>❖ Internal roads will be concreted / asphalted to reduce dust emissions;</li> <li>❖ Thick green belt will be provided along the internal roads and plant boundary which will limit the spread of dust and odour;</li> <li>❖ Proper gas management plan.</li> <li>❖ Post closure monitoring of ambient air quality at site should be undertaken as per the requirements of MSW Rules, 2016.</li> </ul> <p><b>NOISE QUALITY MITIGATION MEASURES.</b></p> <p>Acoustic enclosures, rubber paddings and linings will be provided for all noise producing equipment's such as shredders, DG sets etc. ❖ Proper plantation will be done in barrier of project site.</p> <ul style="list-style-type: none"> <li>❖ Proper maintenance of machineries such as diesel and exhausts silencers, lubrication of conveyer trolleys, etc.</li> <li>❖ Working hours of the workers employed in high noise areas will be rotated; ❖ Earplugs/muffs, or other hearing protective wear will be provided to those working very close to the noise generating machinery; ❖</li> </ul>

				Periodic monitoring of noise levels on site and at nearby receptors will be carried out to ensure compliance with Noise Pollution (Regulation & Control) Rules 2000.
5	Sh. Gyaanchand	VPO Meghpur District Palwal	Pond Rejuvenation	There is presence of pre cast boundary around the pond, the pond can be fully utilized for animals in summer season. The proposed project will not impact the pond and full mitigation measures shall be adopted for the same.

Thereafter, Regional Office, HSPCB, Palwal again appealed to the general public present during the time of hearing to ask any more questions/suggestions w.r.t. the said project. No more question/suggestion asked by the public present during hearing and thereafter public hearing was ended with permission of the chair.

  
Vijay Chaudhry  
Regional Officer, HSPCB

Ld Deputy Commissioner, Palwal

  
30/01/2023





















2661790/2023/Estt.Br



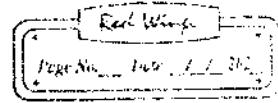






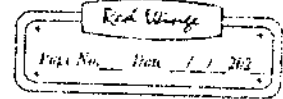




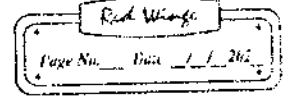


Sy. No.	Name	Address	Mobile No.
1	रवि	मेथपुर	9998626990
2	सतीश	पलवल	
3	जगदीश	पलवल	
4	Robin	Palwal	7988751218
5	Ankit	Palwal	9711109280
6	हरिभद्र	मेथपुर	
7	रामेश्वर	पलवल	8901584499
8	Harkesh	मेथपुर	9728668427
9	रवि	पलवल	9728906922
10	संजय वरुणा	पलवल	9518184064
11	जगदीश	दीदी	9050691714
12	Sachin	मेथपुर	9350880986
13	Bhagwat	meethpur	9817507281
14	शोभा	मेथपुर	
15	पुष्पा	मेथपुर	

16. सुरेश कुमार 9812601533 मेघपुर
17. Anamchand Megh Pur 8683 959733
18. मीरा रानी मेघपुर 8278 57120
19. सुनील सिंह मेघपुर 9991 550499
20. राजेश कुमार मेघपुर 9024 809602
21. Sanjay Aalwal 9812 366123
22. Shakuntla Meghpur
23. Savita Meghpur
24. Babita "
25. Anokhi "
26. Rajbati "
27. Kamlesh "
28. Manjit "
29. Rajan "
30. Buliya "



31.	Rajesh	-	Meghpur	
32	Sharda	-	Meghpur	
33.	Mohran	-	Meghpur	
34	Bhura		Patna	9050508920
35	Omkar		Patna	9093298900
36	Dharma Tiwari		Gurgaon	9891544829
37	Ravinder		Meghpur	8708434930
38	Nidhi		delhi	
39	Rajesh -		Meghpur -	8860076103
40	Kuldeep		Meghpur	9812273109
41	Pawan		Meghpur	
42				
43				
44				
45				

4/01/2023

1. Smt. Neha Singh I.A.S. D.C. Palwal - ~~12~~
2. Sh. Hitesh Kumar I.A.S. A.O.C. cum AM.C. Palwal ~~12~~
3. Vijay Choudhary, R.O, HSPER Palwal - ~~12~~

**Executive Summary in (Hindi)**

*For*

**Remediation and Reclamation and  
construction, operation and maintenance  
of Sanitary Landfill**

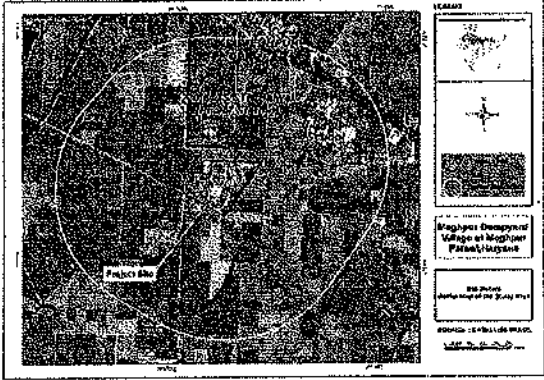
at

**Meghpur village, Palwal, Haryana,  
("Sanitary Landfill Site").**

## कार्यकारी सारांश

<p>परियोजना का परिचय (Introduction of the Project)</p>	<p>नगर परिषद "प्राधिकरण" मौजूदा डंपसाइट के सुधार और सुधार के कार्यान्वयन और गांव मेघपुर पलवल, हरियाणा ("स्वच्छता लैंडफिल साइट") में सेनेटरी लैंडफिल के निर्माण, संचालन और रखरखाव का इरादा रखता है।</p> <p>MCP एमसीपी के वर्तमान अनुमान (2021) के अनुसार, 100 टीपीडी कचरा उत्पन्न हो रहा है जिसमें आवासीय, वाणिज्यिक, धार्मिक, खाद्य बाजार और सड़क पर सफाई करने वाला कचरा शामिल है।</p> <p><b>परियोजना की आवश्यकता और क्षेत्र के लिए इसका महत्व (Need of Project and its Importance to Region)</b></p> <p>खुले क्षेत्रों में ठोस कचरे का संचय एक आंखों की रोशनी, घटती अचल संपत्ति और संपत्ति के मूल्य, कीड़ों और अन्य वैक्टर (चूहों और चूहों, जंगली और पालतू जानवरों, साथ ही साथ दूषित कचरे के संपर्क में आने वाले मनुष्यों) के लिए एक प्रजनन स्थल है। यह गंध उपद्रव का भी कारण बनता है, समुदाय की असंगठित प्रकृति को दर्शाता है और बढ़ते बच्चों के लिए खराब वातावरण बनाता है। नगरीय ठोस अपशिष्ट के उचित प्रबंधन के लिए कोई योजना नहीं होने के कारण अनुचित और असंगठित निपटान के कारण मनुष्यों और जानवरों के बीच संचारी और गैर-संचारी दोनों तरह के घातक रोग हो गए। म्युनिसिपल सॉलिड वेस्ट मैनेजमेंट ठोस कचरे के उत्पादन, भंडारण, संग्रह, परिवहन, उपचार और निपटान के नियंत्रण से संबंधित है जो सार्वजनिक स्वास्थ्य, अर्थशास्त्र, इंजीनियरिंग, संरक्षण, सौंदर्यशास्त्र और अन्य पर्यावरणीय विचारों के सर्वोत्तम सिद्धांतों के अनुरूप है। नगरपालिका ठोस अपशिष्ट के वर्तमान डंपिंग में सुधार के लिए स्थिति में सुधार के लिए उचित उपचार किया जाएगा। प्रस्तावित स्थल पर कंपोस्टिंग, सैनिटरी लैंडफिल जैसी निम्नलिखित प्रक्रियाएँ</p>
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	अपनाई जाएंगी और उपयुक्त विक्रेताओं को आरडीएफ और रीसाइक्लिंग सामग्री सौंप दी जाएगी।
परियोजना विवरण (Project description)	<p><b>परियोजना का प्रकार (TYPE OF PROJECT)</b></p> <p>प्रस्तावित परियोजना आइटम 7 (i) (सामान्य नगर ठोस अपशिष्ट प्रबंधन सुविधाएं) के अंतर्गत आती है और अनुसूची के तहत एक निर्दिष्ट परियोजना है और 14 सितंबर, 2006 की पर्यावरण प्रभाव आकलन (ईआईए) अधिसूचना के कारण श्रेणी बी के अंतर्गत आती है और मंजूरी की आवश्यकता है राज्य पर्यावरण प्रभाव आकलन प्राधिकरण से (एसईआईएए)।</p> <p><b>अपशिष्ट मात्रा (WASTE QUANTITY)</b></p> <p>MCP एमसीपी के वर्तमान अनुमान (2021) के अनुसार, 100 टीपीडी कचरा उत्पन्न हो रहा है जिसमें आवासीय, वाणिज्यिक, धार्मिक, खाद्य बाजार और सड़क पर सफाई करने वाला कचरा शामिल है।</p>
साइट सेटिंग (Site Setting)	<p>साइट पूर्व उत्तर पूर्व (ENE) दिशा की ओर सोहना-पलवल रोड के करीब है। निकटतम रेलवे स्टेशन पलवल रेलवे स्टेशन है - पूर्व दिशा (E) में 4.58 किमी। आईजीआई हवाई अड्डा 46.13 किमी एनएनडब्ल्यू दिशा (NNW) में निकटतम हवाई अड्डा है।</p> <p><b>परियोजना स्थल का उपग्रह दृश्य (Satellite view of the Project Site)</b></p>  <p>जिले में मिली नदी की रेत फरीदाबाद और पलवल यमुना नदी और उसकी सहायक</p>

<p>नदियों द्वारा हिमालय से ऊपर की ओर से लाए गए नदी के निक्षेपों के जलोढ़ तलछट हैं, जिनकी मूल भूमि के आधार पर परिवर्तनशील मोटाई होती है, जिस पर निक्षेपण हुआ था। नदी की रेत यमुना नदी द्वारा जमा की गई स्वच्छ रेत का सबसे हालिया जमा है और हर साल फिर से काम किया जा रहा है</p>			
क्रमांक	मानदंड	मानदंड दूरी	प्रस्तावित एसएलएफ साइट से उपलब्ध दूरी
1	निकटतम नदी से दूरी	100 मीटर	यमुना नदी - पूर्व दिशा (East) में 17.96 किमी
2	निकटतम तालाब से दूरी	200 मीटर	0.87 किमी in WNW दिशा
3	निकटतम राजमार्ग से दूरी (NH-2)	200 मीटर	SH-22A: 2.23 किमी in East दिशा NH-2 (Delhi-Kolkata Highway): 2.74 किमी in ENE दिशा
4	निकटतम बस्ती से दूरी	200 मीटर	ककराली गांव - 1.05 किमी WNW दिशा
5	निकटतम सार्वजनिक पार्कों से दूरी	200 मीटर	हुडा पार्क Huda Park - 1. किमी in ENE दिशा
6	निकटतम जल आपूर्ति कुओं से दूरी	200 मीटर	-
7	निकटतम हवाई अड्डों/एयरबेस से दूरी	20 किमी	आईजीआई हवाई अड्डा IGI Airport - 46.13 किमी in NNW दिशा
क्षेत्र में पर्यावरण सेटिंग (Environment Setting in area)			

<p><b>भूमि की आवश्यकता (Land requirement)</b></p>	<p>प्रस्तावित परियोजना 1 वर्ष के लिए 9.1 एकड़ के कुल क्षेत्रफल में 100 टीपीडी एसडब्ल्यूएम की सेनेटरी लैंडफिल सुविधा के रखरखाव के लिए है। साइट पूर्व उत्तर पूर्व (ENE) दिशा की ओर सोहना-पलवल रोड के करीब है। निकटतम रेलवे स्टेशन पलवल रेलवे स्टेशन है - पूर्व दिशा (E) में 4.58 किमी। आईजीआई हवाई अड्डा 46.13 किमी एनएनडब्ल्यू दिशा (NNW) में निकटतम हवाई अड्डा है।</p>
<p><b>आधारभूत पर्यावरण की स्थिति (Baseline Environmental Conditions)</b></p>	
<p>प्रस्तावित स्थल के 10 किमी के दायरे में और वर्तमान पर्यावरणीय परिदृश्य के लिए आधारभूत डेटा प्रदान करने के लिए पर्यावरणीय प्रभाव आकलन (ईआईए) अध्ययन के अक्टूबर-दिसंबर 2021 के दौरान किए गए क्षेत्र अध्ययन। अध्ययन के लिए डेटा संग्रह सर्वेक्षण, जिसमें भूविज्ञान, जल विज्ञान, मौसम विज्ञान, परिवेशी वायु गुणवत्ता, पानी की गुणवत्ता और मिट्टी की विशेषताएं, ध्वनि स्तर, वनस्पति और जीव, भूमि उपयोग पैटर्न, जनसांख्यिकी, सुविधाएं और बुनियादी ढांचा शामिल हैं, विशेषज्ञों की फील्ड टीम द्वारा किया गया था। और विश्लेषण कार्य।</p>	
<p><b>तलरूप (Topography)</b></p>	<p>यह क्षेत्र तलछटी संरचनाओं की समतल स्थलाकृति द्वारा चिह्नित है, जो रेत के जमाव के ऊपर महीन दाने वाली उड़ा मिट्टी से घिरी हुई है। प्रस्तावित पट्टा क्षेत्र में उच्चतम ऊंचाई 191.70 एमआरएल mRL और न्यूनतम 181.10 एमआरएल mRL है।</p>
<p><b>भूगर्भशास्त्र (Geology)</b></p>	<p>जिले में मिली नदी की रेत फरीदाबाद और पलवल यमुना नदी और उसकी सहायक नदियों द्वारा हिमालय से ऊपर की ओर से लाए गए नदी के निक्षेपों के जलोढ़ तलछट हैं, जिनकी मूल भूमि के आधार पर परिवर्तनशील मोटाई होती है, जिस पर निक्षेपण हुआ था। नदी की रेत यमुना नदी द्वारा जमा की गई स्वच्छ रेत का सबसे हालिया जमा है और हर साल फिर से काम किया जा रहा है। नदी के तल में पाई जाने वाली लिथो इकाइयाँ प्रकृति में युवा तलछटी संरचनाएँ हैं और हिमाचल प्रदेश की पहाड़ियों की हिमालय पर्वतमाला की ऊँची पहुँच से नदी के पानी द्वारा लाई जाती हैं। तलछट नदी से उत्पन्न होती है और नदी के तल और उसके बाढ़ के मैदानों में जमा हो जाती है।</p>

<p><b>भू-जल विज्ञान</b> <b>(Geo-hydrology)</b></p>	<p>जिला चतुर्धातुक युग के इंडो-गंगा जलोढ़ मैदान द्वारा कब्जा कर लिया गया है, और गंगा बेसिन के यमुना उप-बेसिन में पड़ता है। केंद्रीय भूजल बोर्ड ने संभावित जलभृत क्षेत्रों को चित्रित करने और निर्धारित करने, जलभृत विशेषताओं के मूल्यांकन के लिए 21 खोजपूर्ण बोरहोल ड्रिल किए हैं। भूजल की खराब गुणवत्ता के कारण 21 खोजी बोरहोलों में से 13 बोरहोल को छोड़ दिया गया था। पारगम्य दानेदार क्षेत्र जिसमें महीन से मध्यम दानेदार रेत और कभी-कभी मोटे रेत और बजरी शामिल हैं। उनकी पार्श्व और साथ ही ऊर्ध्वाधर सीमा सीमित है। बोरहोल के आंकड़ों से पता चलता है कि जिला क्षेत्र में रेत समूह पर संरचनाओं का मिट्टी समूह हावी है। भूजल जलोढ़ और अंतर्निहित अपक्षय/खंडित क्वार्टजाइट में होता है। जलोढ़ में रेत, गाद, कंकड़ और बजरी शामिल हैं। जो मुख्य भूजल असर क्षितिज बनाते हैं। क्वार्टजाइट निर्माण में, जिले के उत्तर-पश्चिमी भाग में स्थित, भूजल अपक्षयित और संयुक्त खंडित क्षितिज में होता है। अपक्षय और फ्रैक्चरिंग के परिणामस्वरूप अर्ध-समेकित रेत बैंड (बदरपुर रेत) का निर्माण हुआ है जो संभावित जलभृत क्षेत्र बनाते हैं। भूजल घटना के लिए इस क्वार्टजाइट गठन का पता नहीं लगाया गया है। जलोढ़ में, दानेदार क्षेत्रों को पूरी मोटाई में समान रूप से वितरित किया जाता है जो कि क्वार्टजाइट आउटक्रॉप्स के पास नगण्य है और यमुना नदी के पास पूर्वी भागों में 350 मीटर से अधिक है। कुओं का निर्वहन 5.5 से 7.00 मीटर की गिरावट पर 750 एलपीएम से 900 एलपीएम तक होता है। ट्रांसमिसिविटी 'टी' मान 55 से 200 मीटर 2 / दिन के बीच निर्धारित किया गया था। सिंचाई के उपयोग के लिए उथले नलकूप आमतौर पर 40 मीटर की गहराई तक बनाए जाते हैं। इन उथले नलकूपों का निर्वहन 360-600 लीटर प्रति मिनट की सीमा में होता है।</p>
<p><b>मिट्टी (Soil)</b></p>	<p>प्राप्त परिणाम की कृषि हैंडबुक में दिए गए मानक मिट्टी वर्गीकरण के साथ तुलना की जाती है। चिन्हित स्थानों से एकत्र किए गए नमूनों से संकेत मिलता है कि उनका पीएच मान 6.98 से 8.09 के बीच है जो दर्शाता है कि मिट्टी प्रकृति में थोड़ी क्षारीय है। एकत्र किए गए मिट्टी के नमूनों की जल धारण क्षमता 44.7 से 54.2% तक कम</p>

	पाई गई। विनिमेय पोटेशियम मूल्य 112.6 से 152.5 किग्रा / हेक्टेयर और फास्फोरस 25.5 से 49.8 किग्रा / हेक्टेयर तक भिन्न होता है।
<b>पानी की गुणवत्ता (Water Quality)</b>	<p>विश्लेषण के परिणाम बताते हैं कि pH मान 7.16 से 7.86 है जो कि 6.5 से 8.5 के निर्दिष्ट मानक के भीतर है। TDS 432 से 1880 मिलीग्राम / लीटर mg/l के रूप में देखा गया था। क्लोराइड 56.20 से 454 मिलीग्राम/ली mg/l के रूप में पाए गए। सल्फेट 43.3 से 166.6 मिलीग्राम/लीटर mg/l पाया गया। यह देखा गया है कि सल्फेट सीमा के भीतर है। कुल कठोरता Total hardness 210 से 920 मिलीग्राम / लीटर mg/l के बीच होती है।</p> <p>धातु: लोहा Metals: Iron 0.16 से 0.89 मिलीग्राम/लीटर mg/l के बीच पाया जाता है।</p>
<b>परिवेशी वायु गुणवत्ता निगरानी (Ambient Air Quality Monitoring)</b>	<ul style="list-style-type: none"> <li>• परिवेशी वायु गुणवत्ता निगरानी से पता चलता है कि सभी 10 वायु गुणवत्ता निगरानी स्टेशनों के लिए PM10 की न्यूनतम और अधिकतम सांद्रता क्रमशः 81.3 <math>\mu\text{g}/\text{m}^3</math> और 397.4 <math>\mu\text{g}/\text{m}^3</math> की सीमा में पाई गई, जबकि PM2.5 के लिए 47.4 <math>\mu\text{g}/\text{m}^3</math> और 176.4 <math>\mu\text{g}/\text{m}^3</math> के बीच पाई गई है।</li> <li>• जहां तक गैसीय प्रदूषक SO2 और NO2 का संबंध है, आवासीय और ग्रामीण क्षेत्रों के लिए NAAQ मानकों के तहत निर्धारित सीमा कभी भी किसी भी स्टेशन पर पार नहीं हुई है।</li> <li>• NO2 की न्यूनतम और अधिकतम सांद्रता क्रमशः 5.2 <math>\mu\text{g}/\text{m}^3</math> और 49.7 <math>\mu\text{g}/\text{m}^3</math> पाई गई।</li> <li>• SO2 की न्यूनतम और अधिकतम सांद्रता क्रमशः 5.2 <math>\mu\text{g}/\text{m}^3</math> और 24.3 <math>\mu\text{g}/\text{m}^3</math> पाई गई।</li> <li>• CO की न्यूनतम और अधिकतम सांद्रता क्रमशः 0.5 <math>\text{mg}/\text{m}^3</math> और 3.5 <math>\text{mg}/\text{m}^3</math> पाई गई।</li> </ul>
<b>शोर Noise</b>	ध्वनि का स्तर क्रमशः दिन और रात के समय के लिए 51.3 - 68 db और 42.2-

	<p>52.8 db पाया गया।</p> <p>परियोजना स्थल के लिए दिन में उच्च स्तर के शोर को निर्माण और संचालन और वाहनों की गतिविधियों के कारण जिम्मेदार ठहराया जा सकता है।</p>
<p><b>जैविक पर्यावरण</b> <b>(Biological Environment)</b></p>	<p>अध्ययन क्षेत्र के मौजूदा वातावरण (पट्टा खदान क्षेत्र से 10 किमी के दायरे) के भीतर पुष्प और जीव जैव विविधता के मूल्यांकन के लिए आधारभूत अध्ययन किया गया था और इसमें 10 किमी के अध्ययन से सर्वेक्षण के दौरान कुल 187 पुष्प प्रजातियों को शामिल किया गया है। क्षेत्र जिसमें से 59 पेड़ हैं, 32 झाड़ियाँ हैं, 63 जड़ी-बूटियाँ, 15 घास, पर्वतारोही की 17 प्रजातियाँ और एक परजीवी प्रजातियाँ 10 किमी परिधि के अग्रभाग के भीतर मौजूद हैं। कोई भी स्थानिक, लुप्तप्राय या संरक्षित पुष्प प्रजाति दर्ज नहीं की गई थी।</p> <p>जीव समूहों में से अध्ययन क्षेत्र में 68 जीव प्रजातियां पाई गई हैं, जिनमें से 15 स्तनधारी, 11 हर्पेटोफौना, 9 तितली और 33 एक्स प्रजातियां 10 किमी आसपास के क्षेत्र से दर्ज की गई हैं। केवल 5 अनुसूची-1 प्रजातियां अर्थात् कैनिंस ऑरियस (जैकल), मकाका मुलता (बंदर), प्रेस्बिटिस एंटेलस (कॉमन लंगूर), डाबोइया रसेली (रसेल्स वाइपर), (इंडियन कोबरा) और रामफोटीफ्लॉप्स ब्राभिनस (कॉमन वर्म स्नेक) का दस्तावेजीकरण किया गया। पावो क्रिस्टेटस 10 किमी अध्ययन क्षेत्र से केवल एक अनुसूची-1 प्रजाति पाई गई है।</p> <p>पलवल जिले की प्रमुख फसलें खरीफ मौसम में धान, ज्वार, बाजरा, मक्का और गन्ना हैं, जबकि रबी मौसम की फसलें गेहूँ, जौ, सूरजमुखी, अरहर, मूंग, चना, मसूर, रेपसीड, मटर और बरसीम हैं। उगाई जाने वाली अन्य फसलें गन्ना, तिलहन और दलहन हैं। जिले में बागवानी और सब्जियों की फसलों की भी खेती की जाती है।</p> <p>परियोजना स्थल के 10 किमी के दायरे में कोई बायोस्फीयर रिजर्व, राष्ट्रीय उद्यान, वन्यजीव अभयारण्य, टाइगर रिजर्व और हाथी-रिजर्व नहीं है। निकटतम संरक्षित क्षेत्र असोला भट्टी वन्यजीव अभयारण्य जो परियोजना स्थल से ~37.74 किमी दूर है</p>

<p><b>Socio-economic Profile of The Area</b></p>	<p>ऊपर की गई व्याख्या के आधार पर, प्राथमिक सर्वेक्षण (हितधारकों के साथ बातचीत, FGD, समुदाय परामर्श और अध्ययन क्षेत्र के एक प्रभावशाली व्यक्ति के साथ चर्चा) और माध्यमिक स्रोत, अध्ययन क्षेत्र में महत्वपूर्ण अवलोकन और अंतराल खराब स्वच्छता और अनुचित जल निकासी व्यवस्था। अध्ययन क्षेत्र में साफ-सफाई, रोजगार और चिकित्सा सुविधाओं की बड़ी समस्या देखी गई है।</p> <p>अध्ययन क्षेत्र के अधिकांश लोगों की आजीविका श्रम, कृषि, पशुपालन पर निर्भर करती है</p> <p>पालन-पोषण और नौकरी। अध्ययन क्षेत्र में पीने के पानी के स्रोत नल का पानी, नलकूप, हैंडपंप और कुएं हैं। भारत में, ग्रामीण क्षेत्रों में भी कोरोनावायरस (कोविड-19) महामारी का सबसे अधिक बोझ है, और अध्ययन क्षेत्र में खांसी और बुखार के सामान्य मामले भी सामने आए हैं। नए प्रस्तावित प्रोजेक्ट को लेकर लोगों की मिली-जुली राय है। लोग उद्योग में स्थानीय लोगों के लिए रोजगार चाहते हैं। उद्योग के माध्यम से ग्राम विकास में सीईआर गतिविधियों को अंजाम दिया गया। ग्रामीणों के अनुसार, उद्योग वायु, जल और ध्वनि और भूमि प्रदूषण पर उचित कार्रवाई करेगा।</p> <p>सामाजिक-आर्थिक अध्ययन से पता चला कि परियोजना क्षेत्र के युवाओं के पास रोजगार के अवसर नहीं हैं। वे न्यूनतम हैंडहोल्डिंग और व्यावसायिक शिक्षा कौशल वाले श्रमिकों का एक संभावित स्रोत हो सकते हैं, इसलिए विभिन्न सरकारी योजनाओं के बारे में जागरूकता निर्माण के माध्यम से युवा सशक्तिकरण कार्यक्रम, उनकी योग्यता और कौशल के लिए प्रासंगिक अवसर प्रदान करना, कौशल विकसित करने वाले कार्यक्रमों का संचालन करना आदि।</p>
<p><b>पर्यावरण प्रभाव आकलन (Environmental Impact Assessment)</b></p>	
<p><b>निर्माण चरण (Construction)</b></p>	<p><b>पानी की गुणवत्ता (Water Quality)</b></p> <p>एक तालाब की उपस्थिति है जो NNW दिशा में 0.87 किमी है। लैंडफिल तालाब को</p>

Phase)	<p>प्रदूषित कर सकता है जो क्षेत्र की उत्तरी दिशा में मौजूद है।</p> <p><b>शमन के उपाय (Mitigation Measures)</b></p> <p>उत्तर में मौजूद तालाब हाइड्रोलिक ढाल के विपरीत है क्योंकि इस क्षेत्र में पश्चिम से पूर्व की ओर ढाल है। परियोजना स्थल से कोई भी सतही जल उत्तर दिशा की ओर प्रवाहित नहीं होगा। अतः उत्तर दिशा में स्थित तालाब पर कोई प्रभाव नहीं पड़ेगा।</p> <p>लीचेट उत्पादन को कम करने और सतही जल के प्रदूषण को रोकने के लिए और बाढ़ से बचने और दलदली परिस्थितियों के निर्माण के लिए तूफानी जल निर्वहन नालियों के प्रकार के मोड़ के प्रावधान किए जाएंगे।</p> <p>स्टॉर्म वाटर ड्रेन का डिजाइन और निर्माण इस तरह से किया जाएगा कि सतही अपवाह जल को लैंडफिलिंग साइट से हटा दिया जाए और ठोस अपशिष्ट स्थानों से लीकेज सतही अपवाह जल के साथ मिश्रित न हो।</p> <p>प्रवाह की रुकावट से बचने के लिए तूफान के पानी की नालियों की नियमित सफाई की जाएगी।</p> <p>यदि कोई संदूषण हो तो तालाब के पानी की नियमित रूप से निगरानी की जाएगी।</p> <p><b>हवा की गुणवत्ता: (Air Quality):</b></p> <p>वायु गुणवत्ता प्रभाव प्रकृति में अस्थायी होगा और निर्माण समाप्त होने पर रुक जाएगा। परियोजना विकासकर्ता द्वारा एक धूल और उत्सर्जन नियंत्रण योजना तैयार और कार्यान्वित की जाएगी।</p> <p><b>शोर: (Noise):</b></p> <p>निर्माण स्थल के अंदर और आसपास शोर जानवरों और आसपास के क्षेत्रों के निवासियों को प्रभावित कर सकता है। हालांकि, साइट के आसपास निकटतम आवास की दूरी लगभग है। 1.05 किमी और क्षेत्र के जानवरों में शोर से दूर जाने की प्रवृत्ति होगी और अंततः निर्माण पूरा होने पर क्षेत्र में वापस आ जाएगा। एक ध्वनि नियंत्रण और प्रबंधन परियोजना विकासकर्ता द्वारा तैयार और कार्यान्वित किया जाएगा।</p>
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	<p><b>श्रम शिविर के मुद्दे: (Labour Camp Issues):</b></p> <p>सभी निर्माण क्षेत्रों में कार्यबल और कार्य शिविरों से संभावित प्रभाव भूमि और प्राकृतिक संसाधनों पर अतिरिक्त दबाव के रूप में होंगे। ठोस और तरल कचरे का उत्पादन होगा। इसके अतिरिक्त, निर्माण शिविरों के पास स्वतःस्फूर्त विकास सार्वजनिक स्वास्थ्य जोखिम पैदा कर सकता है।</p> <p>कार्य शिविरों का अपशिष्ट जल आसन्न जल निकाय में पानी की गुणवत्ता की समस्या पैदा कर सकता है। अनुचित ठोस अपशिष्ट निपटान से मिट्टी और सतही जल निकाय का संदूषण हो सकता है, और संचारी रोग फैल सकते हैं। कार्य शिविरों और श्रम बल के प्रबंधन की उचित योजना होगी।</p> <p><b>भौतिक सांस्कृतिक और पुरातात्विक संसाधनों को नुकसान (Damage to Physical cultural and archaeological resources):</b></p> <p>साइट के भीतर कोई भौतिक सांस्कृतिक संसाधन नहीं है और इसलिए यह मुद्दा महत्वपूर्ण नहीं है।</p> <p><b>यातायात से संबंधित प्रभाव: (Traffic related Impact):</b></p> <p>यातायात में कोई वृद्धि नहीं होगी क्योंकि प्रस्तावित परियोजना मौजूदा विरासत कचरे का प्रबंधन करने के लिए है। इसलिए, शहर से ठोस कचरा ले जाने वाले आगामी ट्रकों की संख्या में कोई वृद्धि नहीं होगी। केवल आवश्यक निर्माण सामग्री ले जाने वाले यातायात में न्यूनतम वृद्धि होगी।</p>
<p><b>ऑपरेशन चरण (Operation Phase)</b></p>	<p>SWM, नियमों के अनुसार, केवल निष्क्रिय सामग्री का निपटारा किया जाना चाहिए, हालांकि वर्तमान स्थिति को देखते हुए, लैंडफिल गैस उत्पादन पर विचार किया गया है। परियोजना के संचालन चरण के दौरान पर्यावरणीय और सामाजिक प्रभावों को मुख्य रूप से छह श्रेणियों में विभाजित किया गया है: (1) खाद से प्रभाव; (2) लैंडफिल गैस उत्सर्जन से प्रभाव; (3) उत्सर्जन डीजी सेट के संचालन के रूप में होता है (4) की हैंडलिंग और भंडारण तेल/रसायन और ईंधन; (5) घरेलू तरल और ठोस कचरे का</p>

	<p>प्रबंधन और निपटान; (6) लैंडफिल लीचेट से प्रभाव। इन प्रभावों पर निम्नलिखित अनुभागों में विस्तार से चर्चा की गई है।</p> <p><b>लैंडफिल गैस से प्रभाव (Impacts from landfill gas)</b></p> <p>लैंडफिल गैस के कई घटक खतरनाक हैं और मानव स्वास्थ्य और पर्यावरण के लिए संभावित रूप से महत्वपूर्ण जोखिम पैदा करते हैं। कुछ अन्य जोखिम भड़कने की प्रक्रिया से उत्पन्न होते हैं।</p> <p><b>डीजी सेट (DG set)</b></p> <p>DG set बिजली की विफलता के समय अपने सामयिक संचालन के दौरान वायु प्रदूषण का उत्सर्जन करेगा।</p>
	<p><b>तेल/रसायनों का रिसाव और रिसाव (Spillage and leakage of oil/chemicals):</b></p> <p>संचालन और भंडारण प्रक्रिया के दौरान तेल और रासायनिक रिसाव से गतिविधि क्षेत्र के तत्काल आसपास के क्षेत्र में पानी और भूमि संदूषण हो सकता है। बारिश के दौरान, जल प्रदूषण अधिक दूरी तक फैल सकता है।</p> <p><b>घरेलू तरल और ठोस अपशिष्ट का निर्वहन: (Discharge of domestic liquid &amp; solid waste):</b></p> <p>साइट पर दैनिक दिनचर्या की गतिविधियों से घरेलू अपशिष्ट जल उत्पन्न होगा, जिसे यदि उचित उपचार और निपटान के बिना छोड़ दिया जाता है, तो आस-पास की सतह और भूजल निकाय का प्रदूषण होगा। दैनिक गतिविधियों से उत्पन्न नगरपालिका के ठोस कचरे को अच्छे हाउसकीपिंग और स्वच्छता उद्देश्यों के लिए उचित संग्रह और निपटान की आवश्यकता होगी।</p> <p><b>लैंडफिल से लीचेट (Leachate from landfill):</b></p> <p>लैंडफिल ऑपरेशन से लीचेट में पानी प्राप्त करने वाले निकायों को नुकसान पहुंचाने की काफी संभावनाएं हैं। प्रस्तावित साइट में एक ही समस्या है और परियोजना</p>

	विकासकर्ता को पर्याप्त तरीके से लीचेट प्रबंधन की योजना बनानी होगी।
क्लोजर और पोस्ट क्लोजर चरण की गतिविधियाँ (Closure and post closure phase activities)	<p>यह अनुभव किया गया है कि मीथेन गैस छोड़ने के कारण बंद लैंडफिल साइट में कभी-कभी विस्फोट होता है। यह स्थानीय लोगों पर दुर्घटना और स्वास्थ्य प्रभाव का कारण बनता है जो संयोग से उस स्थान पर हो सकते हैं। प्रस्तावित स्थल पर भी ऐसी ही घटना की संभावना हो सकती है।</p> <p>लैंडफिल के बंद होने के बाद, लीचेट ट्रीटमेंट प्लांट के संचालन को तब तक जारी रखने की आवश्यकता हो सकती है जब तक कि यह स्थापित न हो जाए कि लीचेट अब साइट पर कोई समस्या नहीं है।</p>
सामुदायिक मुद्दे (Community Issues)	<p><b>मच्छरों, वैक्टर और मक्खियों का प्रजनन (Breeding of mosquitoes, vectors and flies)</b></p> <p>यह एक प्रतिकूल प्रभाव होगा, क्योंकि लैंडफिल साइट पर प्रजनन का जोखिम होगा।</p> <p><b>आवासीय और व्यावसायिक क्षेत्र में कूड़ा-करकट करना</b></p> <p>कचरा परिवहन वाहनों से निकलने वाले कचरे के कारण स्थानीय जनता को परेशानी हो सकती है जिनके घर और दुकानें कचरा वाहनों के परिवहन के लिए सड़क के किनारे स्थित हो सकती हैं।</p> <p><b>लैंडफिल में अनधिकृत प्रवेश (Unauthorized entry in landfill)</b></p> <p>लैंडफिल साइट के संचालन से अनधिकृत प्रवेश हो सकता है जिससे दुर्घटनाएं हो सकती हैं और घुसपैठियों के स्वास्थ्य पर प्रभाव पड़ सकता है।</p> <p><b>स्थानीय समुदाय में रोग होने की दर में वृद्धि (Increase in disease occurrence rate in local community)</b></p> <p>वर्तमान में साइट के आसपास कोई महत्वपूर्ण बंदोबस्त नहीं है, हालांकि, लैंडफिल साइट के चालू होने के बाद इसमें वृद्धि हो सकती है। ऐसे में लैंडफिल के प्रभाव से स्थानीय लोगों में बीमारी की संभावना बनी रहेगी। साइट के आसपास स्थानीय बंदोबस्त को रोकने के लिए साइट के चारों ओर एक बफर जोन विकसित किया जाना चाहिए।</p>

	<p>(निर्माण श्रमिकों और श्रमिक शिविरों के बीच सामाजिक संघर्ष) (Social conflict among construction workers and labour camps)</p> <p>प्रवासित श्रमिक क्षेत्र में स्थानीय समुदाय के साथ कानून और व्यवस्था की समस्या पैदा कर सकते हैं। हालांकि, यह गंभीर मुद्दा होने का अनुमान नहीं है क्योंकि साइट पर और उसके आसपास ज्यादा बस्तियां नहीं हैं।</p> <p>लैंडफिल गैस से स्वास्थ्य पर प्रभाव (Health impact from landfill gas)</p> <p>लैंडफिल साइट में अनधिकृत व्यक्ति लैंडफिल गैस से स्वास्थ्य प्रभाव के संपर्क में आ सकते हैं।</p> <p>मैला ढोने वालों का स्वास्थ्य और सुरक्षा (Health and safety of scavengers)</p> <p>अगर PPE (व्यक्तिगत सुरक्षा उपकरण) के बिना अनियंत्रित तरीके से मैला ढोने की गतिविधि की जाती है, तो यह मैला ढोने वालों के लिए स्वास्थ्य और सुरक्षा संबंधी चिंताओं का कारण बनेगा।</p>
<p><b>पर्यावरण प्रबंधन योजना (Environmental Management Plan)</b></p>	
<p><b>पर्यावरण प्रबंधन योजना (Environmental Management Plans)</b></p>	<ul style="list-style-type: none"> <li>▪ संभावित प्रतिकूल प्रभावों को कम करने और सकारात्मक प्रभावों को बढ़ाने के लिए ध्वनि पर्यावरण प्रबंधन योजनाएं तैयार और कार्यान्वित की जाएंगी।</li> <li>▪ ईएमपी को साइट पर संयंत्र गतिविधियों के निम्नलिखित चरणों के लिए विकसित किया गया है।</li> <li>▪ परियोजना तैयार करने का चरण</li> <li>▪ परियोजना निर्माण चरण</li> <li>▪ परियोजना संचालन चरण</li> <li>▪ प्लांट क्लोजर और पोस्ट क्लोजर स्टेज</li> </ul> <p>EMP ईएमपी के कार्यान्वयन का समर्थन करने के लिए, पर्यावरण की गुणवत्ता (परिवेश वायु, भूजल, शोर और अपशिष्ट जल) की नियमित निगरानी परियोजना विकासकर्ता द्वारा निर्माण के साथ-साथ संयंत्र के संचालन के दौरान की जाएगी।</p>

<p>न्यूनीकरण उपायों के कार्यान्वयन और निगरानी के लिए संस्थागत ढांचा (Institutional Framework for Implementation &amp; Monitoring of Mitigation Measures)</p>	<p>पर्यावरण प्रबंधन योजनाओं को निविदा दस्तावेज में चर्चा के प्रमुख बिंदुओं के रूप में शामिल किया जाएगा। संभावित निर्माण ठेकेदारों को अपने प्रस्ताव में, ईएमपी की विभिन्न आवश्यकताओं के कार्यान्वयन प्रतिक्रिया और उसी के लिए बजट आवंटन के साथ स्वास्थ्य और सुरक्षा योजना प्रस्तुत करने के लिए कहा जाएगा। ठेकेदार का चयन ईएमपी और प्रस्तावित बजट के प्रति उनकी प्रतिक्रिया से प्रभावित होगा। ठेकेदार को अपने प्रस्ताव में परिभाषित और परियोजना विकासकर्ता द्वारा अनुमोदित ईएमपी को लागू करने की आवश्यकता होगी।</p> <p>पूर्व-निर्माण कार्य शुरू करने से पहले ईएमपी और स्वास्थ्य और सुरक्षा योजना के सभी आवश्यक घटक चालू होंगे।</p> <p>परियोजना के परिचालन चरण के लिए ईएमपी और स्वास्थ्य और सुरक्षा योजना का बड़े पैमाने पर लैंडफिल प्लांट के डिजाइन और साइटिंग के दौरान ध्यान रखा जाएगा। प्रक्रिया से संबंधित कुछ अवशिष्ट योजनाएं जैसे अपशिष्ट प्रबंधन, ईंधन की हैंडलिंग और भंडारण, आदि को परिचालन गतिविधियों के भीतर नियमित गतिविधियों के तहत लागू किया जाएगा। पर्यावरणीय गतिविधियों को सुव्यवस्थित करने के लिए, परियोजना आईएसओ-14001 मानक के अनुकूल पर्यावरण प्रबंधन प्रणाली को लागू करेगी। प्रणाली में संयंत्र के सुरक्षित और पर्यावरण के अनुकूल संचालन की तुलना में कई प्रक्रिया निगरानी कदम होंगे।</p>
<p>कॉर्पोरेट पर्यावरण उत्तरदायित्व (सीईआर) (Corporate Environment Responsibility (CER))</p>	<p>CER सीईआर अधिसूचना दिनांक 1 मई 2018 के तहत कंपनी अपनी परियोजना लागत का 2% खर्च करेगी, जो कि 2.52 लाख आती है; यह जनता की मांग को पूरा करेगा और इलाके के समग्र सुधार को लाएगा और इलाके और स्थानीय लोगों के समग्र विकास के लिए खर्च किया जाएगा। कुछ सामुदायिक विकास योजनाओं को परियोजना डेवलपर द्वारा कॉर्पोरेट सामाजिक जिम्मेदारी के हिस्से के रूप में माना जा सकता है।</p>
<p>निष्कर्ष</p>	<p>बेहतर रहने की स्थिति (Better Living Conditions)</p>

<b>(Conclusion)</b>	<ul style="list-style-type: none"> <li>✓ कोई खुला डंपिंग नहीं।</li> <li>✓ हवा, पानी और मिट्टी के दूषित होने की संभावना कम करें।</li> <li>✓ उत्सर्जन गंध कम करें।</li> <li>✓ समाज के जीवन स्तर में सुधार करना और सुरक्षित और स्वच्छ वातावरण प्रदान करना।</li> </ul> <p><b>प्रत्यक्ष और अप्रत्यक्ष रोजगार के अवसर (Direct &amp; indirect employment opportunities)</b></p> <ul style="list-style-type: none"> <li>✓ परियोजना का विकास निर्माण और संचालन दोनों चरणों के दौरान स्थानीय कुशल, अकुशल और अर्धकुशल लोगों को रोजगार के अवसर प्रदान करेगा।</li> <li>✓ परियोजना के निर्माण चरण के दौरान अप्रत्यक्ष रोजगार भी उत्पन्न हो सकता है।</li> </ul>
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# **DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT**

**FOR**

## **ENVIRONMENTAL CLEARANCE**

**(Under Clause 6 of S.O.1533 of Environment Impact Assessment Notification, 2006)**

**FOR**

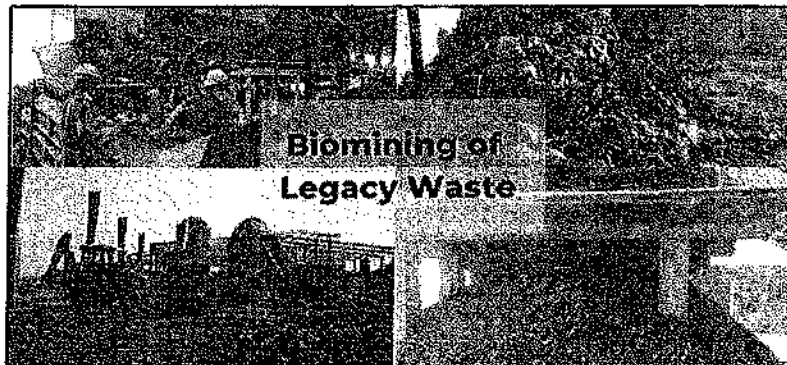
**Implementation of Remediation and Reclamation and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana, ("Sanitary Landfill Site").**

**AREA-9.1 ACRES**

**Category of the project- "B" Project schedule 7(i)**

**PROJECT PROPONENT**

**MUNICIPAL COUNCIL PALWAL**



**Consultant**



**AMALTAS ENVIRO INDUSTRIAL CONSULTANTS**

**2925, Sec-46, Gurugram-120001**

**(NABET Accredited EIA Consultants Organization)**

**NABET -Certificate Number -NABET/EIA/1821/RA0141 (Rev.01)**

**Study Period -October-December 2021**



**National Accreditation Board  
for Education and Training**

(Member - International Accreditation Forum & Pacific Accreditation Cooperation)



QCI/NABET/ENV/ACO/22/2304

April 07, 2022

To

**Amaltas Enviro Industrial Consultants LLP**  
B-1/1244, Vasant Kunj, New Delhi

Sub.: Extension of Validity of Accreditation till July 06, 2022 – regarding  
Ref.. Certificate no. NABET/EIA/1821/RA 0141 (Rev.01)

Dear Sir/Madam

This has reference to the accreditation of your organization under QCI-NABET EIA Scheme, the validity **Amaltas Enviro Industrial Consultants LLP** is hereby extended till July 06, 2022 or completion of assessment process, whichever is earlier.

The above extension is subject to the submitted documents/required information with respect to your application and timely submission and closure of NC/Obs during the process of assessment.

You are requested not to use this letter the after expiry of the above-stated date.

With best regards.

(A K Jha)  
Sr. Director, NABET



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**ToR letter issued by SEIAA Haryana with vide  
Proposal number (SIA/HR/MIS/64778/2021;**

**Dated 26<sup>th</sup> Oct, 2021**

**for**

**The project of Remediation and  
Reclamation of Existing Dumpsite and  
construction, operation and maintenance  
of Sanitary Landfill at Meghpur village,  
Palwal, Haryana.**



**STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY HARYANA**  
**Bay No. 55-58, Prayatan Bhawan, Sector-2, PANCHKULA.**

Tel: 0172-2565232, 4043956  
 E-mail Id: [seiaa-21.env@hry.gov.in](mailto:seiaa-21.env@hry.gov.in)

No. SEIAA(129)/HR/2021/ **975**

Dated: **26** /10/2021

To

**M/s PATHEYA,**  
**RZH-15/9 Gurudwara Road,**  
**Mahavir Enclave Dabri Palam Road, New Delhi-110045**

Subject:

**Finalization of ~~Terms of Reference (TOR)~~ for Environmental Clearance for the "Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at village Meghpur, Pawai Haryana.**

This has reference to your application for the subject cited above addressed to Member Secretary, SEIAA Haryana to prescribe the ToR (Terms of Reference) for undertaking detailed EIA Study for the purpose of obtaining Environment Clearance in accordance with the provisions of EIA Notification, 2006. For this purpose the Project Proponent had submitted application through Parivesh Web Portal vide Proposal No. SIA/HR/MIS/64778/2021 in the prescribed format (Form-1) along with Pre-feasibility Report under Category 7(i) of EIA Notification dated 14.09.2006.

The details of the proposal as under:

1.	Online Proposal No:	SIA/HR/MIS/64778/2021
2.	Name of the Project Proponent:	M/s PATHEYA
3.	Nature of the project:	Remediation and Reclamation of Existing Dumpsite and construction
4.	Category of the proposal:	7(i) of EIA Notification dated 14.09.2006
5.	Date of online acceptance of Project	03.08.2021
6.	Date of submission of Hard Copy by PP of the Project	04.08.2021

In this connection, it is intimated that Project Proposal for approval of Terms of Reference was placed before the State Environment Impact Assessment Authority (SEIAA) in its 129<sup>th</sup> Meeting held on 14.10.2021.

The Authority approved the "Terms of Reference" and it was decided that you have to prepare Environment Impact Assessment Report and Environment Management Plan for obtaining Environment Clearance by using Model Terms of Reference as per MoEF & CC with the additional Terms of Reference as recommended by SEAC in its 219<sup>th</sup> Meeting held on 13.08.2021:

**Additional TOR:**

- i. Importance and benefits of the project

STATE ENVIRONMENT IMPACT ASSESSMENT AUTHORITY HARYANA  
Bay No. 55-58, Prayatan Bhawan, Sector-2, PANCHKULA.

Tel: 0172-2565232, 4043956

E-mail Id: [sciaa-21.env@hrv.gov.in](mailto:sciaa-21.env@hrv.gov.in)

No. SEIAA(129)/HR/2021/1091

Dated: 29/10/2021

To

M/s PATHEYA,  
RZH-15/9 Gurudwara Road,  
Mahavir Enclave Dabri Palam Road, New Delhi-110045

Subject: Finalization of Terms of Reference (ToR) for Environmental Clearance for the "Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at village Meghpur, Palwal Haryana.

This has reference to your application for the subject cited above addressed to Member Secretary, SEIAA Haryana to prescribe the ToR (Terms of Reference) for undertaking detailed EIA Study for the purpose of obtaining Environment Clearance in accordance with the provisions of EIA Notification, 2006. For this purpose the Project Proponent had submitted application through Parivesh Web Portal vide Proposal No. SIA/HR/MIS/64778/2021 in the prescribed format (Form-1) along with Pre-feasibility Report under Category 7(i) of EIA Notification dated 14.09.2006.

It is to intimate that Haryana Government has notified vide Notification No. DE&CC/H/3060 dated 14<sup>th</sup> October, 2021 that the State Government decided to impose scrutiny fees for projects seeking clearance of the State Level Environment Impact Assessment Authority (SEIAA) under the EIA Notification no. S.O.1533 (E) dated 14.09.2006. The link of notification for seeking scrutiny fees is [http://environmentclearance.nic.in/ViewB\\_order.aspx?rid=1308&pid=Haryana](http://environmentclearance.nic.in/ViewB_order.aspx?rid=1308&pid=Haryana).

In view of above, you are hereby directed to deposit the scrutiny fees accordingly to the project cost of your aforesaid project in favour of Member Secretary, SEIAA, Haryana in the shape of bank demand draft at Panchkula, so that, further action the initiated in the matter accordingly.

3-101 ayaal  
29/10  
Member Secretary,  
SEIAA, Haryana

- ii. A sensitivity analysis of the site shall be carried out as per the MoEF&CC criteria and form part of the EIA report
- iii. The EIA would include a separate chapter on the conformity of the proposals to the Municipal Solid Waste Management Rules, 2016 and the Construction and Demolition Waste Management Rules, 2016 including the sitting criteria therein.
- iv. Characteristics and source of waste to be handled and methodology for remediating the project site, which is presently being used for open dumping of garbage.
- v. Details of storage and disposal of pre-processing and post-processing rejects/inerts
- vi. List of proposed end receivers for the rejects/inerts should be provided. MoUs to be submitted in this regard
- vii. Details of various waste management units with capacities for the proposed project. Details of utilities indicating size and capacity to be provided
- viii. The EIA would also examine the impacts of the existing land till site and include a chapter on the closure of the existing site including disposal of accumulated wastes and capping
- ix. A pond is present at 200 m from the project site. EIA should include the impact of the proposed project on the pond's water quality
- x. The project proponents should consult the Municipal Solid waste management manual of the Ministry of Urban Development, Government of India and draw up project plans accordingly.
- xi. Waste management facilities should maintain safe distance from the nearby pond
- xii. Layout maps of proposed solid waste management facilities indicating storage area, plant area, greenbelt area, utilities etc.
- xiii. Details of air emission, effluents generation, solid waste generation and their management
- xiv. Requirement of water, power, with source of supply, status of approval, water balance diagram, man power requirement (regular and contract).
- xv. Process description along with major equipment's and machineries, process flow sheet (quantitative) from waste material to disposal to be provided
- xvi. Hazard identification and details of proposed safety systems
- xvii. Details of Drainage of the project upto 5 km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided
- xviii. Details of effluent treatment and recycling process
- xix. Action plan for measures to be taken for excessive leachate generation during monsoon period
- xx. Detailed Environmental Monitoring Plan
- xxi. Timeline for implementation of the project shall be included in the EIA Report.
- xxii. Report on health and hygiene to be maintained by the sanitation workers at the work place.
- xxiii. A tabular chart with index for point wise compliance of above ToRs.

#### STANDARD TOR

- 1) The project should be designed based on the population projections as by Master Plan.
- 2) Submit a 10 km. radius map (on survey of India toposheet) showing co-ordinates of project site, national highway, state highway, district road/approach road, river, canal, natural drainage; protected areas, under Wild Life (Protection) Act, archaeological site, natural lake, flood area, human settlements (with population), industries, high tension electric line, prominent wind direction (summer and winter), effluent drain, if any and ponds etc. should be presented and impacts assessed on the same.
- 3) Examine and submit details of alternative technologies viz. RDF shall also be evolved.
- 4) Examine and submit details of storm water/ leachate collection from the composted area.
- 5) Examine and submit details of monitoring of water quality around the landfill site. Water analysis shall also include for nitrate and phosphate.

- 6) Examine and submit details of the odour control measures.
- 7) Examine and submit details of impact on water bodies/rivers/ ponds and mitigative measures during rainy season.
- 8) Submit the criteria for assessing waste generation. Any segregation of hazardous and bio-medical wastes.
- 9) Submit a copy of the layout plan of project site showing solid waste storage, green belt (width & length, 33% of the project area), all roads, prominent wind direction, processing plant & buildings etc. should be provided.
- 10) Submit a copy of the land use certificate from the competent authority.
- 11) NOC from local or nearest airport within 20 km and any flight funnel restrictions.
- 12) Submit a copy of the status of ambient air quality and surface and ground water quality, soil type, cropping pattern, land use pattern, population, socio-economic status, anticipated air and water pollution.
- 13) Submit a copy of the topography of the area indicating whether the site requires any filling, if so, the details of filling, quantity of fill material required, its source and transportation, etc.
- 14) Examine and submit the details of impact on the drainage and nearby habitats/settlements (surroundings).
- 15) Examine and submit the details of surface hydrology and water regime and impact on the same.
- 16) Examine and submit the details of one complete season AAQ data (except monsoon) with the dates of monitoring, impact of the project on the AAQ of the area (including H<sub>2</sub>S, CH<sub>4</sub>).
- 17) Submit a copy of detailed plan of waste management.
- 18) Submit the details of sanitary land fill site impermeability and whether it would be lined, if so details, thereof.
- 19) Examine and submit the details of impact on environmental sensitive areas.
- 20) Examine and submit the details of rehabilitation/compensation package for the project effected people, if any.
- 21) Submit Environmental Management Plan and Environmental Monitoring Plan with costs and parameters.
- 22) Public hearing to be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issued by the Ministry and not on the basis of Minutes of the Meeting available on the web-site.
- 23) A detailed draft EIA/EMP report should be prepared in accordance with the above additional TOR and should be submitted to the SEIAA in accordance with the Notification.
- 24) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
- 25) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
- 26) Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website "<http://moef.nic.in/Manual/Common Municipal Solid Wastes>".

The Project Proponent will submit Environment Impact Assessment Report and Environment Management Plan by incorporating the Terms of References (ToR) as approved by the Authority within a time schedule in compliance of EIA Notification dated 14.09.2006. It was also decided that their project will be considered as received only after receipt of complete information.

*S. Lalayal*  
25/10  
Member Secretary,  
SEIAA, Haryana



## Municipal Council, Palwal



To : ~~M/S~~ Peoples Association for Total Help and youth Applause  
RZ II 15/9, Gurudrvara Road, Mahavir Enclave  
Palam Village S.O, South west Delhi

Memo No 52/6-17/MCP

Dated 04/12/2020

**SUBJECT: WORK ORDER FOR BIO REMEDIATION AND RECLAMATION OF  
EXISTING LEGACY WASTE DUMPSITE AT VILLAGE MEGHIPUR IN  
MC PALWAL**

Please refer tender ID 2020\_Hry\_147496\_1 dated 12.10.2020 and Worthy DMC, Palwal office letter No.1330/DMC/PWL dated 04.12-2020. This is to inform you that work cited as above has been allotted to you at the following rates and conditions :-

Tender rates : @ Rs 947.00/- per MT

Approved rates : @ Rs 669.00/- per MT vide DGULB letter No.XEN-I/BR/DGULB/2020/6045 dated 03-12-2020.

Total Project Cost: Rs.1,26,44,100/-

**TERMS AND CONDITIONS :-**

- 1 You have to make an agreement with Municipal council Palwal within Three days after receipt of work order.
- 2 You are directed to start the work within 7 days from issue of this work order.
- 3 Agency has to ensure that there should be no violation of any order of any court and Hon'ble NGT and all the legacy waste should be processed and disposed off as per SWM rules 2016 and as per the guideline of HSPCB and CPCB.
- 4 The work should be completed before 07.04.2021 positively.
- 5 Sanitary Land fill site (SLF) is to be developed by the agency for the disposal of inert and is to be constructed as per the norms/specification prescribed by the central Public Health and Environmental Engineering Organisation (CPHEEO) / Central Pollution control Board (CPCB)
- 6 The fraction arising out of the processed waste such as RDF Compost/Soil enrich C&D waste and inert are being disposed off scientifically as per the norm of CPCB & SWM rule 2016. Due sampling of the soil enriches/compost etc. is being done by the concessionaire as per CPCB norms.
- 7 The agency has to prepare proper record of quantity of the processed waste and same will be recorded in measurement book by the concerned JE and checked by AE/ME/XEN.



## Municipal Council, Palwal



- 8 The agency shall ensure that daily processing of waste should be of such quantity that the total waste be processed within the prescribed time frame i.e. 07 /04/2021 as given by the Hon'ble NGT.
- 9 The agency shall ensure the standard of the fraction arising after Bio Remediation of the legacy waste such as recyclable , RDF inert and compost etc fulfilling the norms of MoEF , CPCB or other Govt , departments and the fractions are transported in the covered vehicles as per norms of MoEF , CPCB etc.
- 10 In case if in future the tender of ISWM Palwal on PPP project is allotted to concessionaire, this contract shall ceased to be in operation the site shall be handed over to concessionaire on as is where is basis and processing of the remaining legacy waste shall be the responsibility of concessionaire of ISWM Project.
- 11 Agency shall insure that the RDF is being utilized in the Industries/Plants where the conventional fuel can be replace with RDF as prescribed by CPCB/SPCB. Agency shall insure that fraction arising out of the processed waste is not being dumped in open area unscientifically by the agency within or out side the MC limit
- 12 In case of any dispute, the District Municipal commissioner Palwal will be the sole arbitrator and his orders will be final.
- 13 A team comprising of Municipal Engineer and Junior Engineer will check the specification / work done.
- 14 The inspection committee is competent to amend or add any minor change while execution of the work and contractor is bound to do so.
- 15 The contractor is bound to follow all the conditions written in the tender form MW4, DNIT and tender notice.
- 16 No material will be supplied by the department.
- 17 The agency will submit the documentary evidence regarding security /Bank Gaurantee within the 15 days. The security /Bank guarantee will be released after completion of the tender period without intrest.
- 18 GST/income tax/ any applicable tax will be deducted from the bill of contractor as per Government instructions at the time of execution /bill payment.
- 19 Any item of work not provided in the contract schedule of rates if required to be executed will be paid as per Haryana PWD schedule of rates 1988, together with the ceiling premium exhibited in the DNIT for various chapter subject to premium or discount tendered by the contractor, where the item exist in Haryana PWD schedule of rates 1988.The department reserves the option to take away any item of work of any part thereof at any time during the currency of contract and re allot to another contractor with due notice to the contractor without liability of compensation.



## Municipal Council, Palwal



- 20 Contractor is required to provide cautionary measurement/sign board etc during execution of work and he is fully responsible for any loss /compensation in case of accident, mishap at the site of work.

*[Signature]*  
Executive Officer  
Municipal Council  
Palwal.

*[Handwritten mark]*

Endst No: 5218/MCP

Dated: 04/12/2020

A copy of the same is forwarded to the following for information please.

- (a) Director General, Urban Local Bodies Haryana, Panchkula for information with respect to your office letter No. No.XEN-1/BR/DGULB /2020/6045 dated 03-12-2020.
- (b) District Municipal Commissioner, Palwal for information with respect to your office letter No.1330/DMC/PWL/2020 dated 04-12-2020.

*[Handwritten mark]*

*[Signature]*  
Executive Officer  
Municipal Council  
Palwal.

Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana	EIA Report
Scope of the study (compliance of terms of reference)	

### Scope of the study (compliance of terms of reference)

Point wise compliance of ToR letter issued by SEIAA Haryana with vide Proposal number (SIA/HR/MIS/64778/2021; Dated 26<sup>th</sup> Oct, 2021 for the project of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana.

### Additional TOR

S. No.	Conditions	Details
1.	Importance and benefits of the project.	Refer Chapter 9, Project Benefits
2.	A sensitivity analysis of the site shall be carried out as per the MoEF&CC criteria and form part of the EIA report.	Refer Chapter 6, Legal Framework for sensitivity analysis of the site details
3.	The EIA would include a separate chapter on the conformity of the proposals to the Municipal Solid Waste Management Rules, 2016 and the Construction and Demolition Waste Management Rules, 2016 including the sitting criteria therein.	Refer Chapter 6
4.	Characteristics and source of waste to be handled and methodology for remediating the project site, which is presently being used for open dumping of garbage.	Refer Chapter 3
5.	Details of storage and disposal of pre-processing and post-processing rejects/inserts.	Refer Chapter 3
6.	List of proposed end receivers for the rejects/inserts should be provided. MoUs to be submitted in this regard.	Refer Chapter 3 the MOUs for the same is mentioned and attached as annexure-2.
7.	Details of various waste management units with capacities for the proposed project. Details of utilities indicating size and capacity to be provided.	Refer Chapter 3: Project Description
8.	The EIA would also examine the impacts of the existing land fill site and include a chapter on the closure of the exiting site including disposal of accumulated wastes and capping.	Refer Chapter 2: Closure of Existing Dump Site
9.	A pond is present at 200 m from the project site. EIA should include the impact of the proposed project on the pond's water quality.	There is presence of one pond which is 0.87 km in WNW direction. No pond is available in 200m radius area.



Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana		EIA Report
Scope of the study (compliance of terms of reference)		
S. No.	Conditions	Details
		Refer Chapter 4: Description of the Environment and chapter 5: Anticipated Environmental Impacts & Mitigation Measure
10.	The project proponents should consult the Municipal solid waste Management manual of the Ministry of Urban Development, Government of India and draw up project plans accordingly.	Agreed
11.	Waste management facilities should maintain safe distance from the nearby pond.	There is presence of one pond which is 0.87 km in WNW direction. Refer Chapter 4: Description of the Environment
12.	Layout maps of proposed solid waste management facilities indicating storage area, plant area, greenbelt area, utilities etc.	Refer Chapter 3 of the EIA report
13.	Details of air Emission, effluents, solid waste generation and their management	Refer Chapter 10 : Environmental Management Plan
14.	Requirement of water, power, with source of supply, status of approval, water balance diagram, man-power requirement (regular and contract)	Refer Chapter 3: Project Description.
15.	Process description along with major equipment's and machineries, process flow sheet (quantitative) from waste material to disposal to be provided	Refer Chapter 3: Project Description
16.	Hazard identification and details of proposed safety systems	Refer Chapter 8: Additional Studies, Section 8.3: Hazard Identification and Risk assessment
17.	Details of Drainage of the project upto 5 km radius of study area. If the site is within 1 km radius of any major river, peak and lean season river discharge as well as flood occurrence frequency based on peak rainfall data of the past 30 years. Details of Flood Level of the project site and maximum Flood Level of the river shall also be provided.	Refer Chapter 4: Description of the Environment Details of drainage provided in Chapter 4 of Hydrology. No Major River is within 1km radius from project site.
18.	Details of effluent treatment and recycling process	Refer Chapter 3, Project Description

Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana	EIA Report
Scope of the study (compliance of terms of reference)	

S. No.	Conditions	Details
19.	Action plan for measures to be taken for excessive leachate generation during monsoon period.	Refer Chapter 3: Project Description for leachate generation and treatment
20.	Detailed Environmental Monitoring Plan	Refer Chapter 7, Environmental Monitoring Programme
21.	Timeline for implementation of the project shall be included in the EIA Report	Refer Chapter 3, Project Description
22.	Report on health and hygiene to be maintained by the sanitation workers at the work place.	Refer Chapter 3, Project Description
23.	A tabular chart with index for points wise compliance of above ToRs.	Agreed

TABLE NO-1.1 STANDARD TERMS OF REFERENCE

S. No	Terms of Reference	Compliance to Terms of Reference
1	The project should be designed based on the population Projections as by Master Plan.	The proposed project is to manage the existing legacy waste via sanitary landfill composting. MRF. This land where Dumpsite is located is owned by Municipal Council Palwal and has been used for open dumping of mixed MSW since the years. About 18,900 Metric ton of legacy waste has already been deposited at the Dumpsite. At present, the Dumpsite receives an estimated 100 TPD of Municipal Solid Waste ("MSW") per day. The decade population of the year 2021 is 1,14,240 and the waste generation is 100. As per the NGT orders mentioned clearly to made best efforts to complete the work of bioremediation of legacy waste up to the date fixed by this Hon'ble NGT i.e., 07.04.2021.
2	Submit a 10 km. radius map (on survey of India toposheet) showing co-ordinates of project site, national highway, state highway, district road/approach road, river, canal, natural drainage; protected areas, under Wild Life (Protection) Act, archaeological site, natural lake, flood area, human settlements (with population), industries,	Chapter 4 in the report presents the latest topographical map from Survey of India covering 10 km radius from the project location. No negative impacts have been envisaged due to the proposed MSW project activity. Chapter 4 present more details.

Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana	EIA Report
Scope of the study (compliance of terms of reference)	

S. No	Terms of Reference	Compliance to Terms of Reference
	high tension electric line, prominent wind direction (summer and winter), effluent drain, if any and pond etc. should be presented and impacts assessed on the same.	
3	Examine and submit details of alternative technologies viz. RDF shall also be evolved.	No alternative site is proposed for development of the proposed landfill project. As per the SWM rules 2016, the selected site is for managing the legacy waste. As this is already an existing dump site so no alternative sites were examined and as per the SWM rules 2016, the existing dump site is fulfilling all the site selection criteria  The generated RDF shall be supplied to nearby industrial units (cement plant, waste to energy plant etc.)
4	Examine and submit details of storm water/ leachate collection from the compost area	Aeration pad will be covered from the top and floor level will be made above normal ground level to avoid mixing of storm water. Leachate collection system shall be provided.
5	Examine and submit details of monitoring of water quality around the landfill site. Water analysis shall also include for nitrate and phosphate.	Water samples were collected from ten (10) ground water sources around the proposed site within 10 km radius. All samples were analyzed for physical and chemical characteristics including nitrates and phosphates. Chapter 4 presents the locations from where the water samples were taken and also presents analysis results of ground water samples.
6	Examine and submit details of the odour control measures.	Inoculums and sanitizer will be sprayed over waste for odour suppression. Special chemicals will be sprayed over waste heap for bird & fly management.
7	Examine and submit details of impact on water bodies/rivers/ ponds and mitigative measures during rainy season.	No negative impact on water bodies/rivers/ponds has been envisaged. Runoff water from the site gets collected in a tank and if there is any overflow, will be diverted to greenbelt. Leachate/runoff water will not be let out from the premises.

Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana	EIA Report
Scope of the study (compliance of terms of reference)	

S. No	Terms of Reference	Compliance to Terms of Reference
8	Submit the criteria for assessing waste generation. Any segregation of hazardous and bio-medical wastes.	At present, the Dumpsite receives an estimated 100 Tons of Municipal Solid Waste ("MSW") per day. The processing of the Legacy Waste shall be in accordance with CPCB guidelines for handling Legacy Waste along with SWM Rules 2016 (as amended time to time) (Chapter 3 present the criteria adopted for assessing waste generation. Hazardous waste and bio- medical wastes are not expected to be a part of MSW stream.
9	Submit a copy of the layout plan of project site showing solid waste storage, green belt (width & length, 33% of the project area), all roads, prominent wind direction, processing plant & buildings etc. should be provided.	Chapter 3 presents the area break up and details of the infrastructure.
10	Submit a copy of the land use certificate from the competent authority.	The land is provided by Municipal Council Palwal for development of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Meghpur Palwal. copy of the land use certificate from the competent authority is enclosed as <b>Annexure-1</b>
11	NOC from local or nearest airport within 20 km and any flight funnel restrictions.	IGI Airport 46.13 Km in NNW direction is the nearest airport. NOC not applicable.
12	Submit a copy of the status of ambient air quality and surface and ground water quality, soil type, cropping pattern, land use pattern, population, socio-economic status, anticipated air and water pollution.	Chapter 4 present the details on status of ambient air quality and surface and ground water quality, soil type, cropping pattern, land use pattern, population, socio-economic status, anticipated air and water pollution.
13	Submit a copy of the topography of the area indicating whether the site requires any filling, if so, the details of filling, quantity of fill material required, its source and transportation, etc.	Chapter 4 presents the topographical map of the proposed site. The project has been designed with focus on balancing the earthwork such that the fill volumes are equal to or less than the cut volumes. Excavated soils (cut volumes) shall be re-used for levelling the low-lying areas at the site to avoid transport of fill material.

Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana	EIA Report
Scope of the study (compliance of terms of reference)	

S. No	Terms of Reference	Compliance to Terms of Reference
14	Examine and submit the details of impact on the drainage and nearby habitats/settlement (surroundings).	Impact on water quality with mitigation measure is given in Chapter-5
15	Examine and submit the details of Surface hydrology and water regime and impact on the same.	Chapter 4 presents details of surface hydrology and water regime and impact on the same. Impact is given in Chapter-5.
16	Submit a copy of detailed plan of waste management	Chapter 3 presents detailed information on the plan of waste management systems & presents the process flow chart information and material mass balance of MSW processing information.
17	Submit the details of sanitary land fill site Permeability and whether it would be lined, if so, details thereof.	Chapter 2 presents the facility for closure of existing waste. Chapter 3 presents details of Plan & Sections of Landfill.
18	Examine and submit the details of impact on environmental sensitive areas.	Chapter 5 presents detailed study of Impact on Environmental Sensitive Areas.
19	Examine and submit the details of Rehabilitation / compensation package for the project affected people, if any.	No Rehabilitation and Resettlement (R&R) is required to establish the proposed facility. The land is provided by Municipal Council Palwal for Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village Palwal, Haryana.
21	Submit Environmental Management Plan and Environmental Monitoring Plan with costs and parameters.	Detailed Environmental Management Plan is Provided in Chapter 10. Detailed Environmental Monitoring Plan is provided in Chapter 7. In order to comply with the environmental protection measures as specified in the Environmental Management Plan (EMP), capital cost of Rs. 19 Lakhs is allocated. Recurring cost for EMP is estimated to be Rs. 3.5 lakhs per annum. (Chapter 10) presents more details on EMP budget.
22	Public hearing to be conducted for the project in accordance with provisions of Environmental Impact Assessment Notification, 2006 and the issues raised by the public should be	Public Hearing shall be conducted at Project Site. All the concerns raised during the Public Hearing shall be addressed and replies shall be incorporated in the Final EIA Report.

Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana		EIA Report
Scope of the study (compliance of terms of reference)		
S. No	Terms of Reference	Compliance to Terms of Reference
	addressed in the Environmental Management Plan. The Public Hearing should be conducted based on the ToR letter issued by the SEIAA and not on the basis of Minutes of the Meeting available on the web-site	
23	A detailed draft EIA/EEMP report should be prepared in accordance with the above additional TOR and should be submitted to the ministry in accordance with the Notification.	Noted and followed.
24	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	There is issuance of NGT orders to facilitate each and every municipality to arrange a concrete and appropriate management of legacy remediations" NGT mentioned clearly to made best efforts to complete the work of bioremediation of legacy waste up to the date fixed by this Hon'ble NGT i.e., 07.04.2021.
25	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website " <a href="http://moef.nic.in/Manual/Commo">http://moef.nic.in/Manual/Commo</a>	All the studies/activities suggested in the TOR were completed in detail and presented in the EIA report. No further clarification required for carrying out the studies suggested.



# **EXECUTIVE SUMMARY**

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<p><b>Introduction of the Project</b></p>	<p>Municipal Council the "Authority" intends for Implementation of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Meghpur Palwal, Haryana ("Sanitary Landfill Site").</p> <p>As per the current estimates (2021) of the MCP, 100 TPD waste is generating which includes residential, commercial, religious, food market and street sweeping waste.</p> <p><b>Need of Project and its Importance to Region</b></p> <p>Accumulation of solid waste in open areas is an eyesore, diminishing real estate and property value, a breeding ground for insects and other vectors (rats and mice, wild and domesticated animals, as well as humans who may come in contact with contaminated wastes). It also causes Odour nuisance, reflects the unorganized nature of the community and creates poor environment for growing children. Improper and unorganized disposal of Municipal Solid Waste due to lack of any plan for its proper management led to various fatal diseases both communicable and non-communicable among human beings and animals. Municipal Solid Waste Management deals with the control of generation, storage, collection, transport, treatment and disposal of solid waste in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations. For improving the current dumping of Municipal Solid Waste proper treatment will be done for improving the situation. Following processes will be adopted like composting, sanitary landfill at site and handover the RDF &amp; Recycling material to the appropriate vendor.</p>
<p><b>Project description</b></p>	<p><b>TYPE OF PROJECT</b></p> <p>The proposed project falls under Item 7 (i) (Common Municipal Solid Waste Management Facilities) and is a designated project under Schedule and falls under category B due to of the Environment Impact Assessment (EIA) Notification dated September 14<sup>th</sup> September, 2006</p>



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and requires clearance from State Environment Impact Assessment Authority.

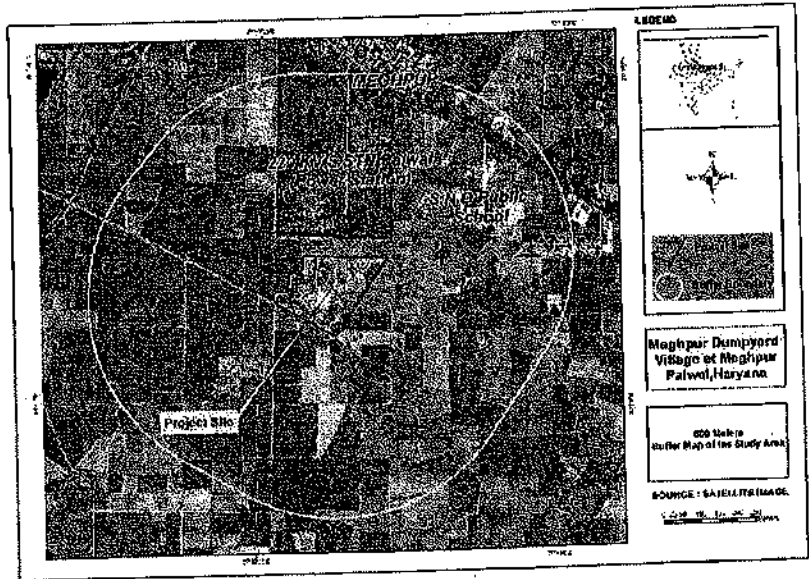
**WASTE QUANTITY**

As per the current estimates (2021) of the MCP, about 100 tons of solid waste is generated daily in Palwal. The main solid waste generation sources are residential, commercial and institutional establishments, vegetable and meat markets, hospitals, hotels and restaurants, and construction and demolition waste (debris).

**Site Setting**

The site is close to Sohna- Palwal Road towards East North East direction. The nearest railway station is Palwal Railway Station – 4.58 Km in East direction. IGI Airport 46.13 Km in NNW direction is the nearest airport.

**Satellite view of the Project Site**



River sand found in Distt. Faridabad & Palwal are Alluvial sediments of fluvial deposits brought down from Himalayas from the upstream side by river Yamuna and its tributaries which have variable thickness depending upon the original land form on which deposition took place. The river sand is most recent deposit of clean sand deposited by river Yamuna and is being reworked every year.

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S. No.	Criteria	Criteria distance	Available distance from proposed SLF site
1	Distance from nearest River	100 meters	Yamuna River – 17.96 Km in East direction
2	Distance from Nearest Pond	200 meters	0.87 Km in WNW direction
3	Distance from nearest Highway (NH-2)	200 meters	SH-22A: 2.23 Km in East direction NH-2 (Delhi-Kolkata Highway): 2.74 Km in ENE direction
4	Distance from nearest habitation	200 meter	Kakrali Village – 1.05 Km in WNW direction
5	Distance from nearest Public Parks	200 meter	Huda Park – 1.81 Km in ENE direction
6	Distance from nearest Water supply wells	200 meters	-
7	Distance from nearest Airports/Airbase	20 km	IGI Airport – 46.13 Km in NNW direction
<b>Environment Setting in area</b>			
<b>Land requirement</b>	<p>The proposed project is for maintenance of Sanitary landfill facility of 100 TPD of SWM in total area of 9.1 Acres for 1 years.</p> <p>The site is close to Sohna-Palwal Road towards East North East direction. The nearest railway station is Palwal Railway Station – 4.58 Km in East direction. IGI Airport 46.13 Km in NNW direction is the nearest airport. The site is landlocked and away from sea or waterways.</p>		
<b>Baseline Environmental Conditions</b>			
<p>The field studies carried out during Oct.-Dec. 2021 for the Environmental Impact Assessment (EIA) study to provide the baseline data for the present environmental scenario at and within 10 km radius of the proposed site. Data collection survey for the study, which included, geology, hydrology, meteorology, ambient air quality, water quality and soil characteristics, noise level, flora and fauna, land use pattern, demography, amenities and infrastructure was undertaken by the field team of experts and analysis work.</p>			
<b>Topography</b>	<p>The area is marked by flat topography of sedimentary formations, which are surrounded by fine-grained blown soil overlying the sand deposits. Highest elevation is 191.70 mRL &amp; lowest 181.10 mRL in the proposed lease area.</p>		
<b>Geology</b>	<p>River sand found in Distt. Faridabad &amp; Palwal are Alluvial sediments of fluvial deposits brought down from Himalayas from the upstream side by</p>		

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	<p>river Yamuna and its tributaries which have variable thickness depending upon the original land form on which deposition took place. The river sand is most recent deposit of clean sand deposited by river Yamuna and is being reworked every year. The litho units encountered in the river bed are younger sedimentary formations in nature and are brought by river water from high reaches of Himalayan range of hills of Himachal Pradesh. The sediments are river borne and have been deposited in the riverbed and its flood plains.</p>
<b>Geo-hydrology</b>	<p>The district is occupied by Indo-Gangetic alluvial plain of Quaternary age, and falls in Yamuna sub-basin of Ganga basin. The Central Ground Water Board has drilled 21 exploratory boreholes to delineate and determine potential aquifer zones, evaluation of aquifer characteristics. Out of 21 exploratory boreholes 13 boreholes were abandoned due to poor quality of ground water. The permeable granular zones comprising fine to medium grained sand and occasionally coarse sand and gravel. Their lateral and as well as vertical extent is limited. The borehole data reveals that clay group of formations dominate over the sand group in the district area. Ground water occurs in alluvium and the underlying weathered/fractured quartzites. Alluvium comprises sands silt, Kankar and gravel. Which form the principal ground water bearing horizon. In Quartzite formation, occupying the north- western part of the district, ground water occurs in weathered and jointed fractured horizons. Weathering and fracturing have resulted in formation of semi-consolidated sand beds (BADARPUR SANDS) which form potential aquifer zones. This quartzite formation has not been explored for ground water occurrence. In alluvium, granular zones are evenly distributed in entire thickness which is negligible near the quartzite outcrops to over 350 m in the eastern parts near Yamuna River. The discharge of the wells ranges from 750 lpm to 900 lpm at a drawdown of 5.5 to 7.00 m. The transmissivity 'T' value ranges between 55 to 200 m<sup>2</sup>/day were determined. Shallow tube wells for irrigation use are generally constructed upto a depth of 40 m. The discharge of these shallow tubewells range 360 -600 litres per minutes.</p>

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<b>Soil</b>	The result obtained is compared with the standard soil classification as given in Agriculture Handbook. Samples collected from identified locations indicate that the pH value is ranging between 6.98 to 8.09 which show that the soils are slightly alkaline in nature. Water holding capacity of the soil samples collected were found to be low ranging from 44.7 to 54.2%. Exchangeable Potassium value ranging from 112.6 to 152.5 kg/ha & Phosphorous varies from 25.5 to 49.8 kg/ha.	
<b>Water Quality</b>	The analysis results indicate that the pH value is 7.16 to 7.86 which is well within the specified standard of 6.5 to 8.5. The TDS was observed as 432 to 1880 mg/l. The chlorides were found as 56.20 to 454 mg/l. The sulphate was found as 43.3 to 166.6 mg/l. It is observed that sulphate is within limits. Total hardness ranges between 210 to 920 mg/l. Metals: Iron is found in between 0.16 to 0.89 mg/l.	
<b>Ambient Air Quality Monitoring</b>	<p>Ambient Air Quality Monitoring reveals that the <b>minimum and maximum concentrations of PM<sub>10</sub></b> for all the 10 Air Quality monitoring stations were found in the range of 81.3 <math>\mu\text{g}/\text{m}^3</math> and 397.4 <math>\mu\text{g}/\text{m}^3</math> respectively, while for <b>PM<sub>2.5</sub></b> varies between 47.4 <math>\mu\text{g}/\text{m}^3</math> and 176.4 <math>\mu\text{g}/\text{m}^3</math>.</p> <p>As far as the gaseous pollutants SO<sub>2</sub> and NO<sub>2</sub> are concerned, the prescribed limits under NAAQ Standards for residential and rural areas has never surpassed at any station.</p> <p>The <b>minimum and maximum concentrations of NO<sub>2</sub></b> were found to be 5.2 <math>\mu\text{g}/\text{m}^3</math> and 49.7 <math>\mu\text{g}/\text{m}^3</math> respectively.</p> <p>The <b>minimum and maximum concentrations of SO<sub>2</sub></b> were found to be 5.2 <math>\mu\text{g}/\text{m}^3</math> and 24.3 <math>\mu\text{g}/\text{m}^3</math> respectively.</p> <p>The <b>minimum and maximum concentrations of CO</b> were found to be 0.5 <math>\text{mg}/\text{m}^3</math> and 3.5 <math>\text{mg}/\text{m}^3</math> respectively.</p>	
<b>Noise</b>	<p>The noise levels are found to be 51.3-68 <b>db(A)</b> for day and 42.2-52.8 <b>db(A)</b> night time respectively.</p> <p>The high levels of noise in day for project site can be attributed due to construction and operation and vehicular activities.</p>	
<b>Biological Environment</b>	The baseline study was conducted for the evaluation of the floral and faunal biodiversity within the existing environment of the study area (10 Km radius from the lease mine area) and it comprises of total 187 floral	

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	<p>species have been recorded during survey from the 10 km study area out of which 59 are Trees, 32 are shrubs, 63 herbs, 15 grasses, 17 species of Climbers and one parasite species are existing within the 10 km periphery fore core. There is no any endemic, endangered or protected floral species was recorded.</p> <p>Among the faunal groups 68 faunal species have been encountered in the study area out of which 15 Mammals, 11 Herpetofauna, 9 Butterfly and 33 aves species were recorded from 10 km vicinity area. Only 5 schedule -II SPECIES VIZ. <i>Canis aureus</i> (Jackal), <i>Macaca mulata</i> (Monkey), <i>Presbytis entellus</i> (Common Langur), <i>Daboia russelli</i> (Russell's viper), (Indian Cobra) and <i>Ramphotyphlops braminus</i> (Common worm snake) were documented. <i>Pavo cristatus</i> only one schedule-I species been found from 10 km study area.</p> <p>The Palwal district the major crops are paddy, jowar, bajra, makai and sugarcane in kharif seasons, while that of Rabi seasons crops are wheat, barley, sunflower, arahar, mung, chana, masoor, rapeseed, pea and barseem. The other crops grown are sugarcane, oilseeds and pulses. Horticultural and vegetable crops are also cultivated in the district.</p> <p>There is no Biosphere Reserve, National Parks, Wildlife Sanctuary, Tiger Reserve and Elephant -Reserve within 10 km radius of the project site. The nearest protected areas Asola Bhatti Wildlife sanctuary which is ~37.74 km away from away from project site</p>	
<b>Socio-economic Profile of The Area</b>	<p>Based on the interpretation made above, primary survey (interaction with stakeholders, FGD, community consultation and discussion with an influential person of the study area) and secondary sources, the significant observations and gap in the study area poor sanitation and improper drainage system. sanitation employment and medical facilities are substantial problems seen in the study area.</p> <p>The Livelihood of most people in the study area depends on labor work, Agriculture, cattle rearing and jobs. Tap water, tube well, hand pump and wells are the sources of drinking water in the study area. In India, rural areas also have the highest overall burden of coronavirus (Covid- 19) epidemic, and the study area also has been reported in general cases of cough and fever. The people have a mixed opinion about the new</p>	

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proposed project. People want employment for local people in the industry. CER activities carried out in village development through the industry. According to villagers, the industry will take proper action to air, water, and noise and land pollution.

The socio-economic study revealed that the youth in the project area is devoid of employment opportunities. They can be a potential source of workers with minimum handholding and vocational education skills, hence Youth empowerment programs through awareness creation about various government schemes, providing appropriate opportunities with relevance to their qualification and skills, conducting skills inculcating programs etc.

### Environmental Impact Assessment

**Construction Phase**

#### Water Quality:

There is presence of one pond which is 0.87 Km in WNW direction. The landfill may pollute pond which is present in northern direction of the area.

#### MITIGATION MEASURES

- The pond present in north is against the hydraulic gradient as the area is having gradient from west to east. No surface water will flow to north direction from project site. Hence, there will not be impact on pond present in northern direction.
- Provisions for diversion of storm water discharge drains lined type shall be made to minimise leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions.
- The storm water drain shall be designed and constructed in such a way that the surface runoff water is diverted from the landfilling site and leachates from solid waste locations do not get mixed with the surface runoff water.
- Regular Cleaning of Storm water drains will be carried out in order to avoid blockage of flow.
- Water from pond will regularly monitored for contaminations if any.

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	<p><b>Air Quality:</b> Air quality impact will be temporary in nature and will stop when construction is over. A dust and emission control plan will be prepared and implemented by the project developer.</p> <p><b>Noise:</b> Noise in and around the construction site may affect the animal and residents in the surrounding areas. However, the distance of nearest habitation around site is approx. 1.05 km and animals in the area will have tendency to move away from the noise and eventually return to the area when construction is complete. A noise control and management will be prepared and implemented by the project developer.</p> <p><b>Labour Camp Issues:</b> Potential impacts from the workforce and the work camps in all construction areas, will be in terms of additional pressure on land and natural resources. There will be generation of solid and liquid wastes. Additionally, the spontaneous development near the construction camps could create public health risks. Wastewater from the work camps could cause water quality problems in the adjacent water body. Inappropriate solid waste disposal could lead to the contamination of the soil and surface water body, and the spread of communicable diseases. There shall be proper plan for managing work camps and labour force.</p> <p><b>Damage to Physical cultural and archaeological resources:</b> There is no physical cultural resource within the site and hence this issue is not significant.</p> <p><b>Traffic related Impact:</b> There will be no increase of traffic as the proposed project is to manage the existing legacy waste. So, there will no increase of upcoming trucks carrying solid waste from the city. Only there will be minimal increase of traffic carrying required construction material.</p>
<b>Operation Phase</b>	As per SWM Rules, only inert material is supposed to be disposed off, however looking to the current situation, the landfill gas generation has been considered. Environmental and social impacts during operation phase of the project are mainly divided into six categories: (1) Impacts

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	<p>from Compost ;( 2) impacts from landfill gas emissions ;( 3) emissions form the operation of DG set (4) Handling and storage of oil/chemicals and fuels;(5) Handling and disposal of domestic liquid and solid waste;(6) Impact from landfill leachate. These impacts are discussed in detail in following sections.</p> <p><b>Impacts from landfill gas</b></p> <p>Many constituents of landfill gas are hazardous and pose potentially significant risks to human health and the environment. Some other risks result from the process of flaring.</p> <p><b>DG set:</b></p> <p>DG set will emit air pollution during its occasional operation in times of power failure.</p>	
	<p><b>Spillage and leakage of oil/chemicals:</b></p> <p>Oil and chemical spillage during handling and storage process may lead to water and land contamination in the immediate vicinity of the activity area. During rains, water contamination may extend to larger distance.</p> <p><b>Discharge of domestic liquid &amp; solid waste:</b></p> <p>Daily routine activities at the site will generate domestic wastewater, which if discharged without proper treatment and disposal, will cause pollution of nearby surface and ground water body. Municipal solid waste, generated from daily activities, will require proper collection and disposal for goodhousekeeping and sanitation purposes.</p> <p><b>Leachate from landfill:</b></p> <p>Leachate from landfill operation has great potential to cause damage to water receiving bodies. Proposed site faces the same issue and project developer shall have to plan leachate management in adequate manner.</p>	
<b>Closure and post closure phase activities</b>	<p>It has been experienced that occasional explosion takes place in closed landfill site due to methane gas release. This causes accident and health impact on the local people who may be there at the location by chance. There may be possibility of similar occurrence at proposed site.</p> <p>After the closure of the landfill, there can still be need for continuing operation of leachate treatment plant until a time by when it could be established that leachate is no longer an issue at the site.</p>	



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<p><b>Community Issues</b></p>	<p><b>Breeding of mosquitoes, vectors and flies</b> This will be an adverse impact, as landfill site will be cause risk of breeding.</p> <p><b>Littering of waste in residential and commercial area</b> Littering of waste from the waste transport vehicles may cause nuisance to local public whose houses and shops may be located on the sides to road for transport of garbage vehicles.</p> <p><b>Unauthorized entry in landfill</b> Operation of the landfill site may cause unauthorized entry which may lead to accidents and health impact of intruders.</p> <p><b>Increase in disease occurrence rate in local community</b> Currently there is no significant settlement around the site, however, it may increase after the landfill site is operational. In that case, there will be chances of disease in local people from the impact of landfill. A buffer zone must be developed around site to prevent local settlement around site.</p> <p><b>Social conflict among construction workers and labour camps</b> Migrated workers may create law and order problems with local community in the area. However, this is not anticipated to be severe issue because there not much settlements at and around site.</p> <p><b>Health impact from landfill gas</b> Unauthorized persons in the landfill site may be exposed to the health impact from landfill gas.</p> <p><b>Health and safety of scavengers</b> Scavenging activity if done in uncontrolled manner without PPEs (Personal Protective Equipment) will cause health and safety concerns for scavengers.</p>
<p><b>Environmental Management Plan</b></p>	
<p><b>Environmental Management Plans</b></p>	<p>Sound environmental management plans will be prepared and implemented to mitigate potential adverse impacts and enhance positive impacts. The EMPs have been developed for the following stages of the plant activities at the site.</p>

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	<ul style="list-style-type: none"> <li>▪ Project preparation stage</li> <li>▪ Project construction stage</li> <li>▪ Project operation stage</li> <li>▪ Plant closure and post closure stage</li> </ul> <p>To support implementation of EMPs, regular monitoring of environment quality (ambient air, Ground water, noise and waste water) will be undertaken by the project developer during construction as well as operation of the plant.</p>	
<b>Institutional Framework for Implementation &amp; Monitoring of Mitigation Measures</b>	<p>Environment Management Plans will be incorporated as key points of discussion in the tender document. Prospective construction contractors will be asked to submit, in their proposal, the implementation response to various requirements of EMPs and health and safety plan along with budget allocation for the same. Selection of the contractor will be influenced by their response to the EMPs and proposed budget. The contractor will be required to implement EMPs as defined in their proposal and approved by project developer.</p> <p>All the necessary components of EMP and Health and Safety Plan will be operational before starting pre-construction work.</p> <p>ESMP and Health and Safety Plan for operational stage of the project will largely be taken care of during design and siting of the landfill plant. A few residual plans related to the process like waste handling, handling and storage of fuels, etc. will be implemented under routine activities within operational activities. In order to streamline environmental activities, project will implement environmental management system compatible with ISO-14001 standard. The system will have number of process monitoring steps vis-à-vis safe and environment friendly operation of the plant.</p>	
<b>Corporate Environment Responsibility (CER)</b>	<p>Under CER notification dated 1<sup>st</sup> may 2018 the company shall spend 2% of its project cost, which comes 2.52 lakhs; this will fulfill public demand and bring about the overall improvement of the locality and shall be spent for overall development of the locality and local people. Some of the community developments plans can be considered by the project Developer as part of corporate social responsibility.</p>	

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<b>Conclusion</b>	<p><b>Better Living Conditions</b></p> <ul style="list-style-type: none"> <li>✓ No open dumping.</li> <li>✓ Reduce the chances of air, water &amp; soil contamination.</li> <li>✓ Reduce Emission Odour.</li> <li>✓ Improve the living standard of society &amp; will provide safe &amp; hygienic surroundings.</li> </ul> <p><b>Direct &amp; indirect employment opportunities</b></p> <ul style="list-style-type: none"> <li>✓ Development of project will provide employment opportunity to local skilled, unskilled &amp; semiskilled people during both construction &amp; operation phase.</li> <li>✓ Indirect employment may also generate during construction phase of project.</li> </ul>
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# **CHAPTER 1**

## **INTRODUCTION OF THE PROPOSED PROJECT**

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<b>CHAPTER-1 INTRODUCTION OF THE PROPOSED PROJECT</b>	

### 1.1 PURPOSE OF THE REPORT

The Environmental Impact Assessment has been prepared to assess the current environmental scenario of the area. The main objective of the proposed municipal solid waste processing is to collect 100% of MSW generated in the area limits and dispose of the same through scientific process. Management of Solid Wastes is of growing concern to the general public at large, local authorities and business communities in cities and towns across India. The problem is exacerbating in urban areas due to rapid strides in population growth, coupled with an economic boom that encourages the consumption of goods and, hence, wastes generation. The Government of India has taken several initiatives to improve the existing Solid Waste Management practices in the Country.

In short, the objective of the project is to introduce appropriate technologies for management of MSW so as to prevent the waste from causing pollution and health hazards. The EMP has been prepared with a view to ultimately ensure that the adverse impacts are minimized.

As per the EIA Notification dated 14<sup>th</sup> September 2006, it is mandatory to have the Environmental Clearance for any new/existing / expansion or modernization of the project from Ministry of Environment, Forests & Climate Change, Government of India, New Delhi /SEIAA. The proposed project is categorized under Item "7(i) Common Municipal Solid Waste Management Facility (CMSWMF)" in the EIA Notification, dated September 14<sup>th</sup>, 2006 and its amendments.

Recently, Hon'ble NGT alarmed that due to incremental growth of Municipal Solid Waste (MSW), these MSW dumps are converting into virtual mountains. Hon'ble NGT further directed that every city/town should adhere to clause 'J' of Schedule-I of SWM Rules, 2016. Finally, Hon'ble NGT directed CPCB to propose Standard Operating Processing (SOP) for implementation of Bio-mining and Bio-remediation of legacy solid waste.

As per the NGT orders, it is clearly mentioned on Page No. 2" legacy waste is causing huge damage to environment, so NGT said in their orders to facilitate each and every municipality to arrange a concrete and appropriate management of legacy remediations" NGT mentioned clearly to made best efforts to complete the work of bioremediation of legacy waste up to the date fixed by this Hon'ble NGT i.e., 07.04.2021.

There is no violation in the proposed project and till now it was a dumping site so it was not attracting the provision of EIA notification 2006. To manage the existing waste Municipal authority are taking immediate actions of composting, MRF and Landfill. Sanitary Landfill sites attract the provision of EIA notification 2006.

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The letter of TOR was proposed vide proposal no. (SIA/HR/MIS/64778/2021) Dated 26<sup>th</sup> Oct, 2021 by SEIAA Haryana for preparation of an Environmental Impact Assessment (EIA).

## 1.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

The state of Haryana generates about 5,380 Tonnes per day (TPD) of Municipal Solid Waste and this quantity is likely to be more than 7,675 TPD by 2042, assuming the rate of increase of per capita waste generation is in proportion to increase in urban population. Directorate of Urban Local Bodies (DULB), in its endeavor to provide people safe, clean and healthy environment, has proposed to set up cluster based integrated solid waste management facilities in the ULBs of Haryana in Public Private Partnership mode. The government of India through Solid Waste Management Rules, 2016 has set the baseline for the modus operandi of SWM in the country.

There are 31 wards in the Palwal city with the total population of 10, 42,708 as per 2011 census and approx. all 31 wards including commercial and public places are covered under door-to-door collection.

Municipal Council the "Authority" intends for Implementation of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Meghpur Palwal, Haryana ("Sanitary Landfill Site").

The waste generation is approx. 100 TPD which includes residential, commercial, religious, food market and street sweeping waste.

### Identification of project proponent

Applicant	Authorized signatory
Municipal Council Palwal	Mr. Mahinder (Executive Engineer)

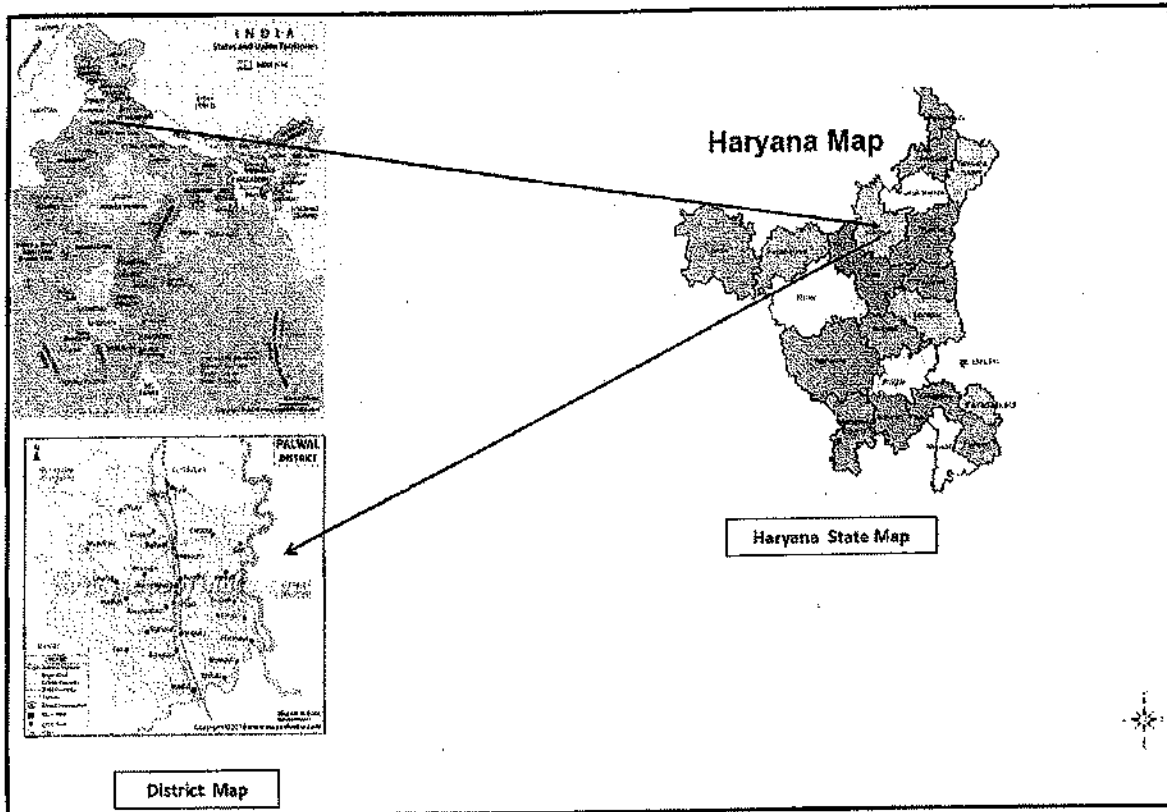
## 1.3 BRIEF DESCRIPTION OF NATURE, SIZE, LOCATION OF THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY, REGION.

S. No.	Particulars	Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana.
A.	<b>Nature of the Project</b>	<b>Size of the Project</b>
	Remediation and Reclamation of Existing Dumpsite	9.1 Acre
B	<b>Location Details</b>	
1.	Village	Meghpur
2.	District	Palwal

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3.	State	Haryana		
4.	Latitude & Longitude	<b>Coordinates Points</b>	<b>Latitude</b>	<b>Longitude</b>
		1.	28° 9'13.34"N	77°17'35.89"E
		2.	28° 9'13.31"N	77°17'43.10"E
		3.	28° 9'6.19"N	77°17'38.07"E
		4.	28° 9'9.18"N	77°17'31.83"E
		5.	28° 9'10.08"N	77°17'31.80"E
		6.	28° 9'10.06"N	77°17'33.26"E
		7.	28° 9'11.69"N	77°17'33.28"E
		8.	28° 9'11.70"N	77°17'34.71"E
5.	Toposheet No.	H 43 X 4, H43 X 8		
C	<b>Environmental Settings of the Area</b>			
1.	Ecological Sensitive Areas	No		
2.	River / water body	<b>River/ water body</b>	<b>Distance</b>	<b>Direction</b>
		-	-	-
3.	Nearest Town / City	72 km in East direction		
4.	Nearest Railway Station	Palwal Railway Station – 4.58 Km in East direction.		
5.	Nearest Airport	IGI Airport – 46.13 Km in NNW direction.		
6.	State Boundary	SH-22A 2.23 Km in East direction, NH-2 (Delhi-Kolkata Highway) 2.74 Km in ENE direction		
7.	Seismic Zone			
D	<b>Cost Details</b>			
1.	Total Project Cost			
E	<b>Requirements of the Project</b>			
1.	Water Requirement	3 KLD		
2.	Man Power Requirement (Skilled and unskilled persons)			

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**FIGURE 1.1: LOCATION MAP**

**Importance to country and region: -**

Accumulation of solid waste in open areas is an eyesore, diminishing real estate and property value, a breeding ground for insects and other vectors (rats and mice, wild and domesticated animals, as well as humans who may come in contact with contaminated wastes). It also causes Odour nuisance, reflects the unorganized nature of the community and creates poor environment for growing children. Improper and unorganized disposal of Municipal Solid Waste due to lack of any plan for its proper management led to various fatal diseases both communicable and non-communicable among human beings and animals. Municipal Solid Waste Management deals with the control of generation, storage, collection, transport, treatment and disposal of solid waste in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations. For improving the current dumping of Municipal Solid Waste proper treatment will be done for improving the situation. Following processes will be adopted like composting, sanitary landfill at site and handover the RDF, soil & Recycling material to the appropriate vendor.



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#### 1.4 OBJECTIVE OF EIA STUDY

**The specific objective of the EIA study is to:**

The state of Haryana generates about 5,380 tonnes per day (TPD) of Municipal Solid Waste and this quantity is likely to be more than 7,675 TPD by 2042, assuming the rate of increase of per capita waste generation is in proportion to increase in urban population. Directorate of Urban Local Bodies (DULB), in its endeavor to provide people safe, clean and healthy environment, has proposed to set up cluster based integrated solid waste management facilities in the ULBs of Haryana in Public Private Partnership mode. The government of India through Solid Waste Management Rules, 2016 has set the baseline for the modus operandi of SWM in the country.

Based on factors such as existing treatment plants, free land pockets, optimal waste transport distance 13 cluster-based SW treatment plants have been proposed in Haryana. Hisar Palwal cluster is one such cluster comprising of Hisar, Barwala, Hansi, Siwani, Palwal, Bhuna, Uklana mandi, Ratia, Tohana, Jhakhal ULBs.

Municipal Council the "Authority" The municipal council Palwal city is divided into 31 municipal wards for administrative purposes. Municipal council Palwal is undertaking solid waste management in all 31 wards. The objective of the project study is to intend for Implementation of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at the existing dump waste site in an environmentally and economically sustainable manner. The scope of work consists of. -

- ❖ Excavation of old dumped waste.
- ❖ Make windrow of legacy waste thereafter stabilization of the waste through bio-remediation.
- ❖ Construction of sanitary landfill facility.
- ❖ Review of applicable national and international legal environmental requirements.
- ❖ Discuss justification for development of the project;
- ❖ Establish environmental baseline condition within a study area of 10 km radius of the project site.
- ❖ Develop Environmental Management Plan (EMP) and Environmental Monitoring Plan;
- ❖ Undertake hazard identification and develop Disaster Management Plan; and identify project benefit.

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- ❖ Predict and evaluate of potential environmental and socio-economic impacts and identify.

### 1.5 SCOPE OF EIA STUDY

The scope of the Environmental Impact Assessment (EIA) study is in line with Terms of Reference (TOR) issued by the SEAC Haryana.

- ❖ **Secondary Data Collection:**

Collection of secondary data comprising of information on project conception, planning and development, land details, physical, biological, geological and land use information of the project area, socioeconomic data.

- ❖ **Investigations and surveys:**

Environmental investigations and laboratory testing for samples (air, water, and noise and soil quality) and analysis of meteorological and social surveys were also conducted in the immediate surrounding area.

- ❖ **Legal framework, statutory requirements and international guidelines:**

A desktop review of all the applicable legal framework and statutory requirements (national and state) has been carried out and included in the report. The guidelines pertaining to EHS aspects of solid waste management facilities were referred to and included in the report.

- ❖ **Public consultations and disclosure:**

A public consultation shall be done, as per the procedure prescribed in EIA Notification 2006.

- ❖ **Impact Assessment:**

Assessment of the potential impacts with respect to environmental and social aspects has been carried out and their significance determined.

- ❖ **Environmental Management Plan (EMP) along with Monitoring Plan:**

Appropriate mitigation and monitoring measures are suggested to minimize any potential damaging effects or any lasting negative consequence.

- ❖ **Report Layout:**

The objective of the study is to identify the possible environmental impacts, which can be anticipated as a result of the construction and the operational phase of the proposed sanitary landfill at the existing dump site to manage the current situation and to suggest suitable measures to mitigate the expected, adverse impacts on the environment. The work has been carried out in accordance with MoEF&CC guidelines and covers the requirements of

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environmental appraisal committee of MoEF & CC. Baseline information such as data on flora, fauna and demography has been collected from available literature field surveys. A sampling network was designed for field studies to collect air, water, soil and noise quality data apart from collection of data pertaining to hydrology, meteorology, and land use, which were collected from secondary sources.

The main chapters of the report are following:

- ❖ Chapter-1: Introduction of the proposed project;
- ❖ Chapter-2: Closure of Existing Landfill Site;
- ❖ Chapter-3: Description on the proposed project activities and facilities;
- ❖ Chapter-4: Description of the Environment;
- ❖ Chapter-5: Anticipated Environmental Impacts & Mitigation Measures;
- ❖ Chapter-6: Analysis of Alternatives;
- ❖ Chapter-7: Environmental monitoring programme;
- ❖ Chapter-8: Additional Studies;
- ❖ Chapter-9: Project Benefits;
- ❖ Chapter-10: Environmental Management Plan;
- ❖ Chapter-11: Summary & Conclusion;
- ❖ Chapter-12: Disclosure of Consultants Engaged;



# **CHAPTER 2**

## **CLOSURE OF EXISTING DUMP SITE**

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<b>CHAPTER-2 CLOSURE OF EXISTING LANDFILL SITE</b>	

## 2.1 Background

The Legacy Waste Dumpsite is located in Meghpur Village Palwal, Haryana. The height of the Meghpur village Dumpsite is 1.25 meters, depth is 4.57 meters and total area is about 37170 sq mtr. This land where Meghpur village Dumpsite is located is owned by MC Palwal and has been used for open dumping of mixed MSW since the year 2017. About 18,900 Metric ton of MSW has already been deposited at the Meghpur village Dumpsite. At present, the Meghpur village Dumpsite receives an estimated 100 tons of Municipal Solid Waste ("MSW") per day. Waste lying on site has very steep slopes ranging from 1 (V): 1 (H) to 1(V): 2.5 (H).

### Need for the Project

As discussed, solid waste is dumped at Meghpur village Palwal dump site, which is not an engineered landfill and only a dumpsite. It causes many environmental issues. The Site needs a well-defined scientific management and closure plan of the existing waste which should address the various issues such as groundwater contamination, surface water contamination, odour, nuisance, potential fire issues, slope instability of the waste mass and aesthetics. Some extra care may have to be taken during slope of stabilization. The excavation and relocation of old dumped waste is a complex process which may produce odour, dust and sometimes fire and has to be executed in extremely controlled manner and monitored regularly.

- ❖ To channelize water and gas movement by providing associated control measures.
- ❖ To minimize leachate production by controlling the Ingress of rain and surface water into the underlying waste.
- ❖ To prevent uncontrolled escape of landfill gas or the entry of air into the waste.
- ❖ To provide enclosure for the emplaced waste from air/ winds and help prevent littering due to high winds.
- ❖ To restore the Closure site to its ultimate land use e.g. recreation, garden, etc.

### Location

The existing dump site at Meghpur Village Palwal is located at 28° 9'13.34"N and 77°17'35.89"E. The site is close to Sohna-Palwal Road towards East North East direction. The nearest railway station is Palwal Railway Station – 4.58 Km in East direction. IGI Airport 46.13 Km in NNW direction is the nearest airport.

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### **Concept and Methodology of Closure Work**

As mentioned earlier, the open dumpsite has been in operation since 2017 and waste has been spread all over the area in an unplanned, haphazard manner. This is true for the management of the site as well as its surroundings. It should be noted that due to lack of original ground survey data (prior to dumping) and the subsequent waste dumping over the years, the original ground profile of the closure area is not known. The current survey data and contours reflect the surface of the existing waste at the site. These existing waste contours have been used as the basis of design for the closure system.

The Site needs a well-defined scientific closure or management plan which should address the various issues such as groundwater contamination, surface water contamination, odour, nuisance, potential fire issues, slope instability of the waste mass and aesthetics. The scope of work includes (but not limited to) re-profiling of the waste and capping the dump site for gas recovery for flaring. It will be necessary to excavate and relocate the waste to such an extent that the waste slopes can be made stable. Some extra care may have to be taken during slope of stabilization.

1. Primary Site Investigations (, Contour Survey, Baseline Environmental Monitoring, MSW Composition)
2. Waste Shifting & Grading
3. Slope Formation & compaction of waste
4. Storm water Gutters
5. Gas Well drilling & Installation
6. Liner Installation
7. Cover Soil spreading
8. Surface drains on slopes
9. Vegetation on capping
10. LFG venting/flaring system etc.

### **Salient Features of Proposed Closure Site**

- ❖ Team of contractor has visited the site to understand the features of the site and also Contour survey has also been carried out. The salient features of the site are summarized below:
- ❖ The site is owned by Municipal Council Palwal and it is in operation since 2017.
- ❖ Total volume of MSW dumped is approx. 18,900 metric ton.

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- ❖ Contour survey shows that; the natural ground is sloping towards South.
- ❖ It can be seen from the contour survey that waste has reached a height of only 1.25 m from the ground.
- ❖ The side slopes of existing dumps ranging from 1 (V):1 (H) to 1 (V): 2.5 (H)
- ❖ Currently waste is spread on 7 acres of land.
- ❖ To scientifically cap the land, waste need to be spread on 8.5 acres of land. It will also have amenities like gas flaring station, leachate treatment plant and storm water drains.

### **Volume Calculation**

Contour Survey of Existing has been carried out. It is estimated from AutoCAD 3D modelling, approximately 18,900 metric ton of waste volume is lying at existing site.

Volume of Existing waste at site : 18,900 metric ton.

### **Components of Closure**

The geometry of the site should be adapted to accommodate maximum waste with stable slopes. After the waste is relocated, compacted and graded as per the design, the waste will be provided with a capping system. The closure liner system open dump site, will consist of the following layers.

- ❖ Gas Collection layer – 200 mm thick gravel
- ❖ Compacted clay liner (CCL) 600 mm thick
- ❖ 1.5 mm HDPE liner
- ❖ Drainage layer – 150mm thick gravel
- ❖ Gas collection & Leachate collection wells
- ❖ Vegetative soil layer 450 mm thick

### **Functions of Closure Liners**

#### **Gas Collection Layer**

Landfill gas control system including gas collection system shall be installed at landfill site to minimize odour, prevent off-site migration of gases, to protect vegetation planted on the rehabilitated landfill surface. For enhancing landfill gas recovery, use of geomembranes in cover systems along with gas collection wells should be considered. Gas collection layer of 200 mm thick stone aggregate is proposed. Gravel/ metal recovered from Mining of waste can be used in the gravel layer.

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### **Compacted Clay Liner (CCL):**

CCL will be placed on the gas collection layer having thickness of 600 mm. The CCL will have a low permeability in order to act as an effective barrier. To achieve this permeability, good quality soil will need to be used and it will have to be compacted up to 95% proctor density. Adequate tests will have to be carried out to ensure that the desired density is achieved. It also proposed to use 10% Bentonite to enhance soil properties.

### **HDPE Geomembrane (GM)**

A 1.5 mm thick High-Density Polyethylene Geomembrane (henceforth called liner) having a permeability of  $1 \times 10^{-13}$  cm/s should be provided above the CCL. Liner installation should be avoided during conditions of extreme temperature, wind or precipitation. Hot wedge seaming should be the primary method of seaming on site.

### **Drainage Layer**

A 150mm thick Gravel / metal layer (size 15-25mm) will be placed on the GT so that the storm water percolated through Vegetative soil layer will drained through the layer. Drainage layer is embedded into 400 gsm Geotextile from both side, to protect geomembrane from stone aggregates and to avoid clogging of drainage layer.

In case of unavailability of stone aggregates from mining, equivalent quality of Geo-composite may be used.

### **Vegetative Soil Layer**

The topmost layer will be vegetative soil of 450 mm thickness. This layer will support the grass growth. Grass will prevent possible erosion problems during the rainy season. There is possibility of erosion at initial stage when grass is not fully grown, hence it is proposed to use readymade grass mats.

A 300mm thick layer of stone screening is recommended instead of 450 mm thick soil layer at some portions of closure. There will be no erosion of top layer and it will also reduce water requirement during O&M stage. To keep stone aggregate intact during rainfall it is proposed to use Geocells & Geogrid only in this portion.

Geocell is a strong, lightweight, three-dimensional honeycomb-like cellular confinement systems. Geocell is made of ultrasonically-welded HDPE strips that are expandable on-site to form a honeycomb-like structure.



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Geocell Wall Shear strength i.e. sufficient wall strength and joint strength to resist the shear forces as well as construction loading during the infilling process and Wall - Soil frictional interaction helps so that infill stays in the cell.

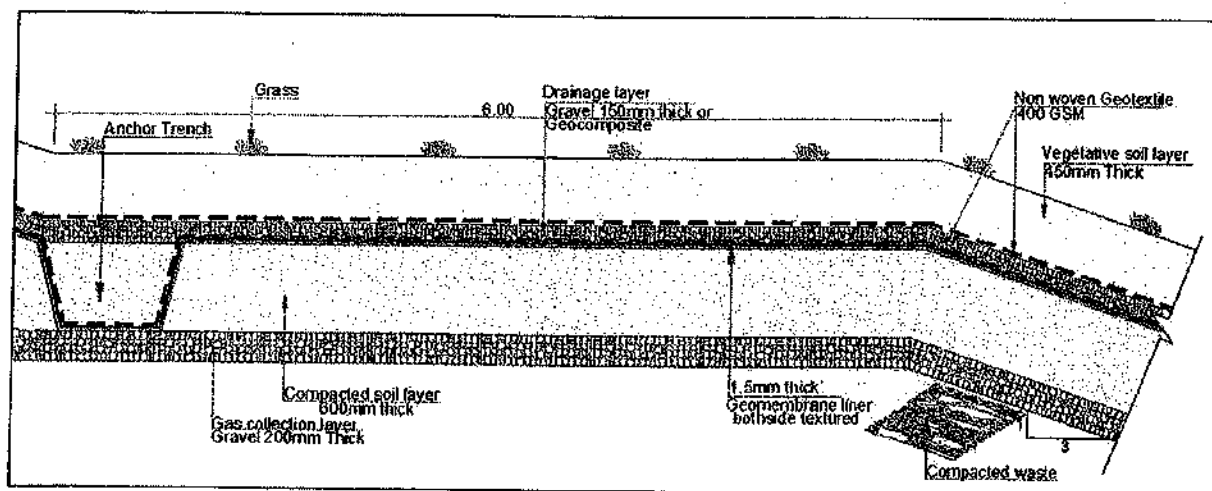


FIGURE 2-1: SECTION OF CLOSURE OF EXISTING DUMP

### Mining

Landfill mining is the process of excavating old MSW from operating or closed solid waste landfills, and sorting the unearthed materials for recycling, processing, or for other dispositions. It is the process whereby solid waste that has been previously land filled is excavated and processed.

Landfill mining process typically involves a series of mechanical operations to recover one or all of the following:

- ❖ Combustible material
- ❖ Inerts of less than 15 mm for soil recovery
- ❖ Metals such as iron, aluminium, copper etc., for recycling;
- ❖ Landfill space

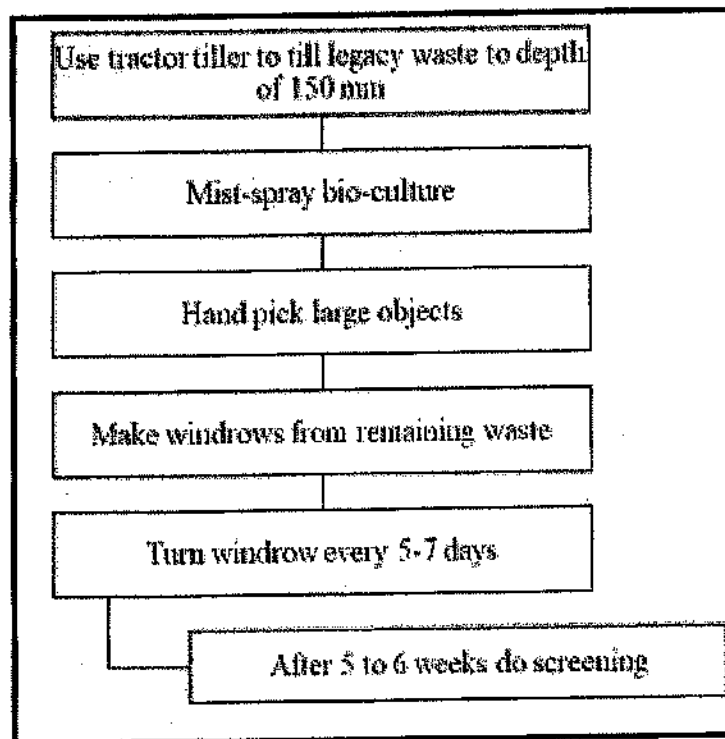
### Objectives of Mining of Legacy Waste

- ❖ To remove excess of waste from Meghpur Dumpsite
- ❖ Recover material required for Closure lining

### Process of Mining

Exposing the legacy waste to air to stabilize in many ways. Involve forming the waste into long low heaps of about 2-meter height called wind-rows, to get maximum surface area to volume. Repeated turning shall be done to ensure that the innermost waste in wind-rows also gets exposed to air. Usually, 3-4 turnings of legacy waste shall be done to stabilize it.

1. Use a tractor-tiller to repeatedly loosen the topmost 150 mm layer of legacy waste. Mist-spray the waste lightly with bio-cultures to control odour and get the decomposing microbes dispersed into the waste. Hand-pick out large objects like rocks or coconut-shells or long pieces of cloth. Form the waste into wind-rows using a Bob-cat or JCB or similar earth-moving equipment. Turn these wind-rows every 5 days. After 2-3 weeks when the heaps are free-flowing enough for screening, move the material to multi-deck vibrating screens or to trommels (rotating cylinders with different size perforations) to get fractions of different size and weight.



**Schematic representation of Bio-mining through Tractor Tiller by Windrows**

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### **Closure and Rehabilitation of Old Dumps**

Solid waste dumps which have reached their full capacity or those which will not receive additional waste after setting up of new and properly designed landfills should be closed and rehabilitated by examining the following options:

- I. Reduction of waste by bio-mining and waste processing followed by placement of residues in new landfills or capping as in (ii) below.
- II. Capping with solid waste cover or solid waste cover enhanced with geomembrane to enable collection and flaring / utilization of greenhouse gases.
- III. Capping as in (ii) above with additional measures (in alluvial and other coarse-grained soils) such as cut-off walls and extraction wells for pumping and treating contaminated ground water.
- IV. Any other method suitable for reducing environmental impact to acceptable level.

### **Leachate Treatment**

Approx. 2,000 L or 2 KLD leachate will be generated in the operation phase will be treated in treatment plant of 5 KLD capacity.

#### **> Primary Treatment**

**Screening:** The leachate generated will pass through screen chamber where large as well as floatable solids will get arrested to avoid choking of downstream equipment. This arrested material will be removed manually and disposed suitably. The chamber is fitted with MS perforated screen.

**Equalization:** To absorb variation in quantity and quality of leachate and to provide uniform flow at the downstream treatment process, a collection / equalization chamber is provided. This will avoid shock loading in the treatment plant.

**Primary Tube Settler:** It is compact size clarifier for removal of suspended solids from the leachate stream. The sludge settled at the bottom will be transferred to the sludge holding chamber. The clarified water will be collected in the feed sump.

#### **> Secondary Treatment**

**Anaerobic Digester:** The water from primary tube settler will be pumped into the Anaerobic Digester. The anaerobic process is based on Modified Up flow Anaerobic Sludge Blanket process.

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Here, the COD and BOD reduction will occur to great extent. In the digester the Biogas will be generated, it will be collected in biogas balloon and sludge will be collected at the bottom in a sludge chamber.

**Anoxic Tank:** The overflow from Anaerobic Digester will be taken into the Anoxic tank. The process of biological nitrogen removal takes place by observing aerobic & anaerobic condition.

**Aeration:** The overflow from the Anoxic tank will be taken into the aeration tank. Air is provided in this chamber for continuous mixing of the leachate through the air blower. It helps to provide the oxygen for the growth of microorganism. The air supply is continuous to avoid the anaerobic condition and maintain the growth of microorganisms. These bacterial colonies will be rich in nature and effectively convert the organic matter into Carbon Dioxide and water by reducing the COD and BOD.

**Polymer Dosing System:** Polymer is dosed which acts as catalyst to increase the size of flocs.

**Flocculator:** Flocculator is a mixer where we dose polymer to increase the size and weight of flocs. It consists of agitator to mix polymer with raw water.

**Secondary Tube Settler:** Tube settler is compact size clarifier for removal of suspended solids. The sludge settled at the bottom will be transferred to the sludge holding chamber. The clarified water will be collected in the feed sump.

**Sludge Dewatering:** The Sludge generated will be taken into the sludge dewatering unit.

### Tertiary Treatment

**Pressure Sand Filter (PSF):** The treated water from sump will be pumped into this filter for tertiary treatment. The Pressure Sand filter has a graded sand supporting pebbles. The PSF media has special surface properties due to which the small colloidal particles get attached to the surface. Manual valve is used for operation of the filter. Filter backwash is carried out once a day for removing adhered particle on the media in filter.

**Post Chlorination:** Water from sand filter then dosed with chlorine to get residual chlorine of 0.1 ppm. This water then fed to Activated Carbon Filter to remove the excess residual chlorine.

**Activated Carbon Filter (ACF):** The treated sewage from Pressure Sand filter will be further treated in ACF for removal of odour and colour. ACF has Activated Carbon, one of the most widely used media for absorption of impurities. The Activated carbon media has finite capacity of absorption and shall exhaust on prolonged usage depending upon the inlet impurity load.

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Manual valve is used for operation of the filter. Filter backwash is carried out once a day for removing adhered particle on the media in filter.

**Final Treated Water Collection Tank:** The treated water after chlorination is collected in this chamber. This treated water can be utilized for irrigation/ gardening.

### Storm Water Drains

The Closure system is designed to minimize infiltration into the waste. The top two cover layers the topsoil and the drainage layer drain into the peripheral storm water gutter built along the perimeter of the closure. The trenches will be trapezoidal channels made in brick work for side slopes and the bottom. The storm water trenches drain runoff only from the closure area and will open into the proposed storm water management.

### Green Development

The proposed peripheral greenbelt will provide a much better habitat. To minimize the impact green belt will be developed all along the periphery. This will act as curtain to prevent the spread of pollution in adjacent area. Green area after completion of closure of existing dump will be approx. 2.7 acres (approx. 30%) of the total project site area.

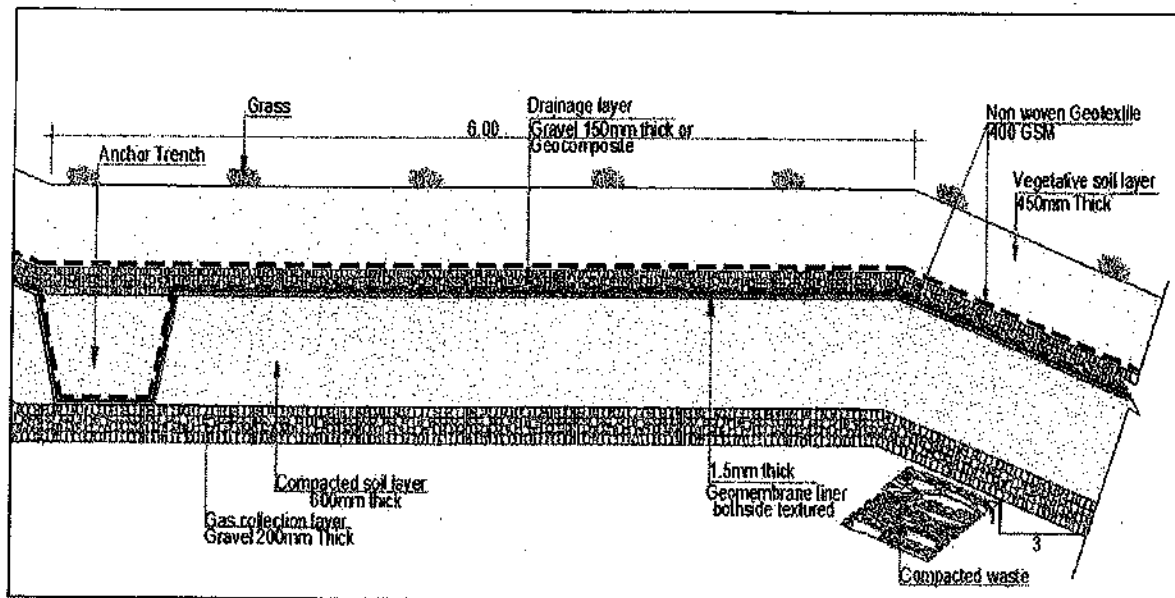


FIGURE 2-2: SECTION ON CLOSURE WITH VEGETATIVE SOIL LAYER



**CHAPTER 3**  
**DESCRIPTION ON THE**  
**PROPOSED PROJECT**  
**ACTIVITIES AND FACILITIES**

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### 3.1 TYPE OF PROJECT

As per the EIA notification dated 14<sup>th</sup> September, 2006, as amended till date, the proposed project falls under the Project / Activity: 7 (i)– Common Municipal Solid Waste Management Facility (CMSWMF) under Category B”.

This project is Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Meghpur Palwal. The proposed project is planned in accordance to the solid waste management rules 2016 and it'll adhere to clause 'J' of Schedule–I of SWM Rules, 2016 and it consists of segregation facility, waste processing unit and a sanitary landfill to manage the legacy waste which is dumped at the site since the years.

### 3.2 NEED FOR THE PROJECT

Until the 1970s, there were few dumpsites exists in India. Since Vedic times, household discards mostly food waste, which went back to the soil along with stable wastes via compost pits. Urban discards were collected by farmers, they convert it into compost and utilize it in farming and bring their produce to town/city. With the introduction of plastic in the seventies the composition of city waste started changing and people started discarded plastic along with kitchen wastes. These plastics blanketed the fields and made them infertile, as less rain could enter and few seeds could germinate, so farmers stopped collecting urban mixed wastes and cities were left with an unexpected burden.

Initially most towns and cities in India started dumping all this unwanted waste outside city limits, along roadsides which are unsupervised and were dumped in no-mans-land. Uncontrolled and continuous dumping of municipal solid waste led to mountains of legacy waste. After three decades of neglecting these open dumps have grown larger and higher, becoming point sources of pollution.

The heaps of garbage continuously creating the pollution. Recently, Hon'ble NGT alarmed that due to incremental growth of Municipal Solid Waste (MSW), these MSW dumps are converting into virtual mountains. Hon'ble NGT further directed that every city/town should adhere to clause 'J' of Schedule–I of SWM Rules, 2016.

The proposed project is planned in accordance of said guidelines of setting up a Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Meghpur Palwal, Haryana.

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CHAPTER-3 DESCRIPTION ON THE PROPOSED PROJECT ACTIVITIES AND FACILITIES	

### 3.3 LOCATION OF THE PROJECT

The site is close to Sohna- Palwal Road towards East North East direction. The nearest railway station is Palwal Railway Station – 4.58 Km in East direction. IGI Airport 46.13 Km in NNW direction is the nearest airport. The location map is shown in Figure 3.1.

The site connectivity details and the coordinate of the proposed project site are given in Table 3-1 & Table 3-2 and the Google map of the project site is shown in Figure 3-2 and the existing dumpsite pictures is shown in Figure 3-3.

**TABLE 3-1: SITE CONNECTIVITY FROM THE PROJECT SITE**

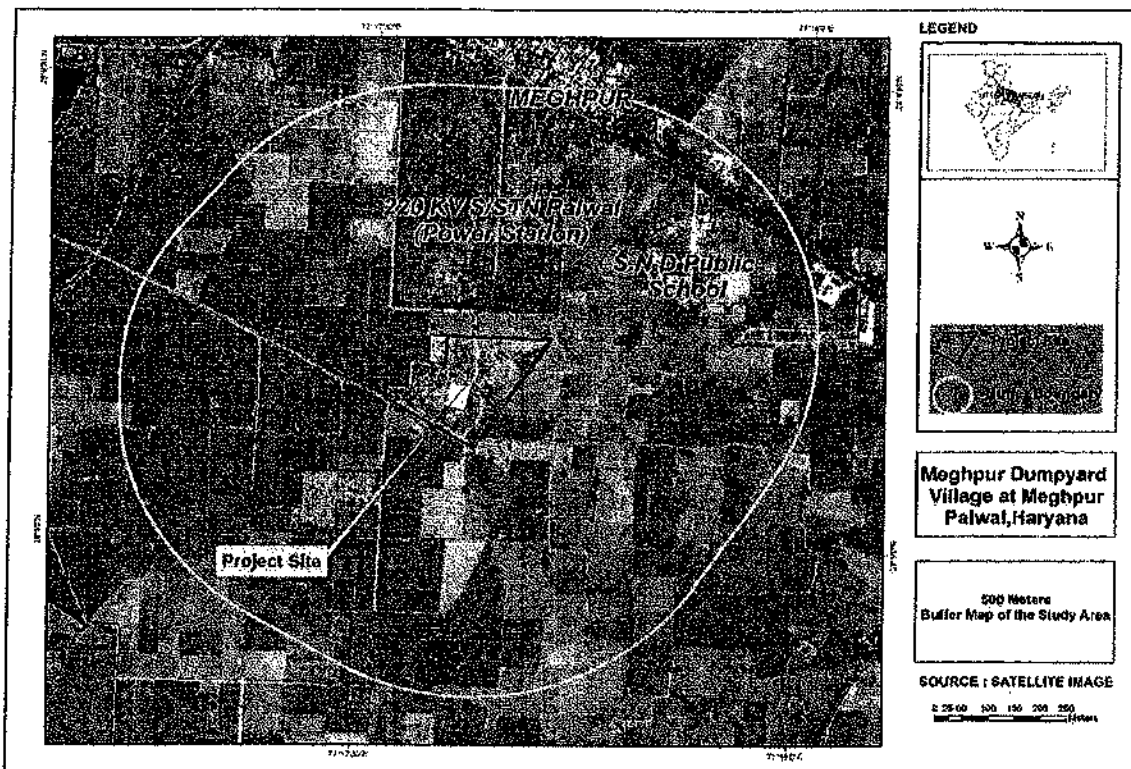
Name	Distance (Km) & Direction from project Site
Sohna-Palwal Road	0.44 Km in NNE direction
NH-2 (Delhi-Kolkata Highway)	2.74 Km in ENE direction
Western Peripheral Expressway (Kundli-Manesar-Palwal Expressway)	3.76 Km in SSW direction
Hathin Road	2.69 Km in SE direction
Hasanpur-Palwal Road	4.93 Km in SE direction
Palwal-Aligarh Road (SH-22A)	2.23 Km in East direction
Old GT Road	3 Km in East direction
Palwal Road	3.23 Km in NE direction
Eastern Peripheral Expressway	11.33 Km in ESE direction

**TABLE 3-2: COORDINATE OF THE PROJECT SITE**

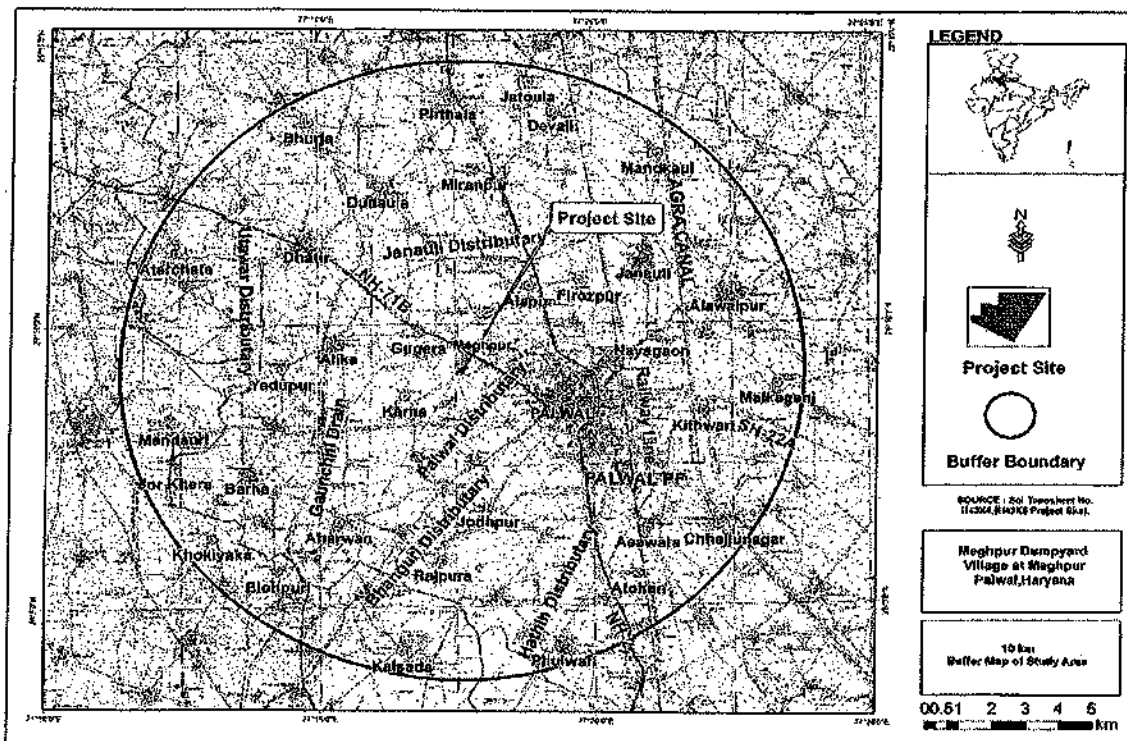
Pillar No	Latitude	Longitude
1	28° 9'13.34"N	77°17'35.89"E
2	28° 9'13.31"N	77°17'43.10"E
3	28° 9'6.19"N	77°17'38.07"E
4	28° 9'9.18"N	77°17'31.83"E
5	28° 9'10.08"N	77°17'31.80"E
6	28° 9'10.06"N	77°17'33.26"E
7	28° 9'11.69"N	77°17'33.28"E
8	28° 9'11.70"N	77°17'34.71"E
9	28° 9'11.55"N	77°17'34.78"E
10	28° 9'11.51"N	77°17'35.84"E



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**FIGURE 3.1: GOOGLE IMAGE OF THE AREA**



**FIGURE 3.2: KEY PLAN OF THE AREA**

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**FIGURE 3.3: SITE PICTURES**

### **3.4 SIZE OR MAGNITUDE OF OPERATION (INCL. ASSOCIATED ACTIVITIES REQUIRED BY OR FOR THE PROJECT)**

The proposed project is for maintenance of Sanitary landfill facility of 100 TPD of SWM in an area of 9.1 Acres for approx. 1 years. This is to meet the temporary volume requirement. The Government of India has notified the Solid Waste Management Rules (SWM) Rules, 2016 for proper and effective management of municipal solid waste (MSW). Under the SWM Rules, 2016, provisions have been made to manage old dumps of MSW, which will be followed for the proposed project.

#### **3.4.1 Current Scenario of municipal solid waste management**

As per the current estimates (2021) of the MCP, about 100 tons of solid waste is generated daily in Palwal. The main solid waste generation sources are residential, commercial and institutional establishments, vegetable and meat markets, hospitals, hotels and restaurants, and construction and demolition waste (debris).

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**TABLE- 3.3 WASTE GENERATION DETAILS**

Description	Waste Generation approx	Unit
Residential	72.10	TPD
mandis (sabji, fruit and anaj).	9.40	TPD
Commercial	10.50	TPD
Religious Place	2	TPD
Street sweeping	6	TPD
<b>Total Waste Generation</b>	<b>100</b>	<b>TPD</b>

### 3.4.2 Project Description with Project Details

Excavate the existing mixed compacted garbage and sieve the waste through mechanical sieving machines/ any other equipment. Necessary steps and processes shall be taken to minimize environmental pollution while carrying out remediation/ reclamation of legacy waste at Village Meghpur Palwal Dumpsite. The reasonable steps shall be taken to ensure that there is control of odour, dust and treatment generated leachate, flies, rodents and bird menace and fire hazards in and around the existing Dumpsite during the period of reclamation. The processing of the Legacy Waste in accordance with CPCB guidelines for handling Legacy Waste along with SWM Rules 2016 (as amended time to time). The mechanical segregation and compost recovering facility shall be set up at the existing dumpsite. There shall be set up of a processing system flexible enough and convenient for segregation of dumped material; Segregate the excavated garbage in the land portion earmarked. Maximize the separation of recyclables viz. glass, metal etc. from the Dumpsite. Maximize the separation of components for generation of Refuse Derived Fuel ("RDF") from the Dumpsite. Provide on-site storage facility for various fractions of processed Waste. The reasonable endeavors shall be made to maximize the utilization of the Waste from the Dumpsite and for this purpose shall ensure that at least 80% of the Waste will be utilized / reused so as to produce products/outputs such as soil enricher/compost, recyclables, RDF and products from construction and demolition waste. There is availability of proper MOU with pre-processing outputs such as RDF. There is target to generate compost from the biodegradable component of the Waste at the Dumpsite. While reclaiming and excavating MSW from the present open dumpsite following aspects must be handled carefully like exposure to hazardous material, leachate, gases, odour etc., contaminated wastes that shall be uncovered during reclamation operations require special handling and disposal requirements, precautions must be taken while excavating as it releases gases like methane, Sulphur dioxide and other gases which causes explosion and fire. There

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shall be minimizing the disposal of inert/processing rejects and maximize the usage of such inert waste including but not limited to making of curb side blocks, filling of low-lying areas, construction of roads etc. Proper responsibility shall be taken to sale and marketing of all recovered materials to appropriate vendors. There shall be for creation and maintenance of infrastructure, facilities and amenities for sieving the excavated garbage and storing the segregated materials etc. at their own risk and cost. There shall be adequate number of processing machines for achieving its daily target of handling at least 1000 (one thousand) Metric Tons of Waste per day or above so as to achieve the total reclamation of land based on the estimated quantum of waste at Dumpsite. There shall be the provision of weighbridge to measure the quantity of various components of waste at dumpsite, processed in terms of sorting and segregated materials, RDF, compost material, and inerts going out of the Dumpsite. Leveling of the earth surface shall be carried out by bulldozers or any other earth moving equipment. There shall be deployment of the necessary manpower, materials, equipment, tools and construction of plants and sheds and creation of facilities for handling, separating, segregating and storing for the operation of the plant. Legacy C&D waste during excavation, sorting/segregation and final disposal of such legacy C&D Waste shall be used for various useful purpose in the proposed Sanitary Landfill project. C&D waste shall be used for the Daily cover. The alternate uses for C&D waste as per the C&D Waste Rules, 2016 shall also be found. Hazardous waste such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive waste, if found, during excavation, sorting or segregation shall be handled as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. There shall be proper handover of any domestic hazardous waste/ biomedical waste if found during excavation, sorting/segregation to the nearest biomedical/ hazardous waste facility. This waste shall be handled as per Biomedical Waste Management Rules, 2016. The process flow chart for the same is given in **Figure3-4**.



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	Depth (m) from Top of the Dump Site	A1 (0-2 m)	A2 (2-4 m)	A3 (4-6 m)	A4 (6-8 m)	A5 (8-10 m)
12.	Paper/Cardboard	0	0	0	0	0
13.	Textile/Cotton/Jute	66	51	38	31	24
14.	Rubber/Leather/Tyre	9	9	6	7	10
15.	Polythene/Plastic	144	111	75	52	33
16.	PVC	68	51.8	40.8	55.1	35.9
17.	Thermocol	4	5	1.3	0.7	0.4
18.	Metals	7	5	3	3	0.4
19.	Glass	4	2	1.6	1.8	1.7
20.	Inert and Other	175	200.1	66	57	14.9
21.	Sand/Soil/Earth	310.7	444.4	465.2	499.1	504
22.	Stones/Brick/Concrete	204	181.3	173.7	251.8	177.3
23.	Ceramic and Other	0	0	0	0	0
24.	Human Hair	0	0	0	0	0
25.	Batteries	0	0	0	0	0

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**TABLE 3-5: CHEMICAL CHARACTERISTICS**

Parameters	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
1 - Moisture Content % by mass	33.1	38.2	36.4	25.1	43.9	41.5	2.71	30.8	42.9	48.3
Calorific value, cal/g	1210	1158	1286	1596	1310	1096	1642.5	1410.2	1310.5	1196.8
3 pH (1.10)	7.25	7.51	7.72	7.11	7.23	7.39	7.24	7.75	7.84	7.44
4 Organic carbon % by	4.95	5.31	6.99	5.77	4.84	3.82	5.71	4.11	4.19	4.50
6 Nitrogen (as n %) by mass	0.22	0.40	0.43	0.4	0.38	0.45	1.12	0.48	0.37	0.49
7 Phosphate (as P2O5)	0.49	0.41	0.52	0.51	0.43	0.40	1.12	0.48	0.37	0.47
8 Potash (as k2O)20%by mass	0.85	1.19	1.38	2.11	0.97	1.02	0.84	0.92	1.57	1.81
9 C/N ration	22:5:1	13:3:1	16:3:1	14:4:1	12:7:1	8:5:1	9:8:1	10:5:1	9:9:1	10:2:1
10 Conductivity, $\mu$ s/cm	801	7699	2645	2399	2287	1681	3244	3085	1710	2052
11 Total Solids% by mass	55.1	57.0	64.0	65.4	51.3	55.0	73.31	61.1	52.2	44.2
12 Chloride, %by mass	1.65	1.32	1.35	1.41	1.47	1.15	0.8	1.17	1.47	1.48
13 Sulphur, %by mass V	0.77	0.41	0.89	0.74	0.72	0.82	1.33	1.15	0.78	0.75
14 COD, mg/kg	475.3	658.5		255.3	153.71	820.7	325.68	425.1	915.15	651.0

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Parameters	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Sample 6	Sample 7	Sample 8	Sample 9	Sample 10
15 Arsenic (as AS), mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
16 Cadmium (as Cd),mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
17 Total Chromium(as Cr), mg/kg	21.20	11.20	27.68	13.63	55.45	137.81	33.77	41.67	43.67	93.15
18 Copper (as Cu), mg/kg	91.78	52.08	32.41	65.73	65.10	48.21	61.65	102.20	57.27	39.25
19 Lead (as Pb), mg/kg	27.15	74.04	52.70	44.21	ND	27.40	8.75	12.85	42.75	18.21
20 Mercury (as Hg), mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
21 Nickel (as Ni),mg/kg	35.50	8.74	17.35	26.22	76.9	135.25	84.75	95.75	240.44	169.10
22 Zinc (as ZN),mg/kg	435.48	355.75	515.20	564.0	652.7	625.84	777.45	810.10	934.95	645.48
23 Iron (as Fe),mg/kg	7218.45	3010.15	10122.3	4022.0	3125.42	3115.3	6220.48	6101.35	5320.15	8514.12
24 Manganese (as Mn),mg/kg.	235.12	438.15	285.20	255.40	152.20	441.22	238.31	208.05	201.45	240.31



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TABLE 3-6: MASS BALANCE

S No.	Material	Required
1	Garbage	18,900
2	Soil 61%	11529
3	Inert 11%	2079
4	C&D 16.5%	3118.5
5	RDF 10.5%	1984.5
6	Misc. 0.5%	189

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**TIMELINE FOR IMPLEMENTATION OF THE PROJECT**

S No.	Description of Activity	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11	M-12	M-13	M-14	M-15	M-16	M-17	M-18	
1	Site fencing-temporary																			
2	Mobilization and setup of plant with CCTV, weighbridge																			
3	Stabilization of legacy waste-with spraying of bio-culture/windrow preparation																			
4	Construction work for Bio-remediation process equipment.																			
5	Deployment of Dumper/Tractor/JCB/Pocklane/Tractor trolley																			
6	Bioremediation of waste- Qty... tons per day (segregation of materials i.e. recyclables, inerts, debris, compostable)																			
7	Earthwork (Waste) excavating and start of Bioremediation work as per fraction																			
8	Leachate management																			
9	Disposal of residue waste/inerts- Landfill location																			
10	Tree planting with combination of green grass																			

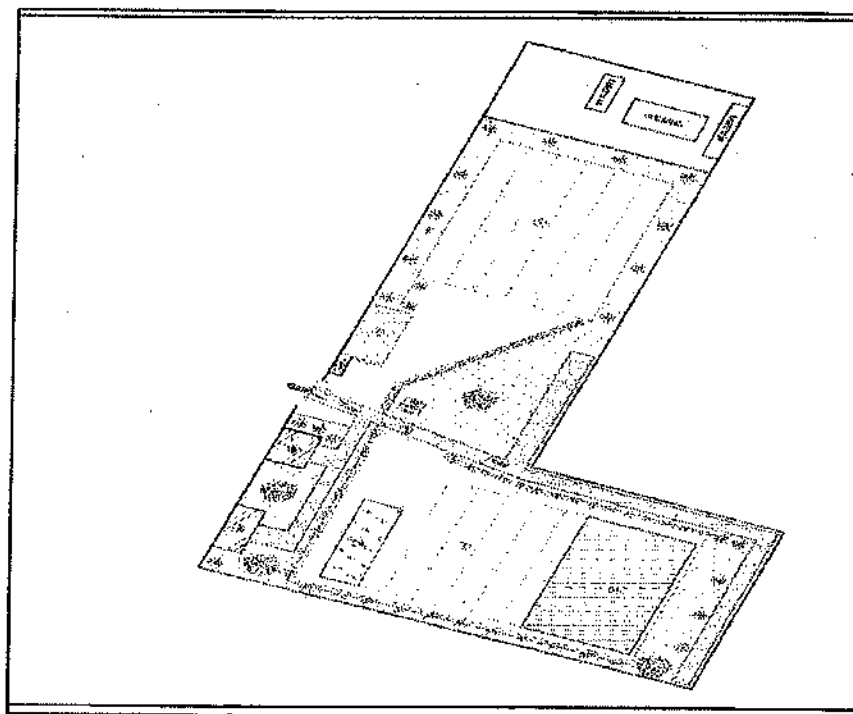
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### 3.5 PROPOSED LAND BREAKUP FOR SOLID WASTE MANAGEMENT FACILITY

The proposed project is for maintenance of Sanitary landfill facility of 100 TPD of SWM in total area of 9.1 Acres for 1 years. Area breaks up details is given in Table 3-7.

**TABLE 3-7: AREA BREAK-UP DETAILS**

S. No.	Description	Area sq. m.	Area (Acre)
1	plant area (Machinery area)	500	0.12
2	office building	100	0.02
3	common toilets	100	0.02
4	internal approach road	800	0.19
5	Horticulture	11,153	2.7
6	SLF	2,000	0.49
7	guard room/wb room	30	0.007
8	vehicle parking	150	0.03
9	windrow area	18,000	4.4
10	storage area	4,333	1.07
	<b>Total Area</b>	<b>37,176.86</b>	<b>9.1</b>



**FIGURE- 3.5 LAYOUT MAP OF THE AREA**

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### 3.6 QUANTITY OF WASTE TO BE GENERATED

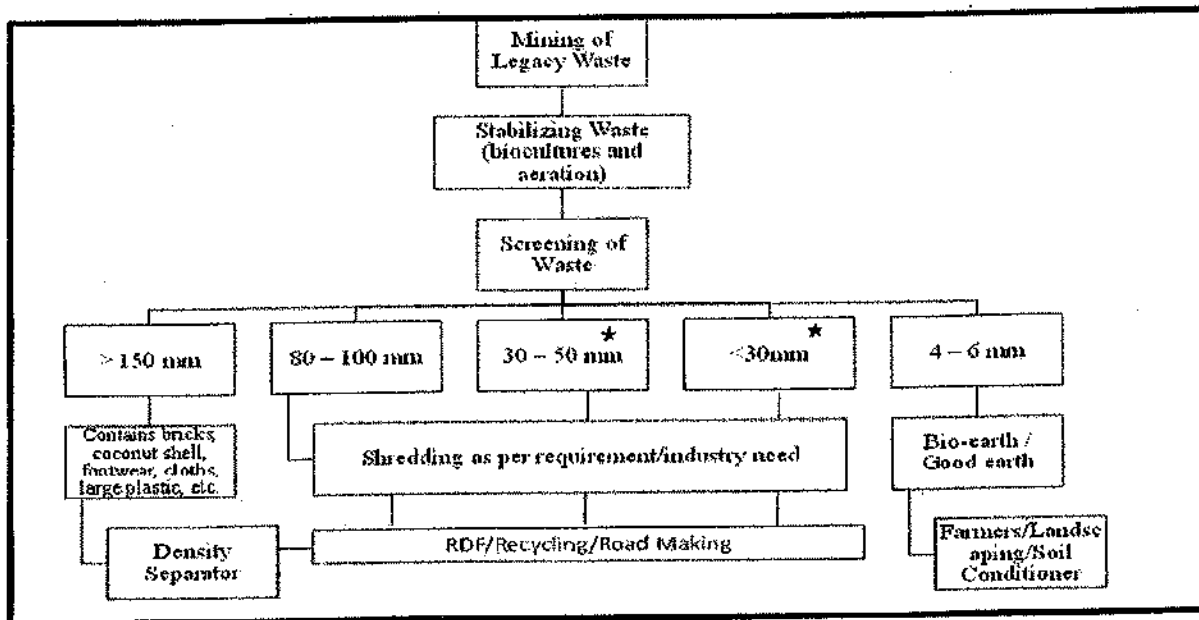
The details about the population and waste generation for Proposed Cluster are given in Table 3.8

**TABLE 3-8: PROJECTED POPULATION AND WASTE GENERATION**

Decades	Population	Waste Generation (Tones /day)
2001	109,803	32
2011	1,12,000	55
2021	1,14,240	100

### 3.7 BIO-REMEDIATION & BIO-MINING OF OLD MUNICIPAL DUMPSITES:

It refers to the excavation of old dumped waste and make windrow of legacy waste thereafter stabilization of the waste through bio-remediation i.e. exposure of all the waste to air along with use of composting bio-cultures, i.e. screening of the stabilized waste to recover all 11 valuable resources (like organic fines, bricks, stones, plastics, metals, clothes, rags etc.) followed by its sustainable management through recycling, co-processing, road making etc.



**FIGURE- 3.6 OVERVIEW OF BIO REMEDIATION AND BIO MINING OF LEGACY WASTE**

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### **3.8 TREATMENT PROCESS OF LEGACY WASTE**

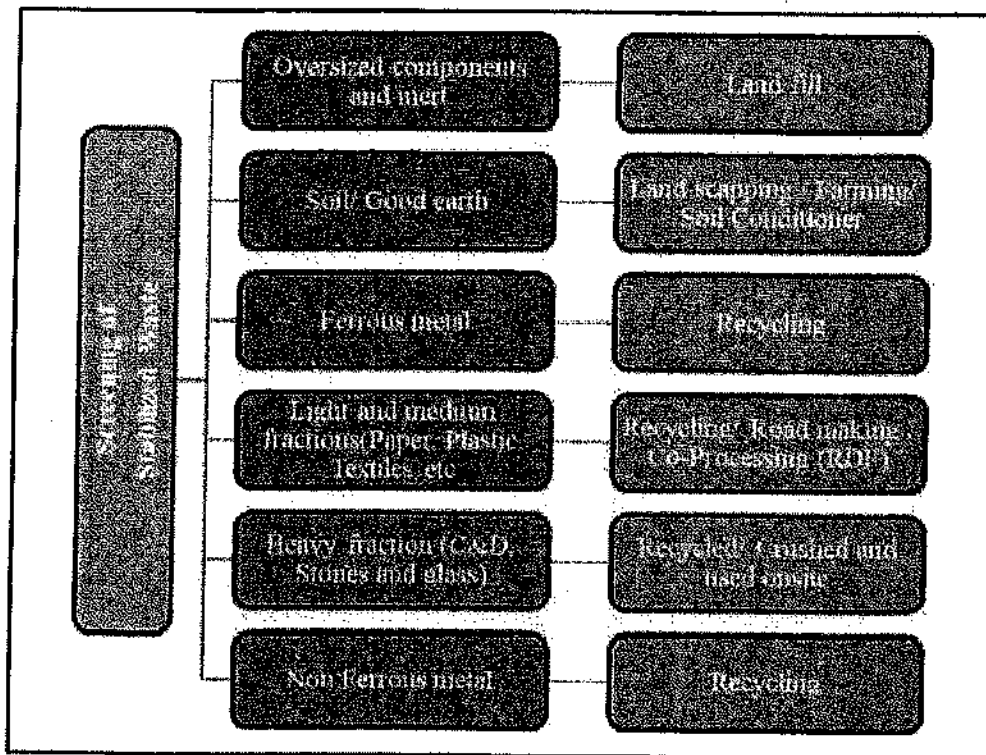
- 1) Local Body (LB) shall make a time bound plan to execute the bio-mining process.
- 2) Volume of waste to be determined through contour survey (Total Station Survey) and site measurements.
- 3) Initial Contour level survey of the site has been done and Final Contour level survey of the site shall be done at the completion of work.
- 4) Initial baseline survey has been done.
- 5) Sprinkle the newly exposed surfaces with a composting bio culture solution.
- 6) Usually, the top layer has several materials in the active biological state. This layer shall be stabilized through composting bio-cultures, as well as herbal/biological sanitizers if found necessary for odour control.
- 7) Waste pickers or labour shall be manually pick out bulky waste.
- 8) Local turning of these windrow heaps once a week shall be done until no more volume reduction is observed in the heaps and no more heat is generated.
- 9) Trommels and/or Horizontal Screens or other types of screens for the purpose of screening shall be used.
- 10) The recyclables recovered from the bio-mining process shall be sent for recycling as per the quality of the material.
- 11) Non-Recyclable plastic material shall be sent for road making or to RDF units or cement plants.
- 12) The recovered earthy fines shall preferably be used for landscaping or gardening or road medians within the Local Body or the site.
- 13) The recyclables like plastic, glass, metals, rags and cloth recovered from the waste during screening shall be sorted out and preferably cleaned before sending to recycling industries or as RDF.
- 14) The heavy fractions may be sand and gravel usable for road shoulders or for plinth filling.
- 15) There may be some (maximum 20% of total) left over waste including lumps of heterogeneous nature. The waste may be soaked with leachate or hard and difficult to disintegrate. This waste shall be sent to scientific landfill for disposal (near zero residues).

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### 3.9 PROCESS MANAGEMENT OF LEGACY WASTE

- ❖ **Space Management-** Try to work downward from the top surface, ensure leaving a stable wall of waste with a safe slope of 25 - 30 degrees while you work.
- ❖ **Leachate Management:** Channels must be created to lead the oozing leachate rivulets to a lined depression or pond for treatment or for leachate recirculation onto wind-rows as a type of bio culture.
- ❖ **Fire Control and Safety:** A bag of textile discards or plastic waste or a ball of oily rags. Earthmover drivers must learn to dig in and pluck out these burning balls of fire. Wet soil shall be kept handy to immediately plug the excavated hole.
- ❖ **Use of Recovered Space:** Ensure of no new habitation for up to 500 meters, put up a signboard indicating that use, to ensure public acceptance of the biomining operations, cleared dumps shall not be permitted for habitation for at least 15 years (SWM Rules Schedule I, H (2). reuse for SWM, open stadia, sports grounds, parks and gardens, parking lots, container yards.
- ❖ **Engineered Landfill and Capping:** The top and bottom liners shall be in accordance with the minimum requirement stated in the SWM rules 2016, Closure of scientifically engineered landfills with bottom and side liners, lines as well as drainage layers and leachate and gas collection pipes shall be installed, capping shall be done to keep out rain from the landfill, Landfill gas captured through pipes shall be flared.
- ❖ **Clearing vs. Capping of Legacy Waste:** As per the SWM Rules 2016 clearing of sites as a first option, is by bio-mining and bio-remediation. Clearing by bio-mining recovers the entire base area of a dump at almost ground level. Capping gives only one-third of the base area as usable area at an inconvenient height for future use. Cleared sites require no after-care. Bio-remediation and Bio-mining to clear a site shall start immediately at one part of an actively used dump while fresh waste continues to be received and stabilized at another part. Clearing shall be done in phases to match available funds.

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**FIGURE- 3.7 SCHEMATIC REPRESENTATION OF SCREEN COMPONENTS AND ITS SUSTAINABLE DISPOSABLE**

The processing of waste shall be done by following methods including: -

### 3.10 MSW PRE-PROCESSING

The municipal waste received at the site is processed at waste management facility by segregating the waste into recyclable and non-recyclable material. After separation of recyclables, the compostable material will be diverted to compost plant. MSW processing unit would comprise of the following:

- ❖ Bio-drying with Thermophilic Enzymes for aerobic digestion to produce compost.
- ❖ Segregation of Compost, RDF & Reject through Density separation technique.

Proposed scheme for MSW processing is shown below:-

#### 3.10.1 Brief of MSW Processing

- ❖ MSW shall be unloaded inside the pit.
- ❖ The MSW will be stacked in the form of trapezoidal heaps in MSW Pits and sprayed with inoculums and turned periodically to provide proper aeration and temperature control.
- ❖ Systematic turning of the material, which mixes the different components and aerates the

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mixture, generally accelerates the process of breaking down the organic fraction. EOT grabs will be used to turn material for aeration and feed bio-dried material in to the hoppers. There will be 5 to 7 days retention time for drying and moisture reduction.

- ❖ After the leachate removal, primary segregation shall be undertaken to recover the big sized RDF (>80mm) for further shredding and storage. The inert removed, shall be directed to landfill.
- ❖ Moisture will be reduced and leachate present in the garbage will be collected in the collection pit for further treatment.
- ❖ On 7<sup>th</sup> day this waste heap will be fed into hopper of mechanical segregation.
- ❖ The fraction of waste which is less than 80 mm consists of mixture of organic as well as inorganic waste and shall be fed to further screen of 20 mm.
- ❖ MSW shall be subjected to trommels where the light RDF material will be separated from dense compost through double screens. Here heavy inert material shall also be separated out.
- ❖ -20 mm Compostable material will be sent to curing section for further maturing / stabilizing and refined into required marketable parameters.

### 3.10.2 Product Recovery & Its Advantage

#### ✓ Benefits of Composting:

As per compost quality norms nationally (FCO) and internationally, the compost should be below 4 mm average particle size and it should not contain impurities such as glass, plastic, other inert material etc. which spoils the overall appearance and creates suspicion in the mind of the end user about quality of the final product.

To achieve this, a refinement section is incorporated in the machine line.

- ❖ Highly suitable to deal with putrescible fraction of MSW that causes several problems related to environment, health, water contamination, mal-Odour.
- ❖ Consumes wide variety of organic materials waste streams
- ❖ It can tolerate presence of silt and soil to a great extent.
- ❖ It can treat and process even one-week old waste or some quantity of accumulated waste.
- ❖ Composting is extremely useful in minimizing the burden of methane and leachate generation from Land Filling.



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- ❖ Entire system is indigenous with local availability of spares and expertise.
- ❖ It is first significant step towards scientific management of MSW.
- ❖ Returns back the nutrient elements and carbon energy to the farmer's field.
- ✓ **Merits of RDF Production**
- ❖ Maintains consistency in fuel in terms of its heat value, Compositions etc. which further is to be utilized for power generation.
- ❖ Reduces moisture content in fuel resulting efficient combustion.
- ❖ Availability of uniform size fuel for smooth feeding in power generation unit

✓ **Merits of Recyclables Recovery**

Recycling is most positively perceived and doable of all the waste management practices. Recycling will return raw materials to market by separating reusable products from the rest of the municipal waste stream. The benefits of recycling are as follows:

1. It saves natural and synthetic resources.
2. Reduces the need for mining of virgin materials, which lowers the environmental impacts for mining and processing, and reduces the amount of energy consumed.
3. Help in stretching landfill capacity.
4. Improve the efficiency in compost manufacturing by removing non degradable, non-combustible materials, such as plastics, metals and glass.

✓ **Equipment**

Equipment typically used includes machines commonly used as part of solid waste management operations as well as machinery used in the surface mining industry. For example, equipment (e.g., backhoes, dozers) used for the excavating land filled wastes is commonly used at many landfill sites.

**Processing Equipment's for Processing of Legacy Waste**

A. Screening

- ❖ Trommels
- ❖ Vibrating Screen
- ❖ Disc/ Star

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## B. Handling Equipment

- ❖ Loader (Front Load)
- ❖ Conveyers
- ❖ Fork Lifts

### **Material Handling and Sorting**

Depending on the waste processing methods and equipment used, large-sized pieces (e.g., white goods) also may need to be sorted out before processing the mined material using a mechanical screen. A front-end loader working with the excavator can be used for this purpose.

### **Screening**

The primary purpose of screening the mined material is to separate the soil or fine fraction from the larger components. The fine fraction, while being composed primarily of soil will be used to backfill the excavated area. The two types of mechanical screening equipment most often used for screening fines from larger materials in excavated waste are trommel screens and shaker or vibratory screens.

Combustible Screened material shall be sent to RDF processing line and rest inert and debris shall be disposed in to sanitary landfill. Old waste will be reclaimed and the cleared shall be landscaped. The proposed landfill details are mentioned below: -

### **3.11 LANDFILL**

The disposal of processing rejects & inerts shall be limited to a maximum of 20 % of total waste quantity. Compactors will be used to arrange the waste in thin layers and to achieve high density of the waste. To minimize the run off to the ground water, the sanitary landfill will have a sealing system consisting of sheets made of plastic material and soil layer with low permeability. The site will be provided with a leachate collection and removal system, which will be explained in the next section. Sand, silt and soil, which are separated during the segregation steps, are going to be used as earth cover to prevent infiltration. A cover of 10 cm is provided daily and an intermediate cover of 40-64 cm during monsoon.

Deposition of waste in conical heaps over the landfill site and spreading these heaps using a tracked bull dozer is a low cost and easy option. The lower levels of waste are permanently saturated and free flow of water into and out of the dumped waste will lead to the migration of leachate into the surrounding surface and sub-surface water and thereby contaminating the ground water aquifers.

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The other major issue of simple deposition waste will be the formation of anaerobic conditions at the site as the waste deposition thickness increases, giving rise to the generation of landfill gas and thereby creating serious safety concerns in the immediate project influence area.

### **3.11.1 Leachate Generation and Treatment**

Water that percolates through the placed solid waste is known as leachate. During its progress through the waste, the water entrains suspended solids, extracts soluble constituents of the waste and soluble products of the waste degradation process. The composition of leachate depends up on the stage of waste degradation and the types of waste within the landfill. The main components of leachate will comprise:

- ❖ Major elements and ions including calcium, magnesium, iron, potassium, sodium, ammonia, carbonates, Sulphates, chlorides, etc.
- ❖ Trace metals including manganese, chromium, nickel, lead, cadmium, etc.
- ❖ Organic compounds including phenols, Poly aromatic hydrocarbons, etc.
- ❖ Microbiological components.

The quantity of leachate generated will depend on the annual precipitation rates and active area of the landfill. This requires preparation of complete water balance of the landfill site, in accordance with the development phases of the project. It is now too early to anticipate a detailed phasing of the landfill site and hence it is assumed that an area equivalent to the total waste generated in a year would be the active area for the landfill site in the particular year.

However, it is to be noted that the leachate generation trends vary drastically depending upon the quantity of waste deposited every day and the actual quantity shall be estimated by considering the cumulative quantity of waste deposited in the landfill. The quantity estimated here will just give an idea for the area requirements of leachate treatment.

### **3.11.2 Landfill Gas Generation, Control and Management**

Landfill gas is generated due to the degradation of the organic matter in the wastes. Since the landfill material will be basically inert, the landfill gas generation will be minimal. However, a minor portion of un-composted material may also go to the landfill and therefore adequate gas ventilation system has to be provided as a part of the design.

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### 3.11.3 Storm Water Control and Management

The drains of storm water from the active landfill area and processing plant area, adequate drainage facilities are recommended for landfill area. As a part of this, drainage arrangements will have to be constructed. Temporary drainage ditches would be installed in waste reception area, topsoil storage plant, haul roads, floor preparation areas and waste placement areas.

#### Buffer Zones

A vegetative cover will have to be provided as buffer zone between the landfill sites. In addition to the buffer zone, a compound wall/rigid fencing all around the landfill site to a height of 3 m or as suitable, shall also to be constructed, to totally seclude the site from outside activities.

The proposed vegetative cover shall comprise trees and shrubs that improve the visual and aesthetic appearance of the site. In addition, the waste reception area, administrative area and segregation areas shall also be provided with vegetative cover to the extent possible.

### 3.11.4 Proposed Site Infrastructure

In addition to the landfill area, the site shall be provided with the following infrastructure:

- A. Waste reception facilities
- B. Haul roads
- C. Site Utility Office
- D. Top soil storage
- E. Support services such as electricity, water supply, telephones etc.
- F. Site Staff

#### A. Waste Reception Facilities

The waste reception facilities shall comprise of the following: -

- ❖ An approach road to permit two-way traffic, Metalled and of adequate length to permit the queuing of vehicles
- ❖ Site notice board displaying license conditions, hours of operation and site regulations
- ❖ Secure and lockable gates at the entrance to the site.
- ❖ Cattle grid at the entrance to the waste reception area
- ❖ A weigh bridge of 30-ton capacity capable of weighing 8-10 vehicles per hour

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- ❖ Weigh booking office with all amenities and preferably computer logging facilities.
- ❖ Site administration office for site management with all support services
- ❖ Amenity block with toilets and washing facilities
- ❖ Provision of first aid facilities
- ❖ Adequate store room
- ❖ Work shop for the first line on-site maintenance with all spares and support services.
- ❖ Adequate site lighting.

#### **B. Haul Roads**

The entire stretch of access road shall be upgraded. All the primary haul roads from the public high way to the waste reception area and the landfill operational area shall be treated as permanent roads and should be constructed as per the standards.

The secondary arterial roads and temporary roads within the site can be of lesser standards, as the locations of these roads will be changing, following the landfill development.

#### **C. Site Utility Office**

Security to the whole of landfill area shall be provided for all 24 hours the day. A compound wall all around the site shall be constructed to provide integrity to the site and also serve as noise barrier to the adjoining areas. The wall can be of masonry or any other suitable material / rigid fence. As unauthorized access to the site may pose significant health and safety risks, warning notices and access control shall be provided at the following locations of the site.

- ❖ Plant and equipment compounds
- ❖ Waste receipt point
- ❖ Leachate and Land fill gas collection and treatment locations and
- ❖ Parts of site undergoing construction Vehicles and Equipment

#### **D. Top soil storage**

Soil erosion removes the top soil that is necessary for organic matter, nutrients, micro-organisms that are requires for plants to grow and shine. Soil conservation is one such step that protects the soil from being washed away. The soil then ends up in aquatic

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resources bringing in pesticides and fertilizers used on agricultural land. Healthy soil is important for plants to grow and flourish. Taking necessary steps to conserve the soil is part of environmentally friendly lifestyle. There are several ways to conserve soil that can be done through agricultural practices or measures you take at home.

**E. Support services such as electricity, water supply telephones etc.**

The entire area of waste reception area and landfill site shall be provided with electricity and backup generators of 50 KVA, potable water supply, communication facilities such as phones and efficient surface water drainage. The exact requirements of all these facilities shall be worked out during the detailed engineering phase of the project, before execution of the project.

**F. Site Staff**

Adequate manpower (10-12) is required to ensure that the site is constructed and operated successfully. The staff employed shall be sufficiently trained, competent and adequately supervised, to ensure efficient functioning of the plant.

**G. Vehicle and Equipment Maintenance and Spares**

In keeping with good working practice, regular machinery inspections shall be undertaken on weekly basis and preventive maintenance should be practiced. Workshop facilities will be provided on site, for routine maintenance and servicing as required. Sufficient holding of spare parts should be maintained, to keep each landfill facility operational on a continuous basis.

**3.11.5 Containment of Potential Pollutants**

Containment measures such as double liners at the bottom and lateral sides of the landfill, and surface capping after the land filling is completed, are required to control the pollutants and mitigate subsequent impacts on environment.

**I. Basal and Lateral Containment**

The basal and lateral containment at the site shall be provided by using in situ natural soils and geological strata of permeability less than  $1 \times 10^{-9}$  m/sec. detailed geo-technical investigations, by excavating top soil should be carried out to assess the

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permeability of the soil. The site preparation and construction of liner will comprise of

- a. Site clearance.
- b. Grading and dozing of the floor at foundation level to provide suitable slope for gravity drainage of leachate.
- c. Placement and compaction of excavated clay in minimum of four lifts of
- d. 250 mm thick with clay placed at or within +4% of optimum moisture content.
- e. Within each major phase the mineral liner will be laid, as to be continuous at foundation level and will form as the primary containment layer.

If the geo-technical investigations conclude soil permeability, not suitable for liners, clay either has to be imported or in situ sandy materials, has to be improved through addition of bentonite under controlled application rates.

## II. Surface Capping

To minimize the ingress of water into the site after completion, it is proposed to form an engineered capping layer. This will comprise a multilayer system comprising:

- a. A protective layer of graded fine granular material of 100 mm thick and free from objects larger than 10 mm size, placed above the gas drainage layer over the last lift of waste
- b. Sealing layer with a maximum permeability and an equivalent layer of clay 0.6 m thick with a permeability of  $1 \times 10^{-7}$  m/sec and
- c. A second protective layer with same specifications as mentioned above, placed above the sealing layer.

## III. Ground and Surface Water Interception and Drainage

Conventional dewatering measures shall be employed within the landfill area to discharge and maintain groundwater levels below landfill foundation level. This will be ensured through

- a. Pumping from perimeter trench drains installed on the bunds or from sumps installed below the landfill foundation level for areas undergoing preparation
- b. Installation of temporary or permanent surface water interception drainage ditches to carry peak rainfall runoff and prevent flooding of landfill site

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#### **IV. Leachate and storm Water Collection and Removal**

The leachate and storm water collection shall be achieved through the following measures:

- i. The storm water drain shall be designed and constructed in such a way that the surface runoff water is diverted from the landfilling site and leachates from solid waste locations do not get mixed with the surface runoff water.
- ii. Provisions for diversion of storm water discharge drains shall be made to minimise leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions.
- iii. Non-permeable lining system at the base and walls of waste disposal area. For landfill receiving residues of waste processing facilities or mixed waste or waste having contamination of hazardous materials (such as aerosols, bleaches, polishes, batteries, waste oils, paint products and pesticides) shall have liner of composite barrier of 1.5 mm thick high-density polyethylene (HDPE) geomembrane or geo-synthetic liners, or equivalent, overlying 90 cm of soil (clay or amended soil) having permeability coefficient not greater than  $1 \times 10^{-7}$  cm/sec.
- iv. The highest level of water table shall be at least two meters below the base of clay or amended soil barrier layer provided at the bottom of landfills.
- v. Provisions for management of leachates including its collection and treatment shall be made.
- vi. The treated leachate shall be recycled or utilized as permitted, otherwise shall be released into the sewerage line, after meeting the standards specified in Schedule- II.
- vii. Arrangement shall be made to prevent leachate runoff from landfill area entering in any drain, stream, river, lake or pond.

#### **V. Leachate Treatment**

Approx. 2,000 L or 2 KLD leachate will be generated in the operation phase will be treated in treatment plant of 5 KLD capacity.

##### **Primary Treatment**

**Screening:** The leachate generated will pass through screen chamber where large as well as floatable solids will get arrested to avoid choking of downstream equipment. This arrested material will be removed manually and disposed suitably. The chamber is fitted with MS perforated screen.



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**Equalization:** To absorb variation in quantity and quality of leachate and to provide uniform flow at the downstream treatment process, a collection / equalization chamber is provided. This will avoid shock loading in the treatment plant.

**Primary Tube Settler:** It is compact size clarifier for removal of suspended solids from the leachate stream. The sludge settled at the bottom will be transferred to the sludge holding chamber. The clarified water will be collected in the feed sump.

### **Secondary Treatment**

**Anaerobic Digester:** The water from primary tube settler will be pumped into the Anaerobic Digester. The anaerobic process is based on Modified Up flow Anaerobic Sludge Blanket process. Here, the COD and BOD reduction will occur to great extent. In the digester the Biogas will be generated, it will be collected in biogas balloon and sludge will be collected at the bottom in a sludge chamber.

**Anoxic Tank:** The overflow from Anaerobic Digester will be taken into the Anoxic tank. The process of biological nitrogen removal takes place by observing aerobic & anaerobic condition.

**Aeration:** The overflow from the Anoxic tank will be taken into the aeration tank. Air is provided in this chamber for continuous mixing of the leachate through the air blower. It helps to provide the oxygen for the growth of microorganism. The air supply is continuous to avoid the anaerobic condition and maintain the growth of microorganisms. These bacterial colonies will be rich in nature and effectively convert the organic matter into Carbon Dioxide and water by reducing the COD and BOD.

**Polymer Dosing System:** Polymer is dosed which acts as catalyst to increase the size of flocs.

**Flocculator:** Flocculator is a mixer where we dose polymer to increase the size and weight of flocs. It consists of agitator to mix polymer with raw water.

**Secondary Tube Settler:** Tube settler is compact size clarifier for removal of suspended solids. The sludge settled at the bottom will be transferred to the sludge holding chamber. The clarified water will be collected in the feed sump.

**Sludge Dewatering:** The Sludge generated will be taken into the sludge dewatering unit.

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### Tertiary Treatment

**Pressure Sand Filter (PSF):** The treated water from sump will be pumped into this filter for tertiary treatment. The Pressure Sand filter has a graded sand supporting pebbles. The PSF media has special surface properties due to which the small colloidal particles get attached to the surface. Manual valve is used for operation of the filter. Filter backwash is carried out once a day for removing adhered particle on the media in filter.

**Post Chlorination:** Water from sand filter then dosed with chlorine to get residual chlorine of 0.1 ppm. This water then fed to Activated Carbon Filter to remove the excess residual chlorine.

**Activated Carbon Filter (ACF):** The treated sewage from Pressure Sand filter will be further treated in ACF for removal of odour and colour. ACF has Activated Carbon, one of the most widely used media for absorption of impurities. The Activated carbon media has finite capacity of absorption and shall exhaust on prolonged usage depending upon the inlet impurity load. Manual valve is used for operation of the filter. Filter backwash is carried out once a day for removing adhered particle on the media in filter.

**Final Treated Water Collection Tank:** The treated water after chlorination is collected in this chamber. This treated water can be utilized for irrigation/ gardening.

### VI. Landfill Gas and Management

The primary measures to restrict the uncontrolled migration of landfill gas from the site will comprise,

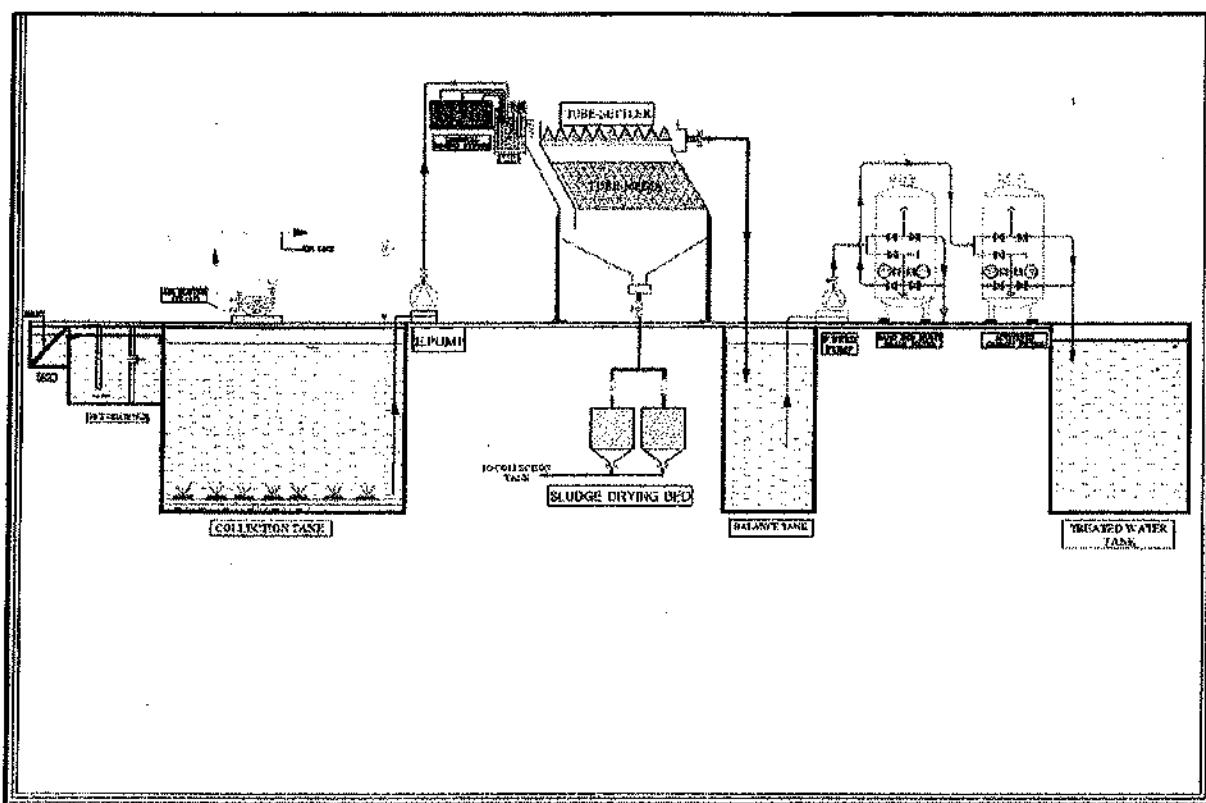
- a. Low permeability containment layers and systems installed on the base and side walls
- b. Permeable gas drainage blanket of 0.6 m thickness laid beneath the capping layer and
- c. Vertical gas chimneys vents and extraction wells.

The gas drainage blanket will be formed of a layer of fines free, graded granular fill overlain by a layer of fine sand 100 mm thick and provide protection to the capping layer. Chimneys, vents and extractions wells shall be constructed by drilling from the surface of the capping layer. The extraction wells will have an outer diameter of 0.3 m to 1 m and a HDPE well pipe of 0.1 to 0.15 m within well body.

### VII. Surface Restoration

The landfill will be brought up to its pre-settlement level in stages and capped off in a program of progressive restoration, to limit the ingress of water into the site and to facilitate the control of landfill gas. The capping will be a composite structure comprising of four layers of an engineered seal designed to prevent water ingress and egress of landfill gas and an agricultural cap comprising of subsoil drainage layer.

A suitable vegetative cover will have to be established on the closed site to ensure slow surface runoff, promote evapo-transpiration of rainfall, retain moisture in the cap and enhance the formation of a soil structure in the agriculture soil.



**FIGURE- 3.8 LEACHATE SCHEMATIC PLAN**

#### 3.11.6 Odour Suppression System

The waste processing plants are very susceptible with respect to its bad Odour and cleanliness issues. It is very important to manage these two points in order to make its acceptability in public. The following measures are proposed to manage these issues:

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- 1) The unloading, storage as well as processing of waste will be done in completely covered sheds.
- 2) Enzymes will be sprayed over the unloaded waste in order to decompose & dry the organic matter. The drying of the organic matter also reduces the bad odour from.
- 3) The whole shed area will be maintained under negative pressure by sucking the unpleasant air and methane gases by network of ducts
- 4) The air from waste processing area shall be passed through scrubber where the odour gases are treated with odour neutralizers. A wet scrubber shall be installed at the outlet of suction blower for cleaning the unpleasant gases. Scrubbing the unpleasant gases with water mixed with odour neutralizer will remove the unpleasant odour. After scrubber a chimney of sufficient height will be installed on the scrubber itself to efficiently disperse the treated air.
- 5) Spray of odour neutralizers in every section of shed to maintain the odour free ambience. The agent will be sprayed through a network of nozzles connected via tubes throughout the complete shed. It will be sprayed with the help of misting system having number of nozzles covering entire MSW pit and processing area. High pressure pumps will be used to spray these odour neutralizers.
- 6) Frequent cleaning of the areas which will be used for waste movement into the plant like vehicle moving path, weighbridge, unloading areas, etc.
- 7) Tipping floors are provided with the bottom slope for removal of leachate after unloading of the waste. Leachate will be removed from the bottom of the pit and collected in leachate collection tank. From leachate collection tank it will be pumped to the leachate treatment plant.

### **3.12 UTILITIES**

#### **3.12.1 Man power requirement**

Adequate manpower (10-12) is required to ensure that the site is constructed and operated successfully. The staff employed shall be sufficiently trained, competent and adequately supervised, to ensure efficient functioning of the plant.

#### **3.12.2 Water requirement**

The source of water supply is hired tankers and during operation phase total water requirement will be 3 KLD.

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**TABLE 3-9: WATER BREAK UP**

Processing consumption	1 KLD
Water consumption for labor	0.5 KLD
Horticulture	1.5 KLD
<b>Total Water Requirement</b>	<b>3 KLD</b>

**3.12.3 Power requirement**

During operation phase the required power shall be 50 KW and the source of power shall be UHBVN. In case of emergency a backup generator will also be provided of 15 KVA.

**3.13 CONSTRUCTION AND DEMOLITION WASTE**

The Construction and Demolition (C&D) waste generated shall be used for various useful purpose in the proposed Sanitary Landfill project, some of the fruitful uses of this C&D waste is presented here below.

1. The soil part in C&D is useful material for daily soil cover, intermediate soil cover, and final soil cover.
2. The good quality earth in C&D can also be used for preparation of embankments of Sanitary landfill
3. C&D material can be utilized for filling low lying area in the site premises to achieve required level, if required
4. Stones, hard strata, rock, concrete material coming in C&D waste is very useful for preparing temporary internal road, ramps for the vehicles to climb up on the higher levels of the SLF. This type of material is generally stocked in the site and can be utilized especially during rainy season for internal road works in SLF.

**3.14 HEALTH AND SAFETY**

The landfill management should be responsible for all aspects of site safety, including public safety in areas adjoining the site. The safety officer of the operator should also be responsible for the health and safety of landfill staff. Following are the tasks involved:

- ❖ Planning, operation, maintenance, and inspection of installations with regard to health and safety;
- ❖ Organization and realization of training and instructions of landfill staff with regard to occupational health and safety;
- ❖ Assessment and evaluation of accidents; and internal reporting on safety aspects.

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### 3.15 GENERAL SAFETY MEASURES

General safety measures have to be applied during landfill operations, regardless of the nature of ongoing activity or location. Below is a list of priority measures, which should be elaborated, based on site-specific conditions:

- ❖ Maximum traffic speed should be 20 kilometers per hour (km/h).
- ❖ Every person working at the landfill should have a yearly medical examination.
- ❖ No one should be allowed to operate at the landfill without a mobile communication system (either radio or mobile telephone).
- ❖ Smoking should be prohibited except in designated smoking areas.
- ❖ Ingestion of food is restricted outside designated areas.
- ❖ General hygienic requirements have to be applied while working at the landfill.

### 3.16 PERSONAL PROTECTIVE SAFETY MEASURES

The workers have to be equipped with the following personal protection equipment:

- ❖ Safety boots (always to be used while working outside the buildings);
- ❖ Reflective vests (always to be used while working outside the buildings);
- ❖ Safety helmets (to be used in case of risk of head injuries, e.g., during construction, loading or unloading activities, while operating machinery etc.);
- ❖ Gloves (to be used in case of risk of hand injuries, e.g., during loading or unloading, or maintenance activities);
- ❖ Ear protectors (to be used while working in noisy areas); and
- ❖ Disposable dust mask (to be used in case of exposure to dust)

#### 3.16.1 First Aid

The landfill workers should be trained in first aid, so that they themselves can properly provide first aid. Considering the specific conditions at a sanitary landfill, it is strongly recommended that landfill staff working on a regular basis be trained on first aid.

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### 3.16.2 Personnel Accidents

In case of accidents involving injuries, the following procedures have to be applied:

- ❖ Stop work immediately;
- ❖ Inform first aider;
- ❖ Inform management and
- ❖ Call medical services (ambulance emergency number should be duly filled in and maintained by the responsible landfill operator).

### 3.16.3 Fire Prevention and Protection

To prevent fire incidents, the following rules have to be applied:

- ❖ Banning smoking in all areas of the sanitary landfill.
- ❖ Handling material on fire as well as setting fire to materials on the landfill is strictly forbidden.
- ❖ Waste that has been unloaded in the filling area has to be examined visually for potential fire sources (glowing ash or glowing burning remains). If fire sources are located, these have to be neutralized with cover material immediately.
- ❖ All mobile equipment or vehicles should be furnished with a fire extinguisher.
- ❖ Fire Control
- ❖ In case of fire, the following basic rules of conduct have to be complied with:
- ❖ Every fire has to be reported immediately.
- ❖ The preservation and protection of lives and health have priority over firefighting.
- ❖ Alarm signals should be heeded.



# **CHAPTER 4**

## **DESCRIPTION OF THE ENVIRONMENT**



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#### 4.1 INTRODUCTION

This chapter illustrates the description of the existing environmental status of the study area with reference to the major environmental attributes. The existing environmental setting is considered to establish the baseline conditions, which are described with respect to physical environment, air environment, water environment, noise environment, traffic pattern and density, land environment, biological environment and socio-economic environment.

The monitoring of environmental parameters was conducted within the core zone and buffer zone (10 km radial distance) from project site located at Meghpur village, Palwal, Haryana, in accordance with the guidelines issued by the MoEF&CC, CPCB, and SPCB during the study period (Oct-Dec. 2021).

Baseline Environmental status in and around the proposed, depicts the existing quality of Air, Noise, Water, Soil, Ecology & Biodiversity and Socio-economic environment. Based on the baseline data, environmental impact assessment is carried out and Environmental Management Plan is prepared.

This baseline environmental study reveals information on existing environmental scenario.

- ❖ Delineation of project site and study area
- ❖ Delineation of the environmental components and methodology
- ❖ Delineation of study period
- ❖ Delineation of the location of the site and description of its surroundings based on secondary data.
- ❖ Baseline data generation/establishment of baseline for different environmental components

#### 4.2 STUDY AREA

This Chapter contains the description of baseline studies of the 10 km radius of the surrounding Integrated Solid Waste Management project at Meghpur village, Palwal, Haryana. The data collected has been used to understand the existing environment scenario around the proposed project against which the potential impacts of the project can be assessed.

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The objective of the present study is to assess comprehensive environmental impacts due to proposed project activity. The current environmental status around the identified project site represents the baseline status for proposed project. The methodology adopted for conducting baseline studies is described in following sections.

#### 4.3 METHODOLOGY

The generation of primary data as well as collection of secondary data and information from the site and surroundings was carried out. Meteorological data was collected from the site. Apart from these, secondary data have been collected from Census Handbook, Revenue Records, Statistical Department, Soil Survey and Land Use Organization, District Industries Centre, Forest Department, Central Ground Water Authority, etc.

The studies involved in conducting field studies and analyzing various parameters that might be affected due to the project and conducting socio-economic survey among the people. For reconnaissance survey, the sampling locations were identified based on: -

- ❖ Existing topography and meteorological conditions
- ❖ Location of human habilitation and other sensitive areas present in the vicinity of the project site.
- ❖ Representative areas for baseline conditions
- ❖ Accessibility for sampling

The various parameters surveyed and studied for the baseline study are tabulated below:

**TABLE 4-1: ENVIRONMENTAL COMPONENTS AND THEIR METHODOLOGIES**

S. No.	Environmental Components	Parameters	Methodology
1	Air	Meteorology(Temp., RH, WS, WD, RF)	USEPA (Meteorological Monitoring guidance for regulatory modeling applications)
		Ambient Air Quality (PM10, PM2.5, SO2, NO2, CO)	IS-5182 part-14, CPCB (guidelines for measurement of Ambient Air Pollutants).
2	Water	Water Quality(Surface & Ground)	Standard limits: Surface-CPCB Water quality criteria Ground-IS 10500:2012 Sampling Methodology- IS:3025 Part-1
3	Noise	Ambient Noise Quality (Lmax, Lmin, Leq)	SOP/Noise/01/01.04.2020

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S. No.	Environmental Components	Parameters	Methodology
4	Soil	Soil Quality (pH, EC, BD, Texture, SAR, Key nutrients, OM, OC)	Sampling Methodology and Analysis- IS: 2720/soil chemical analysis by M.L Jackson
5	Land Use	Land use types, Land schedules, Satellite imagery	Bhuvan, NRSA
6	Ecology	Ecology studies (Floristic diversity, Terrestrial ecosystemsustainability, Green belt development, sinking capacity of pollutants)	Field Study/ Secondary Data
7	Socio Economic	Demography and Occupational details, Agricultural situation etc.	Census, District report, Public Consultation
8	Hydrology & Geology	Geological, Hydrological, Geo-morphological studies	Geological Survey of India, NRSC

#### 4.4 ESTABLISHMENT OF BASELINE FOR VALUED ENVIRONMENT COMPONENT

##### 4.4.1 Land Environment

###### 4.4.1.1 Topography

The area of is marked by flat topography of sedimentary formations, which are surrounded by fine-grained blown soil overlying the sand deposits. Highest elevation is 191.70 RL & lowest 181.10 mRL in the proposed lease area.

Source:

<https://cdn.s3waas.gov.in/s3b6d767d2f8ed5d21a44b0e5886680cb9/uploads/2020/12/2020120996.pdf>

###### 4.4.1.2 Geology

River sand found in Distt. Faridabad & Palwal are Alluvial sediments of fluvial deposits brought down from Himalayas from the upstream side by river Yamuna and its tributaries which have variable thickness depending upon the original land form on which deposition took place. The river sand is most recent deposit of clean sand deposited by river Yamuna and is being reworked every year. The litho units encountered in the river bed are younger sedimentary formations in nature and are brought by river water from high reaches of Himalayan range of hills of Himachal Pradesh. The sediments are river borne and have been deposited in the riverbed and its flood plains.

Source:

<https://cdn.s3waas.gov.in/s3b6d767d2f8ed5d21a44b0e5886680cb9/uploads/2020/12/2020120996.pdf>

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#### 4.4.1.3 Land use/Land Cover of study area

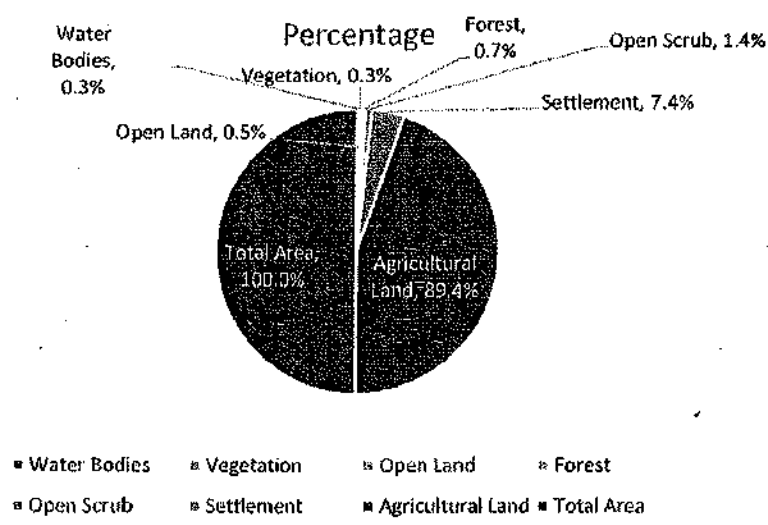
The satellite based remote sensing is a sustainable global information system because of the potential to meet the needs and demands of the present and future. The synoptic Average, which provides capability for integration of real time information on regional and global scales, is a unique characteristic of this information system. Its versatility lies in its inherent capability to conceptualize situation to give clear perceptions for defining short term and long-term objectives.

An activity could bring about changes in the Land use and Land cover in the vicinity. A data based on Land use and land cover indicates ecosystems existing in and around the center of an economic activity, to safeguard to allow comparison at a future date to draw conclusions on the nature. The study reported here is with the honest intention of building such a database on land use and land cover in an area within about 10 km radius of the proposed project. The details of the land use present in the 10 km study area are given below in **Table 4.2**; Land use Land Cover Map are shown in below **Figure 4.1**:

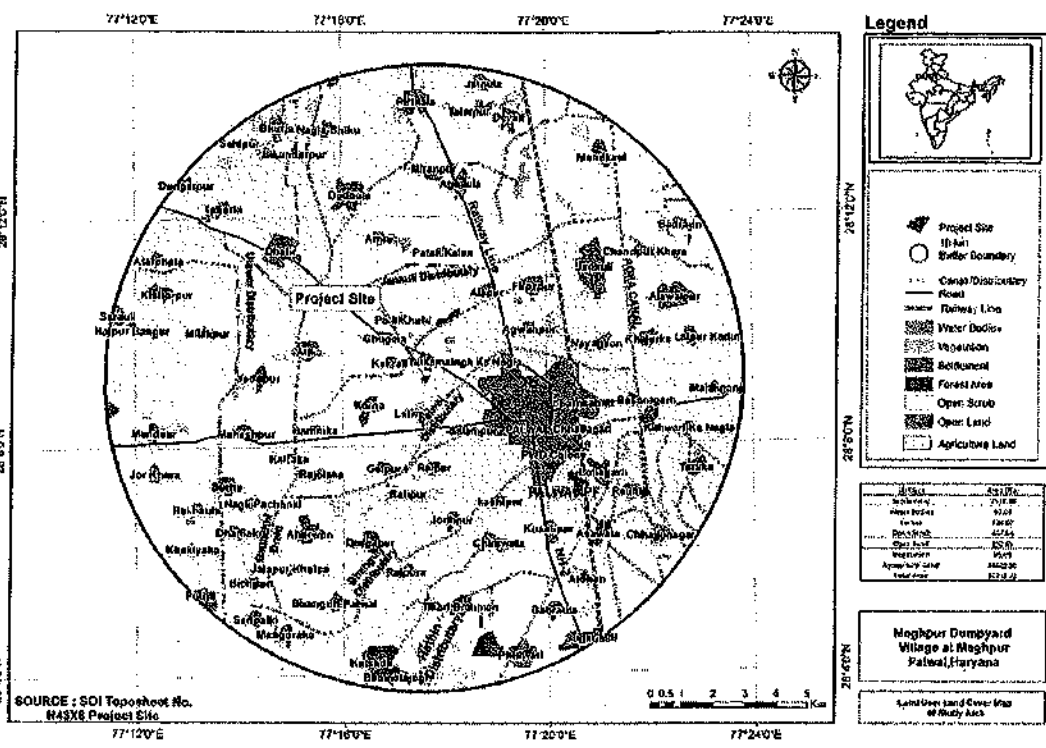
**TABLE 4-2: DETAIL OF LAND USE/LAND COVER**

LU Class	Area (Ha)	Percentage (%)
Settlement	2372.38	7.360044277
Water Bodies	97.03	0.30102475
Forest	234.07	0.726176061
Open Scrub	447.63	1.388722136
Open Land	152.85	0.474200072
Vegetation	99.69	0.309277103
Agricultural Land	28829.58	89.4405556
<b>Total Area</b>	<b>32233.23</b>	<b>100</b>

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**FIGURE 4-1: LAND USE/LAND COVER OF 10 KM OF STUDY AREA**



**FIGURE 4-2: LAND USE / LAND COVER MAP PATTERN OF THE STUDY AREA**

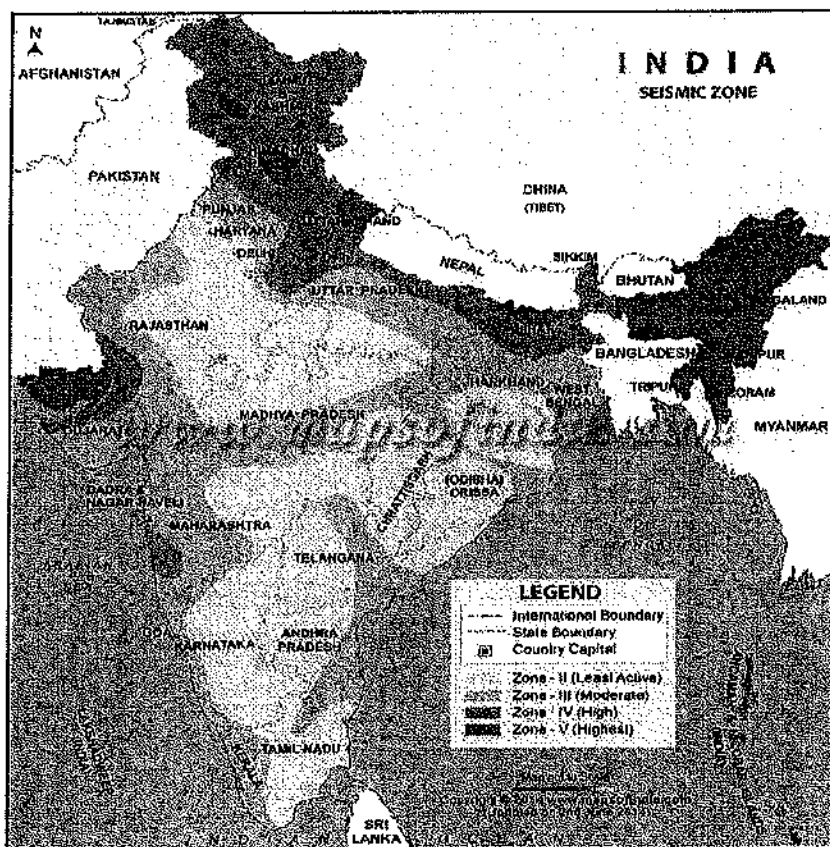
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#### 4.4.1.4. Landform, Land Use and Land Ownership

The proposed facilities will be developed inside the existing area available with the Municipal Council of Palwal.

#### 4.4.1.5. Seismicity of the area

According to the Bureau of Indian Standards, on a scale ranging from I to V in order of increasing susceptibility to earthquakes, the city lies inside seismic zone III. This zone is called the moderate seismic zone.



**FIGURE 4-3: SEISMIC MAP OF INDIA**

Following are the varied seismic zone of the Nation, which are prominently shown in the map:

**Seismic zone-II-** This is said to be the least active seismic zone.

**Seismic zone-III-** It is including in the moderate seismic zone.

**Seismic zone-IV-** This is considered to be the high seismic zone.

**Seismic Zone-V-** It is the highest seismic zone.

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#### 4.4.1.6 Soil quality

Soils of Palwal district are classified as tropical and brown soils, existing in major parts of the district. In Hath in block the organic content of soils ranging from 0.41 to 0.75 percent which is of medium category. In rest of the area organic contents is 0.2 to 0.4 percent and falls in Low category.

#### Methodology for soil monitoring:

The soil survey was carried out to assess the soil characteristics of the area. For studying soil quality of the area, 10 samples were collected from the study area (in and around the project site) to assess the existing soil conditions. The sampling station of soil from the project site has been given below in Table 4.3.

The samples were collected from the five places of the field (30 cm depth) and mixed to each other. After coining and quartering process final ½ kg sample packed in fresh poly bag and mark proper identification of sample and send to laboratory. The physical, chemical and heavy metal concentrations were determined. The objective of the sampling is:

- ❖ To determine the baseline soil characteristics of the study area;
- ❖ To determine the impact of proposed activity on soil characteristics; and
- ❖ To determine the impact on soils more importantly from agricultural productivity.

**TABLE 4-3: SOIL SAMPLING LOCATIONS IN THE STUDY AREA**

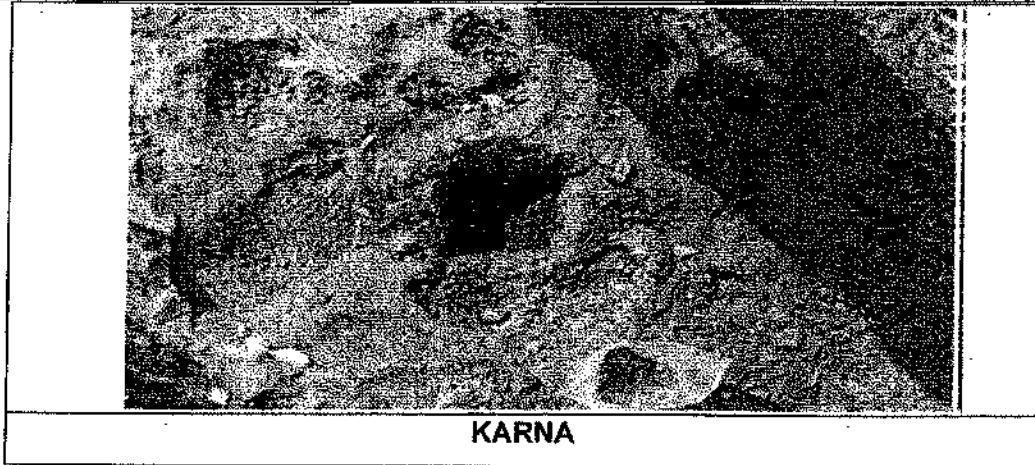
Station Code	Location	Distance	Direction
SQ1	Project Site	Center	0
SQ2	Kakrali	WNW	1
SQ3	Ghughera	NW	1.6
SQ4	Lalwa	SW	1
SQ5	Meghpur	NNE	0.5
SQ6	Sanjay Colony	E	1.7
SQ7	Kanungo Mohalla	ESE	2
SQ8	Raipur	S	2.7
SQ9	Karna	WSW	1.7
SQ10	Alapur	NE	3

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<b>PROJECT SITE</b>	<b>KAKRALI</b>	<b>GHUGHERA</b>
		
<b>LALWA</b>	<b>MEGHPUR</b>	<b>SANJAY COLONY</b>
		
<b>KANUNGO MOHALLA</b>	<b>RAIPUR</b>	<b>ALAPUR</b>

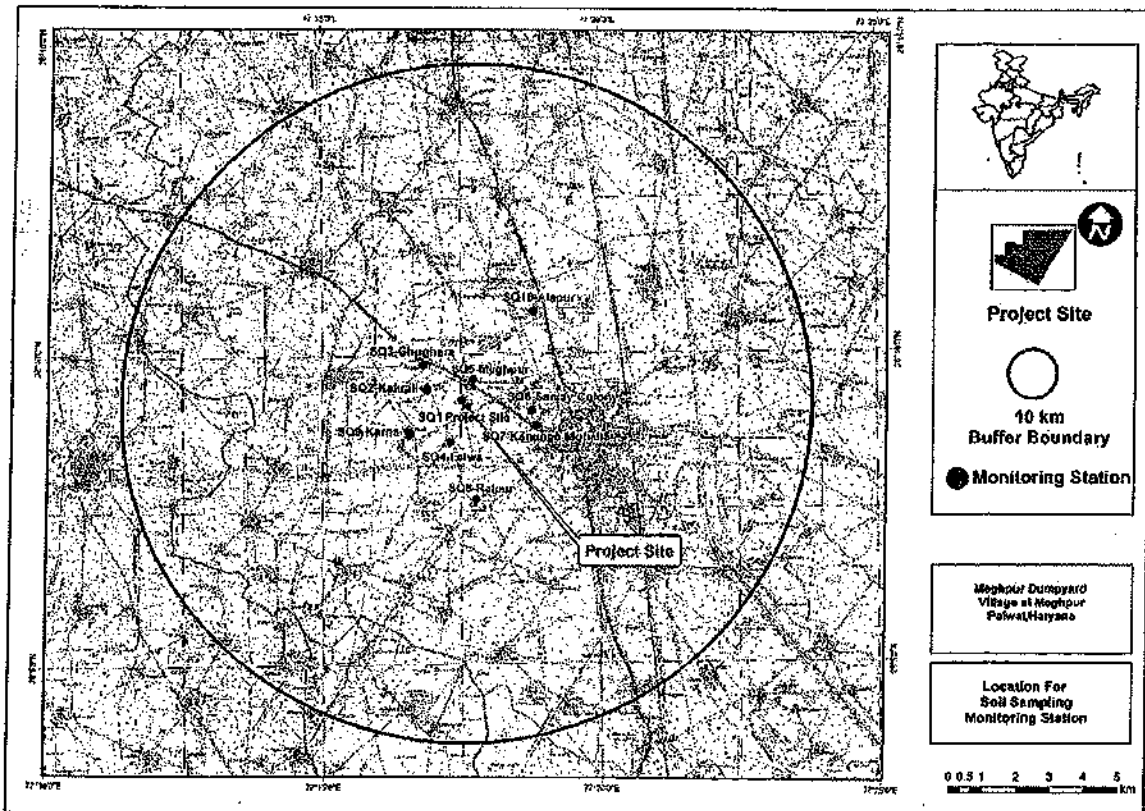


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**KARNA**

**FIGURE 4-4: SOIL MONITORING PHOTOGRAPHS OF STUDY AREA**



**FIGURE 4-5: SOIL SAMPLING MONITORING STATIONS MAP**

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**TABLE 4-4: STANDARD CLASSIFICATION OF SOIL**

S. No	Soil Test	Classification
1.	pH	<4.5 - Extremely acidic 4.51- 5.50 Very strongly acidic 5.51-6.0 moderately acidic 6.01-6.50 slightly acidic 6.51-7.30 Neutral 7.31-7.80 slightly alkaline 7.81-8.50 moderately alkaline 8.51-9.0 strongly alkaline 9.01- very strongly alkaline
2.	Salinity Electrical Conductivity (mmhos/cm)(1 ppm = 640 mmho/cm)	Upto 1.00 Average 1.01-2.00 harmful to germination 2.01-3.00 harmful to crops (sensitive to salts)
3.	Organic Carbon	Upto 0.2: very less 0.21-0.4: less 0.41-0.5 medium, 0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient
4.	Nitrogen (Kg/ha)	Upto 50 very less 51-100 less 101-150 good 151-300 Better >300 sufficient
5.	Phosphorus (Kg/ha)	Upto 15 very less 16-30 less 31-50 medium, 51-65 on an average sufficient 66-80 sufficient >80 more than sufficient

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S No.	Soil Test	Classification
6.	Potash (Kg/ha)	0 -120 very less 120-180 less 181-240 medium 241-300 average 301-360 better >360 more than sufficient

*Source: Handbook of Agriculture, Indian Council of Agriculture Research, New Delhi*

**Soil Analysis** -Analysis of soil samples have been done by NABL accredited laboratory by following prescribed standard methods & the result of analysis is shown in below table.

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**TABLE 4-5: ANALYSIS RESULTS OF SOIL SAMPLES**

S.No.	Parameters	S1-Project Site	S2- Kakrai	S3- Ghughhera	S4- Jaitwa	S5- Meghpur	S6- Sanjay Colony	S7- Kanungo Mohrailla	S8- Rajpur	S9- Karna	S10- Alapur
	<b>Physical Characteristics</b>										
1	Colour	Brown	Brown	Brown	Brown	Light Brown	Brown	Brown	Brown	Brown	Brown
2	Textural class	Sandy	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay	Sandy Clay
3	Bulk Density -gm/cc	1.41	1.35	1.29	1.34	1.48	1.38	1.32	1.48	1.38	1.34
4	Water Holding Capacity (%)										
4	V/V	45	46.7	44.7	49.5	53.2	46.5	51.4	52.2	48.9	51.7
5	<b>Particle Size Distribution</b>										
	Sand (% w/w)	52	45	48	36	39	48	49.8	52.5	45	35
	Silt (% w/w)	21	19	20	26	22	24	22.7	19.1	36	23
	Clay (% w/w)	27	36	32	38	39	28	27.5	28.4	19	42
	<b>Chemical Characteristics</b>										
6	pH (1:2 Suspension)	7.47	7.48	7.78	7.42	6.98	7.42	7.65	8.3	6.98	8.09
7	Electrical Conductivity (1:2)- umho/cm	495	388	425	242	164	247	360	160	222	406
8	Organic Carbon (% w/w)	0.021	0.024	0.026	0.027	0.024	0.029	0.017	0.023	0.034	0.031
9	Organic Matter (% w/w)	0.04	0.04	0.04	0.05	0.04	0.05	0.03	0.04	0.06	0.05
10	Exchangeable Calcium (mg/100 gm)	533.08	324.60	288.50	284.50	140.28	435.50	645.28	424.80	136.27	120.24
11	Exchangeable Magnesium (mg/100 gm)	29.16	24.3	26.7	24.2	218.7	204.5	102.06	29.16	31.57	194.4

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S. No.	Parameters	S1-Project Site	S2- Kakrali	S3- Ghagghera	S4- Lalwa	S5- Meghipur	S6- Sanjay Colony	S7- Kanungo Mohalla	S8- Rajpur	S9- Karni	S10- Alapur
12	Cation Exchange Capacity (meq/100 gm)	15.34	9.58	9.30	9.12	14.69	20.35	21.99	12.43	5.93	13.28
13	Iron (mg/kg)	746.5	847.5	782.1	654.2	711	1088	1125.6	1064	192	475.2
14	Lead (mg/kg)	7.2	6.8	6.1	6.2	4.05	4.7	2.8	4.1	3.5	7.2
15	Moisture Content (w/w)	3.43	1.68	3.46	7.2	8.6	4.9	7.5	8.4	4.87	4.1
	Available Nutrients (Kg/Ha)										
16	Nitrogen	542.5	345.2	425.5	424.5	452.2	389.8	452.5	578.4	385.5	378.4
17	Phosphorus	37.6	45.5	25.5	36.5	38.5	49.8	35.5	34.2	45.9	28.4
18	Exchangeable Potassium	121.01	152.5	124.8	135.8	148.7	127.4	112.6	114.5	124.5	124.9

#### Analysis Result

The soil analysis results are presented in Table 4.5. The result obtained is compared with the standard soil classification as given in Agriculture Handbook. Samples collected from identified locations indicate that the pH value is ranging between 6.98 to 8.09 which show that the soils are slightly alkaline in nature. Water holding capacity of the soil samples collected were found to be low ranging from 44.7 to 54.2%. Exchangeable Potassium value ranging from 112.6 to 152.5 kg/ha & Phosphorous varies from 25.5 to 49.8 kg/ha

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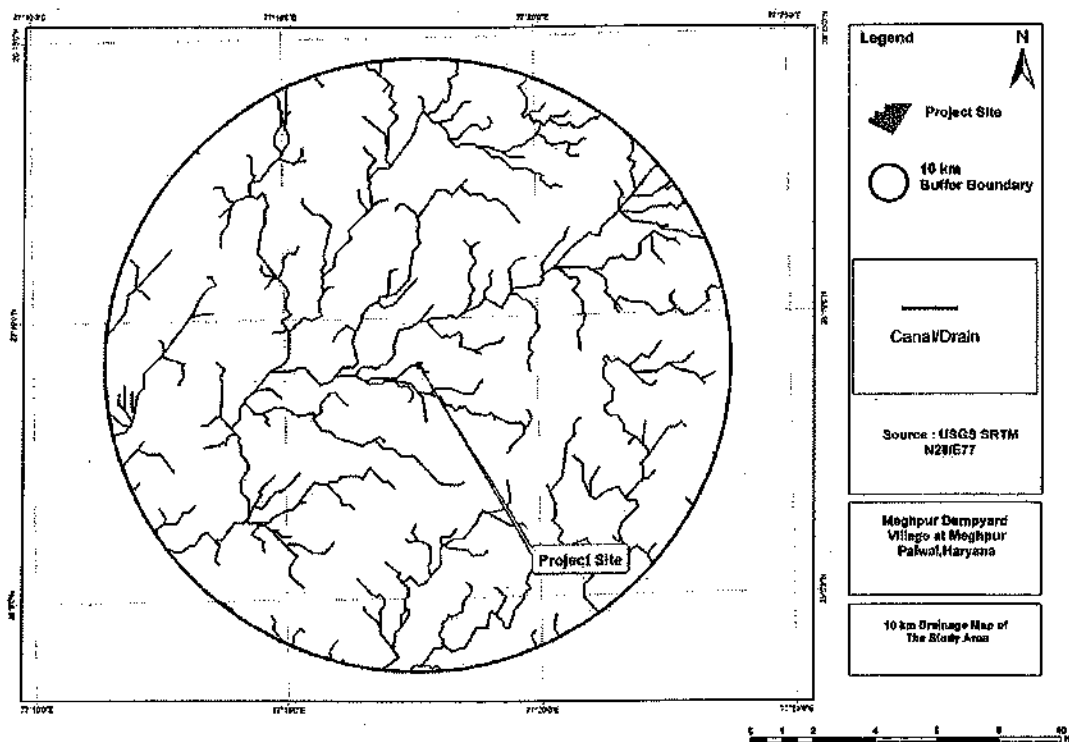
**4.4.2. Water Environment**

In order to conduct EIA Studies, baseline data pertaining to water environment of the proposed project was carried out evaluating the basic characteristics, drainage pattern, and hydrology. Water Environment of the area has been studied by locating surface and ground water sources.

**4.4.2.1 Hydrology**

The Yamuna River flows from N to S direction. The alluvial ground surface area over lying sand some distance away from the riverbed is under cultivation. It is believed that in the past, the river Yamuna used to flow closer to the present GT road which has now moved about 5-15 kms towards east. Table 4.6 and represents the ground water locations of the study area. ponds are seen around the study area, which is very important from the perspective of irrigation. **Figure 4.6** represent the drainage pattern of the study area.

Source:  
<https://cdn.s3waas.gov.in/s3b6d767d2f8ed5d21a44b0e5886680cb9/uploads/2020/12/2020120996.pdf>



**FIGURE 4.6: DRAINAGE PATTERN PRESENT IN THE STUDY AREA WITHIN 10 KM RADIUS**

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#### 4.4.2.2. Hydrogeology

The district is occupied by Indo-Gangetic alluvial plain of Quaternary age, and falls in Yamuna sub-basin of Ganga basin. The Central Ground Water Board has drilled 21 exploratory boreholes to delineate and determine potential aquifer zones, evaluation of aquifer characteristics. Out of 21 exploratory boreholes 13 boreholes were abandoned due to poor quality of ground water. The permeable granular zones comprising fine to medium grained sand and occasionally coarse sand and gravel. Their lateral and as well as vertical extent is limited. The borehole data reveals that clay group of formations dominate over the sand group in the district area. Ground water occurs in alluvium and the underlying weathered/fractured quartzites. Alluvium comprises sands silt, Kankar and gravel. Which form the principal ground water bearing horizon. In Quartzite formation, occupying the north-western part of the district, ground water occurs in weathered and jointed fractured horizons. Weathering and fracturing has resulted in formation of semi-consolidated sand beds (BADARPUR SANDS) which form potential aquifer zones. This quartzite formation has not been explored for ground water occurrence. In alluvium, granular zones are evenly distributed in entire thickness which is negligible near the quartzite outcrops to over 350 m in the eastern parts near Yamuna River. The discharge of the wells ranges from 750 lpm to 900 lpm at a drawdown of 5.5 to 7.00 m. The transmissivity 'T' value ranges between 55 to 200 m<sup>2</sup>/day were determined. Shallow tube wells for irrigation use are generally constructed upto a depth of 40 m. The discharge of these shallow tubewells range 360 -600 liters per minutes.

#### Water level behavior

The depth to water level ranges from 2.00 m bgl to 10.75 m bgl during pre-monsoon period (Plate1), and m. bgl village. 2 to 9.40 m. bgl. during post monsoon period. The water level trend during pre-monsoon period indicates average fall of 0.20m/year. The long-term water level trend is show small decline and other places rise in district.

#### Ground water flow

The elevation of the water table in the district varies from 213 m to 219 m above mean sea level. The average gradient of the water table is of the order of 1 m/km. The overall flow of ground water is from north to south direction

Source: [http://cowb.gov.in/District\\_Profile/Haryana/Palwal.pdf](http://cowb.gov.in/District_Profile/Haryana/Palwal.pdf)

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#### 4.4.2.3. Ground Water

There are ground water sources exist in project site. Ten Sampling of ground water from the study area have been taken for monitoring the ground water quality. Table 4.6 is showing the location of water monitoring location.

##### a) Methodology








Water samples were collected from 10 ground water locations. Necessary precautions were taken while collecting, preserving and transporting. The parameters like pH, temperature and DO were measured at the site while collecting the sample. For analyzing other parameters, the samples were brought to the Laboratory. All the parameters were analyzed as per "Methods of Sampling and Test (Physical and Chemical) for water and waste water" IS: 3025 and 'Standard Methods for the Examination of Water and Wastewater' APHA. The ground water results are compared with IS: 10500, 2012 specification for drinking purposes. Water samples were collected from the study area to assess the water quality during the study period. The locations of ground water and mentioned above.

**TABLE 4-6: DISTANCE & DIRECTION OF GROUND WATER MONITORING LOCATION WITHIN THE 10 KM RADIUS AREA**

S. No.	Location	Direction	Distance
GW1	Project Site	Center	0
GW2	Kakrali	WNW	1
GW3	Ghughera	NW	1.6
GW4	Lalwa	SW	1
GW5	Meghpur	NNE	0.5
GW6	Sanjay Colony	E	1.7
GW7	Kanungo Mohalla	ESE	2
GW8	Raipur	S	2.7
GW9	Karna	WSW	1.7
GW10	Alapur	NE	3



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LALWA	MEGHPUR	SANJAY COLONY
		
KANUNGO MOHALLA	RAIPUR	KARNA
		
	ALAPUR	

**FIGURE 4-7: PHOTOGRAPHS OF GROUND WATER MONITORING**

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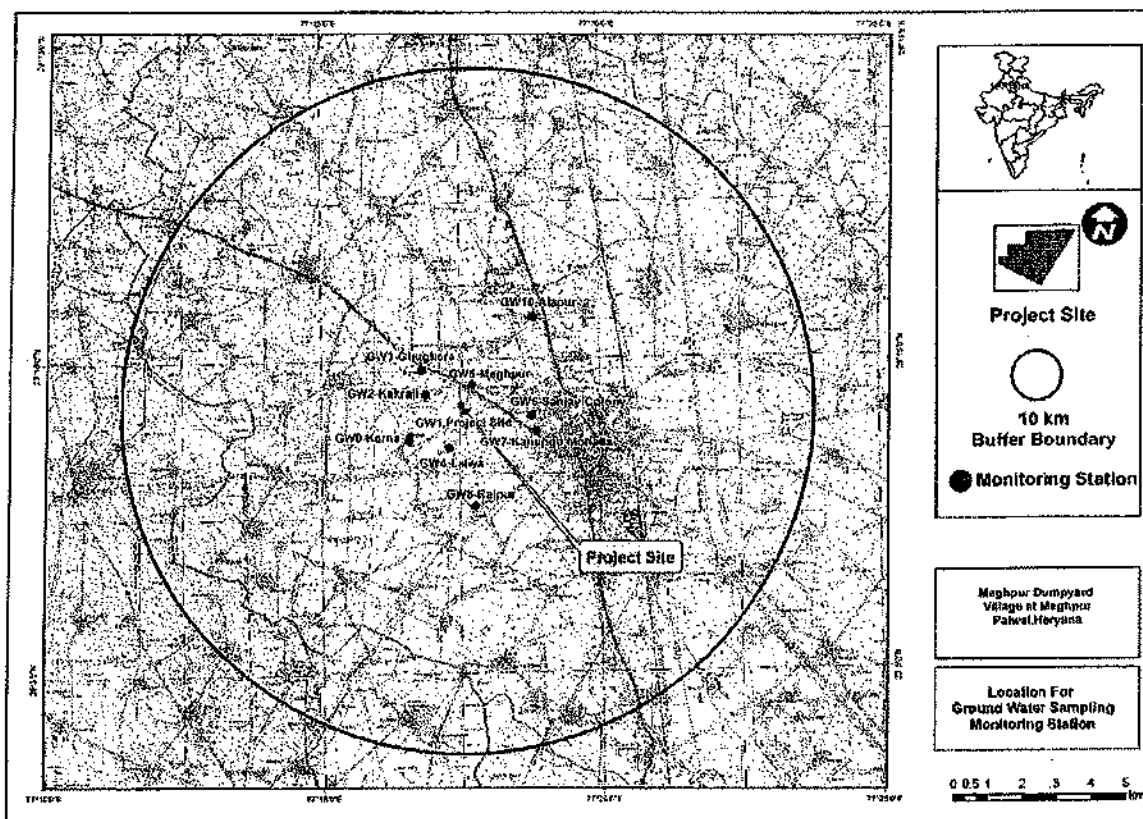


FIGURE 4-8: GROUND WATER MONITORING LOCATIONS MAP

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a) Analysis Report of Water Quality		

TABLE 4.7 ANALYSIS RESULTS OF GROUND WATER SAMPLES

S. No.	Parameters	Unit	Limit (S-10500:2012)	GW-01	GW-02	GW-03	GW-04	GW-05	GW-06	GW-07	GW-08	GW-09	GW-10
				Near Project Site	Kakrali	Ghughera	Lalwa	Meghpur	Sanjay Colony	Kanungo Mohalla	Raipur	Karna	Alapur
1	Color	Hazen	5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
2	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
5	Phosphate (as PO4)	mg/l		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
6	pH	-	6.5-8.5	7.26	7.25	7.27	7.82	7.34	7.29	7.65	7.28	7.16	7.16
7	TDS	mg/l	500	620	590	932	1880	1922	822	766	633	432	432
8	Total Hardness (as CaCO3)	mg/l	200	300	380	540	804	920	540	432	322	240	240
9	Aluminium (as Al)	mg/l	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02

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S. No.	Parameters	Unit	Limit (IS-10500:2012)	GW-01	GW-02	GW-03	GW-04	GW-05	GW-07	GW-08	GW-09	GW-10
10	Ammonia (as Total ammonia )	mg/l	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
11	Anionic detergents (as MBAS)	mg/l	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
12	Boron (as B)	mg/l	0.5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
13	Calcium(as Ca)	mg/l	75	80	48.2	72	96	242	96	92	61	56
14	Magnesium (as Mg)	mg/l	30	24.30	21.30	48.20	72.60	71.10	72.30	47.60	36.50	24.20
15	Chlorides (as Cl)	mg/l	250	132.00	166.00	156.00	232.00	454.00	176.50	123.50	76.60	56.20
16	Copper (as Cu)	mg/l	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
17	Fluoride (as F )	mg/l	1	0.87	0.42	0.58	0.78	0.77	0.55	0.54	0.34	0.22
18	Iron (as Fe)	mg/l	1	0.54	0.32	0.23	0.65	0.82	0.39	0.23	0.23	0.16
19	Manganese (as Mn)	mg/l	0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
20	Mineral oil	mg/l	0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

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S. No.	Parameters	Unit	IS-10500 (2012)	GW-01	GW-02	GW-03	GW-04	GW-05	GW-06	GW-07	GW-08	GW-09	GW-10
21	Nitrate (as NO3)	mg/l	45	No Relaxation	8.7	12.2	23.2	34.4	42.2	24.6	17.7	3.5	2.5
22	Sulphate (as SO4)	mg/l	200	400	54.4	43.5	82.4	166.6	126.8	98.8	76.6	43.3	56.5
23	Alkalinity as CaCO3	mg/l	200	600	254	232	344	766	824	344	322	344	212
24	Phenolic compounds (as C6H5OH)	mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
25	Zinc (as Zn)	mg/l	5	15	0.11	0.16	0.24	0.45	0.57	0.23	0.21	0.11	0.19
26	Cadmium (as Cd)	mg/l	0.003	No relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
27	Cyanide (as CN)	mg/l	0.05	No relaxation	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
28	Lead (as Pb)	mg/l	0.01	No relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
29	Mercury (as Hg)	mg/l	0.001	No relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
30	Nickel (as Ni)	mg/l	0.02	No relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
31	Total arsenic (as As),	mg/l	0.01	No relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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S. No	Parameters	Unit	Limit (IS:10500:2012)	GW-01	GW-02	GW-03	GW-04	GW-05	GW-06	GW-07	GW-08	GW-09	GW-10
32	Chromium (as Cr)	mg/l	0.05	No Relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
<b>Microbiological Parameter</b>													
34	Total Coliform	IS: 15185: 2016	Should be absent/ 100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml
34	E.coli	IS: 15185: 2016	Should be absent/ 100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml	Absent/100 ml

**a) Analysis result:**

- The analysis results indicate that the pH value is 7.16 to 7.86 which is well within the specified standard of 6.5 to 8.5.
- The TDS was observed as 432 to 1880 mg/l.
- The chlorides were found as 56.20 to 454 mg/l.
- The sulphate was found as 43.3 to 166.6 mg/l. It is observed that sulphate is within limits.
- Total hardness ranges between 210 to 920 mg/l.
- Metals: Iron is found in between 0.16 to 0.89 mg/l.

#### 4.4.3 Ambient Air Environment

##### a) Meteorology

Meteorological factors such as wind speed, direction variation in temperature, humidity etc. play a direct role in dispersion of pollutants atmospheric pressure, rainfall and cloud cover also govern this activity. In order to establish the prevailing climatic condition, a meteorological monitoring station was installed in the study area during the study period.

Based on the site meteorological information gathered during the monitoring period, wind rose diagram was generated to understand the prevailing wind direction so as to anticipate the dispersion of pollutants in the wind direction.

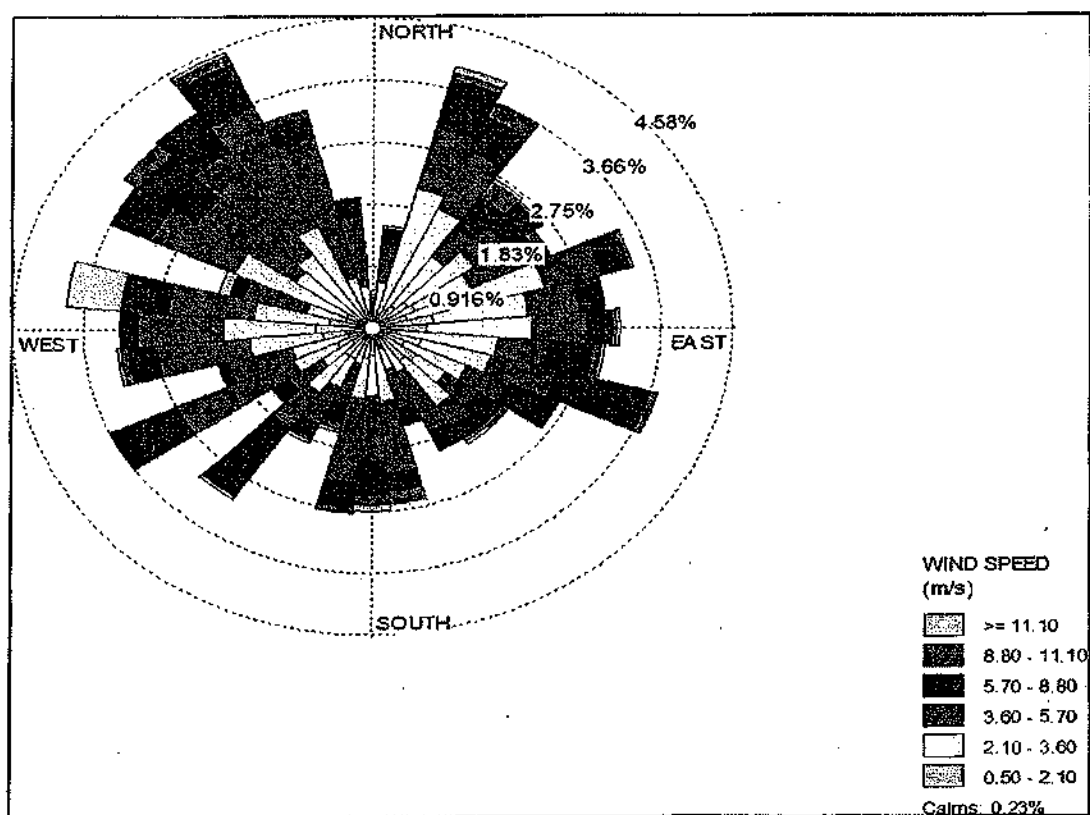


FIGURE 4-9: WIND ROSE DIAGRAM OF STUDY AREA (Oct-Dec, 2021)

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#### **b) Climate**

The climate of Palwal district can be classified as tropical steppe, semiarid and hot which is mainly characterized by the extreme dryness of the Air except during monsoon months. During three months of south west monsoon from last week of June to September, the moist air of oceanic penetrate into the district and causes high humidity, cloudiness and monsoon rainfall. The period from October to December constitutes post monsoon season. The cold weather season prevails from January to the beginning of March and followed by the hot weather or summer season which prevails up to the last week of June

Source: [http://cgwb.gov.in/District\\_Profile/Haryana/Palwal.pdf](http://cgwb.gov.in/District_Profile/Haryana/Palwal.pdf)

#### **c) Annual Rainfall**

The normal annual rainfall in Palwal district is about 542 mm spread over 27 days. The south west monsoon sets in the last week of June and withdraws towards the end of September and contributes about 85% of the annual rainfall. July and August are the wettest months 15% of the annual rainfall occurs during the non-monsoon months in the wake of thunder storms and western disturbances.

Normal Annual Rainfall: 542 mm Normal monsoon Rainfall: 460mm

Source: [http://cgwb.gov.in/District\\_Profile/Haryana/Palwal.pdf](http://cgwb.gov.in/District_Profile/Haryana/Palwal.pdf)

#### **d) Temperature**

Palwal is located in the southern part of Haryana and the western part of India, being a part of the National Capital Region. It shares a geographical boundary with Mewat, Aligarh, Gurgaon, Faridabad and Delhi. Palwal also has an extreme climate. During the summer months of April (latter half), May, June and July, the temperature is 36 deg C on an average. During the rainy months, majorly in August, the rainfall peaks to 184 mm and temperature is 22 deg C on an average. During the winters, the temperature swings at 15 deg C on an average.

Source: - Error! Hyperlink reference not valid.

#### **4.4.3.1 Ambient air quality monitoring**

Ambient air quality monitoring was carried out during the study period (Oct.-Dec. 2021) to establish the ambient air quality. "An Ambient Air Quality (AAQ) monitoring programme" is collection of data that form an accurate record of air quality.



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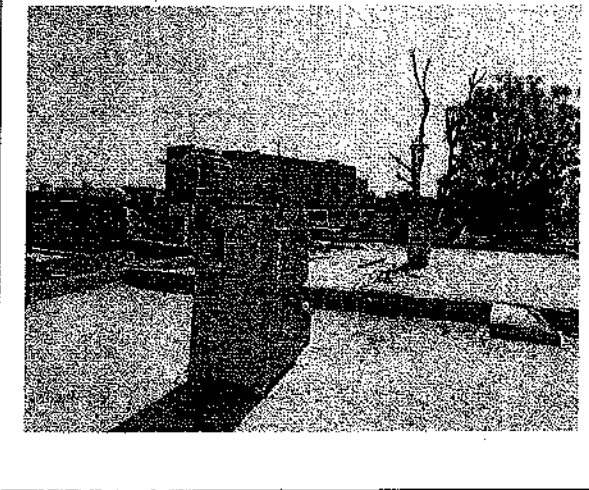
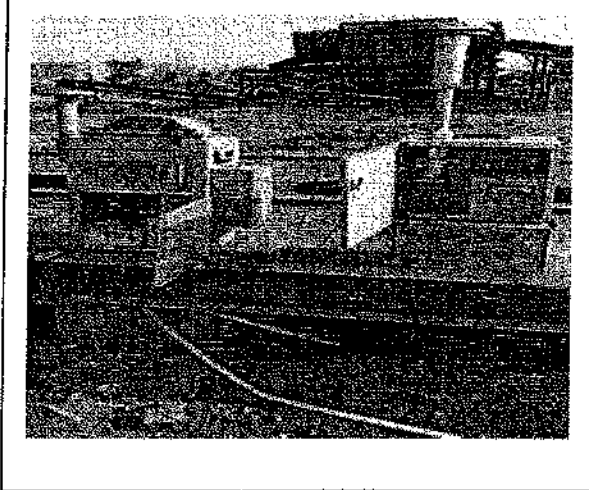
The purpose of collection of baselines AAQ data was to know the present status of air environment in and around the project site. Sampling was carried out with the help of Repairable particulate matter Sampler "Repairable Dust Sampler" (RDS). The data generated for ambient air quality status is within 10 km. radius of the project site.

#### 4.4.3.2 Location of Ambient Air Sampling Stations

Sampling locations were established for ambient air monitoring in and around the project site within a radius of 10.0 km, to study the present quality of the air. The locations of the monitoring stations were based on the frequent wind directions (secondary data) in order to site the stations as close as feasible to the anticipated maximum pollutant deposition areas moreover duly considering human habitation and proximity to sensitive zones within the study area. Locations of sampling points are given below: -

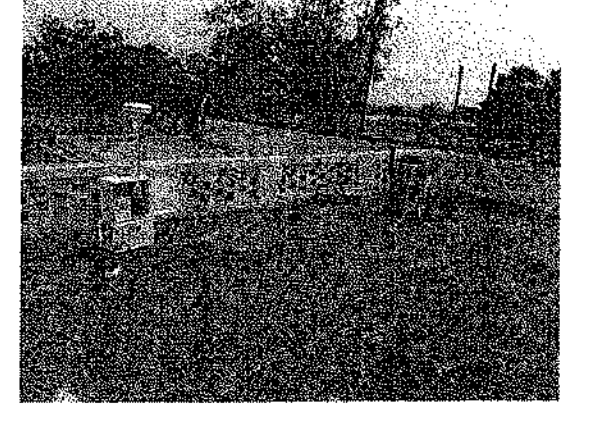
Station Code	Location	Distance	Direction
AAQ1	Project Site	Center	0
AAQ2	Kakrali	WNW	1
AAQ3	Ghughera	NW	1.6
AAQ4	Lalwa	SW	1
AAQ5	Meghpur	NNE	0.5
AAQ6	Sanjay Colony	E	1.7
AAQ7	Kanungo Mohalla	ESE	2
AAQ8	Raipur	S	2.7
AAQ9	Karna	WSW	1.7
AAQ10	Alapur	NE	3

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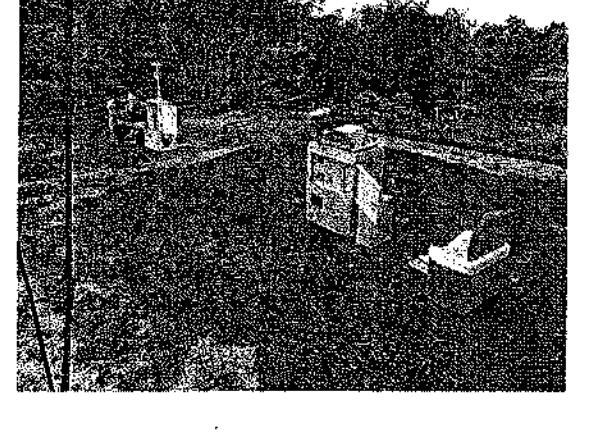
**PROJECT SITE**  
 Coordinate- 28.153479 N, 77.293911 E

**KAKRALI**  
 Coordinate 28.1508 N,77.2896 E







**GHUGHERA**  
 Coordinates- 28.166198 N, 77.278708 E

**LALWA**  
 Coordinates- 28.13959 N, 77.289031 E



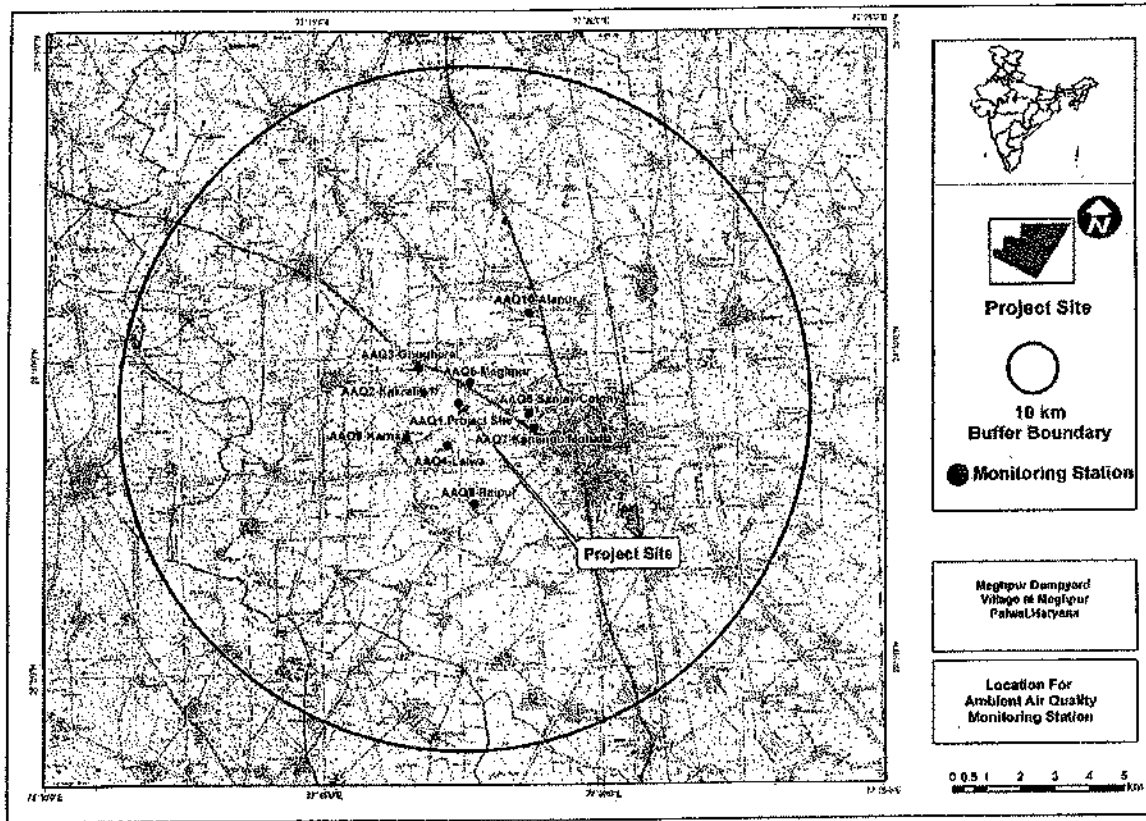
**SANJAY COLONY**  
 Coordinate- 28.147492 N, 77.322851 E

**MEGHPUR**  
 Coordinates- 28.158577N, 77.158577E

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<p align="center"> <b>KANUNGO MOHALLA</b>  <b>Co-ordinate-28.125259 N</b>  <b>77.297719 E</b> </p>	<p align="center"> <b>RAIPUR</b>  <b>Coordinate- 28.125269 N, 77.297681E</b> </p>	
		
<p align="center"> <b>KARNA</b>  <b>Co-ordinate-28.138543 N,77.275438</b> </p>	<p align="center"> <b>ALAPUR</b>  <b>Co-ordinate- 28.17675 N, 77.31369 E</b> </p>	

**FIGURE 4-10: MONITORING PHOTOGRAPHS OF AMBIENT AIR QUALITY**

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**FIGURE 4-11: AMBIENT AIR SAMPLING LOCATION IN THE STUDY AREA**

**4.4.3.3. Air Quality Standards**

The National Ambient Air Quality Standards for the above-mentioned pollutants, notified vide NAAQS Notification dated 18<sup>th</sup> November, 2009, are presented in **Table 4.8**.

**TABLE 4-8: AMBIENT AIR QUALITY STANDARDS**

S. No.	Pollutant	Time weighted Average	Concentration in air	
			Industrial, residential, rural and other areas	Ecologically sensitive area (notified by Central Govt.)
1.	Sulphur dioxide (SO <sub>2</sub> ), µg/m <sup>3</sup>	Annual*	50	20
		24 Hours**	80	80
2.	Nitrogen dioxide (NO <sub>2</sub> ), µg/m <sup>3</sup>	Annual*	40	30
		24 Hours**	80	80
3.	Particulate matter PM <sub>10</sub> ,	Annual*	60	60

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S. No.	Pollutant	Time weighted Average	Concentration in air		
			Industrial, residential, rural and other areas	Ecologically sensitive area (notified by Central Govt.)	
	$\mu\text{g}/\text{m}^3$	24 Hours**	100	100	
4.	Particulate matter PM 2.5, $\mu\text{g}/\text{m}^3$	Annual*	40	40	
		24 Hours**	60	60	
5.	Ozone(O <sub>3</sub> ), $\mu\text{g}/\text{m}^3$	8 Hours**	100	100	
		1 Hours**	180	180	
6.	Lead (Pb), $\mu\text{g}/\text{m}^3$	Annual*	0.50	0.50	
		24 Hours**	1.00	1.00	
7.	Carbon monoxide (CO), $\text{mg}/\text{m}^3$	8 Hours**	02	02	
		1 Hour**	04	04	
8.	Ammonia (NH <sub>3</sub> ), $\mu\text{g}/\text{m}^3$	Annual*	100	100	
		24 Hours**	400	400	
9.	Benzene(C <sub>6</sub> H <sub>6</sub> ), $\mu\text{g}/\text{m}^3$	Annual*	05	05	
10.	Benzo(a)Pyrene (BaP) - particulate phase only, $\text{ng}/\text{m}^3$	Annual*	01	01	
11.	Arsenic(As), $\text{ng}/\text{m}^3$	Annual*	06	06	
12.	Nickel (Ni) $\text{ng}/\text{m}^3$	Annual*	20	20	

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

\*\* 24 hourly, 8 hourly or 1 hourly monitored value, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring

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**TABLE 4-9: AMBIENT AIR QUALITY MONITORING RESULTS**

Location	PM <sub>2.5</sub> (µg/m <sup>3</sup> )			PM <sub>10</sub> (µg/m <sup>3</sup> )			SO <sub>2</sub> (ppm)			NO <sub>2</sub> (ppb)					
	Min	Max	Average	8th /11th	Min	Max	Average	SO <sub>2</sub>	Min	Max	Average	NO <sub>2</sub>	Min	Max	Average
Project Site	113.2	176.4	175.1	163.4	197.5	397.4	269.1	364.2	10.3	19.8	16.2	19.8	26.1	49.7	37.7
Katralli	47.4	86.8	65.0	85.7	88.2	303.4	164.4	275.3	5.8	19.8	11.9	19.7	11.5	24.2	38.2
Ghughera	47.4	86.8	66.1	85.7	81.8	146.4	116.9	145.8	5.2	17.9	10.4	17.4	12.6	43.4	28.5
Lalwa	51.3	88.3	68.1	87.8	91.1	157.6	120.0	155.1	5.2	17.9	10.4	17.4	12.6	43.4	28.5
Meghpur	51.3	88.3	68.1	87.8	88.5	174.3	127.0	169.3	5.2	19.8	11.0	19.2	12.8	31.2	21.7
Sanjay Colony	47.4	86.8	69.6	85.7	87.5	155.3	124.7	160.8	5.3	24.3	11.5	22.0	11.8	41.2	26.7
Kanungo Mohalla	53.9	89.2	68.7	88.3	88.8	303.4	161.3	275.3	5.8	19.8	11.9	19.7	5.2	46.5	17.6
Raipur	51.2	88.3	69.4	87.6	84.3	145.3	115.7	144.6	5.2	17.9	10.4	17.4	13.1	43.4	28.7
Karna	47.4	86.8	66.6	85.7	94.3	243.4	155.1	238.3	5.2	19.4	10.0	18.3	12.6	41.2	25.8
Alapur	47.4	87.4	68.7	87.1	81.3	164.4	120.5	161.0	5.6	16.9	10.0	16.7	0.8	1.0	0.9



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Location	SO <sub>2</sub> (µg/m <sup>3</sup> )			CO <sub>2</sub> (µg/m <sup>3</sup> )			PM <sub>10</sub> (µg/m <sup>3</sup> )			PM <sub>2.5</sub> (µg/m <sup>3</sup> )		
	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average
Project Site	1.3	3.5	2.0	3.0	8124.0	6916.4	7995.7	16.5	25.1	21.4	24.9	0
Kakrali	0.8	1.3	1.0	1.3	1987.0	1512.0	1986.1	0	0	0	0	0
Ghughera	0.6	1.9	1.1	1.7	2523.0	1573.8	2297.1	0	0	0	0	0
Lalwa	0.8	1.9	1.1	1.8	1948.0	1499.9	1943.4	0	0	0	0	0
Meghpur	0.8	1.3	1.0	1.3	1935.0	1448.4	1934.5	0	0	0	0	0
Sanjay Colony	0.5	2.0	1.3	2.0	1987.0	1512.0	1986.6	0	0	0	0	0
Kanungo Mohalla	0.6	1.3	1.0	1.3	1925.0	1351.5	1893.6	0	0	0	0	0
Raipur	0.6	1.7	0.9	1.5	1936.0	1441.5	1936.0	0	0	0	0	0
Karna	0.8	1.9	1.1	1.7	1935.0	1383.0	1890.8	0	0	0	0	0
Alapur	0.8	1.0	0.9	1.0	1948.0	1438.8	1912.6	0	0	0	0	0

**Air Analysis Interpretation**

Ambient Air Quality Monitoring reveals that the minimum and maximum concentrations of PM<sub>10</sub> for all the 10 Air Quality monitoring stations were found in the range of 81.3 µg/m<sup>3</sup> and 397.4 µg/m<sup>3</sup> respectively, while for PM<sub>2.5</sub> varies between 47.4 µg/m<sup>3</sup> and 176.4 µg/m<sup>3</sup>. As far as the gaseous pollutants SO<sub>2</sub> and NO<sub>2</sub> are concerned, the prescribed limits under NAAQ Standards for residential and rural areas has never surpassed at any station. The minimum and maximum concentrations of NO<sub>2</sub> were found to be 5.2 µg/m<sup>3</sup> and 49.7 µg/m<sup>3</sup> respectively. The minimum and maximum concentrations of SO<sub>2</sub> were found to be 5.2 µg/m<sup>3</sup> and 24.3 µg/m<sup>3</sup> respectively. The minimum and maximum concentrations of CO were found to be 0.5 mg/m<sup>3</sup> and 3.5 mg/m<sup>3</sup> respectively.

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#### 4.4.4 Noise Environment

Noise pollution can be defined as an unpleasant and unwanted sound, causes annoyance, distracts from work, and disturbs sleep, thus deteriorating quality of human environment. The noise level monitoring in the study area was done at the ambient air environment monitoring locations. Monitoring was done as per the CPCB guideline. The noise monitoring results were compared with the Ambient Noise Quality Standard notified under Environment (Protection) Act, 1986. The day noise levels have been monitored during 6.00 am to 10.00 pm and night noise levels during 10.00 pm to 6.00 am, at all the 10 locations covered in 10 km radius of the study area.

##### 4.4.1.1 Standards for Ambient Noise Level

The Ministry of Environment, Forests and Climate Change has notified the ambient air quality standards in respect of noise for different area categories vide gazette notification dated 14<sup>th</sup> February, 2000 under the Environment Protection Act (1986). These standards are given in **Table-4.10**.

**TABLE 4-10: AMBIENT NOISE QUALITY STANDARDS**

Area Code	Category of Area	Noise dB(A) Leg	
		Daytime	Nighttime
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

**Note:**

1. Day Time is reckoned between 6AM and 10PM
2. Night Time is reckoned between 10PM and 6AM
3. Silence Zone is defined as area upto 100 metres around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the competent authority. Use of vehicular horns, loudspeakers and bursting of crackers shall be banned in these zones.
4. Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.



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*dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is related to human hearing*








*"A", in dB(A), denotes the frequency weighing in the measurement of noise and corresponds to frequency response characteristics of the human ear.*

#### 4.4.1.2. Noise Monitoring Locations

The location of Noise Quality Monitoring stations is depicted in Table 4.11. The statistical analysis (Table-4.12) is done for recorded noise levels at 10 locations.

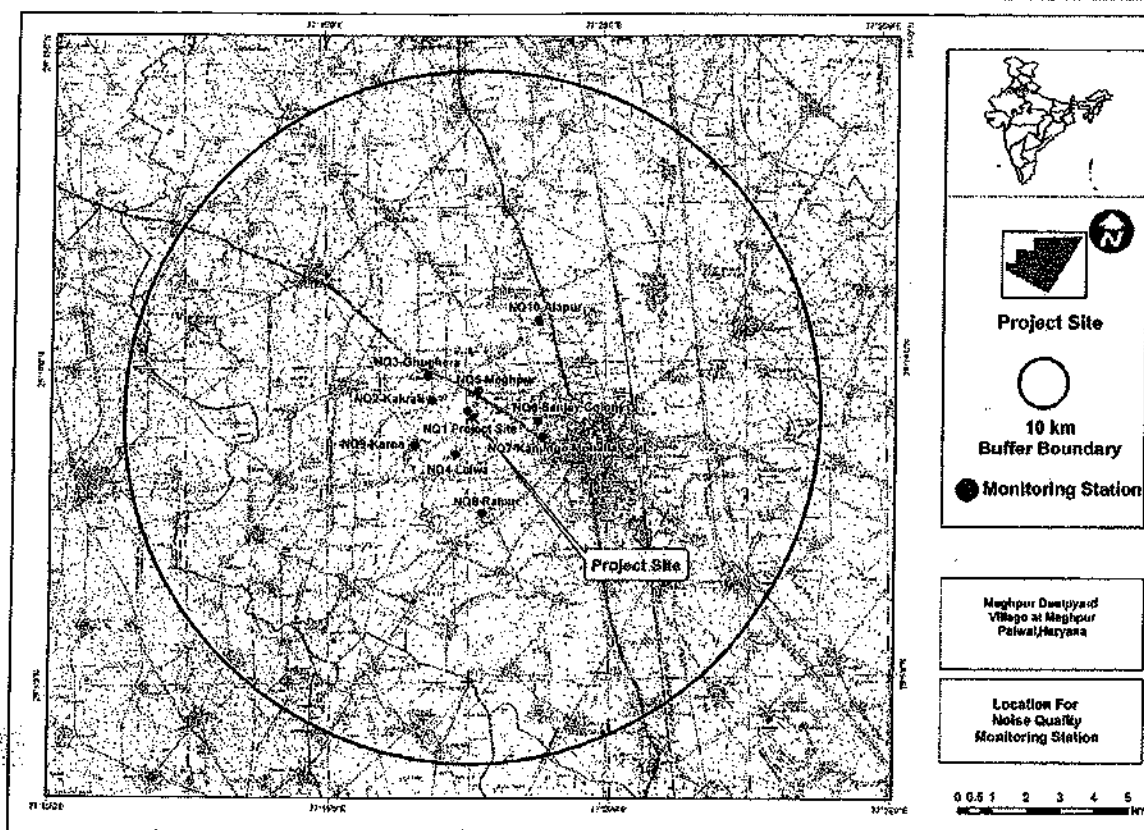
**TABLE 4-11: AMBIENT NOISE QUALITY MONITORING STATION**

Station Code	Location	Direction	Distance (km)
NQ1	Project Site	Center	0
NQ2	Kakrali	WNW	1
NQ3	Ghughera	NW	1.6
NQ4	Lalwa	SW	1
NQ5	Meghpur	NNE	0.5
NQ6	Sanjay Colony	E	1.7
NQ7	Kanungo Mohalla	ESE	2
NQ8	Raipur	S	2.7
NQ9	Karna	WSW	1.7
NQ10	Alapur	NE	3

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<b>LALWA</b>	<b>MEGHPUR</b>	<b>SANJAY COLONY</b>
		
<b>KANUNGO MOHALLA</b>	<b>RAIPUR</b>	<b>KARNA</b>
		
	<b>ALAPUR</b>	

**FIGURE 4.12: PHOTOGRAPHS OF AMBIENT NOISE QUALITY MONITORING**

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**FIGURE 4-13: NOISE QUALITY MONITORING LOCATIONS MAP**

#### 4.4.4.3 Methodology

The intensity of sound energy in the environment is measured on a logarithmic scale and is expressed in a decibel (dB) scale. Ordinary sound level meter measures the sound energy that reaches the microphone by converting it into electrical energy and then measures the magnitude in dB. In a sophisticated type of sound level meter, an additional circuit (filters) is provided, which modifies the received signal in such a way that it replicates the sound signal as received by the human ear and the magnitude of sound level in this scale is denoted as dB(A). The sound levels are expressed in dB(A) scale. Noise levels were measured using an Integrating sound level meter, with an indicating mode of Lp and Leq. Keeping the mode in Lp for few minutes and setting the corresponding range and the weighting network in "A" weighting set the sound level meter was run for one-hour time and Leq was measured at all locations. Day time Leq and night time Leq values were computed from these measured 1 hour Leq values. The day noise levels represent the value during 6.00am to 10.00 pm and night noise levels, during 10.00pm to 6.00am at all the eight (8) locations covered under the study.

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#### 4.4.4.4 Noise Level Results

The noise monitoring within the study area was recorded using sound level meter and results are given in the table below:

**TABLE 4-12: AMBIENT NOISE QUALITY MONITORING DATA**

Location-ANQ-01: Project site		Noise Level in Db(A)					
		Mar-21					
		Leq Day	Leq Night	L10	L50	L90	Leq
1-ANQ-01	16/03/2021	68	52.8	69.9	67.1	54.6	67.7
Limits - Industrial Area		75	70				
Location-ANQ-02: Kakralli		Noise Level in Db(A)					
		Mar-21					
		Leq Day	Leq Night	L10	L50	L90	Leq
1-ANQ-02	17/03/2021	52.2	43.4	54.1	51.1	46.4	51.9
Limits - Residential Area		55	45				
Location-ANQ-03: Ghughera		Noise Level in Db(A)					
		Mar-21					
		Leq Day	Leq Night	L10	L50	L90	Leq
1-ANQ-03	18/03/2021	51.3	43.1	52.8	50.9	46.1	50.2
Limits - Residential Area		55	45				
Location-ANQ-04: Lalwal		Noise Level in Db(A)					
		Mar-21					

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		Leq Day	Leq Night	L10	L50	L90	Leq
1-ANQ-04	19/03/2021	54.2	44.3	54.8	51.1	45.6	54.5
Limits - Residential Area		55	45				
Location-ANQ-05, Meghpur		Noise Level in Db(A)					
		Mar-21					
		Leq Day	Leq Night	L10	L50	L90	Leq
1-ANQ-05	20/03/2021	52.9	43.8	53.8	51.1	44.8	53.2
Limits - Residential Area		55	45				

#### 4.4.4.5 Noise Analysis Interpretation

- ❖ The noise levels are found to be 51.3-68 db(A) for day and 42.2-52.8 db(A) night time respectively.
- ❖ The high levels of noise in day for project site can be attributed due to construction and operation and vehicular activities.
- ❖ The noise levels at all location are well below the NAAQS standards.

#### 4.5 BIOLOGICAL ENVIRONMENT

Study of biological environment is one of the important aspects for the Environmental Impact Assessment, in view of the need for conservation of Environmental quality and biodiversity of particular geographical area. Ecological systems show multi-faceted inter relationship between biotic and Abiotic components including dependence, competition and mutualism. Biotic components comprise of plant and animal communities which interact not only within and between themselves but also with the Abiotic components viz. Physical and Chemical; components of the environment.

Assessment of the ecological impacts of change is often difficult either because the complications of these interactions are not satisfactorily known or because ecosystems sometimes react in surprising ways. Most of the unexpected impacts of development result

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from a failure to anticipate effects which are distant, in spatial, temporal or ecological terms from the point of action.

#### **Objectives of Biological Study**

The main objectives of biological study were:

- ❖ To collect the baseline data of the existing flora and fauna.
- ❖ To assess the scheduled (rare, endangered, critically endangered, endemic and vulnerable) species.
- ❖ To identify the anticipated Impacts on the ecology and biodiversity.

To suggest mitigation measure for sustainable development

#### **Study Approach & Methodology adopted**

The baseline study for existing ecological environment was carried out during Pre-Monsoon Season – 2021 (15<sup>th</sup> Mar to 15<sup>th</sup> June 2021). A participatory and consultative approach was followed. Field visits were under taken for survey of the vegetation and animals in the study area. The study area is divided into two parts as project area consideration as Core Zone and the Buffer Zone in the 10 km radius of the project site.

#### **Collection of secondary Information**

Secondary information pertaining to flora and fauna, forest maps, forest types and other related information up to the district level, topography, forest map, agricultural information of the 10 km study area in particular were gathered from published reports like State Forest Department's working plan, District gazetteer, Forest Survey of India (FSI), Dehradun, Wildlife Institute of India (WII), World Wildlife Fund (WWF), Botanical Survey of India (BSI), Zoological Survey of India (ZSI), Bombay Natural History Society (BNHS), State Agricultural Department, State Fisheries Department, International Union for Conservation of Natural Resources (IUCN), Environmental Information System (ENVIS), and other published research papers for the basic understanding about ecology and biodiversity of the area.

#### **Primary data collection**

Initially field survey has been done in 10 km study area for collecting basic information of existing biological environment and detail information regarding available forest produces and NTFPs collected and cropping pattern etc. Detailed inventory of major available plant and animal species as well as important habitat like grasslands, open forest, dense forest, agriculture areas, riparian zones, taluses, wastelands, etc. were recorded.

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### **Flora**

Floral study survey was made to assess the existing plant species in all accessible areas within the 10 km radius by the crisscross method of field exploration. The local flora was identified by their morphological observation, such as its size and shape of the leaf, flowers, fruits and their bark features of stem and also documented their habitat viz. Trees, Shrubs, Herbs, Grasses and Climbers etc. The plants which were not identified in the field were collected, brought to the laboratory and identified using standard herbarium references. Photo documentation of some of the key species presents the study area was also done.

### **Fauna**

**Avifauna:** Standard methods were followed to survey the avifauna. The point count method was followed for counting the birds. Opportunistic survey was also carried out with respect to avifauna. Identification by calls was also made for species identification which were not directly encountered or were hidden in the vegetation or canopy (Sridharan, 1989; Bhupathy, 1991; Bibby *et al.*, 1992 and Hutto *et al.*, 1986).

**Herpetofauna:** Area searches were done in the circular plots of 10 m radius to inventory all terrestrial habitats for reptiles and amphibians. Area searches consisted of turning cover objects like logs, boulders etc. (Welsh, 1987). Sampling for these species involved through binoculars and aural surveys.

**Mammals:** Presence of mammals was documented by using both direct and indirect evidences. Opportunistic sightings were also included. Transect line were used to search indirect evidence *i.e.* animal burrows / holes, scat, pellets, feeding signs, and tracks. Photographic (colored pictorial guide) field guide was used for interviews with local residents (Burnham *et al.*, 1980; Rodgers, 1991; Sale and Berk muller, 1988 and Daniel, 1992).

### **Threat Status Assessment/evaluation Criteria**

The biodiversity aspects in the form of endemic status, conservation status and life form were enumerated for all the plant species found in the area during ecological survey. The Red Data Book of the Botanical survey of India was screened to verify their conservation status. For the assessment of scheduled wild animal species, the Wildlife Protection Act (1972) and IUCN Red Data Book was considered.

### **Tabulation and graphs**

Once, the final analysis work has been completed various tables, figure and graphs were prepared with the help of Microsoft Office Excel 2019.



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### Photographic documentation

During the field visits, surveys, individual and group discussions and personal interaction with local villagers and inhabitant's various photographic documentation were made, scanned, processed and incorporated in the report.

### STUDY AREA

Biological communities are the indicator environmental condition and resource of its distribution and survival. Biotic component comprises of both plants (Flora) and animals (Fauna) communities, which interact not only within and between them but also with the Abiotic components, viz. physical and chemical components of the environment. The changes in biotic community are studied in the pattern of distribution, abundance and diversity. The study area is divided into two parts i.e.:

a) **Core Zone:** Project Site

b) **Buffer Zone:** Area within 10 Km radius from the Core boundary.

The Biological study of proposed Sanitary Landfill facility at Meghpur village of Palwal district at Haryana state has been done during Oct, 2021 in following monitoring locations of 10 km radius study area (Table- 4.13 & Figure-4.14).

**TABLE -4.13: SAMPLING LOCATIONS FOR BIOLOGICAL ENVIRONMENT**

Sr. No.	Station Code	Locations	GPS Coordinated	Direction	Distance (Km)
1	TE-1	Core Zone	28° 9'9.91"N 77°17'37.28"E	-	-
2	TE-2	Alapur	28°10'7.65"N 77°17'36.36"E	1.81	N
3	TE-3	Miranpur	28°11'36.52"N 77°19'44.26"E	5.72	NE
4	TE-4	Alika	28° 9'16.97"N 77°15'6.70"E	4.03	W
5	TE-5	Durgapur	28° 5'51.33"N 77°16'38.96"E	6.29	S
6	TE-6	Kithwari	28° 7'16.94"N 77°20'33.88"E	6.02	SE
7	TE-7	Khajurka	28° 9'32.65"N 77°22'36.23"E	8.26	E



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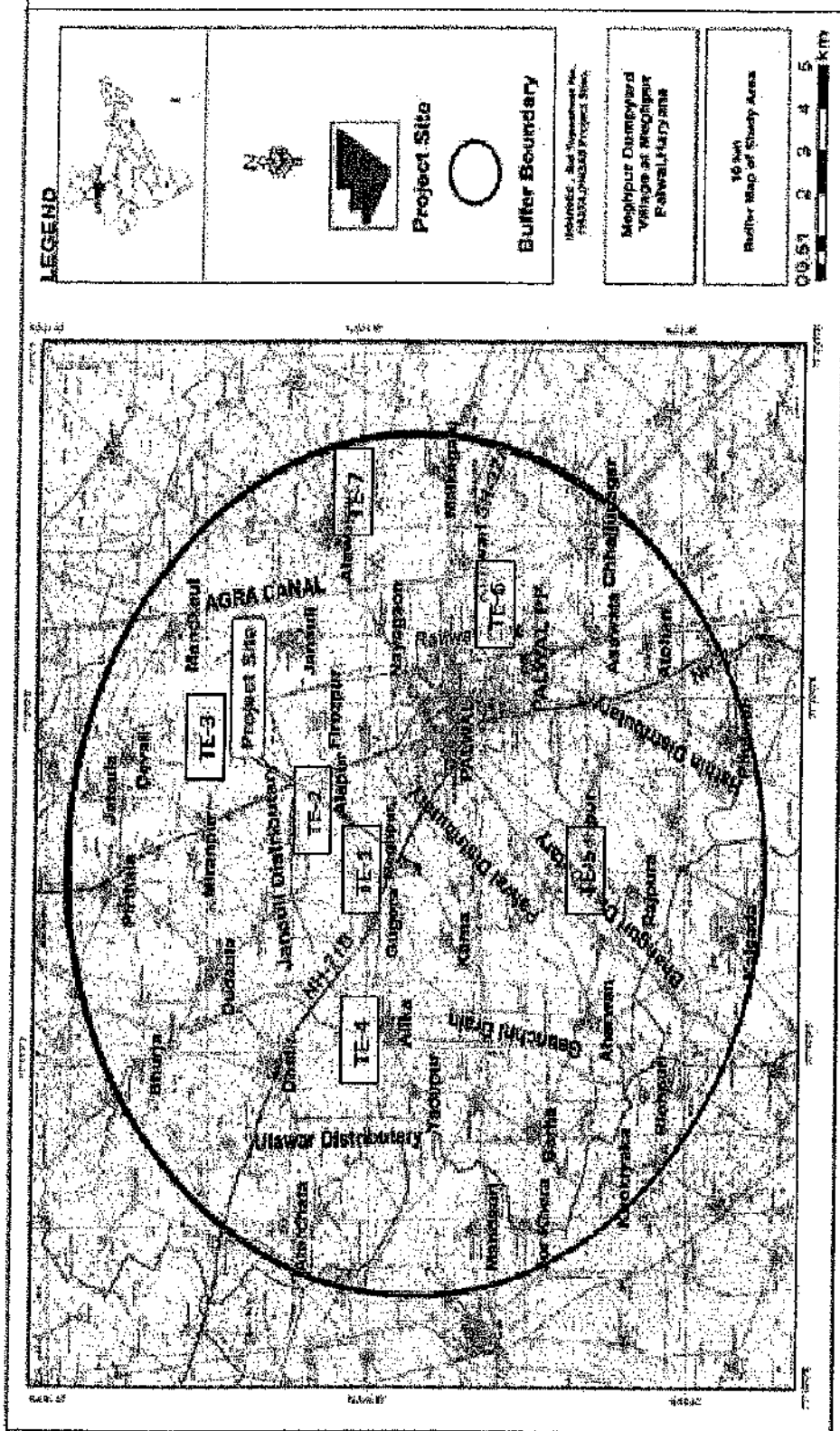


FIGURE-4.14: MAP OF SURVEY LOCATIONS FOR BIOLOGICAL ENVIRONMENT

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### **General Information about District**

Palwal district of Haryana lies between 27°50'00": 28°15'40" North latitudes and 77°05'00": 77° 33'00" East longitudes. Total geographical area of the district is 1364.55 km<sup>2</sup>. Administratively, Palwal is the district Headquarter of the district. It is divided into 4 development blocks namely Palwal, Hathin, Hodal and Hassanpur. The district area is bounded on western side Mewat district, Eastern side by U.P. state and northern side by Faridabad district and falls in survey of India toposheets no. 53H/3, H/4, H/7, H/8, H/9, H/12, and 54E/5 and E/9. There were two main canals Agra canal and Gurgaon canal which passes through western and central part of the district respectively from north to south. The normal annual rainfall in Palwal district is about 542 mm spread over 27 days.

Forest Department is running two schemes namely a forestation and soil Conservation Land Reclamation. As per the National Forests Policy of MOEF&CC, Govt. of India about 1/3 of the geographical area should be under tree cover. In order to achieve this objective various special project large scale plantation on community, Panchayat, Government and Private land were undertaken in last 20 years and saplings of Eucalyptus, Shisham, Neem and other fruit plant were distributed free of costs to farmers to plant in their field.

### **Terrestrial Ecology**

The natural flora and fauna of the land habitats constitute terrestrial ecosystem. The study of terrestrial ecosystem is important as a part of the monitoring environmental changes.

### **Observations and Results**

**Core Zone:** Proposed Sanitary landfill facility at Meghpur village, Palwal, Haryana.

**Buffer Zone:** A total of 187 floral species have been recorded during survey from the 10 km study area out of which 59 are Trees, 32 are shrubs, 63 herbs, 15 grasses, 17 species of Climbers and one parasite plant are given in **Table-4.14**.

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**TABLE-4.14: FLORAL SPECIES DIVERSITY IN THE BUFFER ZONE (10 KM STUDY AREA) INCLUDING FOREST AND WASTELAND AREA.**

**(A) Trees:**

S No	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
1	<i>Acacia nilotica</i> (L.) Delile	Kikar	Fabaceae	NA
2	<i>Acacia simea</i>	Acacia	Leguminosae	NA
3	<i>Aegle marmelos</i> (Corr.)	Bel	Rutaceae	NA
4	<i>Ailanthus excelsa</i> Roxb.	Arusa	Simaroubaceae	NA
5	<i>Albizia lebbek</i> (L.) Benth.	Kala Siris	Fabaceae	NA
6	<i>Albizia procera</i> (Roxb.) Benth.	Safed Siris	Fabaceae	NA
7	<i>Alstonia scholaris</i> (L.) R. Br.	Chitvan	Apocynaceae	NA
8	<i>Artocarpus heterophyllus</i> Lam.	Kathal	Moraceae	NA
9	<i>Azadirachta indica</i> A. Juss. i	Neem	Meliaceae	NA
10	<i>Bauhinia variegata</i> L.	Kachnar	Leguminosae	LC
11	<i>Bombax ceiba</i> L.	Semal	Malvaceae	NA
12	<i>Butea monosperma</i> (Lam.) Taub.	Dhak	Fabaceae	NA
13	<i>Cassia fistula</i> L.	Amaltas	Leguminosae	NA
14	<i>Cassia siamea</i> Lam.	Cassia	Leguminosae	NA
15	<i>Ceiba pentandra</i> (L.) Gaertn.	Kapok	Malvaceae	NA
16	<i>Citrus medica</i> L.	Nimboo	Rutaceae	NA
17	<i>Dalbergia sissoo</i> DC.	Shisham	Leguminosae	NA
18	<i>Delonix regia</i> (Hook.) Raf.	Gulmohar	Leguminosae	LC
19	<i>Ehretia laevis</i> Roxb.	Chamror	Boraginaceae	NA
20	<i>Erythrina indica</i>	Roringe	Fabaceae	NA
21	<i>Eucalyptus triticornis</i>	Nilgiri/Safeda	Myrtaceae	NA
22	<i>Ficus benghalensis</i> L.	Bargad/Bar	Moraceae	NA
23	<i>Ficus racemosa</i> L.	Gular	Moraceae	NA
24	<i>Ficus religiosa</i> L.	Peepal	Moraceae	NA
25	<i>Holarrhena pubescens</i> Wall. ex G. Don	Kura	Apocynaceae	NA

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S. No	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
26	<i>Hymenodictyon excelsum</i> (Roxb.) Wall.	Bairang	Rubiaceae	NA
27	<i>Kigelia pinnata</i> (Jacq.) DC.	Balamkheera	Bignoniaceae	NA
28	<i>Kydia calycina</i> Roxb.	Pula	Malvaceae	NA
29	<i>Lagerstroemia parviflora</i> Roxb.	Sejha	Lythraceae	NA
30	<i>Lagerstromia speciosa</i> L.	Jarul	Lythraceae	NA
31	<i>Lannea coromandelica</i> (Houtt.) Merr.	Jhingan	Anacardiaceae	NA
32	<i>Leucaena leucocephala</i> (Lam.) de Wit	Su-Babool	Leguminosae	NA
33	<i>Mallotus philippensis</i> (Lam.) Müll.Arg.	Rohini	Euphorbiaceae	NA
34	<i>Mangifera indica</i> (Linn.)	Aam	Anacardiaceae	NA
35	<i>Melia azedarach</i> (Linn.)	Bakain	Meliaceae	NA
36	<i>Moringa oleifera</i> (Linn.)	Sahjan	Moringaceae	NA
37	<i>Morus alba</i> L.	Shahtut	Moraceae	NA
38	<i>Musa paradisiaca</i> L.	Kela	Musaceae	NA
39	<i>Neolamarckia cadamba</i> (Roxb.) Bosser	Kadam	Rubiaceae	NA
40	<i>Nyctanthes arbor-tristis</i> L.	Harsingar	Oleaceae	NA
41	<i>Peltophorum pterocarpum</i> (DC.) K.Heyne	Peltophorum	Leguminosae	NA
42	<i>Phoenix sylvestris</i> (L.) Roxb.	Khajur	Aracaceae	NA
43	<i>Phyllanthus emblica</i> L.	Aonla	Phyllanthaceae	NA
44	<i>Pithecellobium dulce</i>	Jungle Jalebi	Fabaceae	NA
45	<i>Plumeria alba</i> L.	Champa	Magnoliaceae	NA
46	<i>Polyalthia longifolia</i> (Sonn.) Thwaites	Ashok	Annonaceae	NA
47	<i>Pongamia pinnata</i> (L.) Pierre	Kanji	Leguminosae	NA
48	<i>Populus ciliata</i> Wall. ex Royle	Poplar	Saliceae	NA
49	<i>Prosopis cineraria</i>	Jand	Fabaceae	NA
50	<i>Prosopis juliflora</i> (Sw.) DC.	Kejri	Leguminosae	NA
51	<i>Psidium guava</i> (Linn.)	Amrood	Myrtaceae	NA

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S No.	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
52	<i>Senna siamea</i> (Lam.) H.S.Irwin & Barneby	Acacia	Leguminosae	NA
53	<i>Spathodea campanulata</i> P.Beauv.	Spathodia	Bignoniaceae	NA
54	<i>Syzygium cumini</i> (L.) Skeels	Jamun	Myrtaceae	NA
55	<i>Tamarindus indica</i> (Linn.)	Imli	Leguminosae	NA
56	<i>Tecoma stans</i> (L.) Juss. ex Kunth	Tecoma	Bignoniaceae	NA
57	<i>Tectona grandis</i> L.f.	Teak	Verbenaceae	NA
58	<i>Terminalia arjuna</i> (W. & A.)	Arjun	Combretaceae	NA
59	<i>Thevetia nerifolia</i> Juss. ex Steud.	Kaner Pila	Apocyanaceae	NA

## (B) Shrubs:

S No.	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
1	<i>Achyranthes aspera</i> L.	Chirchita	Amaranthaceae	NA
2	<i>Aerva javanica</i> var. <i>bovei</i> Webb	Gorakhganja	Amaranthaceae	NA
3	<i>Argemone maxicana</i> (Linn.)	Peelikatheli	Papaveraceae	NA
4	<i>Bougainvillea glabra</i> Choisy	Bougainvillia	Nyctaginaceae	NA
5	<i>Caesalpinia pulcherrima</i> (L.) Sw.	Krishnachuura	Caesalpinaceae	NA
6	<i>Calotropis gigantea</i> (L.) Dryand.	Arakha	Asclepiadaceae	NA
7	<i>Capparis decidua</i> (Forssk.) Edgew.	Ker	Capparaceae	NA
8	<i>Capparis zeylanica</i> L.	Hins	Caparidaceae	NA
9	<i>Cassia occidentalis</i> L.	Kasondi	Leguminoceae	NA
10	<i>Catharanthus roseus</i> (L.) G.Don	Nayantara	Apocynaceae	NA
11	<i>Datura metel</i> L.	Kala Dhatra	Solanaceae	NA
12	<i>Datura stramonium</i> L.	Datura	Solanaceae	NA
13	<i>Echinops echinatus</i> Roxb.	Untkatara	Asteraceae	NA
14	<i>Euphorbia tirucalli</i> L.	Saptala	Euphorbiaceae	CL
15	<i>Flacourtia indica</i> (Burm.f.) Merr.	Baincha	Salicaceae	NA
16	<i>Hibiscus rosa-sinensis</i> L.	Gurhal	Malvaceae	NA

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S. No	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
17	<i>Hygrophila auriculata</i> (Schumach.) Heine	Talmakhana	Acanthaceae	NA
18	<i>Indigofera cassioides</i> DC.	Girelphool	Leguminosae	NA
19	<i>Jatropha gossypifolia</i> L.	Lal Bherenda	Euphorbiaceae	NA
20	<i>Kingiodendron pinnatum</i> (DC.) Harms	Anajvan	Leguminosae	NA
21	<i>Lantana camara</i> L.	Raimuniya	Verbenaceae	NA
22	<i>Mimosa pudica</i> L.	Mimosa	Fabaceae	NA
23	<i>Murraya koenigii</i> (L.) Spreng.	Gandhela	Rutaceae	NA
24	<i>Ricinus communis</i> (Linn.)	Arandi	Euphorbiaceae	NA
25	<i>Rumex hastatus</i> D. Don	Khatti Buti	Polygonaceae	NA
26	<i>Solanum glaucophyllum</i> Desf.	Bhatkateri	Solanaceae	NA
27	<i>Tephrosia purpurea</i> (Linn.) pers.	Sarfaunk	Papilionaceae	NA
28	<i>Thevetia peruviana</i> (Pers.) K.Schum.	Kokilphul	Apocynaceae	NA
29	<i>Urena lobata</i> L.	Lapta	Malvaceae	NA
30	<i>Xanthium strumarium</i> L.	Bada Gokru	Asteraceae	NA
31	<i>Ziziphus jujuba</i> Mill.	Jharberi	Rhamnaceae	NA
32	<i>Ziziphus oenoplia</i> , Mill	Makor	Rhamnaceae	NA

## (C) Herb:

S. No	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
1	<i>Abutilon hirtum</i> (Lam.) Sweet.	Kanghi	Malvaceae	NA
2	<i>Acalypha indica</i> L.	Kuppikhokhali	Euphorbiaceae	NA
3	<i>Aeschynomene indica</i> L.	Laugauni	Fabaceae	NA
4	<i>Ageratum conyzoides</i> (L.) L.	Sahdevi	Asteraceae	NA
5	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	Garundi	Amaranthaceae	NA
6	<i>Alysicarpus bupleurifolius</i> (Linn.) DC.	Chauli	Fabaceae	NA
7	<i>Amaranthus viridis</i> L.	Jangli Choulai	Amaranthaceae	NA
8	<i>Anagallis arvensis</i> L.	Jonkmaari	Primulaceae	NA

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S No	SCIENTIFIC NAME	LOCAL NAME	FAMILY	UICN STATUS
9	<i>Anisomeles indica (L.) O. Kuntze</i>	Kaalachitta	Lamiaceae	NA
10	<i>Asparagus racemosus Willd.</i>	Shatmul	Liliaceae	NA
11	<i>Basella rubra L.</i>	Bathua	Basellaceae	NA
12	<i>Biophytum sensitivum (L.) Don.</i>	Lajalu	Oxalidaceae	NA
13	<i>Blumea lacera (Burm.f) DC.</i>	Kukrondha	Asteraceae	NA
14	<i>Boerhavia diffusa L.</i>	Punaruara	Nyctaginaceae	NA
15	<i>Bryophyllum pinnatum (Linn.)</i>	Pattharchata	Crassulaceae	NA
16	<i>Cardamine hirsuta L.</i>	Bittercross	Brassicaceae	NA
17	<i>Celosia argentea L.</i>	Murga	Amaranthaceae	NA
18	<i>Cleome viscosa L.</i>	Hurhur	Cleomaceae	NA
19	<i>Colebrookia bulbifera Donn</i>	Kala Bans	Zingiberaceae	NA
20	<i>Colocasia esculenta (L.) Schott</i>	Arbi	Araceae	NA
21	<i>Commelina benghalensis L.</i>	Kanchara, Kaua-Kaini,	Commelinaceae	NA
22	<i>Convolvulus arvensis L.</i>	Hiranpag	Convolvulaceae	NA
23	<i>Corchorus tridens L.</i>	Wild Jute	Malvaceae	NA
24	<i>Crotalaria juncea L.</i>	Indian Hemp	Fabaceae	NA
25	<i>Cullen corylifolium (L.) Medik.</i>	Babchi	Fabaceae	NA
26	<i>Cyanotis axillaris Roem. &amp; Schult. F.</i>	Baghanulla	Commelinaceae	NA
27	<i>Cyanthillium cinereum (L.) H. Rob.</i>	Sahadevi	Asteraceae	NA
28	<i>Desmodium triflorum (L.) DC.</i>	Desmodium	Leguminosae	NA
29	<i>Elephantopus scaber L.</i>	Mayurchulla	Asteraceae	NA
30	<i>Emilia sonchifolia (L.) DC. Ex Wight.</i>	Hirankuri	Asteraceae	NA
31	<i>Euphorbia hirta L.</i>	Dudhi	Euphorbiaceae	NA
32	<i>Euphorbia thymifolia L.</i>	Chhotidudhi	Euphorbiaceae	NA
33	<i>Evolvulus nummularius (L.) L.</i>	Onkranta	Convolvulaceae	NA
34	<i>Hyptis suaveolens (L.) Poit.</i>	Ban Tulsi	Lamiaceae	NA
35	<i>Launaea nudicaulis (Linn.) Hook. f.</i>	Ban Gobhi	Asteraceae	NA
36	<i>Launaea procumbens (Roxb.) Ramayya &amp; Rajagopal</i>	Van Gobhi	Asteraceae	NA
37	<i>Leucas aspera (Willd.) Link</i>	Gumma Buti	Lamiaceae	NA
38	<i>Ludwigia adscendens (L.) H. Hara</i>	Water Primrose	Onagraceae	NA

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S. No	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
39	<i>Merremia emarginata (Burm. f.) Hallier f.</i>	Muskani	Convolvulaceae	NA
40	<i>Mollugo cerviana (L.) Ser.</i>	Carpetweed	Molluginaceae	NA
41	<i>Ocimum sanctum L.</i>	Tulsi	Lamiaceae	NA
42	<i>Oxalis corniculata L.</i>	Amrul Sak	Oxalidaceae	NA
43	<i>Parthenium hysterophorus L.</i>	Gajar Ghass	Asteraceae	NA
44	<i>Pedaliium murex Linn.</i>	Kadva Gokkru	Pedaliaceae	NA
45	<i>Persicaria orientalis (L.) Spach</i>	Knot Plant	Polygonaceae	NA
46	<i>Phyllanthus amarus Schumach. &amp; Thonn.</i>	Bhui Aonla	Phyllanthaceae	NA
47	<i>Physalis minima L.</i>	Bandhapariya	Solanaceae	NA
48	<i>Portulaca oleracea L.</i>	Khulpha	Portulacaceae	NA
49	<i>Scoparia dulcis L.</i>	Meethibuti	Plantaginaceae	NA
50	<i>Senna tora (L.) Roxb.</i>	Parwar	Caesalpiniaceae	NA
51	<i>Sida acuta Burm.f.</i>	Bala	Malvaceae	NA
52	<i>Sida rhombifolia L.</i>	Atibala	Malvaceae	NA
53	<i>Solanum americanum Mill.</i>	Makoi	Solanaceae	NA
54	<i>Solanum xanthocarpum Schrad. &amp; Wendl</i>	Bhat Kaliya	Solanaceae	NA
55	<i>Sonchus asper (L.) Hill.</i>	Tillia	Asteraceae	NA
56	<i>Spermacoce pumila (Span.) Boerl.</i>	Chara Mama	Rubiaceae	NA
57	<i>Spilanthes calva DC.</i>	Jangli Akarkara	Asteraceae	NA
58	<i>Trianthema portulacastrum L.</i>	Horse Purslane	Alzoaceae	NA
59	<i>Tribulus terrestris L.</i>	Gokhru	Zygophyceae	NA
60	<i>Trichodesma indicum (L.) R. Br.</i>	Chhota Kulpha	Boraginaceae	NA
61	<i>Tridax procumbens (L.) L.</i>	Mexican Daisy	Asteraceae	NA
62	<i>Triumfetta rhomboidea Jacq.</i>	Chikti	Malvaceae	NA
63	<i>Wedelia chinensis (Osbeck) Merr.</i>	Pila Bhangra	Asteraceae	NA



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**(D) Climbers:**

Sr No	Botanical Name	Common Name	Family	IUCN Status
1	<i>Ampelocissus latifolia (Roxb.) Planch.</i>	Jangli Angur	Vitaceae	NA
2	<i>Antigonon leptopus Hook. &amp; Arn</i>	Coral Vine	Polygonaceae	NA
3	<i>Cissampelos pareira L.</i>	Padh	Menispermaceae	NA
4	<i>Coccinia grandis (L.) Voigt</i>	Jangli Kundru	Cucurbitaceae	NA
5	<i>Cocculus hirsutus (L.) Diels.</i>	Jaljamani	Menispermaceae	NA
6	<i>Combretum indicum (L.) DeFilipps</i>	Guruvela	Combretaceae	NA
7	<i>Hemidesmus indicus (L.) R. Br.</i>	Anantmool	Asclepiadaceae	NA
8	<i>Ichnocarpus frutescens (L.) W.T.Aiton</i>	Kaali Dudhdhi	Apocynaceae	NA
9	<i>Ipomoea cairica (L.) Sweet.</i>	Railway Creeper	Convolvulaceae	NA
10	<i>Ipomoea coccinea L.</i>	Gowri Beeja	Convolvulaceae	NA
11	<i>Momordica charantia L.</i>	Kerala	Cucurbitaceae	NA
12	<i>Pergularia daemia (Forssk.) Choiv.</i>	Utarani	Asclepiadaceae	NA
13	<i>Combretum indicum (L.) DeFilipps</i>	Rangoon Creeper	Combretaceae	NA
14	<i>Rhynchosia baukea Du Puy &amp; Labat</i>	Van Urd	Leguminosae	NA
15	<i>Tinospora cordifolia L.</i>	Giloy	Menispermaceae	NA
16	<i>Vallis solanacea (Roth) Kuntze</i>	Sariva	Apocynaceae	NA
17	<i>Vitis flexuosa Thunb.</i>	Van Angur	Vitaceae	NA

**(E) Grasses:**

S. No	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
1	<i>Apluda mutica L.</i>	Mauritian Grass	Poaceae	NA
2	<i>Aristida depressa Retz.</i>	Safed Lappa	Poaceae	NA
3	<i>Bothriochloa pertusa (L.) A. Camus</i>	Choti Jurgi	Poaceae	NA
4	<i>Bulbostylis barbata (Rottb.) C.B. Clarke</i>	Bearded Watergrass	Poaceae	NA
5	<i>Cenchrus ciliaris L.</i>	Anjan Chara	Poaceae	NA
6	<i>Chloris barbata Sw.</i>	Grass	Poaceae	NA
7	<i>Cynodon dactylon (Linn.) Pers.</i>	Doob	Poaceae	NA
8	<i>Dactyloctenium aegyptium (L.) Willd.</i>	Bhond Grass	Poaceae	NA

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S. No	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
9	<i>Dendrocalamus strictus (Roxb.) Nees</i>	Bans	Poaceae	NA
10	<i>Desmostachya bipinnata (L.) Stapf</i>	Daab	Poaceae	NA
11	<i>Dichanthium annulatum (Forsk) stapf</i>	Jurgi	Poaceae	NA
12	<i>Echinochloa colona (L.) Link</i>	Corn Panicgrass	Poaceae	NA
13	<i>Eleusine indica (L.) Gaertner.</i>	Malankuri	Poaceae	NA
14	<i>Saccharum munja Roxb.</i>	Munj	Poaceae	NA
15	<i>Saccharum spontaneum L.</i>	Kaans	Poaceae	NA

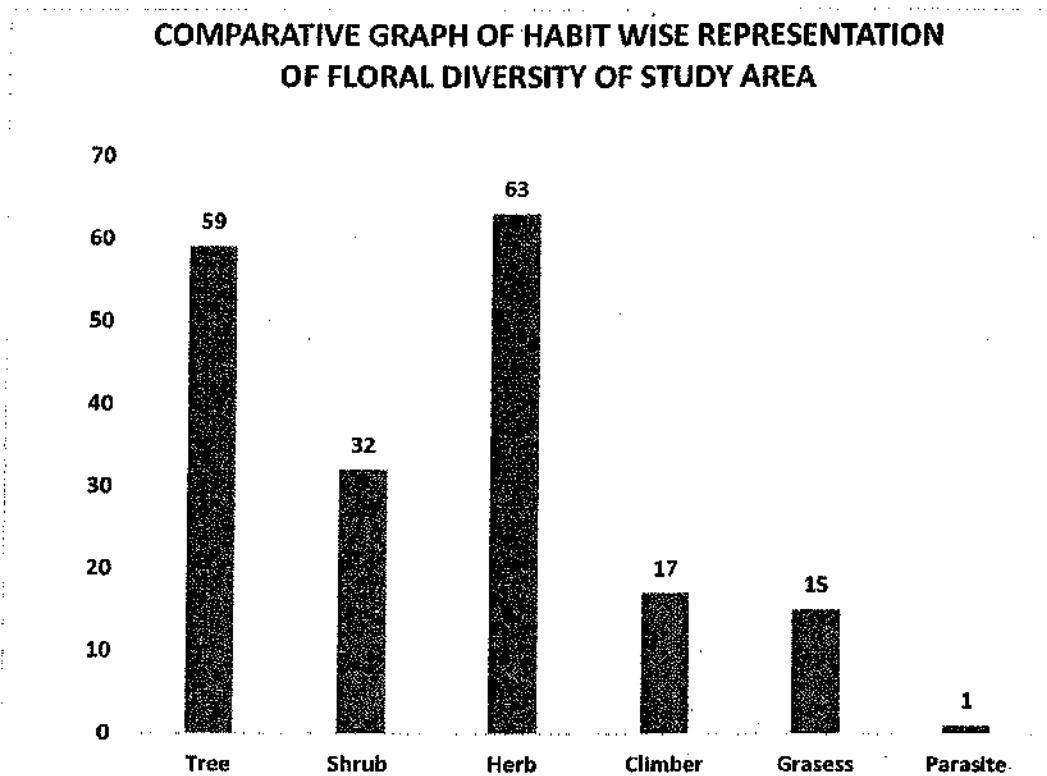
## (F) Parasite:

S. No	SCIENTIFIC NAME	LOCAL NAME	FAMILY	Habit
1	<i>Cuscuta reflexa Roxb.</i>	Amarbel	Cosnopolaceae	Parasite

TABLE-4.15: DIFFERENT HABITAT COMPOSITION OF FLORAL DIVERSITY OF BUFFER ZONE

Habit	No. of Sp
Tree	59
Shrub	32
Herb	63
Climber	17
Grasess	15
Parasite	1
<b>Total species</b>	<b>187</b>

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**FIGURE-4.15: COMPARATIVE GRAPH OF HABIT WISE REPRESENTATION OF FLORAL DIVERSITY OF STUDY AREA**

#### **Agriculture**

#### **Endemic/Endangered Flora**

No endangered and endemic flora was recorded from core and buffer zone of the project area.

#### **Location of National Park/Sanctuaries**

There is no Bio-sphere Reserve, National Parks, Wildlife Sanctuary, Tiger Reserve and Elephant Reserve within 10 km radius of the project site.

#### **Faunal Diversity**

The faunal composition generally with arboreal and semi arboreal based animals. The assessment of wild life fauna has been carried out on the basis of information collected from primary as well as secondary sources (Forest Officer, and local inhabitants). The study area has mammals like Neelgay Hanuman Monkey or Langur, Fruit Bat, etc.

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The assessment of fauna has been done by extensive field survey of the area. During survey, the primary as well as presence of wildlife was also inhabitants depending on animal sightings and the frequency of their visits in the project area which was later confirmed from forest department, Wildlife Department etc. Total 68 faunal species have been encountered in the study area out of which 15 Mammals, 11 Herpatofauna, 9 Butterfly and 33 aves species were recorded from the 10 km study area which are given in below **Table-4.16**.

**TABLE-4.16: FAUNAL SPECIES DIVERSITY IN THE CORE AND BUFFER ZONE (10 KM STUDY AREA)**

**(A) Mammals:**

S. No.	Scientific Name	English Name	Status/ Schedule
1	<i>Bandicota indica</i>	Greater bandicota rat	IV
2	<i>Bosephalus tragocamelus</i>	Blue bull	III
3	<i>Canis aureus</i>	Jackal	II
4	<i>Cynopterus sphinx</i>	Short nosed fruit bat	III
5	<i>Funambulus pennanti</i>	Five striped palm squirrel	IV
6	<i>Lepus nigricollis</i>	Indian Hare	IV
7	<i>Macaca mulata</i>	Rhesus macaque	II
8	<i>Mus booduga</i>	Indian field rat	IV
9	<i>Mus musculus</i>	House mouse	IV
10	<i>Nesokia indica</i>	Short tailed bandicota rat	IV
11	<i>Presbytis entellus</i>	Common langur	II
12	<i>Rousettus leschenaultia</i>	Bat	V
13	<i>Semnopithecus entellus</i>	Hanuman langur	IV
14	<i>Suncus murinus</i>	House shrew	IV
15	<i>Sus scrofa</i>	Indian wildboar	III

**(B) Herpatofauna:**

S. No.	Scientific Name	English Name	Status/Schedule
1	<i>Bungarus caeruleus</i>	Common Indian Krait	IV
2	<i>Calotes versicolor</i>	Common garden lizard	--
3	<i>Daboia russelli</i>	Russell's viper	II
4	<i>Hemidactylus flaviviridis</i>	Indian House Gecko	IV
5	<i>Hoplobatrachus tigerinus</i>	Indian Bull Frog	IV

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S. No.	Scientific Name	English Name	Status/Schedule
6	<i>Mabuya carinata</i>	Brahminy skink	IV
7	<i>Naja naja</i>	Indian Cobra	II
8	<i>Ptyas mucosa</i>	Rat Snake	IV
9	<i>Ramphotyphlops braminus</i>	Common work snake	II
10	<i>Rana tigrina</i>	Common Frog	IV
11	<i>Varanus sp.</i>	Monitor Lizard	IV

**(C) Butterflies:**

S. No.	Scientific Name	English Name	Status/Schedule
1	<i>Acraea issoria</i>	The yellow caster	NA
2	<i>Aglais cashmirensis</i>	The Indian tortoiseshell,	NA
3	<i>Cynthia cardui</i>	The Painted lady	NA
4	<i>Cyrestis thyodamas</i>	Common map	NA
5	<i>Danaus genutia</i>	Stripped Tiger	NA
6	<i>Eurema laeta</i>	Spotted grass yellow	NA
7	<i>Ixias marianne</i>	White orange tip	NA
8	<i>Papilio polytes</i>	Common mormon	NA
9	<i>Sephisia dichroa</i>	The western courtier	LC

**(D) Aves:**

S. No.	Scientific Name	English Name	Status/Schedule
1	<i>Acridotheres ginginianus</i>	Bank Myna	Schedule-IV
2	<i>Acridotheres tristis</i>	Common Myna	Schedule-IV
3	<i>Aethopyga siparaja</i>	Sungbird	Schedule-IV
4	<i>Anthus rufulus</i>	Pipet	Schedule-IV
5	<i>Apus affinis</i>	House swift	Schedule-IV
6	<i>Apus apus</i>	Common swift	Schedule-IV
7	<i>Ardeola grayii</i>	Pond heron	Schedule-IV
8	<i>Bubo bubo</i>	Owl	Schedule-IV
9	<i>Bubulcus ibis</i>	Cattle Egret	Schedule-IV
10	<i>Centropus sinensis</i>	Mahokha	Schedule-IV

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S.No.	Scientific Name	English Name	Status/Schedule
11	<i>Chrysocolaptes lucidus</i>	Greater flameback	Schedule-IV
12	<i>Columba livia</i>	Rock Pigeon	Common
13	<i>Coracias benshalensis</i>	Indian roller	Schedule-IV
14	<i>Corvus splendens</i>	House Crow	Schedule-V
15	<i>Dicrurus macrocercus</i>	Black Drongo	Schedule-IV
16	<i>Egretta garzetta</i>	Little Egret	Schedule-IV
17	<i>Eudynamys scolopacea</i>	Asian Koel	Schedule-IV
18	<i>Garrulus lanceolatus</i>	Ban kaag	Schedule-IV
19	<i>Halcyon smymensis</i>	White Breasted Kingfisher	Schedule-IV
20	<i>Mesophoyx intermedia</i>	Intermediate egret	Schedule-IV
21	<i>Microcarbo niger</i>	Little cormorant	Schedule-IV
22	<i>Passer domesticus</i>	House Sparrow	Schedule-IV
23	<i>Pavo cristatus</i>	Indian peafowl	Schedule-I
24	<i>Ploceus philippinus</i>	Baya	Schedule-IV
25	<i>Pseudibis papillosa</i>	Black Ibis	Schedule-IV
26	<i>Psittacula krameri</i>	Rose Ringed Parakeet	Schedule-IV
27	<i>Pycnonotus cafer</i>	Red Vented Bulbul	Schedule-IV
29	<i>Saxicoloides fulicata</i>	Indian Robin	Schedule-IV
30	<i>Streptopelia decaocto</i>	Ring dove	Schedule-IV
31	<i>Turdoides caudatus</i>	Common Babbler	Schedule-IV
32	<i>Turdoides striatus</i>	Jungle babbler	Schedule-IV
33	<i>Vanellus indicus</i>	Red wattled lapwing	Schedule-IV

#### Endangered Species:

68 species of vertebrates could be seen in the vicinity of the proposed project. It was observed that out of 68 only one Schedule I under Wildlife Protection Act, 1972 has been recorded.

#### Agricultural Crops

The comparative of land use area between 10 km study area Vegetables, Cereals, Pulse, Fruit, spice, oilseed, are common in agricultural practices at Palwal district. In Palwal taluka major crops grown are given below in **Table-4.17**.

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**TABLE-4.17: CROPPING PATTERN OF STUDY AREA**

Group	Local Name	Botanical Name	Family
Cereals	Wheat	<i>Triticum aestivum</i> L.	Poaceae
	Rice	<i>Oryza sativa</i> L.	Poaceae
Minor Millets	Bajra	<i>Pennisetum glaucum</i> (L.) R.Br.	Poaceae
	Maize	<i>Zea mays</i> L.	Poaceae
	Jowar	<i>Sorghum bicolor</i> (L.) Moench	Poaceae
Pulse	Tur	<i>Cajanus cajan</i> (L.) Millsp.	Fabaceae
	Mash	<i>Vigna mungo</i> (L.) Hepper	Fabaceae
	Massar	<i>Lens culinaris</i> Medik.	Fabaceae
	Gram	<i>Cicer arietinum</i> L.	Fabaceae
Oilseed	Groundnut	<i>Arachis hypogaea</i> L.	Fabaceae
	Sarson	<i>Brassica oleracea</i> L.	Brassicaceae
Cashcrop	Sugarcane	<i>Saccharum spontaneum</i> L.	Poaceae
	Cotton	<i>Gossypium herbaceum</i> L.	Malvaceae
Vegetables	Tad Kakri	<i>Cucumis melo</i> L.	Cucurbitaceae
	Kheera	<i>Cucumis sativus</i> L.	Cucurbitaceae
	Loki	<i>Lagenaria siceraria</i> (Molina) Standl	Cucurbitaceae
	Ghiya	<i>Luffa acutangula</i> (L.) Roxb.	Cucurbitaceae
	Kaddu	<i>Cucurbita pepo</i> L.	Cucurbitaceae
	Sponge Gourd	<i>Luffa aegyptiaca</i> Mill.	Cucurbitaceae
	Ridge Gourd	<i>Luffa acutangula</i> (L.) Roxb.	Cucurbitaceae
	Tinda	<i>Praecitrullus fistulosus</i> (Stocks) Pangalo	Cucurbitaceae
	Brinjal	<i>Solanum melongena</i> L.	Solanaceae
	Tomato	<i>Solanum melongena</i> L.	Solanaceae
	Lady Finger	<i>Abelmoschus esculentus</i> (L.) Moench	Malvaceae
	Chilli	<i>Capsicum annum</i> L.	Solanaceae
	Sweet Potato	<i>Ipomoea batatas</i> (L.) Lam.	Convolvulaceae
	Muli	<i>Raphanus raphanistrum</i> subsp.	Convolvulaceae

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Group	Local Name	Botanical Name	Family
		<i>sativus (L.) Domin</i>	
	Gajar	<i>Daucus carota L.</i>	Brassicaceae
	Palak	<i>Spinacia oleracea L.</i>	Amaranthaceae
	Methi	<i>Trigonella foenum-graecum L.</i>	Fabaceae
	Laibhazi	<i>Amaranthus dubius Mart. ex Thell.</i>	Amaranthaceae
	Potato	<i>Solanum tuberosum L.</i>	Solanaceae
	Cauliflower	<i>Brassica oleracea L.</i>	Brassicaceae
	Cabbage	<i>Brassica oleracea var. capitata</i>	Brassicaceae
	Peas	<i>Pisum sativum L.</i>	Fabaceae
	Onion	<i>Allium cepa L.</i>	Liliaceae
	Ginger	<i>Zingiber officinale Roscoe</i>	Zingiberaceae
	Corriender	<i>Coriandrum sativum L.</i>	Apiaceae
Horti-fruits	Mango	<i>Mangifera indica L.</i>	Anacardiaceae
	Guava	<i>Psidium guajava L.</i>	Myrtaceae
	Ber	<i>Ziziphus jujuba Mill.</i>	Rhamnaceae
	Lemon	<i>Citrus limon (L.) Osbeck</i>	Rutaceae
	Chiku	<i>Manilkara zapota (L.) P.Royen</i>	Sapotaceae
	Litchi	<i>Litchi chinensis Sonn.</i>	Sapindaceae

#### Location of National Park and Wildlife Sanctuary:

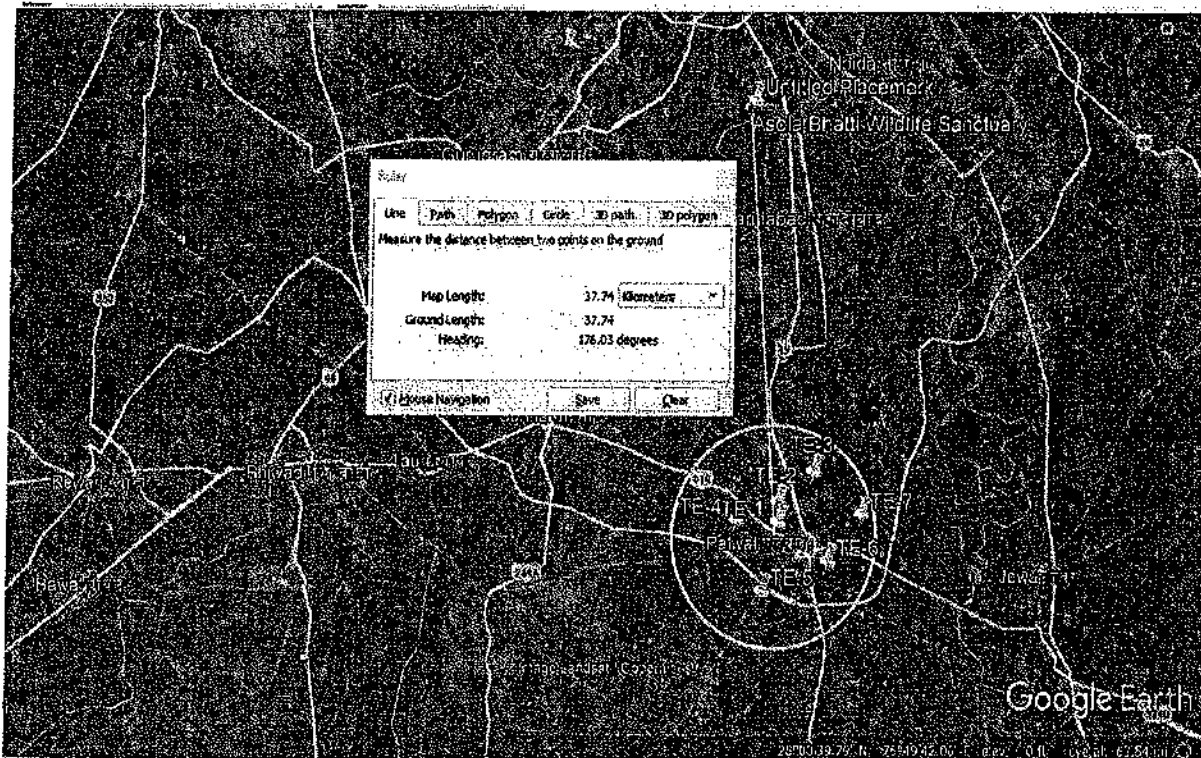
There is no Biosphere Reserve, National Parks, Wildlife Sanctuary, Tiger Reserve and Elephant -Reserve within 10 km radius of the project site. The nearest protected areas Asola Bhatti Wildlife sanctuary which is ~37.74 km away from project site.

#### Conclusion

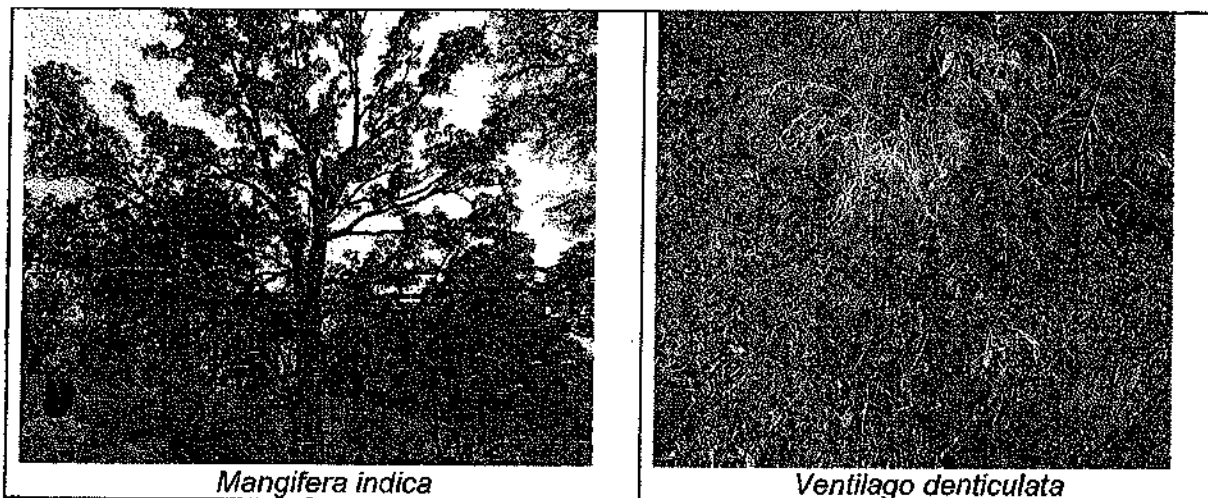
Baseline study for the biological environment was conducted to assess the existing condition of the 10 km study area of the proposed Sanitary landfill facility at Meghpur village, of Palwal district of Haryana state. There are 187 plant species and 68 species of fauna has been recorded. There is one scheduled I species *i.e. Pavo cristatus* was assessed in the 10 km radial of study area. Proposed project is only within the existing premises which will not be disturbing the pristine area.



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**FIGURE- 4.16: LOCATION MAP SHOWING NEAREST WILDLIFE SANCTUARY FROM PROJECT SITE**



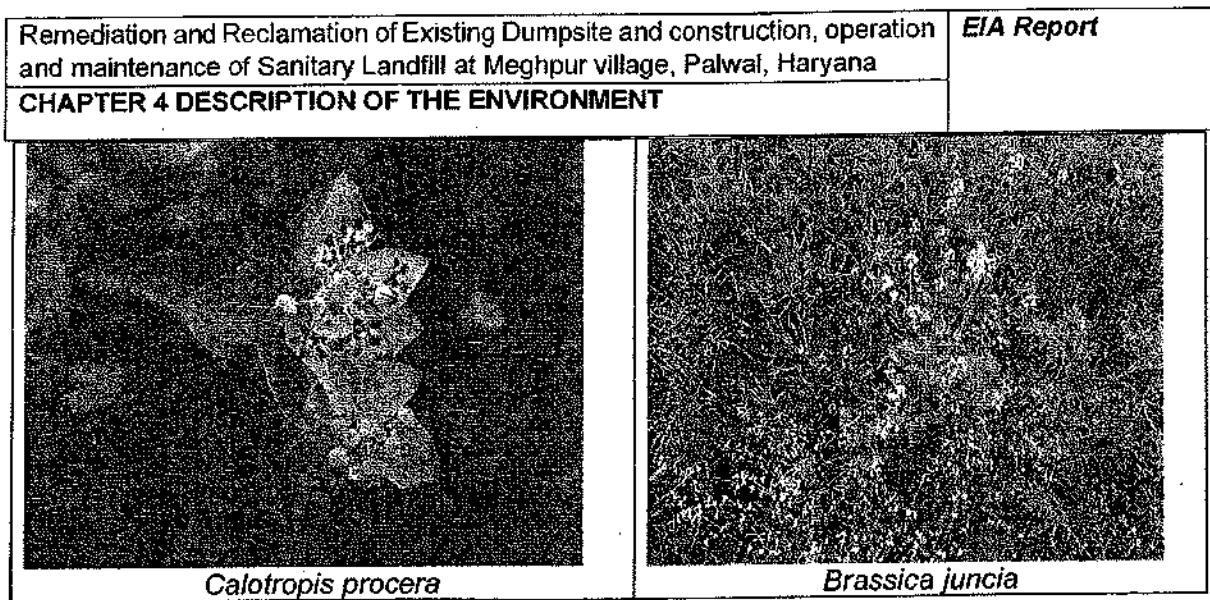


FIGURE -4.17 PHOTO PLATES

## 4.6 SOCIO ECONOMIC ENVIRONMENT OF THE STUDY AREA

### 4.6.1 Introduction

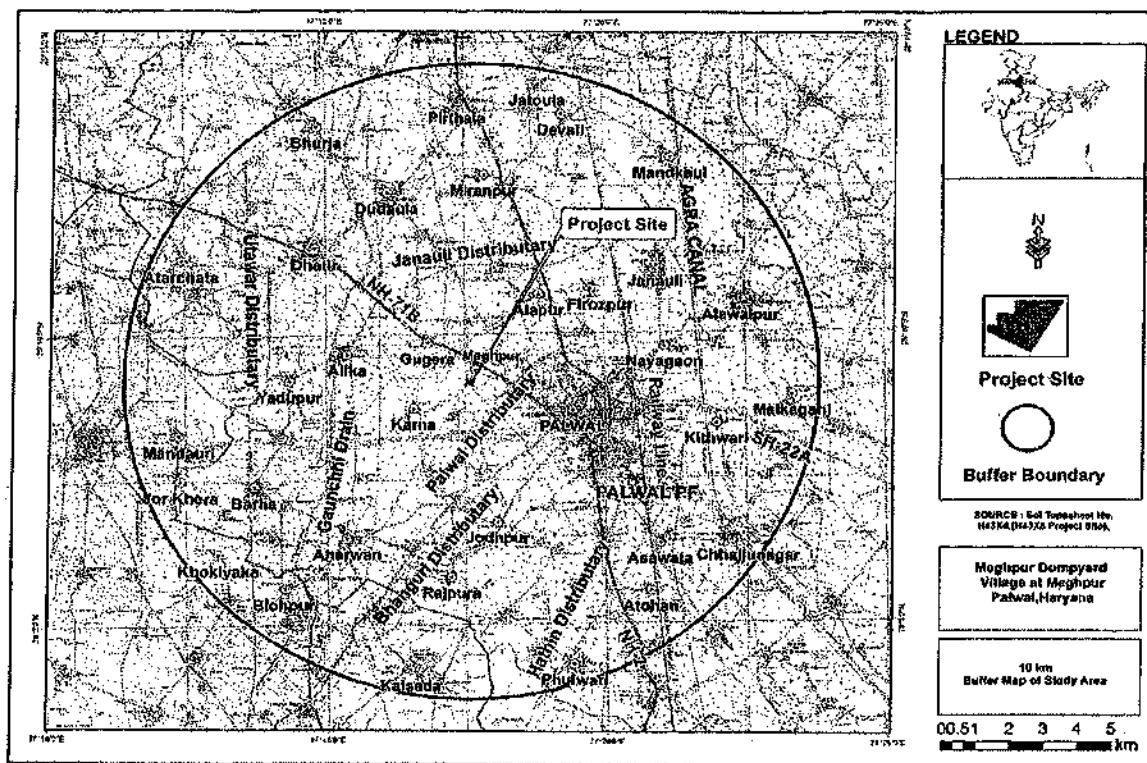
A prosperous nation needs well-developed industries to provide the amenities of life to its citizens. Industrial development has had an important role in the socio-economic growth of countries. Rapid economic growth is often essential for achieving a reduction in absolute poverty. Industrialization is often essential for economic and social growth.

Poverty reduction the pattern of industrialization, however, impacts remarkably on how the poor benefit from growth. Pro-poor economic and industrial policies focus on increasing the economic returns to the productive factors that the poor possess, e.g. raising returns to unskilled labour, whereas policies promoting higher returns to capital and land tend to increase inequality, unless they also include changes in existing patterns of concentration of physical and human capital and of land ownership. Use of capital-intensive methods instead of labor-intensive ones tends to increase employment, labour regulation, social protection, health, education, etc.

Where the level of education is low and human capital concentrated. Income disparities, as does the employment of skill-based technologies, especially Also, the location of industrial facilities has an impact on overall poverty reduction and inequality. As enterprises are often concentrated in urban areas. The industrial revolutions led to the development of factories for large-scale production, with consequent changes in society like Growth and structure of employment, impact of Socio-economic reforms and globalization trade and employment, labour regulation, social protection, health, education, etc. In this manner all developmental

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projects have direct as well as indirect relationship with socio-economic aspect, which also include public acceptability for new developmental projects. Thus the study of socio-economic component incorporating various facets related to prevailing social & cultural conditions and economic status of the project region is an important part of EIA study. The Village Map of the Study Area is as provided in **Figure 4.18**.



**FIGURE 4.18: VILLAGE MAP OF THE STUDY AREA**

**4.6.2 Reconnaissance**

EIA study for Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana.

The details of information on demographic structure of the villages in the study area are presented in in **Table 4.18**.

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**TABLE 4.18: LIST OF VILLAGES IN THE STUDY AREA**

SN	District	Tehsil	Villages
1.	Palwal	Palwal	Devli
2.			Tatarpur
3.			Jataula
4.			Medapur
5.			Chhaprola
6.			Dehlaka
7.			Teharki
8.			Saidpur
9.			Bhurja
10.			Sikandarpur
11.			Nangla Bhiku
12.			Pirthla
13.			Dudola
14.			Miranpur
15.			Janaul
16.			Alawalpur
17.			Malikgani
18.			Lalpur Qadim
19.			Khajurka
20.			Fazalpur
21.			Ferozepur
22.			Aghwanpur
23.			Alapur
24.			Patli Kalan
25.			Patli Khurd
26.			Gugera
27.			Amru
28.			Dhatir
29.			Attar Chata

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SN	District	Tehsil	Villages
30.			Kishorpur
31.			Rajupur Bangar
32.			Papri
33.			Adupur
34.			Alika
35.			Kakrali
36.			Meghpur
37.			Gailpur
38.			Karna
39.			Bamnika
40.			Rajolaka
41.			Kairaka
42.			Maheshpur
43.			Badha
44.			Jor Khera
45.			Rakhota
46.			Dhamaka
47.			Nangli Pachanki
48.			Aharwan
49.			Jalalpur Khalsa
50.			Durgapur
51.			Rajpura
52.			Ratipur
53.			Jodhpur
54.			Tikri Brahman
55.			Rehrana
56.			Chirawta
57.			Dholagarh
58.			Khusropur
59.			Asawta
60.			Lohagarh

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SN	District	Tehsil	Villages
61.			Kithwari
62.			Ronija
63.			Hosangabad
64.			Chhaju Nagar
65.			Taraka
66.			Atohan
67.			Bahrola
68.			Phulwari
69.			Baghola
70.			Palwal
71.		Hathin	Kalsara
72.			Bhanguri Palwal
73.			Sanpal
74.			Bichpuri
75.			Khokiaka

Source: Primary Census Abstract 2011, Palwal District, State Haryana

#### 4.6.3 Objectives of Socio-Economic Assessment

- ❖ To examine, current status of developmental parameter in identified study area.
- ❖ To identify the direct and indirect impact on the social environment as a result of development project.
- ❖ To evaluate the nature and magnitude of these impacts.
- ❖ To provide probable mitigating measures on identified negative impacts due to proposed development activity on socio economic environment.

#### 4.6.4 Baseline Status

Baseline information is collected after delineation of the baseline study area in order to study the socio-economic profile of the project affected area. The process related to baseline database analysis includes:

- ❖ Demographic Structure
- ❖ Infrastructure Base
- ❖ Economic Structure
- ❖ Health Status

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- ❖ Cultural Attributes
- ❖ Salient Observations
- ❖ Socio-economic status in relation with 'Quality of Life'

#### **4.6.5 Demographic Structure**

The demographic structure of the study area was derived primarily from data of Census record of Palwal district covering two tehsil and 75 villages. The demographic structures of each village in the study area as per Census 2011 are presented in **Table 4.19**. Summary of demographic structure is presented in **Table 4.20**.

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**TABLE 4.19: DEMOGRAPHIC STRUCTURE OF VILLAGE IN THE STUDY AREA**

S.No	Village	Area (Hrs)	No. of Households	Total Population			Un-Scheduled Caste			Scheduled Caste			Sub-Castes		
				Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
1.	Devli	375	448	2958	1575	1383	438	222	216	609	346	263	0	0	0
2.	Tatapur	136	185	1018	575	443	183	109	74	252	142	110	0	0	0
3.	Jataula	126	243	1423	753	670	258	150	108	297	158	139	0	0	0
4.	Medapur	126	167	707	424	283	103	58	45	10	7	3	0	0	0
5.	Chhaprola	640	407	2411	1285	1146	386	210	176	739	388	361	0	0	0
6.	Dehlaika	214	101	650	362	288	92	54	38	28	15	13	0	0	0
7.	Teharki	466	399	2268	1224	1044	345	195	149	548	292	256	0	0	0
8.	Sardpur	115	9	45	25	20	7	2	5	0	0	0	0	0	0
9.	Bhunja	294	225	1244	659	585	196	109	87	164	85	79	0	0	0
10.	Sikandarpur	212	273	1767	929	838	298	153	145	548	290	258	0	0	0
11.	Nangla Bhiku	272	187	1126	599	527	176	91	85	448	236	212	0	0	0
12.	Piritha	1228	1227	7009	3795	3214	1049	574	475	1028	559	489	0	0	0
13.	Dudola	646	773	4643	2493	2155	726	384	342	1646	907	738	0	0	0
14.	Miranpur	130	165	959	509	450	139	88	51	401	217	184	0	0	0
15.	Janauli	998	1200	6752	3718	3034	990	552	438	1394	762	632	0	0	0
16.	Alawalpur	1278	1726	10093	5385	4708	1453	754	699	1830	1001	829	0	0	0
17.	Mailkani	49	121	653	372	281	90	47	43	114	71	43	0	0	0
18.	Lalpur Qadim	171	156	948	515	433	138	82	56	75	38	37	0	0	0
19.	Khejurka	592	301	1922	1044	878	312	162	150	1240	669	571	0	0	0
20.	Fazalpur	185	422	2385	1253	1112	334	177	157	602	310	292	0	0	0
21.	Ferozepur	630	710	4122	2241	1881	666	355	311	365	204	161	0	0	0
22.	Aghwanpur	343	351	1864	1039	925	287	144	143	741	382	359	0	0	0

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S.No.	Villages	Area (Ha)	No. of Households	Total Population		Total		Scheduled Caste		Scheduled Tribes						
				Male	Female	Male	Female	Male	Female	Male	Female					
23.	Alapur	283	374	2206	1170	1036	342	180	162	1404	732	672	0	0	0	0
24.	Patli Kalan	129	40	252	144	108	37	25	12	2	2	1	1	0	0	0
25.	Patli Khurd	533	318	1982	1054	928	370	184	176	105	61	44	0	0	0	0
26.	Gugera	288	297	1653	877	776	219	111	108	488	262	236	0	0	0	0
27.	Amnu	276	289	1711	906	805	231	133	98	388	207	181	0	0	0	0
28.	Dhalir	1787	1388	8447	4513	3934	1771	654	517	1313	708	605	0	0	0	0
29.	Alter Chata	370	294	1711	884	817	284	164	120	537	269	268	0	0	0	0
30.	Kishorpur	363	418	2413	1294	1119	322	175	147	576	307	269	0	0	0	0
31.	Rajapur Bangar	79	21	82	41	41	9	2	7	0	0	0	0	0	0	0
32.	Papri	58	15	89	45	44	10	6	4	0	0	0	0	0	0	0
33.	Adupur	282	263	1622	810	712	187	114	73	255	143	112	0	0	0	0
34.	Alilka	203	689	4106	2205	1901	655	294	261	905	466	439	0	0	0	0
35.	Kakrail	234	156	948	522	426	130	69	61	141	77	64	0	0	0	0
36.	Meghpur	987	128	824	445	379	129	77	52	701	381	320	0	0	0	0
37.	Gallpur	136	286	1783	973	810	279	153	126	665	364	301	0	0	0	0
38.	Karna	119	391	2441	1284	1157	343	174	169	674	356	318	0	0	0	0
39.	Bamnika	280	24	145	73	72	23	16	7	0	0	0	0	0	0	0
40.	Rajolaka	407	162	879	485	384	136	82	53	73	42	31	0	0	0	0
41.	Kairaka	138	95	547	293	254	66	39	27	55	24	31	0	0	0	0
42.	Mahestipur	134	349	1975	1052	923	287	154	133	569	301	268	0	0	0	0
43.	Badha	121	482	2924	1586	1338	439	243	196	689	408	281	0	0	0	0
44.	Jor Khera	258	105	631	342	289	92	53	39	90	55	35	0	0	0	0
45.	Rakhota	416	175	1142	610	532	193	103	90	379	196	183	0	0	0	0

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S.No	Village	Area (Hr)	No. of Households		Total Population			0-5 Child Population			Scheduled Tribes				
			Male	Female	Male	Female	Total	Male	Female	Total	Male	Female	Total		
46.	Dhamaka	159	198	1155	634	521	182	95	67	346	193	153	0	0	0
47.	Nangli Pachanki	143	58	424	226	198	51	28	23	0	0	0	0	0	0
48.	Ahanwan	244	607	3253	1712	1541	436	239	197	1011	522	489	0	0	0
49.	Jalalpur Khalsa	93	205	1580	847	733	332	177	155	15	9	6	0	0	0
50.	Durgapur	720	425	2378	1253	1125	334	183	151	815	434	381	0	0	0
51.	Rajpura	189	517	3213	1723	1490	677	365	312	895	483	412	0	0	0
52.	Ralipur	336	336	1828	975	853	275	154	121	212	115	97	0	0	0
53.	Jodhpur	276	252	1583	859	724	249	139	110	487	254	233	0	0	0
54.	Tikri Brahman	339	967	6063	3195	2868	1233	645	588	1578	832	746	0	0	0
55.	Rehrana	230	421	2701	1442	1259	424	238	186	607	319	288	0	0	0
56.	Chirawia	430	251	1578	834	745	270	149	121	363	190	173	0	0	0
57.	Dholagarh	283	404	2471	1289	1182	375	202	173	862	451	411	0	0	0
58.	Lohagarh	239	361	2245	1201	1044	398	210	188	1787	948	839	0	0	0
59.	Kilthwari	449	631	3589	1896	1693	571	308	263	1712	914	798	0	0	0
60.	Rorija	94	255	1439	789	670	178	93	85	198	109	89	0	0	0
61.	Hosangabad	644	68	433	229	204	96	56	40	191	103	88	0	0	0
62.	Chhaju Nagar	244	441	2478	1314	1164	338	181	157	739	390	349	0	0	0
63.	Taraka	182	218	1322	687	635	186	92	94	230	126	104	0	0	0
64.	Atohan	392	290	1744	945	799	247	135	112	431	229	202	0	0	0
65.	Bahrola	208	337	2234	1174	1060	354	188	166	614	327	287	0	0	0
66.	Asawla	449	629	3857	2027	1830	627	338	289	888	485	403	0	0	0
67.	Jor Khera	159	105	631	342	289	92	53	39	90	55	35	0	0	0

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**CHAPTER 4 DESCRIPTION OF THE ENVIRONMENT**

Sl. No.	Villages	Area (Hect.)		Total Population		Un-Schmd Population		Schmdied/Gast		Scheduled Tribes						
		Male	Female	Male	Female	Male	Female	Male	Female	Male	Female					
68.	Phulwari	653	906	5571	2985	2586	862	469	403	700	372	328	0	0	0	0
69.	Baghola	82	931	5413	2826	2587	786	445	341	1782	921	861	0	0	0	0
70.	Palwal	842	3982	23072	12335	10737	3911	2064	1847	9604	5083	4521	0	0	0	0
		24326	30344	179721	96101	83620	27983	15124	12959	49254	26303	22951	0	0	0	0
71.	Kalsara	615	427	2425	1322	1103	336	178	158	636	341	295	0	0	0	0
72.	Bhanguri Palwal	396	276	1599	850	749	244	125	119	530	289	241	0	0	0	0
73.	Sampal	148	288	1832	973	859	407	227	180	97	53	44	0	0	0	0
74.	Bichpuri	86	107	652	354	298	93	50	43	66	36	30	0	0	0	0
75.	Khokriaka	240	133	827	438	389	121	60	61	185	93	92	0	0	0	0
		1487	1231	7335	3937	3398	1201	640	561	1514	812	702	0	0	0	0
		25813	31575	187056	100038	87018	29184	15764	13420	50768	27115	23653	0	0	0	0

Source: Primary Census Abstract 2011, Palwal District, State Haryana

Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at EIA Report  
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TABLE 4.20: DEMOGRAPHIC STRUCTURE OF VILLAGE IN THE STUDY AREA

Sl. No.	Village	No. of Houses		Total Population		Scheduled Caste		Scheduled Tribes							
		Male	Female	Total	Male	Female	Total	Male	Female						
1.	Devli	375	448	2968	1575	1383	438	222	216	609	346	263	0	0	0
2.	Tatarpur	136	185	1018	575	443	183	109	74	252	142	110	0	0	0
3.	Jataula	126	243	1423	763	670	258	150	108	297	158	139	0	0	0
4.	Medapur	126	167	707	424	283	103	58	45	10	7	3	0	0	0
5.	Chhapola	640	407	2411	1265	1146	386	210	176	739	388	351	0	0	0
6.	Dehliaka	214	101	650	362	288	92	54	38	28	15	13	0	0	0
7.	Teharki	466	399	2268	1224	1044	345	196	149	548	292	256	0	0	0
8.	Saidpur	115	9	45	25	20	7	2	5	0	0	0	0	0	0
9.	Bhurja	294	226	1244	659	585	196	108	87	164	85	79	0	0	0
10.	Sikandarapur	212	273	1767	929	838	298	153	145	648	290	258	0	0	0
11.	Nangla Bhiku	272	187	1126	599	527	176	91	85	448	236	212	0	0	0
12.	Pritha	1228	1227	7009	3795	3214	1049	574	475	1028	559	469	0	0	0
13.	Dudola	646	773	4648	2493	2155	726	384	342	1645	907	738	0	0	0
14.	Miranpur	130	165	959	509	450	139	88	51	401	217	184	0	0	0
15.	Janauli	998	1200	6752	3718	3034	990	552	438	1394	762	632	0	0	0
16.	Alawalpur	1278	1726	10093	5385	4708	1453	764	699	1830	1001	829	0	0	0
17.	Mailigani	49	121	653	372	281	90	47	43	114	71	43	0	0	0
18.	Lalpur Qadim	171	156	948	615	433	138	82	56	75	38	37	0	0	0

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Villages No.	Area (Ha)	No. of Households	POPULATION		SCHEDULED CASTES		SCHEDULED TRIBES								
			Male	Female	Male	Female	Male	Female							
									Total	Total					
19. Khajurka	592	301	1922	1044	878	312	162	150	1240	669	571	0	0	0	0
20. Fazalpur	185	422	2365	1253	1112	334	177	157	602	310	282	0	0	0	0
21. Ferozepur	630	710	4122	2241	1881	666	355	311	365	204	161	0	0	0	0
22. Aghwanpur	343	351	1964	1039	925	287	144	143	741	382	359	0	0	0	0
23. Alapur	283	374	2206	1170	1036	342	180	162	1404	732	672	0	0	0	0
24. Patli Kalan	129	40	252	144	108	37	25	12	2	1	1	0	0	0	0
25. Patli Khurd	533	318	1882	1054	928	370	194	176	105	61	44	0	0	0	0
26. Gugera	288	287	1653	877	776	219	111	108	498	282	236	0	0	0	0
27. Annu	276	289	1711	906	805	231	133	98	388	207	181	0	0	0	0
28. Dhatir	1787	1388	8447	4513	3934	1171	654	517	1313	708	605	0	0	0	0
29. Atiar Chata	370	294	1711	894	817	284	164	120	537	269	268	0	0	0	0
30. Kishorpur	363	418	2413	1294	1119	322	175	147	576	307	269	0	0	0	0
31. Rajapur Bangar	79	21	82	41	41	9	2	7	0	0	0	0	0	0	0
32. Papri	58	15	89	45	44	10	6	4	0	0	0	0	0	0	0
33. Adupur	282	283	1522	810	712	187	114	73	255	143	112	0	0	0	0
34. Allika	203	699	4106	2205	1901	555	294	261	905	466	439	0	0	0	0
35. Kakrall	234	156	948	522	426	130	69	61	141	77	64	0	0	0	0
36. Meghpur	987	128	824	445	379	129	77	52	701	381	320	0	0	0	0
37. Gallpur	136	286	1783	973	810	279	153	126	665	364	301	0	0	0	0
38. Karna	119	381	2441	1284	1157	343	174	169	674	356	318	0	0	0	0
39. Barnika	280	24	145	73	72	23	16	7	0	0	0	0	0	0	0

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CHAPTER 4 DESCRIPTION OF THE ENVIRONMENT

Sl. No.	Village	NRIOT Sub-Group			Total Population			Scheduled Caste			Scheduled Tribes				
		Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female		
40.	Rajplaika	407	152	879	495	384	135	82	53	73	42	31	0	0	0
41.	Kaitaka	138	95	547	293	254	66	39	27	55	24	31	0	0	0
42.	Maheshpur	134	349	1975	1052	923	287	154	133	569	301	268	0	0	0
43.	Badha	121	482	2924	1586	1338	439	243	196	689	408	281	0	0	0
44.	Jor Kheta	258	105	631	342	289	92	53	39	90	55	35	0	0	0
45.	Rakhota	418	175	1142	610	532	193	103	90	379	196	183	0	0	0
46.	Dhamaka	159	198	1155	634	521	162	95	67	346	193	153	0	0	0
47.	Nangli Pachanki	143	58	424	226	198	51	28	23	0	0	0	0	0	0
48.	Ahanwan	244	607	3253	1712	1541	436	239	197	1011	522	489	0	0	0
49.	Jalalpur Khalsa	93	205	1580	847	733	332	177	155	15	9	6	0	0	0
50.	Durgapur	720	425	2378	1253	1125	334	183	151	815	434	381	0	0	0
51.	Rajpura	169	517	3213	1723	1490	677	365	312	895	483	412	0	0	0
52.	Raipur	336	336	1828	975	853	275	154	121	212	115	97	0	0	0
53.	Jodhpur	276	252	1583	859	724	249	139	110	487	254	233	0	0	0
54.	Tikri Brahman	339	967	6063	3195	2868	1233	645	588	1578	832	746	0	0	0
55.	Rehrana	230	421	2701	1442	1259	424	238	186	607	319	288	0	0	0
56.	Chirawa	430	251	1579	834	745	270	149	121	363	190	173	0	0	0
57.	Dholagarh	283	404	2471	1289	1182	375	202	173	862	451	411	0	0	0
58.	Lohagarh	239	351	2245	1201	1044	398	210	188	1787	948	839	0	0	0
59.	Kithwari	449	631	3589	1896	1693	571	308	263	1712	914	798	0	0	0

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Sl. No.	Villages	Area (Hect)	No. of Houses		Total Population		Us. Child Population		Scheduled Caste		Scheduled Tribes			
			Old	New	Male	Female	Male	Female	Male	Female	Male	Female		
60.	Ronija	94	255		769	670	178	93	85	198	109	89	0	0
61.	Hosangabad	644	68		229	204	96	56	40	191	103	88	0	0
62.	Chhaju Nagar	244	441		1314	1164	338	181	157	739	390	349	0	0
63.	Taraka	182	218		687	635	186	92	94	230	126	104	0	0
64.	Atohan	392	290		945	799	247	135	112	431	229	202	0	0
65.	Bahrola	208	337		1174	1060	354	188	168	614	327	287	0	0
66.	Asawda	449	629		2027	1830	627	338	289	888	485	403	0	0
67.	Jor Khera	159	105		342	289	92	53	39	90	55	35	0	0
68.	Phulwari	653	906		2985	2586	862	459	403	700	372	328	0	0
69.	Baghola	82	931		2826	2587	786	445	341	1782	921	861	0	0
70.	Palwal	842	3982		12335	10737	3911	2064	1847	9504	5083	4521	0	0
		24326	30344		96101	83620	27983	15124	12869	49254	26303	22951	0	0
71.	Kalsara	615	427		1322	1103	336	178	158	636	341	295	0	0
72.	Bhanguri Palwal	396	276		850	749	244	125	119	630	289	241	0	0
73.	Sampal	148	288		973	859	407	227	180	97	53	44	0	0
74.	Bichpuri	88	107		354	298	93	50	43	66	36	30	0	0
75.	Khoklaka	240	133		438	389	121	60	61	185	93	92	0	0
		1487	1231		3937	3396	1201	640	561	1514	812	702	0	0
		25813	31575		100038	87018	29184	15764	13420	50768	27115	23653	0	0

**Source: Primary Census Abstract 2011, Palwal District, State Haryana**

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**TABLE 4.21: SUMMARY OF DEMOGRAPHIC STRUCTURE IN STUDY AREA**

Demographic Parameters	Details
No. of States	1
No. of District	1
No. of Tehsil	2
No. of Villages	75
Total Area of surveyed village (ha)	25813
Total No. of Households	31,575
Total Population	1,87,056
Density of Population (per km <sup>2</sup> )	725
Sex Ratio (No. of female\ 1000 males)	870
Child Population	29,184 (15.60%)
Scheduled Castes	50,768 (27.14%)
Scheduled Tribes	00 (0%)
Literacy	1,15,913 (62.00%)
Male	72,961 (39.00%)
Female	42,952 (23.00%)

*Source: Primary Census Abstract & DCHB 2011, Palwal District, State Haryana*

#### **Salient Features of Demographic Structure**

Sex ratio (number of females per thousand of males) in the region is recorded as 870 indicating male population in the region is marginally higher than the female population.

To address the issue of the declining inclination of the child sex ratio "Beti Bachao, Beti Padhao scheme" is a central government scheme to promote awareness regarding girl's education and combat the declining Child Sex Ratio.

In the study area, Palwal city is likely to have high Population density. The reason for this could be equipped facilities like education, health, sanitization, banking and transportation

In the study area, Rajupur Bangar village is likely to have very low population density. The reason for this could be lack of facilities like education, health and banking.

#### **4.6.6 Infrastructure resources**

The infrastructure resources base of the eleven study areas with reference to education, medical facility, water supply, post and telegraph, transportation, communication facility, power supply, sanitation, road, bank etc. according to the Village Directory Census CD 2011 supply is given in **Table 4.21**.



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TABLE 4.22: INFRASTRUCTURE RESOURCE BASE OF THE STUDY AREA

S. No.	Villages	Education	Medical	Water	Sanitation	Communication	Transportation	Road	Bank	Power	SHG
1.	Devli	GMS,GSS,PSS S	PHSC,V H	TWT,TWU ,HP,TWB, R/C	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,T,TR C	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
2.	Tatarpur	PPPS,GPS,PP S,PMSPSS	NA	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
3.	Jataula	PPPS,GPS,PP S,GMS,PMSP, SS,SSSS	FWC	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
4.	Medapur	PPPS,GPS,PP S,GMS,PMSP, SS,SSSS	NA	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
5.	Chhaprola	PPPS,GPS,GM S,SS,SSSS	NA	TWT,TWU ,TWB	OD,OPDU	TP,PCO,MPC	PBS,T,V	BTPR,GKR,WBM ,AWR,F	CB	PSDU,PSAU,PS CU,PSAU	SHG
6.	Dehlaika	GPS	NA	TWT,TWU ,TWB	CD	TP,PCO,MPC	GBS,PBS,TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
7.	Teharki	GPS,GMS	PHSC	TWT,TWU ,HP	OD,OPDU	TP,PCO,MPC	GBS,PBS,T,A/M A,TRCNH,SH	BTPR,GKR,WBM ,AWR,F	ACS	PSDU,PSAU,PS CU,PSAU	SHG
8.	Bhurja	GPS	NA	TWT,TWU ,HP,TWB	OD,OPDC,OK D	TP,PCO,MPC	GBS,PBS,RS,T, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
9.	Sikandarpur	GPS,GMS	NA	TWT,TWU ,HP,TWB	OD,OPDU	TP,PCO,MPC	GBS,PBS,T,TR C	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
10.	Nangla Bhiku	GPS,GMS	NA	TWT,TWU ,HP,TWB	OD,OPDU	TP,PCO,MPC	GBS,PBS,T,TR C	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
11.	Pithla	PPPS(3),GPS, PPS(3),GMS,P MS,GSS	PHSC,V H	TWT,TWU ,HP,TWB	OD,OPDU	PO,TP,PCO,MPC	GBS,PBS,T,TR C	BTPR,GKR,WBM ,AWR,F	CB,ACS	PSDU,PSAU,PS CU,PSAU	SHG
12.	Dudola	GPS,GMS,GS S	CHC,PH SC,D(2), VH	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,SPO,PCO,MP C	GBS,PBS,T,TR C	BTPR,GKR,WBM ,AWR,F	CB,ACS	PSDU,PSAU,PS CU,PSAU	SHG

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S. No.	Village	Education	Medical	Water	Station	Community	Transportation	Road	Bank	Water	SHG
13.	Miranpur	GPS,GMS	NA	TWT,TWU ,HP,TWB, T/P/L	OD,OKD	TP,PCO,MPC	GBS,PBS,T,TR C	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
14.	Janauli	PPS(3),GPS(2),PPS(2),GMS(2),PMS(3),GSS(2),PSS	PHSC,D, VH	TWT,TWU ,HP,TWB	OD,OPDU,OK D	PO,TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
15.	Alewalpur	PPPS(5),GPS(2),PPS(5),GMS(2),PMS(5),GSS(2),PSS	PHC,PH SC,VH	TWT,TWU ,HP,TWB	OD,OPDU,OK D	PO,TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	CB,COB, AGS	PSDU,PSAU,PS CU,PSAU	SHG
16.	Malikgani	PPPS,GPS,PPS,PMS,PSS,PSSS	NA	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, V,TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
17.	Lalpur Qadim	GPS	NA	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
18.	Khajurka	PPPS,GPS,PPS,GMS,PMS,PSS(2),PSSS	NA	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
19.	Fazalpur	PPPS(4),GPS,PPS(4),PMS(4),PSS(4),PSSS(4)	VH	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
20.	Ferozepur	PPPS(2),GPS,PPS(2),GMS,PMS(2),GSS,PS(2)	NA	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	PBS,T,TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
21.	Aghwarpur	GPS,GMS	NA	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,T,V	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
22.	Alepur	PPPS(2),GPS,PPS,GMS,PMS,GSS,PSS	PHSC	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	PBS,T,V	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
23.	Patli Kalan	NA	NA	TWT,TWU ,HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	PBS,T,V	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG

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S. No.	Villages	Education	Medical	Water	Satellite	Communication	Transportation	Road	Bank	Power	SHG
24.	Patli Khurd	GPS,GMS	NA	TWT,TWU,HP,TWB	OD,OPDU,OK	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
25.	Gugera	GPS,GMS	NA	TWT,TWU,HP,TWB	OD,OPDU,OK	TP,PCO,MPC	GBS,PBS,NH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
26.	Amru	GPS,GMS	NA	TWT,TWU,HP,TWB	OD,OPDU,OK	TP,PCO,MPC	PBS,T,V	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
27.	Dhatir	GPS(2),PPS(3),GMS(2),PMS(3),GSS(2),PSS(2)	PHSC	TWT,TWU,HP,TWB	OD,OPDU,OK	SPO,TP,PCO,MP	GBS,PBS,NH	BTPR,GKR,WBM,AWR,F	COB,ACS	PSDU,PSAU,PS CU,PSAU	SHG
28.	Altar Chata	GPS,PPS,GMS,PMS	NA	TWT,TWU,HP,TWB	OD,OPDU,OK	TP,PCO,MPC	GBS,PBS,TRC	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
29.	Kishorpur	GPS,GMS	VH	TWT,TWU,HP,TWB	OD,OPDU,OK	TP,PCO,MPC	GBS,PBS,TRC,SH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
30.	Rejupur Bangar	NA	NA	TWT,HP	OD,OPDU,OK	TP,PCO,MPC	GBS,PBS,TRC	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	NA
31.	Papri	NA	NA	TWT,TWU,HP,TWB	OD,OPDU,OK	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
32.	Adupur	GPS,GMS	NA	TWT,TWU,HP,TWB	OD,OPDU,OK	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
33.	Allka	PPPS(4),GPS(2),PPS(4),GMS,PMS(4),GSS,PSS(3)	PHSC,VH	TWT,TWU,HP,TWB	OD,OPDU,OK	SPO,TP,PCO,MP	GBS,PBS	BTPR,GKR,WBM,AWR,F	CB	PSDU,PSAU,PS CU,PSAU	SHG
34.	Kakrali	GPS	VH	TWT,TWU,HP,TWB	OD,OPDU,OK	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
35.	Meghpur	GPS	NA	TWT,TWU,HP,TWB	OD,OPDU,OK	TP,PCO,MPC	GBS,PBS,NH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
36.	Galipur	GPS,GMS	NA	TWT,TWU,HP,TWB	OD,OPDU,OK	TP,PCO,MPC	GBS,PBS,TRC,NH,SH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
37.	Kama	GPS(2),PPS(2),GMS,PMS,GSS,PSS	PHSC,VH	TWT,TWU,HP,TWB	OD,OPDU,OK	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG

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S. No.	Villages	Education	Medical	Water	Sanitation	Communication	Transportation	Road	Energy	Power	SHG
38.	Bamnika	NA	NA	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
39.	Rajplaka	GPS,GMS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
40.	Katraka	PPPS,GPS,GMS	PHSC	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
41.	Maheshpur	GPS,GMS	PHSC	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
42.	Badha	PPPS,GPS,GMS,GSS	VH	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA	BTPR,GKR,WBM,AWR,F	ACS	PSDU,PSAU,PS CU,PSAU	SHG
43.	Jor Kheta	GPS,GMS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
44.	Rakhota	GPS,PPS,GMS,PMS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA,TRC	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
45.	Dhamaka	PPPS,GPS,PPS,GMS,PMS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA	BTPR,GKR,WBM,AWR,F	ACS,AT M	PSDU,PSAU,PS CU,PSAU	SHG
46.	Nangli Pachanki	GPS,GMS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
47.	Aharwan	GPS,PPS,GMS,PMS,GSS,PSSS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OK D	SPO,TP,PCO,MP C	GBS,PBS,A/MA,V,TRC,NH,SH	BTPR,GKR,WBM,AWR,F	CB,ACS	PSDU,PSAU,PS CU,PSAU	SHG
48.	Jalaipur Khalsa	PPPS,GPS,PPS,GMS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA,V,TRC,NH,SH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
49.	Durgapur	GPS,GMS	PHSC	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,A/MA,TRC	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
50.	Rajpura	PPPS,GPS,PPS,GMS,PMS	VH	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA,T,V,TRC,NH,SH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
51.	Ratipur	GPS,GMS	VH	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA,TRC	BTPR,GKR,WBM,AWR,F	ACS	PSDU,PSAU,PS CU,PSAU	SHG
52.	Jodhpur	PPPS,GPS,PPS,GMS,PMS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA,TRC,NH,SH	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
53.	Tikni Brahman	PPPS(3),GPS(2),PPS(4),GMS	PHSC	TWT,TWU,HP,TW/B	OD,OPDU,OK D	PO,TP,PCO,MPC	GBS,PBS,A/MA,TRC	BTPR,GKR,WBM,AWR,F	ACS	PSDU,PSAU,PS CU,PSAU	SHG

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No.	Villages	Education	Medical	Water	Sanitation	Communication	Transportation	Road	Bank	Power	SHG
		.PMS(2),GSS, PSS(2),GSSS									
54.	Rehrana	PPPS(3),GPS, PPS(3),GMS,P MS(3),PSS,PS SS	VH	TWT,TWU .HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
55.	Chirama	GPS,PPS,GMS .PMS,GSS,PS S	PHSC	TWT,TWU .HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
56.	Dholagarh	PPPS(2),GPS, PPS(2),GMS,P MS(2),PSS(2), PSSS	NA	TWT,TWU .HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
57.	Khusropur	PPPS(2),GPS, PPS(2),GMS,P MS(2),PSS,PS SS	NA	TWT,TWU .HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
58.	Asawfa	PSSS(2),GPS, PPS(2),GMS,P MS(2),GSS,GS SS	PHSC,V H	TWT,TWU .HP,TWB	OD,OPDU,OK D	SPOTP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
59.	Lohagarh	PPPS,GPS,PP S,GMS,PMS	NA	TWT,TWU .HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
60	Kithwari	PPPS,GPS(2), PPS,GMS,PM S	NA	TWT,TWU .HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, V,TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
61.	Ronija	PPPS,GPS,PP S,PMS,PSS,P SSS	NA	TWT,TWU .HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, V,TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
62.	Hosangaba d	GPS	NA	TWT,TWU .HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG
63.	Chihaju Nagar	GPS,PPS,GMS .PSS,PSSS	VH	TWT,TWU .HP,TWB	OD,OPDU,OK D	PO,TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	OB	PSDU,PSAU,PS CU,PSAU	SHG
64.	Taraka	PPS,PMS	NA	TWT,TWU .HP,TWB	OD,OPDU,OK D	TP,PCO,MPC	GBS,PBS,A/MA, TRC	BTPR,GKR,WBM ,AWR,F	NA	PSDU,PSAU,PS CU,PSAU	SHG

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S. No.	Village	Education	Medical	Water	Sanitation	Communication	Utilization	Road	Bank	Power	SHG
65.	Alohan	PPPS,GPS,PPS,PMS,PSS,PSSS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OKD	TP,PCO,MPC	GBS,PBS,A/MA,TRC	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
66.	Bairola	PPPS,GPS,PPS,PMS,PSS,PSSS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OKD	TP,PCO,MPC	GBS,PBS,A/MA,TRC	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
67.	Jor Khera	GPS,GMS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OKD	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
68.	Phulwari	PPPS(2),GPS,PMS(2),PMS(2),PSS(2),PSSS	PHSC	TWT,TWU,HP,TW/B	OD,OPDU,OKD	TP,PCO,MPC	GBS,PBS,A/MA,TRC	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
69.	Kalsara	GPS,GMS,GS	PHSC	TWT,TWU,HP,TW/B	OD,OPDU,OKD	TP,PCO,MPC	GBS,PBS,A/MA,TRC	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
70.	Bhanguri Palwal	GPS,PPS,PMS,PSS,PSSS	PHSC	TWT,TWU,HP,TW/B	OD,OPDU,OKD	TP,PCO,MPC	GBS,PBS,A/MA,TRC	BTPR,GKR,WBM,AWR,F	CB,ACS	PSDU,PSAU,PSCU,PSAU	SHG
71.	Sanpal	GPS,PPS,GMS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OKD	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
72.	Bichpuri	GPS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OKD	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
73.	Khoklika	GPS,PPS	NA	TWT,TWU,HP,TW/B	OD,OPDU,OKD	TP,PCO,MPC	GBS,PBS	BTPR,GKR,WBM,AWR,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
74.	Baghota	GPS,PPS,GMS,PMS,PSS,GS,GSSS,PSSS,DC	PHC,D	TWT,TWU,HP,TW/B	CD,OD	DNA	GBS,PBS,A/MA,T,V	BTPR,GKR	NB,CB,A,CS	PSDU,PSIU,PSCU,PSAU	SHG
75.	Palwal	GPS,PPS,GMS,PMS,PSS,GS,GSSS,PSSS,DC	PHC,D	TWT,TWU,HP,TW/B	CD,OD	DNA	GBS,PBS,A/MA,T,V	BTPR,GKR	NB,CB,A,CS	PSDU,PSIU,PSCU,PSAU	SHG

Source: District Census Handbook 2011, Palwal District, State Haryana

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**Abbreviations:**

EDUCATION	MEDICAL FACILITIES	WATER	TRANSPORTATION	SANITATION	COMMUNICATION
AC: Anganwadi Center	AH: Allopathic Hospital	TWT: Tap Water Treated	GBS: Govt. Bus Service PBS: Private Bus Service A/WA: Auto/Modified Autos	OD: Open Drainage	PO: Post Office
GPS: Govt. Primary School	PHC: Primary Health Centre	TWU: Tap Water Untreated		OPDC: Open Pucca Drainage Covered	SPO: Sub Post Office
PPS: Private Primary School	PHSC: Primary Health Sub Centre	CW: Covered Well	V: Van	OPDU: Open Pucca Drainage Uncovered	F&TO: Post & Telegraph office
GMS: Govt. Middle School	M&CWC: Maternity And Child Welfare Centre	UW: Uncovered Well	CPR: Cycle-pulled Rickshaws T: Taxi Trc: Tractor	ND: No Drainage	TP: Telephone
PMS: Private Middle School	FWC: Family Welfare Centre	HP: Hand Pump	SH: State Highway	OKD: Open Kuccha Drainage	PCO: Public Call Office
GSS: Govt. Secondary School	D: Dispensary	SR: Service Reservoir R/C: River/Canal	NH: National Highway	PL: Public Latrine	
GSS: Govt. Secondary School	VH: Veterinary Hospital MHC: Mobile Health clinic	TP/L: Tank/Pond/Lake	ROAD	BANK	POWER
GSSS: Govt. Senior Secondary School	NA: Not Applicable	TWB: Tube Wells/Borehole	BTPR: Black Topped pakka Road	CB: Commercial Bank	PSDU: Power Supply for Domestic use
PSSS: Private Senior Secondary School	SHS: SELF-HELP GROUP	OHT: Over Head Tank	PR: Pakka Road	NB: Nationalize Bank	PSAU: Power Supply Agriculture use
DC: Degree College			GKR: Gravel (kuchha) Road	COB: Co Operative Bank	PSCU: Power Supply For Commercial Use
			AWR: All Weather Road	ACS: Agriculture Credit Society	PSIU: Power Supply For Industrial Users
			F: Footpath	PCB: Private Commercial Bank	

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#### **4.6.7 Socio-Economic Survey - Sampling Methodology**

In order to assess and evaluate the likely impacts arising out of any developmental projects on socio-economic environment, it is necessary to gauge the apprehensions of the people in the project area. Socio-economic survey serves as an effective tool for fulfilling this requirement. Socio-economic survey through interviews, questionnaire, focused group discussion (FGD) was conducted in 9 villages of the study area (Table 3.25). Sarpanch, ward members, school teachers, medical practitioners, self-help group members and village youth and other respondents (adult's male-female) are involved for awareness and opinion, by using judgmental or purposive sampling methods representing different socioeconomic sections of the community. The respondents were asked for their awareness/opinion about the project, job opportunities, drinking water, road and drainage construction, education, health care, housing, transportation facility and economic status.

#### **Data Collection Method**

In order to assess and evaluate the likely impacts arising out of any developmental projects on socio-economic environment, it is necessary to gauge the apprehensions of the people in project area. For the process of data collection through primary and secondary sources certain methods are used as given below:

#### **Field Survey and Observation**

Field survey and observations is made at each sampling villages and the quality of life of that region is studied. Visits are made to hospitals, primary health centres to know the health status of the region. Various governmental organizations such as statistical department, department of census operations are visited to collect the population details of that region.

#### **Interview Method**

Structured interview method is used to collect data regarding the awareness and opinion of sample selected from various socio-economic sections of the community. Structured interviews involve the use of predetermined set of questions that includes fixed and alternative questions. The questionnaire mainly highlights the parameters such as income, employment and working conditions, housing, food, clothing, water supply, sanitation, health, energy, transportation, communication, education, environment and pollution to assess the quality of life of that particular region, general awareness and opinion of the respondents about the project. Interview method helps to collect error free and accurate information to the interviewer during



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the field survey. The respondents were asked for their awareness / opinion about the project and also the impacts of the project which is an important aspect of socio-economic environment, viz. job opportunities, education, health care, transportation facility and economic status.

#### **Focus Group Discussion**

A focus group discussion is a small, but demographically diverse group of people. It is a form of qualitative research consisting of interviews in which a group of people are asked about their perceptions, opinions, beliefs, and attitudes towards an employment, income, transport, education, Medical facilities, Sanitation, housing, health, agriculture, pollution etc. Questions are asked in an interactive group setting where participants are free to talk with other group members. During this process, the researcher either takes notes.

Through the focus group discussion of all these factors, the proposed project helps in evaluating socio-economic conditions in the study area.

The study was carried out with a participatory approach by involving the stakeholders, particularly the project beneficiaries and probable affected persons through a series of consultative process. The population groups consulted include beneficiary group of people shopkeepers, farmers, school teachers, gram panchayat sarpanch/members, village leaders, etc. Out of total 75 villages within the Study Area; Socio-Economic Survey was conducted in 9 representative villages which were approximately over 10% of the villages in the Study Area.

#### **4.6.8 Observations on Infrastructure Resources:**

The significant features of these important parameters for each study area are discussed as follows:

- (a) **Education Facilities:** In the study area, education is available from Primary School to Degree collage. Higher education facilities including colleges and other diploma courses are available at Palwal at a distance of 3 km respectively from the project site.
- (b) **Medical Facilities:** There are Twenty-one (21) government healthcare facilities available within the study area. However, fifty-four (54) villages in the study areas were lacking in medical facilities. In the study area list of villages with Twenty-one (21) government health services available and fifty-four (54) villages lacking medical facilities Table 4.22 is given in. Hospitals and other better medical facilities were available at Palwal

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- (c) **Drinking Water:** The main water supply in the surveyed villages is through tap water, hand pump, well and tube well is the main sources of drinking water in the region.
- (d) **Power Supply:** All villages are accessed with electricity supply.
- (e) **Transportation:** For transportation purpose Government bus and Taxi Service are available in the study area. Transportation facilities were not frequently available in the region. Private vehicles like Bicycles and Motor Cycles were mostly used by villagers for transportation purpose.
- (f) **Communication Facilities:** For communication purpose mainly Sub Post Office, Telephone, Mobile phones and newspaper are available in most of the villages.
- (g) **Agriculture:** Most of the respondents are engaged in labor work, agriculture, and livestock activities. Farming is the main occupation; a few respondents service in government sectors. Most of the respondents are labors and others are trying to migrate towards other city places.
- (h) **Houses:** Most of the houses are pakka and Semi pakka with good construction in the study area.
- (i) **Employment:** Main occupations of the people in the study area are agriculture and labor work. As directed by the Haryana, Office of the Labour Commissioner, the revised minimum rates of wages in the six schedules of Employment covered under Minimum Wages Act, 01/07/2021 (Haryana-Minimum-Wages-Notification-1st-November-2021). in the Haryana are as follows: Unskilled – Rs 377/day; Semi-Skilled – Rs 396/day; Skilled – Rs 416/day;
- (j) **Fuel:** The primary source of cooking fuel is LPG and wood. Kerosene is also been as per the requirement.
- (k) **Main Crops:** The principal crops grown in agricultural farm are Wheat ,bajara, mustard maize Paddy, and Sugarcane. Average crop productivity of paddy is 10-12 quintal per acre.
- (l) **Language:** The official language of Haryana is Hindi. Several regional languages or dialects, often subsumed under Hindi, are spoken in the state. Predominant among them is Haryanvi (also known as Bangru), whose territory encompasses the central and eastern portions of Haryana.
- (m) **Migration:** During survey it was found that local population were migrating maximum towards the Palwal city as a purpose of employment and some to other states.

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- (n) **Sanitation:** Systems of individual and combined septic tanks are in use at some places of this Study area. Toilet facility is one of the most basic facilities required in a house. Most of the households were having toilet facilities in their houses. There was no proper drainage line in the villages. Some of the houses in the villages did not have toilet facility and people go out in the open to defecate. Results in lot of inconvenience to the female members, as well as these results in health-related diseases. The overall condition of cleanliness is not satisfactory in the villages of study area.
- (o) **Road Connectivity:** Most of the roads are tar and connects to the villages. Both tar and gravel roads were commonly seen in the villages.
- (p) **Market Facility:** Study area was predominantly semi urban type. In villages, small shops were available for daily needs. Weekly market facility was available in some villages. Wholesale markets were available at town place. Palwal is major hub for all type of facilities in the area.
- (q) **Recreation:** Temples, Samajbhawan, Television and Radio are the main recreation facilities in the study area. Newspaper/Magazine is also used by the villagers.
- (r) **Other Observations:** The socio-economic study revealed that the youth in the project area are devoid of employment opportunities. They can be a potential source of workers with minimum handholding and vocational education skills. The youth have expressed their willingness to setting up of industries in the area as it provides them gainful employment opportunities. Similarly, this would also trigger many direct and indirect benefits for economic advancement and social development of project area.

#### 4.6.9 Suggestions for improvement of Socio-Economic Status

The socio-Economic status of the population in the project area shall be improved through CSR and focused community development interventions. Some of the salient activities are illustrated below:

- ❖ Youth empowerment programs through awareness creation about various government schemes, providing appropriate opportunities with relevance to their qualification and skills, conducting skills inculcating programs etc.
- ❖ Periodical health checkup camps need to be conducted.
- ❖ Sensitization and awareness programs on child and mother health, sanitation and personal hygiene, HIV/AIDS etc.

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- ❖ Mother-child care awareness programs and need based health camps.

### Employment Pattern

Economic resource base of any region mainly depends upon its economically active group i.e. the working population involved in productive work. Work may be defined as participation in any economically productive activity. Such participation may be physical or mental in nature. Work not only involves actual work but also effective supervision and direction of work. It also includes unpaid work on farm or in family enterprise.

There are different types of workers that may be classified as - those persons who had worked for at least six months or 180 days are treated to be Main Workers, on the other hand if person categorized as worker has participated in any economic or productive activity for less than six months or 180 days during the last one year is treated as Marginal Worker. Non-workers are those who have not worked any time at all in the year preceding the enumeration.

The workers coming under the main and marginal workers category are those involved in activities such as cultivation, agriculture, livestock, forestry, fishing, hunting, plantations, orchards and allied activities, mining and quarrying, manufacturing, processing, servicing and repairs in household industry, construction, trade and commerce, transport, storage and communication and other services. **Table 4.23.**

**TABLE 4.23: SUMMARY OF ECONOMIC ATTRIBUTES IN STUDY AREA**

Demographic Parameters	Details
Total Worker	47,931 (27.00%)
Marginal Worker	14,845 (7.00%)
Non-Worker	1,35,125 (73.00%)
Main Worker	37,086 (20.00%)
Cultivators	12,208 (32.92%)
Agriculture	3,886(10.48%)
Household	881 (2.38%)
Others	20,111 (54.22%)

*Source: Primary Census Abstract & DCHB 2011, Palwal District, State Haryana*

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### ***Health Status***

Diarrhea / Cholera, Malaria, Cough, Cough; viral fever, eye disease, skin disease and Unhygienic are the general health problems which are attributed due to improper sanitation, mosquito nuisance and water logging. Malaria is one of the most frequently occurring diseases and also respiratory infection in the region.

### ***Cultural and Aesthetic Environment***

There is no place of Cultural and Aesthetic Environment within the study area i.e. 10 km radius of mining site. Hence, there shall be no impact on places of interest.

### ***Quality of Life***

Quality of life (QoL) is a term, which indicates overall status of socio-economic environment in a given area. QoL is defined as a function between "objective conditions" and "subjective attitudes" involving a defined "area" of concern.

The "Objective Conditions" are defined as numerically measurable artifacts of a physical, sociological event or economic event. Objective conditions may be defined as any number, which stands for a given quantity of a variable of interest as soon as it is independent of subjective opinion.

Subjective attitude" is primarily concerned with affective and cognitive dimensions. It is specifically concerned with 'how aspects of cognition vary as objective conditions vary'.

Once objective measures are obtained for each factor they are transformed to a normal scale varying from 0 to 1 (value function curve) in which 0 corresponds to the lowest or least satisfactory measure, and 1 corresponds to the highest. The weights are assigned to each factor by ranked-pair wise technique (by the expert group) based on the secondary data and general observations.

For each objective measure, a corresponding subjective measure is developed for each individual of the sample population by asking him to rate his satisfaction scale (value function curve). It is used such that 0 corresponds to the lowest level of attitudinal satisfaction and 1 corresponds to the highest level of satisfaction. Weights are assigned to each factor using ranked - pair wise comparison techniques.

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The Socio-economic Indicators for QoL Assessment are:

1.	Employment	9.	Power
2.	Income	10.	Sanitation
3.	Health	11.	Agriculture
4.	Medical Facilities	12.	Cost of Living
5.	Communication	13.	Business
6.	Transportation	14.	Recreation
7.	Education	15.	Per Capita Income
8.	Housing	16.	Pollution

Subjective, objective and cumulative quality of life is estimated as:

#### Subjective Quality of Life Index

$$QoLs = 1/p \sum_{i=1}^m \sum_{j=1}^p Qlij \times Wi$$

Where,

QoLs = Subjective quality of life index

p = No. of respondents, j = 1, ....., p

m = No. of factors, i = 1, ....., m

Qlij = Subjective quality index for i<sup>th</sup> factor assigned by j<sup>th</sup> respondent

$\sum Qlij$  = Subjective quality index for i<sup>th</sup> factor assigned by all respondents in an area

Wi = Relative weightage of the i<sup>th</sup> factor

#### Objective Quality of Life Index

$$QoLo = \sum_{i=1}^m Qli \times Wi$$

Where,

QoLo = Objective quality of life index

n = No. of QoL Factors

i = 1, ....., n

Qli = Satisfaction level (assigned by the expert group)  
for the i<sup>th</sup> objective indicator

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$W_i$  = Normalized weight for  $i^{\text{th}}$  factor

#### Cumulative Quality of Life Index

$$QoLc = \frac{QoLo + QoLs}{2}$$

Village wise subjective, objective and cumulative quality of life index is given in **Table 4.24**.

**TABLE 4.24: VILLAGE-WISE QUALITY OF LIFE INDEX IN THE STUDY AREA**

S. No.	Name of Villages	Quality of Life		
		Subjective	Objective	Cumulative
1.	Kakrali	0.51	0.53	0.52
2.	Ghughera	0.49	0.51	0.50
3.	Lalwa	0.50	0.52	0.51
4.	Meghpur	0.51	0.53	0.52
5.	Sanjay Colony	0.62	0.64	0.63
6.	Kanungo Mohalla	0.62	0.64	0.63
7.	Raipur	0.48	0.50	0.49
8.	Karna	0.53	0.55	0.54
9.	Alapur	0.52	0.54	0.53
<b>Average</b>		<b>0.53</b>	<b>0.55</b>	<b>0.54</b>

**Results of QoL:** The average QoL index values are estimated as:

$$QoL (S) = 0.53$$

$$QoL (O) = 0.55$$

$$QoL (C) = 0.54$$

The average QoL index value for the study area is leading to satisfactory level due to satisfactory status like, educational facilities, also availability of basic needs viz., food, clothing & housing. Medical Bank, and sanitation were not adequate in the study area; Improvement in these fields will help to increase quality of life of the study area.

#### Rehabilitation and Resettlement Plan (R & R Plan)

As there is no existing settlement on the proposed project area, there are no issues of resettlement or rehabilitation.

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#### 4.6.10 Corporate Environment Responsibility (CER) Activities

Need for CER plan is for the health, education, sustainable lifestyles, social mobilization, infrastructure, water harvesting, agriculture and environmental protection, for the socio-economic development of the project, to enhance the quality of social health.

Municipal Council Palwal will carry out its duties under Corporate Environment Responsibility (CER). This CER plan has been made from this perspective, to ensure the quality of life and quality of study area people will be improved.

Corporate Environment responsibility is the commitment of businesses to contribute to sustainable economic development by working with the employees, their families, local community and society at large to improve their lives in ways that are good for business as well as overall development. It is a voluntary activity of a company that supports social interests and environmental issues. It is a principle through which the business houses contribute to the welfare of the society and not only maximize their profits. CER, in fact, is about business giving back to the society. Municipal Council Palwal proposes to allocate 2% of their total Project cost for CER activities as suggested in MoEF&CC O.M. regarding Corporate Environment Responsibility vide. F.No. 22-65/2017-IA III.

For proposed project, manpower of 10-12 Nos is required; Municipal Council propose to give employment for local people which will help to improve their economic status; The details of the proposed CER Action Plan are as provided in Table 4.25.

**TABLE 4.25: CER ACTION PLAN**

Cost of Proposed Project: 1.26 Crores.; Cost of the (at least 2.00% of the project cost): 2.52,000

S. No.	Activity	Capital cost in lacs/Year
1.	Drinking water supply sanitation	0.252
2.	Plantation in community areas	0.504
3.	Rashan distribution	1.008
4.	Sanitisation, Covid awareness	0.504
5.	Health checkup	0.252
	<b>Total</b>	<b>2.52</b>

\*Note 1: CER Cost as per O.M. F No. 22-65 / 2017- IA III (CER Regarding)



# **CHAPTER 5**

## **ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES**

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## 5.1 INTRODUCTION

Any development activity in its wake will bring about some impacts associated with its origin, which can be broadly classified as reversible, irreversible, long and short-term impacts, in this chapter, an endeavor has been made to identify various environmental impacts associated with the operation of facility and other activities wherein, there may be chance of pollution.

Based on the possible worst-case emission and waste generation from the proposed project and also taking into considering the base line environmental status at the proposed project site, the environmental factors that are likely to be affected (impacts) are identified, quantified and assessed. Both instrumental (positive) and detrimental (negative) impacts are accounted for this purpose.

## 5.2 IMPACTS DURING DEVELOPMENT PHASE

Construction phase works include site clearance, site formation, building works, infrastructure provision and any other infrastructure activities. The impacts due to construction activities are short term and area limited to the construction phase. The impacts will be mainly on-air quality, water quality and soil quality.

### 5.2.1 Impact on Air Quality

The principal potential source of air quality impact arising from the construction of the proposed project is fugitive dust generation. The dust, measurable as Suspended Particulate Matter and Respirable Suspended Particulates would be generated as a result of construction activities. The construction program of the projects shall commence immediately after obtaining statutory clearances.

The potential dust sources associated with construction activities are loading and unloading of the materials, topsoil removal, travel over unpaved roads and wind erosion etc.

Among all the construction activities, site formation has the highest potential for causing dust nuisance to the nearby air sensitive locations.

#### Mitigation measure-

- ❖ The important dust suppression measures proposed will be regular water sprinkling on main haul roads in the project area, this activity will be carried out at least twice a day,

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if need arises frequency will be increased on windy days, in this way around 50% reduction on the dust contribution from the exposed surface will be achieved.

- ❖ Temporary tin sheets of sufficient height (3m) will be erected around the site of dust generation or all around the project site as barrier for dust control.
- ❖ Tree plantations around the project boundary will be initiated at the early stages.
- ❖ Plantation, regular watering will be done, so that the area will be moist for most part of the day.
- ❖ To reduce the dust movement from civil construction site to the neighborhood the external part of the building (administration, canteen, etc.) will be covered by plastic sheets.

### **5.2.2 Impact on Water Quality**

Preparation of designated area of land for subsequent development activities involves levelling the ground surface, removal of vegetation, stockpiling and generation of construction waste. The site formation may produce large quantities of run-off with high suspended solids loading in the absence of appropriate mitigation measures

#### **Mitigation Measures – Water Quality**

- ❖ During site development necessary precautions will be taken, so that the runoff water from the site gets collected to working pit and if any overflow is, it will be diverted to nearby greenbelt/ plantation area.
- ❖ During construction activity all the equipment washed water will be diverted to working pit to arrest the suspended solids if any and the settled water will be reused for construction purposes, and for sprinkling on roads to control the dust emission, etc. The domestic sewage will be generated which will be disposed-off through soak pit.
- ❖ During construction, impacts from the workers include waste and wastewater generated from eating areas, and sewage from temporary sanitary facilities.
- ❖ Sewage is characterized by high levels of BOD, ammonia and E. coli. Significant impact on water quality will happen only if the sewage is discharged directly into the receiving waters without any prior treatment.

#### **❖ Impact of Noise levels**

The major activities, which produce periodic noise, during construction phase, are as Follows:

- ❖ Foundation works
- ❖ Fabrication of structures

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- ❖ Plant erection
- ❖ Operation of construction equipment
- ❖ Movement of vehicles etc.

#### **Mitigation Measures – Noise**

All noise generating equipment will be used during daytime for brief period of its requirement. Proper enclosures will be used for reduction in noise levels, wherever possible the noise generating equipment will be kept away from the human habitation. Therefore, impact on noise environment due to proposed project would be insignificant. All vehicles entering into the project will be informed to maintain speed limits, and not blow horns unless it is required.

#### **5.2.3 Impact Due to Solid Waste**

This category of waste generation in the proposed project is due to different types of raw materials being used during construction stage in general may comprise the following: -

Cement concrete

Bricks, tiles Cement plaster

Steel (RCC, door/ window frames, roofing support, railings of staircase etc.) Rubble, sand, stone (marble, granite, sandstone)

Timber/wood Paints/varnishes

Besides above there are some major and minor components namely pipes, electrical fixtures, panels, etc. all the above items will be segregated and stored at the site and once the facility is established it will process the same in respective treatment facilities within the site.

#### **Mitigation Measure (Solid Waste)-**

The solid waste generated during this period being predominantly inert in nature. Hence maximum effort would be made to reuse and recycle them. Most of the solid waste material can be used for filling/ levelling of low-lying areas within the site. All attempts should be made to stick to the following measures:

- ❖ All construction waste shall be stored within the site itself. A proper screen will be provided so that the waste does not get scattered.
- ❖ Attempts will be made to keep the waste segregated into different heaps as far as possible so that their further gradation and reuse is facilitated.
- ❖ Reuse of bricks, tiles, stone slabs, timber, piping railings etc. to the extent possible and depending upon their conditions.

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- ❖ The unearthed soil can be used for levelling as well as for lawn development.

### **5.3 IMPACT DURING OPERATIONAL PHASE**

#### **5.3.1 Impact on land environment and mitigation measures**

The proposed landfill shall be constructed in line with Solid Waste Management Rules 2016 and guidelines from CPCB and MoEF&CC. There will not much any negative impact on water environment (Groundwater/Surface water) from the proposed landfill. The liner system will avoid leachate from entering into the groundwater. Monitoring bore wells shall be established around the landfill to keep track of any contamination, which is unlikely because of the liner system and engineering landfill construction. The leachate generated from the landfill shall be collected in a leachate holding tank and it is used back on the landfill for dust suppression.

Excess leachate shall be properly treated in spray dryer etc.

#### **Impact on Top soil**

No significant impact is expected on the soils on and around the site, due to the following management measures: -

#### **Mitigation Measure**

- ❖ All solid wastes and hazardous wastes from the plant complex are properly collected, stored and disposed.
- ❖ The entire plant site area shall be well drained and thus there will be no leaching of any substances in case of spills, which are well confined and decontaminated.

Hence, no negative impact on soil quality on the project site is expected due to the proposed project activities.

### **5.4 IMPACT ON WATER ENVIRONMENT AND MITIGATION MEASURES**

During operational phase, there is a potential threat for the contamination of ground water due to the generation of leachates particularly during rains when the surface runoff infiltrate down the surface of finished and the operational cells of the landfills. The water retained in the cells of the landfills shall drift downwards under gravity and may reach the ground water table. Sewage generated from domestic activities of workers at the site can be potential source of ground water contamination if not managed properly. As per the management plan the ground water quality shall be monitored at regular intervals in the operational phase of the project to check for contamination.

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### **Mitigation Measures**

The leachate will be treated in a Leachate Treatment Plant (LTP) and recycled for utilization in Vehicle washing, greenbelt development and floor washing;

- ❖ The proposed sanitary landfill will be using a Geosynthetic Clay Liner system to prevent leakage of leachate from the landfill site. A geotextile is a woven or nonwoven sheet of material that is impervious to liquid as compared to geo-membrane and is more resistant to penetration damage. Bentonite will be used in the liner system as absorbents that swell in presence of moisture, which is leachate in this case.
- ❖ A final cover system at the top of the landfill which enhances surface drainage, infiltrating water and supports surface vegetation shall be provided.
- ❖ A surface water drainage line which collects and removes all surface runoff from the landfill site is provided.
- ❖ An environmental monitoring system which periodically collects and analyses air, surface water, soil-gas and ground water samples around the landfill site.
- ❖ A closure and post-closure plan which lists the steps that must be taken to close and secure a landfill site once the filling operation has been completed and the activities for long-term monitoring, operation and maintenance of the completed landfill.

### **IMPACT ON HYDROLOGY**

The landfill may pollute pond which is present in northern direction of the area.

### **MITIGATION MEASURES**

- ❖ The pond present in north is against the hydraulic gradient as the area is having gradient from west to east. No surface water will flow to north direction from project site. Hence, there will not be impact on pond present in northern direction.
- ❖ Provisions for diversion of storm water discharge drains lined type shall be made to minimise leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions.
- ❖ The storm water drain shall be designed and constructed in such a way that the surface runoff water is diverted from the landfilling site and leachates from solid waste locations do not get mixed with the surface runoff water.
- ❖ Regular Cleaning of Storm water drains will be carried out in order to avoid blockage of flow.
- ❖ Water from pond will regularly monitored for contaminations if any.

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### **IMPACT ON HYDROGEOLOGY**

The water requirement of the project will be 15 KLD which will be sourced from hired tankers. Groundwater may get polluted.

### **MITIGATION ON HYDROGEOLOGY**

- ❖ While, the landfill will consist of 5 layers, i.e, gas drainage layer, geomembrane, drainage layer, clay layer and re-vegetation layer. Hence ground water contamination not envisaged.
- ❖ Non-permeable lining system at the base and walls of waste disposal area.
- ❖ Provisions for management of leachates including its collection and treatment shall be made.
- ❖ The treated leachate shall be recycled or utilized as permitted, otherwise shall be released into the sewerage line, after meeting the standards specified.
- ❖ Pumping from perimeter trench drains installed on the bunds or from sumps installed below the landfill foundation level for areas undergoing preparation.
- ❖ Groundwater quality will be regularly monitored.

### **5.5 IMPACT ON AIR ENVIRONMENT AND MITIGATION MEASURES**

#### **Air Quality Impact Assessment due to proposed Landfill Activities**

The dumping of SW at the existing dump site generate pollution from degradation of biomass, open burning due to emission of methane gas and movement of vehicles for disposal of waste at site. The impact on air quality around the existing dump site were predicted through air quality model called, AERMOD (American meteorological society/environmental protection agency modelling).

AERMOD is an advanced version of ISCST3 that incorporates the effects of vertical variations in the planetary boundary layer (PBL) on the dispersion of pollutants (USEPA, 2005). The plume growth is determined by turbulence profiles that vary with height. AERMOD calculates the convective and mechanical mixing height. It includes the concept of a dividing streamlines and the plume is modelled as a combination of terrain-following and terrain-impacting states. It incorporates AERMET (Meteorological Pre-processor) and AERMAP (terrain pre-processors). Input data for AERMET includes hourly cloud cover observations, surface meteorological observations, such as wind speed and direction, temperature, dew point, humidity and sea level pressure, and twice-a-day upper air soundings. The AERMAP uses

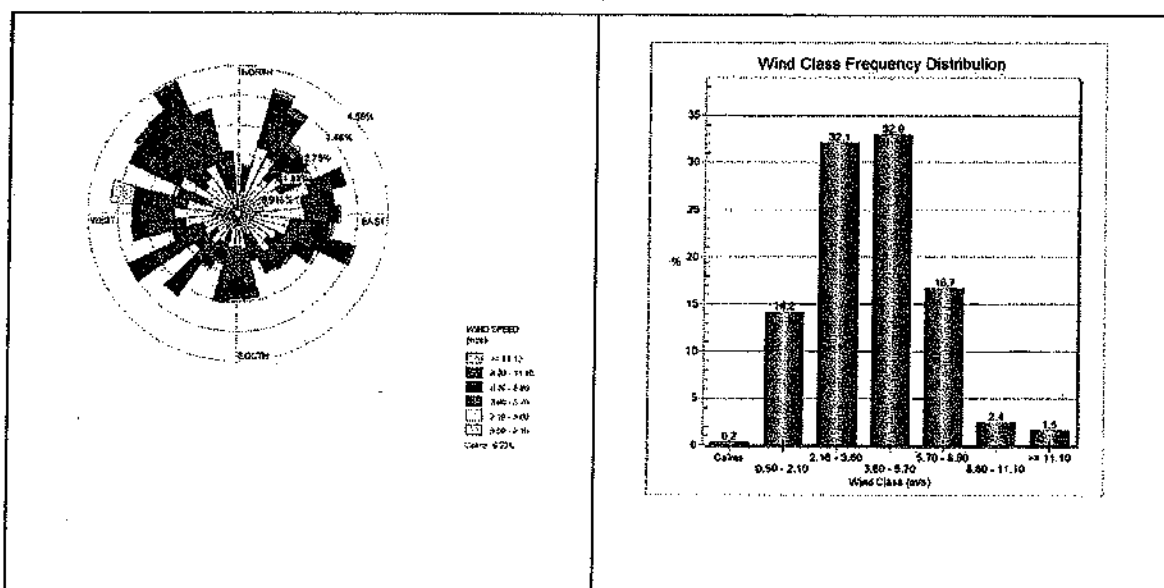
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gridded terrain data (digital elevations model data) to calculate a representative terrain-influence height (hc).

### Model Setup and Run

AERMOD has been set up using the pollutant specific emission rate from landfill activities, meteorological data and surface roughness parameters. AERMAP, the terrain pre-processor, has been run for roughness simulation. The model run with grid receptor for 10 km radius around the landfill site with grid cell size of 200 m<sup>2</sup>.

The site-specific meteorological data were used in the AERMET pre-processor. Hourly average data of one month was monitored for the study. The meteorological parameter used in the model are wind speed, direction, station pressure, ambient temperature, rain fall and relative humidity. AERMOD also need upper air meteorological data to simulate vertical atmospheric boundary layer. However, due to non-availability of upper air data for the site, upper air estimator tool has been used to simulate upper air meteorological parameters. The tool used the surface level meteorological parameter to estimate the upper air data. Wind rose diagram and wind class frequency plot of summer season are shown in Figure 5.1. It is found that wind is dominantly blowing from Northwest and West, however wind blows from southwest and southeast direction also during the study period. The wind speed of 0.5-2.1m/s (14.2%), 2.1-3.6 m/s (32%) and 3.6-5.7 m/s (32.9%). The calm wind condition was found 0.2%.



**FIGURE 5.1: WIND ROSE DIAGRAM AND WIND CLASS FREQUENCY DISTRIBUTION PLOT OF THE STUDY PERIOD**



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### Pollutant Emission Rate

As it is bio-mining project and only source of pollution is emission from the vehicular exhaust which are used for treatment of the waste such as Tractor (2 No.), Hywa (4 No.) JCB Crain (2 Nos.) and Poclain (1 Nos.). One DG set will also run to supply power for emergency purpose. All vehicles are diesel operated and consume ~25500 Ltrs of diesel in a particular month. The details of emission load and emission rates are given below.

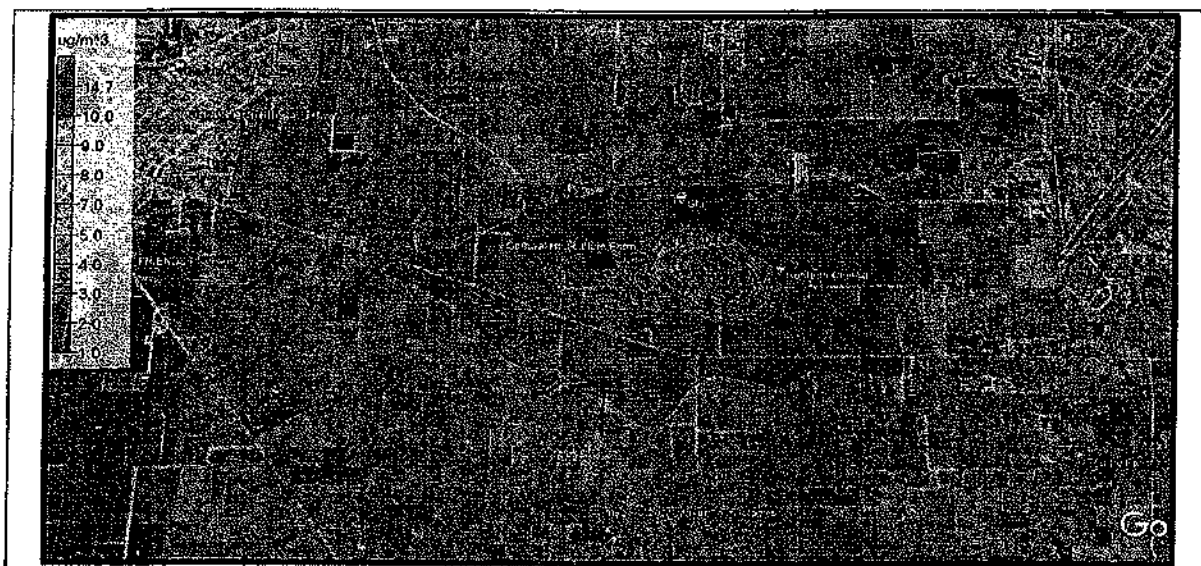
S. N	Vehicle Name/ Number	Number of Vehicles	Qty of diesel per day in months	Emission norms (g/kwh)				Engine Power (KW)	For Emission load (g/day)			
				PM	NOx	SO <sub>2</sub>	CO		PM	NOx	SO <sub>2</sub> *	CO
1.00	Tractor	2	4000	0.40	4.7	-	5.0	37-75	19	226	1.8	240
2.00	Hywa	4	8000	0.40	4.7	-	5.0	37-75	38	451	2.3	480
3.00	JCB	2	8000	0.30	4.0	-	5.0	75-130	14	192	2.3	240
4.00	Poclain	1	5000	0.30	4.0	-	5.0	75-130	7	96	1.5	120
5.00	DG	1	500	0.3	4.0	-	5.0	75-130	7	96	0.1	120
Total								g/day	86	1061	8.0	1200

\*SO<sub>2</sub> emission load calculated based on Sulphur content, which is considered at 10ppm  
Emission norms for nonroad vehicles/diesel operated machines, notified in year 2006

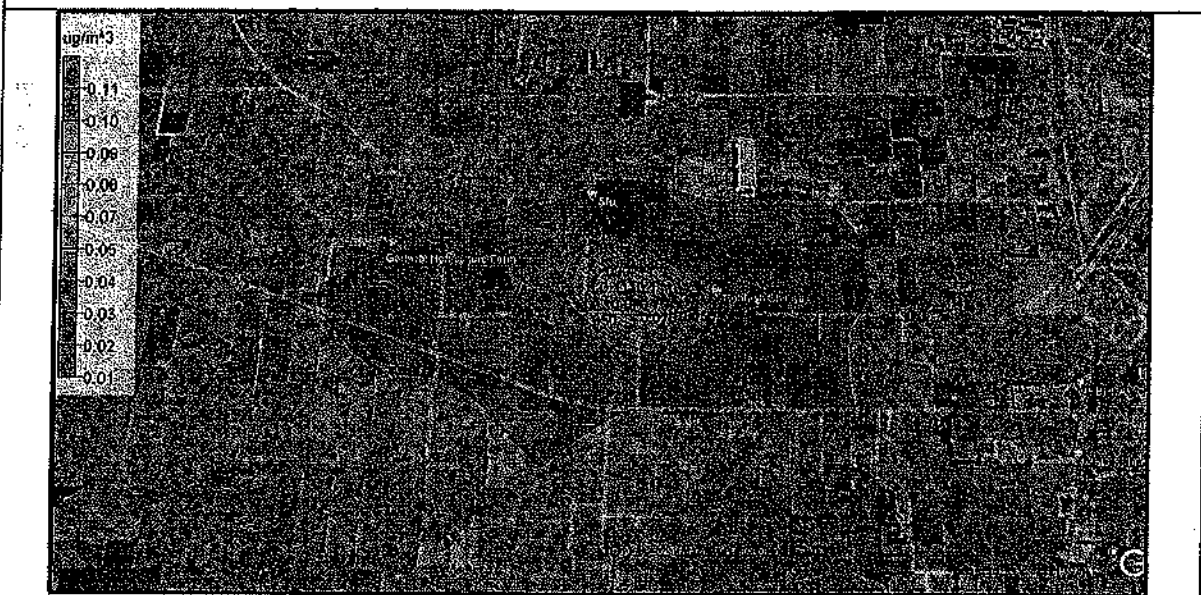
### Predicted Concentration due to Emission from MSW site

The AERMOD prediction results for NO<sub>x</sub>, SO<sub>2</sub>, PM<sub>2.5</sub> and CO with Max. Ground level concentration will be 14.7 µg/m<sup>3</sup>, 0.11 µg/m<sup>3</sup>, 1.19 µg/m<sup>3</sup> and 16.6 µg/m<sup>3</sup>, respectively at premises of the landfill site. The spatial distribution of concentration of selected pollutant emitted from landfill site is shown in Fig 2, which indicates that maximum concentration limited to 200 m around the site. The contribution from the landfill site is negligible outside the premises and will be negligible addition to the baseline level outside the site boundary.

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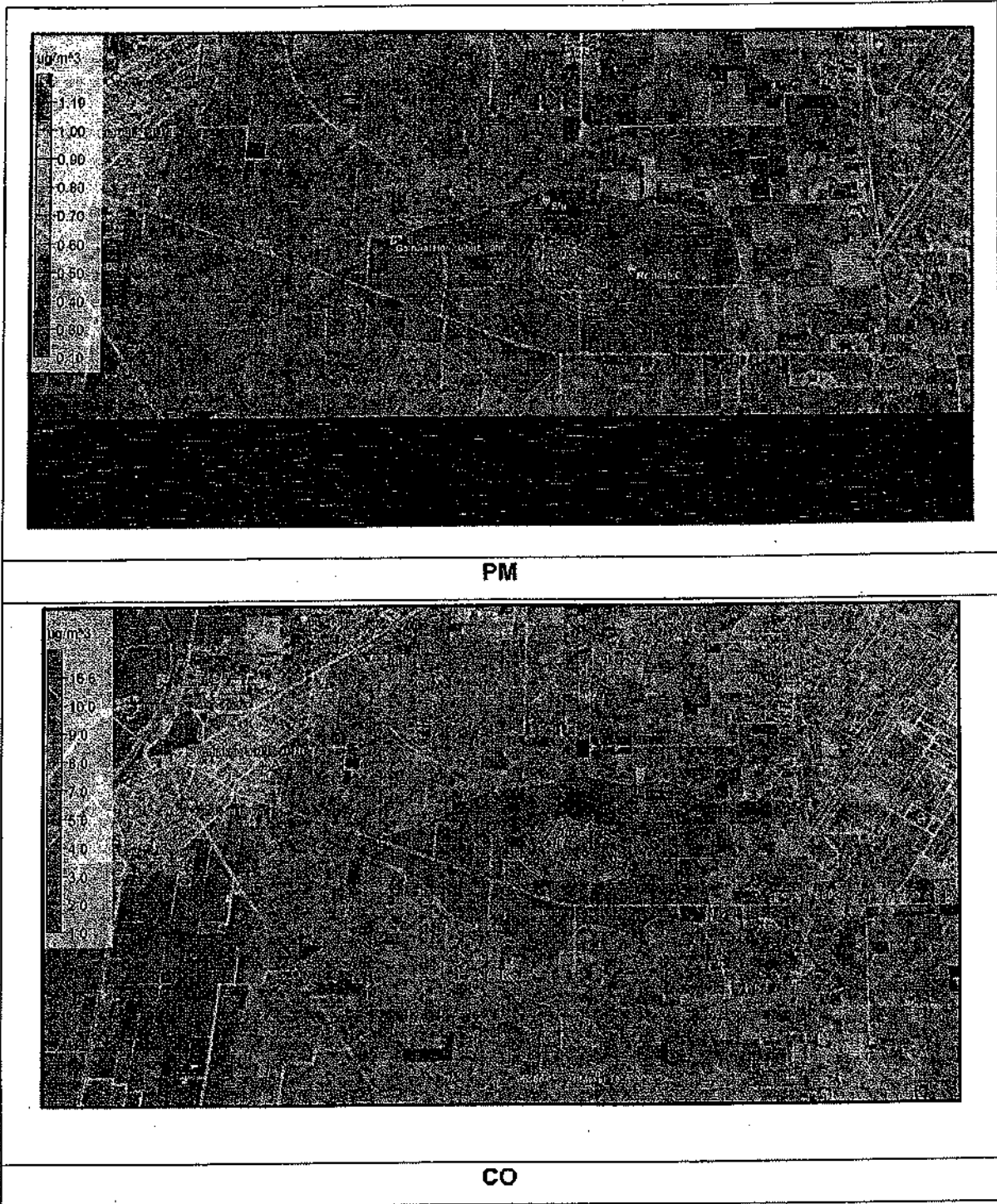


NOx



SO2

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**FIGURE.5.2**  
**POLLUTANT ISOPLETH OF THE PREDICTED CONCENTRATION FROM LANDFILL EMISSION**

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### **Mitigation measures**

- ❖ The first step is to excavate legacy waste, loosen it and make windrows so as the leachate can be dried of through solar exposure and all the entrapped methane is removed from the heap. All biodegradable waste, like discarded food, fruit, flower and garden waste, needs air to decompose it in an odourless way without producing leachate. So, the first step in stabilizing and bringing down airless legacy waste is to expose as much of it as possible to air.
- ❖ A dense green belt with fast growing floral species as recommended by CPCB with climatological adaptability shall be developed along the periphery of the landfill site.
- ❖ The important dust suppression measures proposed will be regular water sprinkling on main haul roads in the project area, this activity will be carried out at least twice a day, if need arises frequency will be increased on windy days, in this way around 50% reduction on the dust contribution from the exposed surface will be achieved.

### **Odour**

Odour is one of the main concerns of those staying in close vicinity to the plant. Considering this, the design of the facility would be such that the odour will be contained within the boundaries of the facility.

Herbal pesticides will be used to deal with the odour problem at the project site.

## **5.6 IMPACT OF NOISE / VIBRATIONS & MITIGATION MEASURES**

Noise and vibration are generated during operation phase due to compactor, transportation vehicles, JCB and operation of Machinery & DG sets

### **Mitigation measures**

The damage risk criteria for hearing, as enforced by OSHA, USA, stipulate that noise levels up to 90 dB (A) are acceptable for 8-hour exposure per day. In this context, it is to be noted that:

- ❖ The noise levels predicted for the human settlements will be below the levels specified by the CPCB for residential areas.
- ❖ At places of continuous noise generation, continuous attendance of workers is not required. Hence, the workers will not be exposed to continuously high noise levels.
- ❖ The noise level at the critical places is of concern from occupational consideration and adequate protective measures aimed at reducing the effect of noise levels will have to be taken for these workers.

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The mitigation measures will include job rotation and provision of earmuffs in high noise areas.

- ❖ Plantation will be done in around the project site.

## **5.7 IMPACT ON BIOLOGICAL ENVIRONMENT & MITIGATION MEASURES**

### **Flora and Fauna & Damage to habits**

Impact of vegetation-The dust is the pollutant which will be generated from construction activities of project. The operation of machinery and movement of vehicles can have impact in terms of disturbance due to noise etc. Only small mammals (rodents etc.) will be affected; however, in an urban scenario these animals are well adapted to changes

### **Construction Phase**

- ❖ Restrict the activities as much as possible to the project site and allocate the trackroads for construction
- ❖ Awareness given to site workers about ecologically sensitive areas.
- ❖ No illegal hunting and poaching activities to be allowed in the study area;
- ❖ No vegetation to be removed from area outside the project site boundary;
- ❖ Minimum levels of noise during construction activities shall be maintained as well as illumination and night operations will be restricted to avoid adverse Impacts on habitat of fauna.
- ❖ Labors will not be allowed to discards food, plastic etc., which can attract animals near the Project site.

### **Operation Phase: -**

- ❖ A green belt will be developed along the periphery of the proposed project which will limit noise reaching outside the project boundary and provide habitat to small birds and mammals.
- ❖ No activities shall be planned in the green buffer other than approach/ service road.
- ❖ Employees should be aware about animals.
- ❖ No illegal hunting and poaching activities to be allowed in the study area;

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## **5.8 IMPACT ON SOCIO ECONOMIC ENVIRONMENT & MITIGATION MEASURE**

The impacts on socioeconomics may occur due to noise, dust and odor issues which may further affect community health and safety.

Critical analysis of socio-economic profile of the area vis-à-vis its scenario with the proposed project activities indicate that the impacts of the project are expected to be of varying nature.

The following are the impacts predicted:

The social impacts due to the proposed project is studied and given in 3 stages.

- 1) *Impact during pre - construction phase*
- 2) *Construction phase*
- 3) *Operation phase*

### **Impact during Pre-construction Phase**

Land clearing, digging for construction activities etc will be performed during pre-construction phase of the project. Local labour force will get direct employment for this phase. During land clearing noise from machines and dust generation during clearing at the site will affect nearest village at some extent.

### **Positive Impact in Construction phase**

❖ **Solid waste management plant construction Increased employment opportunities**  
Construction for the solid waste plant would encompass the following key activities removal of vegetation and general site grading, construction of administrative, control and other support buildings and Installation of utilities. These all type of works need manpower; local population will get employment opportunities in construction phase.

### ❖ **Increased business opportunities in local market**

During construction of plant, local market will be benefited by supplying the raw material for the construction, small hotels, shops will benefit by the project.

### ❖ **Public service and utilities**

The proposed project will require infrastructural facilities e.g. Road, power, communication facility, water etc. will improve in the project area; these facilities will be a positive impact for the population living in surrounding villages

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#### **Negative impact in construction phase**

##### **❖ Increased transportation**

For construction activity, loading unloading of material will increased transportation activities in the study area, heavy vehicles will use village road for transportation purpose it will increase load on village roads.

##### **❖ Impact on noise**

Noise and vibration generated by road traffic, and other vehicles activities also cause nuisance to local people.

#### **Positive impact in operation phase**

##### **❖ Employment generation**

In operation phase employment generation will help to increase contractual employment pattern in the study area.

##### **❖ Impact on village development**

Plant will contribute in village development activities in the field of CSR, in needy areas development/welfare activities will performed.

##### **❖ Generation of waste will be decreased**

#### **Negative impact in operation phase**

##### **❖ Impact on transportation**

In operation phase, loading unloading of material will increased transportation activities in the study area, heavy vehicles will use village road for transportation purpose it will increase load on village roads. In operation phase there will be increased transportation activities, transportation of material activities can disturb day to day life of villagers.

#### **Mitigation Measures**

Mitigation measures are presented below.

##### **❖ Construction of boundary wall**

Before start any construction activity, boundary wall construction surrounding the plant site is needed to restrict the entry of children and animals.

##### **❖ Preference to local workforce in construction/operation phase**

During construction and operation phase preference to local workforce will help to increase employment and income of surrounding villages

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❖ **Proper provisions for labour during construction phase**

During construction activities proper provisions like water, sanitation, rest room etc. should avail onsite.

❖ **Medical camps in surrounding villages (once in 3 months)**

Arrange Free ambulance service, medical camps in surrounding villages, free medicine distribution in medical camps.

❖ **Preventive measures to cover truck while transportation**

During material loading unloading, transporting trucks should cover by sheets to reduce air pollution if any.

❖ **Awareness programme**

Awareness of safety and environment through the plant authority for surrounding village.





# **CHAPTER 6**

## **ANALYSIS OF ALTERNATIVES**

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**The EIA would include a separate chapter on the conformity of the proposals to the Municipal Solid Waste Management Rules, 2016 and the Construction and Demolition Waste Management Rules, 2016 including the sitting criteria therein.**

### **6.1 SITE ALTERNATIVES**

No alternatives site is proposed for Remediation and Reclamation of Existing Dumpsite as this is already an existing dump site so no alternative sites were examined and as per the SWM rules 2016, the existing dump site is fulfilling all the site selection criteria.

### **6.2 SITE SELECTION CRITERIA AS PER SWM RULES 2016**

- ❖ The sanitary landfill site shall be planned, designed and developed with proper documentation of construction plan as well as a closure planning.
- ❖ The landfill sites shall be selected to make use of existing legacy wastes which is being dumped since years.
- ❖ Landfill sites shall be set up as per the guidelines of the Ministry of Urban Development, Government of India and Central Pollution Control Board.
- ❖ The existing dump sites which are in use for more than five years shall be improved in accordance with the specifications given in this schedule.
- ❖ The landfill site shall be 100 meter away from river, 200 meter from a pond, 200 meter from highways, habitations, public parks and water supply wells and 20 km away from airports or airbase. However in a special case, landfill site may be set up within a distance of 10 and 20 km away from the airport/airbase after obtaining no objection certificate from the civil aviation authority/ air force as the case may be. The landfill site shall not be permitted within the flood plains as recorded for the last 100 years, zone of coastal regulation, wetland, critical habitat areas, sensitive or eco-fragile areas.
- ❖ A buffer zone of no development shall be maintained around solid waste processing and disposal facility, exceeding five tonnes per day of installed capacity. This will be maintained within the total area of the solid waste processing and disposal facility. The buffer zone shall be prescribed on case-to-case basis by the local body in consultation with concerned State Pollution Control Board.

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- ❖ Temporary storage facility for solid waste shall be established in each landfill site to accommodate the waste in case of non- operation of waste processing and during emergency or natural calamities.

**TABLE 6.1 SITE SELECTION CRITERIA OF THE PROPOSED SITE**

S. No.	Criteria	Criteria distance	Available distance from proposed SLP site
1	Distance from nearest River	100 meter	Yamuna River – 17.96 Km in East direction
2	Distance from Nearest Pond	200 meter	0.87 Km in WNW direction
3	Distance from nearest Highway (NH-2)	200 meter	SH-22A: 2.23 Km in East direction NH-2 (Delhi-Kolkata Highway): 2.74 Km in ENE direction
4	Distance from nearest habitation	200 meter	Kakrali Village – 1.05 Km in WNW direction
5	Distance from nearest Public Parks	200 meter	Huda Park – 1.81 Km in ENE direction
6	Distance from nearest Water supply wells	200 meter	-
7	Distance from nearest Airports/Airbase	20 km	IGI Airport – 46.13 Km in NNW direction

### 6.3 CONSTRUCTION AND DEMOLITION WASTE: -

- ❖ The proposed facility shall be in conformity of C &D waste management rules 2016.
- ❖ Fines from construction and demolition processed waste having size up to 2 mm shall be used for daily cover over the fresh waste.
- ❖ Use of construction and demolition fines as landfill cover shall be mandatory where such material is available. Fresh soil shall not be used for such places and borrow pits shall not be allowed. Exception soil excavated during construction of the same landfill.
- ❖ During hot windy days in summer months, some fugitive dust problems may arise. These can be minimised by mixing with local soil wherever available for limited period.
- ❖ The soil part in C&D is useful material for daily soil cover, intermediate soil cover, and final soil cover.

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- ❖ The good quality earth in C&D can also be used for preparation of embankments of Sanitary landfill
- ❖ C&D material can be utilised for filling low lying area in the site premises to achieve required level, if required
- ❖ Stones, hard strata, rock, concrete material coming in C&D waste is very useful for preparing temporary internal road, ramps for the vehicles to climb up on the higher levels of the SLF. This type of material is generally stocked in the site and can be utilised especially during rainy season for internal road works in SLF.



# **CHAPTER 7**

## **ENVIRONMENTAL MONITORING PROGRAMME**

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### 7.1 MONITORING SCHEDULE AND PARAMETERS

An environmental monitoring plan provides a delivery mechanism to address the adverse environmental impacts of a project during its execution, to enhance project benefits, and to introduce standards of good practice to be adopted for all project works. An environmental monitoring program is important as it provides useful information and helps to: -

- ❖ Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures.
- ❖ Define the responsibilities of the project proponents, contractors and environmental monitors and provides means of effectively communicating environmental issues among them.
- ❖ Define monitoring mechanism and identify monitoring parameters.
- ❖ Evaluate the performance and effectiveness of mitigation measures proposed in the Environment Management Plan (EMP) and suggest improvements in management plan, if required.
- ❖ Identify training requirement at various levels.
- ❖ An environmental monitoring plan is suggested to monitor environmental parameters during designing phase, construction phase and operation phase of the project. The Monitoring plan is given in Table 7.1.

### 7.2 SCOPE OF ENVIRONMENTAL MONITORING PROGRAM

The main objective of environmental monitoring program is aimed such that there is not much of time lag between commencement of damage to environment mitigation measures to various environmental parameters that are being affected. The Environmental Monitoring Program involves the following-

- ❖ Planning a survey and sampling program for systematic data/information collection.
- ❖ Conducting survey and sampling program.
- ❖ Analysis of samples and data/information collected, and interpretation of data and information.
- ❖ Preparation of reports for submitting to management and statutory authorities.
- ❖ Environmental monitoring is carried throughout project operation to detect changes in the key environmental quality parameters, which can be attributed to the project.

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The results of the monitoring program used to evaluate the following: -

- 1) Extent and severity of the environmental impacts against the predicted impacts.
- 2) Performance of the environmental protection measures or compliance with pertinent rules and regulations.
- 3) Trends in impacts and overall effectiveness of the project Environment Management Plan (EMP).

Environmental Monitoring Program has been prepared for the proposed project for assessing the efficiency of implementation of Environment Management Plan and to take corrective measures in case of any degradation in the surrounding environment.

#### **7.2.1 Air Environment**

Air environment including Ambient Air Quality and odour generation due to the proposed project during construction and operational phases would be accounted. DG set is proposed as standby to use during power failure for emergency needs using diesel as fuel and hence are not expected to contribute emissions to the environment on regular basis. Ambient air quality in and around the project site (nearby villages) will be monitored for important parameters.

#### **7.2.2 Noise Environment**

Monitoring of the noise levels and exposures is essential to assess the Environmental Management Plan implemented to reduce noise levels. A good quality integrated sound level meter and noise exposure meter may be procured for the same. Audiometric tests will be conducted periodically for the employees working close to the noise sources. Noise levels will be monitored within the project site on regular intervals.

#### **7.2.3 Water Environment**

Leachate, domestic sewage, water from piezometers, nearby bore wells, nearby surface water will be analysed regularly for the parameters given below. They are as follows:

- pH & EC
- Suspended Solids
- Dissolved Solids
- Oil and Grease
- Chloride
- Sulphide
- COD and BOD
- Nitrates
- Phosphates

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#### 7.2.4 Land Environment

The soil in the neighbouring areas will be analysed for the relevant parameters. The average canopy height of the greenbelt, number and types of plant species will be monitored. Air and noise pollution attenuation achieved by the greenbelt will also be evaluated. It would be ensured that trained and qualified staff supervises the monitoring of ambient air, stack gases, effluents, noise etc. to see that prescribed standards laid down are obtained.

#### 7.3 SURVEILLANCE AND MONITORING PLAN

The proposed monitoring program for the proposed project has three interrelated objectives.

- ❖ To check implementation and management of the various aspects required for Impact mitigation.
- ❖ To check how effective are the measures for mitigation and control of pollution.
- ❖ In case of non - compliance further measures for rectification.

All monitoring strategies and program have reasons and justifications which are often designed to establish the current status of an environment or to establish trends in Environmental parameters. In all cases the results of monitoring will be reviewed, analysed statistically and submitted to concerned authorities. The design of a monitoring program must therefore have regard to the final use of the data before monitoring starts. The monitoring program will have three phases

- 1) Construction phase
- 2) Monitoring phase
- 3) Post monitoring phase

##### 7.3.1 Construction Phase

The major construction activities involved in setting up of landfill plant, diesel generator, other civil, mechanical and electrical equipment. The construction activities require mobilization of construction material and equipment. The construction activities are expected to last for few months.

During construction phase of landfill at every stage quality of construction will be monitored viz. base preparation, liners quality, drainage layers, leachate collection system, storm water management system, gas vent systems, etc. The generic environmental measures that need to be undertaken during project construction stage are given in the following **Table 7.1**.



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**TABLE -7.1 ENVIRONMENTAL MEASURES DURING CONSTRUCTION PHASE**

S. No	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
1)	Air Emissions	All equipment's are operated Within specified design Parameters.	Random checks of equipment logs/ manuals	Periodic
		Vehicle trips to be minimized to the extent possible.	Vehicle logs	Periodic during site clearance & construction activities.
		Any dry, dusty materials stored in sealed containers or prevented from Blowing.	Stockpiles or open containers of dusty Materials.	Periodic during construction Activities.
		Compaction of soil during various construction activities	Construction logs	
		Maintenance of Construction DG set emissions to meet stipulated standards.	Gaseous emissions (SO <sub>x</sub> , HC, CO, NO <sub>x</sub> )	Periodic emission monitoring
		Ambient air quality within the premises & adjacent villages of the Proposed unit to be monitored.	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>x</sub> , NO <sub>x</sub> and CO	As per CPCB/ SPCB Requirement.
2)	Noise	List of all noise generating machinery onsite along with age to be prepared.	Equipment logs, noise reading	Regular during construction activities,
		Night working is to be Minimized.	Working hour records	
		Generation of vehicular activities noise	Maintenance of records of vehicles	
		Implement good working practices (equipment selection and siting) to minimize noise and also reduce its impacts on human health (ear muffs, safe Distances and enclosures).	Site working practices records, noise reading	
		Acoustic mufflers/ enclosures to be provided in large engines	Mufflers/enclosure shall be in place	Prior to use of equipment
		Noise to be monitored in ambient air within the plant premises.	Instant Noise recording	As per CPCB/SPB requirement
		The noise level will not exceed the permissible limit both during day and night times		
		All equipment operated within specified design parameters.	Random checks of equipment logs/ manuals	Periodic during Construction activities
	Vehicle trips to be minimized to the extent possible	Vehicle logs		

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S. No	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
3)	Soil Erosion	Protect topsoil stockpile.	Site boundaries not extended /breached as per plandocument Effective cover in Place.	Periodic during Construction activities
4)	Waste water Discharge	No direct discharge of Wastewater to be made to surface water, groundwater or soil.	No discharge hoses shall be in vicinity of water courses	Periodic during Construction activities
		The discharge point would be selected properly and sampling and analysis would be undertaken prior to discharge.	Discharge norms for effluents as given in Permits	Periodic during construction activities
		Take care in disposal of wastewater generated such that soil and groundwater resources are protected.	Discharge norms for effluents as given in permits	
5)	Drainage and Effluent Management	Ensure drainage system and specific design measures are working effectively. The design to incorporate existing drainage pattern and avoid disturbing the same.	Visual inspection of drainage and records thereof	Periodic during construction activities
6)	Waste Management	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection, handling & disposal of each waste arising.	Comprehensive Waste Management Plan should be in place and available for Inspection on site. Compliance with SWM Rules, 2016	Periodic check during construction activities.
7)	Non-routine events and accidental releases	Plan will be drawn, considering likely emergencies and steps required to prevent / Limit consequences.	Mock drills and records of the same	Periodic during Construction activities
8)	Health	Employees and migrant labour health check-ups	All relevant parameters Including HIV.	Regular check-ups as per Factories Act

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### 7.3.2 Operation Phase:

During Monitoring and auditing following procedures will be taken: -

- ❖ Reducing operational costs.
- ❖ Training the staff and defining the responsibilities.
- ❖ Facilitate adequate equipment and materials for proper handling of municipal solid waste.
- ❖ Providing write up to-date procedures specifying operational methods.
- ❖ Maintenance and calibration of the equipment both for operations and Monitoring.
- ❖ Retention of record.

Regular monitoring of the various components of the physical environment is planned during the operations period of the facility and also during the post-closure period.

**TABALE 7.2 ENVIRONMENTAL MEASURES DURING OPERATION PHASE**

S. No.	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
1)	Air Emissions	Gas quality from landfill areas	VOC, H <sub>2</sub> S	
		Stack emissions from DG sets	As per CTO conditions PM, SO <sub>x</sub> , NO <sub>x</sub>	
		AAQ within the Project premises	As per CTO conditions / NAAQ Standards	
		All vehicles to be PUC Certificate.	Vehicle logs to be Maintained	
		Meteorological data	Wind speed, direction, temp., relative Humidity and rainfall.	
2)	Noise	Noise generated from operations to be monitored	Spot Recording Noise level	Periodic during operation phase Once in month by third party
3)	Wastewater Discharge (leachate)	Compliance to wastewater discharge standards	pH, TSS, TDS, BOD, COD and Oil & grease (heavy metals if required)	Daily at regular intervals Once in a month by third party
4)	Solid waste/Hazardous Waste	Check compliance to SWM rules	Quality & quantity Monitoring	Periodically norms. /CPCB
5)	Ground Water Quality	Monitoring ground water quality, through piezometers	As per CPCB guidelines	Periodically & as Per CPCB norms.

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S. No.	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
6)	Flora and Fauna	Vegetation, greenbelt / green cover development	No. of plants, species	Once a year
7)	Soil quality	Checking & Maintenance of good soil quality around the site.	Physico-chemical Parameters and Metals.	Once a year
8)	Health	Employees and migrant labour health check ups	All relevant parameters (BP, HIV, Chest X-ray, Eye vision, etc.) and HIV for workers	Regular check-ups as per Factories act.

### 7.3 (A) ENVIRONMENTAL MEASURES DURING POST OPERATIONAL PHASE

S. No.	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
1)	Air Emissions	Gas quality from landfill areas	VOC, H <sub>2</sub> S	As per CFE conditions given by SPCB or EC conditions given by MoEF & CC and as per CPCB protocol.
		AAQ within the project Premises. All vehicles to be PUC Certificate.	As per CFE conditions / NAAQ Standards Vehicle logs to be maintained.	
		Meteorological data	Wind speed, direction, Temperature, relative Humidity and rainfall.	
2)	Wastewater Discharge (leachate) if present	Compliance to wastewater discharge standards	pH, TSS, TDS, BOD, COD, Oil & grease,	Once in a month (during initial period more regularly)
3)	Ground Water Quality and Water Levels	Monitoring groundwater quality, and water levels within	As per CPCB protocol	Periodically and CPCB protocol
4)	Flora and Fauna	Vegetation, greenbelt /green cover development.	No. of plants, species	Once a year
5)	Health	Employees and migrant labour health check ups	All relevant parameters (BP, Sugar, chest X-ray, Eye vision, etc.) and HIV for workers	Regular check-ups as Per Factories Act.

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**TABLE NO- 7.3 ENVIRONMENTAL MONITORING PLAN**

Environmental Component	Project/Phase	Monitoring		Institutional Responsibility	
		Parameters	Standards		Frequency
Air	Pre-Construction Phase	PM10, PM2.5, SO <sub>2</sub> , NO <sub>2</sub>	As per SWM Rules, 2016 and Air (Prevention and Control of Pollution) Rules, 1984	24 hrs sampling for PM, and SO <sub>x</sub> & NO <sub>x</sub>	Contractor through approved monitoring agency
	Construction Phase	PM10, PM2.5, SO <sub>2</sub> , NO <sub>2</sub>		24 hrs sampling for PM, and SO <sub>x</sub> & NO <sub>x</sub>	Contractor through approved monitoring agency
	Operation Phase	PM10, PM2.5, SO <sub>2</sub> , NO <sub>2</sub>		3 locations, 8 hour samples per day, and monitoring for three Seasons.	Contractor through approved monitoring agency
Ground Water	Pre-Construction Phase	pH, Total Dissolved Solids (TDS), heavy metals like As, Cd, Cr, Co, CN, Pb, Hg, Ni, Zn etc., Nitrate, Chloride, Phenolic Compounds and Sulphate.	As per SWM Rules, 2016 and Water quality standards by CPCB/ IS 10500:1991	sampling at above selected locations	Contractor through approved monitoring agency
	Construction Phase	pH, Total Dissolved Solids (TDS), heavy metals like As, Cd, Cr, Co, CN, Pb, Hg, Ni, Zn etc., Nitrate, Chloride, Phenolic Compounds and Sulphate	As per SWM Rules, 2016 and Water quality standards by CPCB/ IS 10500:1991	6 Samples in Pre monsoon and 6 samples in post monsoon during operation phase	Contractor through approved monitoring agency

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Environmental Component	Project/Phase	Monitoring		Institutional Responsibility
		Parameters	Standards	
Noise	Operation Phase	Do	As per SWM Rules, 2016 and Water quality standards by CPCB/IS10500:1991	--
	Pre-Construction Phase	Noise level on dB(A) scale	Noise standards by CPCB	Hourly monitoring for 24 hours at once
	Construction Phase	Noise level on dB (A) scale	Noise standards by CPCB	Hourly monitoring for 24 hours at once
	Operation Phase	Noise level on dB(A) scale	Noise standards by CPCB	Hourly monitoring for 24 hours at once
Soil	Pre-Construction phase	Color, pH, Electrical Conductivity, Moisture Content, Organic Carbon, Bicarbonate, Chloride, P, K, Ca, Mg, Na, SAR, N, Texture	As per Environment (Protection) Act, 1986 and SWM Rules, 2016	Representative samples form in and around project site
	Operation Phase	Do	As per Environment (Protection) Act, 1986 and SWM Rules, 2016	Representative samples form in and around project site Twice a year

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Environmental Component	Project Phase	Monitoring Standards		Frequency	Institutional Responsibility
		Parameters	As per SWM Rules, 2016		
Leachate	Operation Phase	Suspended solid, Dissolved solid, pH, Ammonical Nitrogen, Total Kjeldjhal Nitrogen, BOD, COD, As, Hg, Pb, Cd, Cu, Cr, Zn, Ni, CN, Fluoride, Phenolic compound	As per SWM Rules, 2016	Before discharging of Leachate for reuse	Contractor through approved monitoring agency
Compost quality	Operation Phase	Arsenic, Cadmium, Chromium, Copper, Lead, Mercury, Nickel, Zinc, C/N Ratio, pH	As per SWM Rules, 2016	Before selling the compost	Contractor through approved monitoring agency
Social Factors	Pre-construction phase	Aesthetics, Vectors, Odor, Health of surrounding Habitants and workers, communicable disease and occupational diseases (like skin infection, lung infection, fungal infection, etc	As per SWM Rules, 2016	Once	Contractor through approved monitoring agency
	Construction Phase	Aesthetics, Vectors, Odor, Health of surrounding Habitant, Communicable diseases	As per SWM Rules, 2016	Yearly monitoring of workers health and monitoring of diseases in the surrounding community	Contractor through approved monitoring agency
	Operation Phase	Do	Do	Yearly monitoring of workers health and seasonal monitoring of diseases in the surrounding Community. Annual assessment of the ratio of the incident of particular disease related to the project activity	Contractor through approved monitoring agency

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#### 7.4 PUBLIC HEALTH MONITORING

There is three-stage health-monitoring program is proposed.

- ❖ Monitor the health of workers within the project site to identify adverse health Effects.
- ❖ Periodically obtain feedback from local doctors regarding any potential indicators of adverse health effects due to environmental cause in the communities surrounding, and particularly down-stream of the landfill.
- ❖ By organizing health camps on regular basis.

#### 7.5 BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT

The below table give overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

**TABLE NO-7.4 BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT**

S. No.	Particulars	Capital cost in lacs	Budget in lacs (per Year)
1	Environmental Pollution control (Air, water, Soil, Noise etc.)	10.0	0.50
2	Environment Monitoring	-	1.5
3	Occupation	2.0	0.50
4	Green Belt	7.0	1.0
<b>Total</b>		<b>19.0</b>	<b>3.5</b>

**TABLE NO-7.5 BUDGETARY BREAK UP FOR LABOUR**

S. No.	Activity	Budget in lacs/Year
1.	Safe Drinking Water	0.50
2.	Urinal, Latrine and Bathrooms	1.00
3.	PPE and Safety equipment will be Provided	0.20
4.	First Aid facility	0.20
5.	Regular Health checkup and provision of medicine	0.25
6.	Educational and awareness programme for safety measures & Recreational program	0.30
<b>Total</b>		<b>2.45</b>





# **CHAPTER 8**

## **ADDITIONAL STUDIES**

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## **8.1 RISK ASSESSMENT & DISASTER MANAGEMENT PLAN**

The principal objective of the risk assessment study is to identify and quantify the major hazards and the risk associated with various operations of the proposed project, which may lead to emergency consequences (Disasters) affecting the public safety and health. Based on this information, an emergency preparedness plan is to be prepared to mitigate the consequences. The approach involves hazards identification, assessment, valuation and developing Disaster Management Plan (DMP).

### **8.1.1 Risk analysis**

Risk analysis includes an estimate of the probability or likelihood that an event will occur. Estimation of random incidents totally uncorrected with plant activities may also be taken. Risk can be characterized in qualitative terms as high medium or low, or in quantitative terms using numerical estimates and statistical calculations. For practical purposes a risk analysis may be based on a subjective, common-sense evaluation. Both probability and consequences are extremely important in evaluating risk. A high risk situation can be the result of a high probability with severe consequences (e.g. irreversible health effects or death due to an airborne toxic dust, a fire or explosion with Injuries or fatalities), whereas moderate risk situations can be a result of either high probability with mild consequences or low probability with more severe consequences.

In order to be in a state of readiness to face the adverse effects of accidents, an Emergency Preparedness Plan (EPP) has to be prepared. Such a plan must. Inter-alia, cover the possible hazardous situations in the locality and the causes, areas most likely to be affected, on-site and off-site plans, establishment of Emergency Control Centres (ECC), location of emergency services and duties of officers/staff during emergency.

The following major hazards are anticipated in the proposed project: -

- ❖ Hazardous pertaining to fires in project / plant area
- ❖ Fire in diesel storage areas, garbage storage area and disposal areas
- ❖ Natural disaster (Earthquakes, flooding etc.)
- ❖ Electrical accidents,
- ❖ Flooding from man-made causes,
- ❖ Rainfall induced landslides,

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❖ Environmental & Health Aspects

**8.1.2 Disaster management plan-**

Emergency preparedness and prevention through good design, operation, maintenance and inspection is essential to reduce occurrences of eventualities. The overall objectives of the DMP is to make use of the combined resources at the site and outside services to achieve the following-

- ❖ Localize the emergency on property and people
- ❖ Minimize effects on property and people
- ❖ Effective rescue and medical treatment
- ❖ Evacuation

In order to be in a state of readiness to face the adverse effects of accidents, an Emergency Preparedness Plan (EPP) has to be prepared. Such a plan must. Inter-alia, cover the possible hazardous situations in the locality and the causes, areas most likely to be affected, on-site and off-site plans, establishment of Emergency Control Centres (ECC), location of emergency services and duties of officers/staff during emergency.

**On-site Disaster-**

If an accident/incident takes place within industrial area and its effects are confined to the premises, involving only the persons working in the Industrial area and the property inside the Industrial area, it is called as on-site disaster.

**Off-site Disaster**

If the accident is such that its affects inside the industrial area are uncontrollable and it may spread outside the premises, it is called as off-site disaster.

**(A) On-site Disaster Management Plan- Main Elements of On-site**

**Emergency Plans-**

- ❖ Leadership and administration.
- ❖ Role and responsibilities of key personnel.
- ❖ Emergency action.
- ❖ Light and power.
- ❖ Source of energy control.
- ❖ Protective and rescue equipment.

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- ❖ Communication.
- ❖ Medical care.
- ❖ Mutual aid.
- ❖ Public relation.
- ❖ Protection of vital records.
- ❖ Training.
- ❖ Periodical revision of plan

#### **Action Plan for on-site Disaster Management Plan: -**

##### **8.1.2.1 Control Centre**

This is the main centre from where the operations to handle the emergency are directed and coordinated. Facilities to be made available in the control centre are:

Internal and external communication.

Computer and other essential records.

Daily attendance of workers employed.

Storage of hazardous material records and manufacturing records.

Pollution records.

Plan of the industrial area showing:

- a) Storage area of hazardous materials.
- b) Storage of safety equipment.
- c) Firefighting system and additional source of water.
- d) Site entrance, roadway and emergency exist.
- e) Assembly points.
- f) Truck parking area.
- g) Surrounding location.

Note Book, pad and pencil.

List of Key Personnel with addresses, telephone number etc.

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**TABLE 8.1 KEY PERSONS AND THEIR RESPONSIBILITIES DURING EMERGENCY**

S. No.	Key Person	Responsibilities
	<b>Site Main Controller</b>	<ul style="list-style-type: none"> <li>• On reaching he will assess the magnitude of the situation in consultation with Incident Controller and decide whether inside or outside help are to be called (i.e. Fire Service, Police, and Ambulance etc.).</li> <li>• Ensure that key persons are called in.</li> <li>• Give guidance and direction in vital and important activities to control the emergency situation.</li> <li>• Direct to close down and evacuation of the plants in consultation with Incident controller and key personnel.</li> <li>• Inform the government authorities such as Collector, MC, Factory Inspector, Health Officer &amp; Medical Officer and request them for their help as situation demands.</li> <li>• Give prime importance to human life and guidance in organizing the rescue operations as well as ensure whether injured people getting proper medical attention in time.</li> <li>• Always be in touch with the Incident Controller to get further progress and decide further plan.</li> <li>• On completion of emergency situation declare the normalcy through Administrative Officer.</li> <li>• Control the re-occupation of the affected areas on discontinuation of emergency.</li> <li>• Do not permit to re-start the plant unless it is safe.</li> <li>• Give authentic statement of the incident to news media &amp; government authorities.</li> </ul>

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S. No.	Key Person	Responsibilities
	<b>Incident Controller</b>	<ul style="list-style-type: none"> <li>• Take the charge of situation and assess the magnitude of the event.</li> <li>• Control and guide all the operations with priorities to the safety of personnel, minimize pollution, loss of material and loss to the plant equipment and property.</li> <li>• Provide advice and guide to the fire fighting and rescuing squad and fire brigade while they arrive.</li> <li>• Establish communication with emergency control centre.</li> <li>• Report on all significant developments to the emergency control centre through phone/messenger.</li> <li>• Ensure that evacuation of the areas in the factory getting affected is complete.</li> <li>• After the emergency situation is brought under control, assure that the necessary evidence for further investigation in the incident is preserved and inform Site Controller regarding control of emergency.</li> </ul>
	<b>Technical Staff / Department Head</b>	<ul style="list-style-type: none"> <li>• As soon as informed, rush to the spot and take charge of the situation till senior group arrives.</li> <li>• Ensure that emergency siren is raised which gives information to security, safety, administration staff and technical staff.</li> <li>• On arrival of Incident Controller, inform him about the gravity of the situation and then to work under his guidance to control the situation.</li> <li>• Ensure that only experienced and essential people remains at the location for controlling, while others to be evacuated from the scene</li> </ul>
	<b>Employees</b>	<ul style="list-style-type: none"> <li>• Tackle the emergency as per laid down</li> </ul>

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S. No.	Key Person	Responsibilities
	<b>Near the Spot (Incident Area)</b>	<p>procedures for the area bearing in mind the requirements of the situation called for by the progress of the emergency.</p> <ul style="list-style-type: none"> <li>Remove all non-essential employees (who are not assigned any emergency duty) to evacuate the area and gather at the specified assembly points.</li> <li>Stop the operations as per the information of the Incident Controller.</li> </ul>
	<b>Employees of Other Department</b>	<ul style="list-style-type: none"> <li>On getting information of incident, take permission of superior and confirm own plant, department, safety and then after trained and skill persons will rush to incident spot with necessary personnel protective equipment.</li> <li>Approach the spot from up wind direction and assemble at safe place near to the spot taking in to consideration the wind direction.</li> <li>Extend help to control the situation as per the instruction and guidance given by the senior persons controlling the operation.</li> </ul>
	<b>Personnel Officer</b>	<ul style="list-style-type: none"> <li>Basically, he will work as a Liaison Officer and will station at emergency control centre during emergency. He will work under the direction of Site Controller.</li> <li>To ensure that the casualties receive adequate attention at first aid centre, also ensure additional help if require from government authorities or outside agencies.</li> <li>Arrange transport facility for injured personnel to get timely medical help.</li> <li>He will also arrange for head count at assembly points and will inform Site controller.</li> </ul>

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S. No.	Key Person	Responsibilities
		<ul style="list-style-type: none"> <li>• Also be in touch with the security and other departments for help.</li> <li>• Will check the roll call from time office for availability of trained personnel during emergency situation at the site.</li> <li>• Determine the need to inform statutory authorities of the accident and fill the necessary forms for submission with consultation of the Site Controller.</li> <li>• When emergency is prolonged, arrange for the relief of personnel as well as inform the families of injured persons and</li> <li>• Organize refreshments / catering facility. When emergency declared immediately rushed to emergency control centre.</li> </ul>
	<b>Administrative Officer</b>	<ul style="list-style-type: none"> <li>• When emergency declared, immediately rushed to the emergency control centre and establish contact with Site Main Controller.</li> <li>• Ensure the communication between site controller and incident controller. Keep messenger for communication.</li> <li>• Make arrangement to send portable megaphone and torches to the Incident Controller if required.</li> <li>• On receiving instructions from Site Controller, organize transportation for the evacuation of people from the assembly points.</li> <li>• As per instructions from Site Controller will inform to head office, insurance surveyor, other relevant authorities and neighbouring areas.</li> </ul>



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S.No	Key Person	Responsibilities
		<ul style="list-style-type: none"> <li>• On getting instructions from site controller / incident controller, he will be in touch with other Industries for help in emergency.</li> <li>• Will arrange to announce necessary instructions for all personnel.</li> <li>• Ensure that telephone operator keeps the EPABX free to extend possible for incoming calls.</li> <li>• Ensure that press and other media do not publish unauthentic news.</li> </ul>
	<b>Engineering Services Key Personnel</b>	<ul style="list-style-type: none"> <li>• When emergency declared, immediately proceed to Emergency Control Centre.</li> <li>• Ensure the availability of electrical wiremen, utility, maintenance employees and drivers.</li> <li>• Ensure the water supply &amp; electric power generator in case of power failure.</li> <li>• Be in touch with the site controller / incident controller to extend help as and when required.</li> <li>• Arrange the vehicle as per required by administrative / personnel officer.</li> </ul>
	<b>Security &amp; Fire In-Charge</b>	<ul style="list-style-type: none"> <li>• On getting instruction from site controller/incident controller, cordon the affected area to maintain law and order.</li> </ul> <p>As per instruction from site controller/incident controller, arrange to use the fire extinguishers.</p> <ul style="list-style-type: none"> <li>• Ensure the following duties by security guards. Stop all vehicles and visitors entering into the factory, except any government authorities such as fire brigade, police, factory inspector, medical staff and inform administrative officer on their arrival.</li> <li>• If any press reporter and local leader come at</li> </ul>

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S. No.	Key Person	Responsibilities
		<p>the main gate, take them to administration office.</p> <ul style="list-style-type: none"> <li>• Do not allow any vehicle to park at the main gate or nearby at main road.</li> <li>• Assure that the entrance of the gate is clear for thorough fare. In similar way control/ guide internal traffic for smooth operations.</li> <li>• Act according instructions given by personnel and administrative officer.</li> <li>• Ensure that all essential personnel evacuated and assembled at assembly points.</li> <li>• Arrange effective security nearby the incident place</li> </ul>
	<b>Safety Officer</b>	<ul style="list-style-type: none"> <li>• On hearing emergency siren rush to the spot and assume the position of incident controller and take care of the situation till a senior personnel arrives and on their arrival work with them in team, extending their own expertise.</li> <li>• Give instructions and guideline to the people involved in control measures. As well as help in providing required PPE.</li> <li>• Give instructions to the safety attendants.</li> <li>• Brief the site main controller about the progress of control measures.</li> <li>• Advise site controller regarding type of help required from outside.</li> <li>• Give instructions to other department through internal phones /Communication Officer.</li> <li>• Make arrangement to carry out monitoring whenever necessary and appraise results to the concerned seniors.</li> </ul>
	<b>First Aid Attendants</b>	<ul style="list-style-type: none"> <li>• As per the instructions given by incident controller, arrange the supply of additional</li> </ul>

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S. No.	Key Person	Responsibilities
		<p>emergency related equipment to the incident place. Give necessary First Aid treatment to the affected persons immediately.</p> <ul style="list-style-type: none"> <li>• Inform the personnel and administration officer regarding the severity of injury and advice for further medical help if necessary.</li> <li>• Ask for additional trained first-aiders, if required.</li> <li>• On arrival of doctor, assist him to give medical treatment to the affected people.</li> </ul>
	<b>Driver</b>	<ul style="list-style-type: none"> <li>• On getting information from communication officer remain alert and wait for further instructions along with Ambulance van to meet with emergency.</li> <li>• Extend help to shift the injured people from site of incident to first-aid and if required to hospital through ambulance / other vehicle.</li> </ul>
	<b>Electrical / Utility Personnel</b>	<ul style="list-style-type: none"> <li>• After getting the information rush to the spot with necessary personal protective equipment and if instructed by incident controller cut off the power supply to the affected area.</li> <li>• Ensure that the D.G. Set is in running condition.</li> <li>• Extend help to the Utility operator in maintaining adequate supply of water and others under guidance of supervisors.</li> </ul>

#### Information of Assembly Points

At the time of emergency, non - essential workers, casual workers, visitors and others are to be replaced to assembly points and separate in charge are nominated. Number of Assembly points and location are decided based on the layout of the plant.

In case of an emergency, the visitors, contract persons and factory employees will gather at nearby assembly point. Pre-designated persons will take their roll call. If needed, they can be evacuated easily through any gate in a short period as per instruction of site main controller.

For outside help, company authority will make a mutual understanding with the following Authorities to extend their help whenever an emergency occurs:

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Doctors from civil hospital

Police station

Fire brigade

Time to time company has to inform/impart training to concerned employees for awareness about chemicals and its hazards and the precautionary measures on their part. An emergency guide will be provided to each employee, which gives guidance to him or her during an emergency.

**(B) Off-site Disaster**

The main objectives of the off-site emergency plan are:

- ❖ To save lives and injuries.
- ❖ To prevent or reduce property losses.
- ❖ To provide for quick resumption of normal situation or operation.

Chemical accidents (Emergency Planning, Preparedness and Response) Rules, 1996 Prescribes for the constitution of the State Crisis Group as apex body at the State Level to deal with major chemical accidents and to provide expert guidance for handling major chemical accidents. Schedule 7 and Schedule 8 of the Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 prescribes for the constitution of District and Local Crisis Groups.

**(i) Functions of the State Crisis Group: -**

- ❖ Review all district off-site emergency plans in the State with a view to examine its adequacy in accordance with the Manufacture, Storage and Import of Hazardous Chemical rules and forward a report to the central crisis group once in three months.
- ❖ Assist the state government in managing chemical accidents at a site
- ❖ Assist the state government in the planning, preparedness and mitigation of major chemical accidents at a site in the state.
- ❖ Continuously monitor the post-accident situation arising out of a major chemical accident in the state and forward a report to the central crisis group.
- ❖ Review the progress report submitted by the district crisis groups.

**(ii) Functions of the District Crisis Group: -**

- ❖ Assist the preparation of the district off-site emergency plan.
- ❖ Review all the on-site emergency plans prepared by the occupier of major accident hazards installation for the preparation of the district off-site emergency plan.

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- ❖ Assist the district administration in the management of chemical accidents at a site lying within the district.
- ❖ Continuously monitor every chemical accident.
- ❖ Ensure continuous information flow from the district to the Centre and State Crisis Group regarding accident situation and mitigation efforts.
- ❖ Forward a report of the chemical accident within fifteen days to the State Crisis Group.
- ❖ Conduct at least one full scale mock-drill of a chemical accident at a site each year and forward a report of the strength and the weakness of the plan to the State Crisis Group

**(iii) Functions of the Local Crisis Group: -**

- ❖ Prepare local emergency plan for the industrial pocket.
- ❖ Ensure dovetailing of local emergency plan with the district off-site emergency plan.
- ❖ Train personnel involved in chemical accident management.
- ❖ Educate the population likely to be affected in a chemical accident about the remedies and existing preparedness in the area.
- ❖ Conduct at least one full scale mock-drill of a chemical accident at a site every six months and forward a report to the District Crisis Group.
- ❖ Respond to all public inquiries on the subject

**Central Control Committee**

As the offsite plan is to be prepared by the Government, a Central Control Committee Shall be formed under the Chairmanship of the District Collector. Other officers from police, fire Service, factory inspectorate, medical department shall be incorporated as Members of the Central Control Committee. Under the Central Control Committee, the following committees shall be constituted under the control of the District Collector.

- ❖ Incident and Environment Control Committee
- ❖ Fire Control Committee
- ❖ Traffic control, law and order, evacuation and rehabilitation committee
- ❖ Medical help, ambulance and hospital committee
- ❖ Welfare, restoration and resumption committee
- ❖ Utility and engineering services committee
- ❖ Press, publicity and public relations committee

The off-site Emergency Plan shall be prepared by the District Magistrate in consultation with the factory management and Govt. agencies.

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The plan contains up-to-date details of Outside emergency services and resources such as fire services, hospitals, police etc. with telephone number. The district authorities are to be included in the plan area.

- ❖ Police Department
- ❖ Revenue Department
- ❖ Fire Brigade
- ❖ Medical Department
- ❖ Municipality
- ❖ Gram Panchayat
- ❖ Railway Department
- ❖ Telephone Department
- ❖ Factory Department
- ❖ Electricity Department
- ❖ Pollution Control Department
- ❖ Explosive Department
- ❖ Press and Media

## **8.2 IDENTIFICATION OF MAJOR HAZARD INSTALLATIONS BASED ON GOI RULES, 1989 AS AMENDED IN 1994 AND 2000: -**

By studying accidents occurred in industries in India over a few decades, a specific legislation covering major hazard activities has been enforced by Government of India in 1989 in conjunction with Environment Protection Act, 1986. This is referred here as GOI rules 1989. For the purpose of identifying major hazard installations the rules employ certain criteria based on toxic, flammable and explosive properties of chemicals.

### **8.2.1 Safety Precautions for the Storage of Fuel: -**

Separately stored with proper enclosures and marked within premises in closed Shed.

Sufficient fire extinguishers and PPE to be provided.

Smoking to be prohibited.

### **8.2.2 Identification of Hazards: -**

The first step in risk assessment is to identify the types of adverse health effects that can be caused by exposure to some agent in question, and to characterize the quality and Weight of evidence supporting this identification.

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**TABLE-8.2 IDENTIFICATION OF HAZARDS**

S. No.	Hazard-Name	Operability/ Condition/ Cause and Consequence	Control measures/ Action required
1.	<b>Physical hazards</b>		
A	Fire hazard in windrow Composting due to elevated Temperatures.	Fire hazard may exist with composting process as elevated temperatures and drying may increase the potential for Spontaneous combustion.	<ul style="list-style-type: none"> <li>• Periodic mixing of composting material and maintenance of the proper water content should be done to control windrow compost Temperature and prevent fires.</li> <li>• A well-designed fire suppression system with sufficient water capacity and at sufficient pressures to adequately control a fire within the facility and approved by the local fire authority will be installed.</li> <li>• Portable fire extinguishers and fire control equipment in proper working condition, at the operating area of the facility.</li> </ul>
	<ul style="list-style-type: none"> <li>• Fire Hazard,</li> </ul>	Possible causes of fires at composting facilities include:- <ul style="list-style-type: none"> <li>• spontaneous combustion due to rise in temperature</li> <li>• Lightning strikes.</li> <li>• Cigarettes,</li> <li>• Build-up of particulate matter near engine manifolds and exhaust pipes of processing equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• Unauthorised access to the premises to be prevented.</li> <li>• Banning lighting cigarettes, fires onsite</li> <li>• Regular monitoring of the quantity of gas being vented</li> </ul>

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S. No.	Hazard Name	Operability/ Condition/ Cause and Consequence	Control measures/ Action required
		<ul style="list-style-type: none"> <li>Explosion due to build- up of methane inside the closed landfill in lack of adequate number of gas venting apparatus.</li> </ul>	
	Heavy equipment's and machinery for waste tipping	During soil excavation and compost pile construction, workers may be seriously injured or killed by heavy equipment such as Front- end loaders and scrapers.	<ul style="list-style-type: none"> <li>When approaching operating equipment, the approach should be made from the front and within view of the operator, preferably making eye contact.</li> <li>Heavy equipment should be equipped with a backup alarm that alerts workers.</li> </ul>
	Rough sharp waste items	Workers may be exposed to puncture and cut hazards to feet and hands from rough or sharp waste material during composting operations.	Workers should wear safety boots with steel shanks to prevent Cuts to the bottom of the foot. Workers should minimize manual handling of waste material, and wear cut-resistant gloves if contact with waste materials are necessary.
	Trip Hazards due to pipes/hoses	Trip hazards may exist with hoses and piping systems used for Irrigation of the composting unit.	Workers should exercise caution when walking over hoses and pipes. In heavily travelled areas, extra lighting may be needed to ensure walkways are adequately illuminated.
<b>Chemical Hazards</b>			
	Confined spaces/ covered compost	<ul style="list-style-type: none"> <li>Since a closed shed is proposed for the compost</li> </ul>	Prior to each entry into the enclosed or tented area, the



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S. No.	Hazard Name	Operability/ Condition/ Cause and Consequence	Control measures/ Action required
	pads (CO <sub>2</sub> , CH <sub>4</sub> )	<p>plant, it may be considered that the workers entering the facility enter a Confined space.</p> <ul style="list-style-type: none"> <li>Elevated levels of CO<sub>2</sub> may accumulate during composting process.</li> <li>It is also typical for some ammonia gas to be generated during composting.</li> <li>Exposure to ammonia vapours may occur, especially during waste turning operations.</li> <li>Although aerobic conditions should be maintained in the compost, if anaerobic conditions are allowed to develop, methane and hydrogen sulphide may be generated.</li> </ul>	<p>atmosphere within the tent should be tested to ensure a safe Atmosphere. If the testing indicates atmospheric contaminants or oxygen depletion, a confined-space entry program should be developed and implemented.</p>
	Inhalation/ ingestion/ skin contact	<p>Workers may be exposed to contaminants and degradation Products of contaminants. Exposure may occur inhalation /ingestion/skin contact routes of exposure during loading, unloading, preprocessing, tilling, turning and other operations where soils are agitated.</p>	<p>An analysis of the work tasks and Potential for chemical exposure should be performed to determine the correct personal protective equipment (PPE) and/or respirator cartridge(s), if needed. The analysis should include obtaining specific chemical hazard information to ensure that the PPE specified will be</p>

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S. No.	Hazard Name	Operability/ Condition/ Cause and Consequence	Control measures/ Action required
			appropriate for the respective chemical hazard. Workers may also use respiratory protection including the use of an air-purifying respirator equipped with HEPA (N100, R100, P100) filters and Organic vapour cartridges.
	Chemical reactions within the stored mixed waste.	Some materials used in composting may be explosive, especially when in contact with other incompatible materials (e.g. ammonium nitrate and fuels). Others may be hygroscopic, which may result in chemical reactions.	<ul style="list-style-type: none"> <li>Workers should minimize contact with acidic or corrosive chemical materials by using mechanical chemical delivery methods.</li> <li>Where contact is required, workers should wear gloves (e.g. nitrile) and other personal protective equipment that is resistant to the Materials handled.</li> <li>All chemical reagents used in composting should be segregated to prevent accidental mixing of reactive chemicals, especially Ammonium nitrate fertilizers and fuels.</li> </ul>
<b>Biological Hazards</b>			
	Allergies from pathogen and airborne dust	During dry and windy periods microbe-entrained dusts may become airborne from soil agitation.	<ul style="list-style-type: none"> <li>Periodic application of water to the active area.</li> <li>Personal protective equipment, such as rubber</li> </ul>

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S. No.	Hazard Name	Operability/ Condition/ Cause and Consequence	Control measures/ Action required
		- Exposure to mold spores, including <i>Aspergillus fumigatus</i> and thermophilic actinomycetes, may occur during composting operations. - Inhalation of pathogenic microbes may cause allergic reactions or illness.	gloves, should have used. • Respiratory protection (e.g. air-purifying respirator with HEPA (N100, R100, P100) filter/cartridge) may be used during dusty periods.
	Pests/ bugs at Site	Workers may be exposed to a wide array of biological hazards, including snakes, bees, wasps, massive fly hatches, ticks, hornets, and rodents which get attracted to the higher temperatures associated with composting operations and other hideout warm places.	• Workers should be informed of the potential for snakes and other animals around the compost facility, especially during cooler periods. • Periodic inspections of the site should be performed to identify stinging insect nests and for the presence of snakes. Professional exterminating companies should be consulted for their removal.

### 8.3 IDENTIFICATION OF HAZARDS

**8.3.1 Fire Hazard:** - The following activities and precautions will be taken in order to prevent fire mishaps and to manage emergency situations during the operational phase of the project:

- ❖ Fire protection equipment i.e. fire extinguishers shall be provided at the site.
- ❖ It will be advised to keep oxygen cylinders, medical kits and masks to prevent Smoke inhalation.
- ❖ Maintenance of firefighting equipment will be ensured by concerned person at project site.
- ❖ Cover nose and mouth with wet and clean cloth as it prevents smoke inhalation.
- ❖ Avoid running around in the MSW facility as it leads to inhaling of more poisonous Gases.
- ❖ Ensure strict compliance to the evacuation plan and assist others to escape the site.

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### 8.3.2 Natural Disaster: -

Natural disasters such as earthquakes, floods, hurricanes, landslide etc pose an eminent threat to the proposed project. As there is no way of avoiding such disasters, the following measures can be adopted in case of such occurrences.

Natural disaster	Action
Extreme weather conditions such as tornado or storm	Maintain correspondence with local Meteorological departments to have enough. Take shelter in facilities without windows.
Earthquake	Stay indoors and move to central parts of the building. People staying outdoor should stay outdoor and avoid being in near vicinity to any building or facility. In case of spread of toxic fumes from sanitary.
Flood	Landfill, close doors, windows and seal any cracks or gaps in the buildings. Turn off electricity to reduce risk of Electrocutation.
	Decontaminate flooded rooms. Carry out official instruction over the radio or by loudspeaker.
Landslides	These are likely during monsoon or in heavy down pour conditions. The site conditions around the landfill should be identified for such events if occurred earlier and accordingly precautionary measures need to be taken during such events. The hierarchical set up needs to be planned to take action immediately so that the District Magistrate and other local authorities may be informed to take control of the situation.

### 8.3.3 Electrical Accidents: -

The electrical accidents may occur due to malfunctioning of electrical machinery or due mishap resulting due to short circuits in the LT/HT (high Tension /Low Tension) section of the landfill unit. Also, another possibility of electrical accidents is due to leakage of moisture or water during rains when there is ingress of water or moisture due to failure of the enclosure or cover over the electrical apparatus or at distribution point or at the receiving section of HT/LT cable.

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The electrical accidents may cause secondary accidents such as fire or burns to the operator/s of the equipment or machinery. To avoid such incidents, regular maintenance of electrical wiring/LT/HT section and distribution panel/s may be done periodically as recommended by competent person. Also a certificate to that effect may be kept in display for information of all. The safety aspects as covered under safety requirements as prescribed by the concerned safety inspector need to be followed up for prevention of such accidents.

#### **8.3.4 Environmental & Health Aspects: -**

There are potential risks to environment and health from improper handling of solid wastes. Direct health risks concern mainly the workers in this field, who need to be protected, as far as possible, from contact with wastes. For the general public, the main risks to health are indirect and arise from the breeding of disease vectors, primarily flies and rats.

##### **8.3.3.1 Environmental Aspects: -**

The most obvious environmental damage caused by municipal solid wastes is aesthetic, the ugliness of street litter and degradation of the urban environment and beauty of the landscape. More serious, however, and often unrecognized, is the transfer of pollution to water, ground water. Air pollution can be caused from the inefficient burning of wastes, either in open air, or in plants that lack effective treatment facilities from the gaseous effluents. The generation of stinking odour around the site is a major source of discomfort amongst the inhabitants. The local wind conditions may aggravate this problem further.

##### **8.3.3.2 Health Aspects: -**

Epidemiological studies have shown that a high percentage of workers who handle refuse, and of individuals who live near or on disposal sites, are infected with gastrointestinal parasites, worms and related organisms. Contamination of this kind is likely at all points where waste is handled. A major adverse impact is due to the attraction of rodents and vector insects for which it provides food and shelter. Further the decomposing matter in the landfill is the beehive for flies and other insects and disease vectors such as cholera, typhoid, dysentery, malaria, jaundice and other communicable diseases particularly skin problems, nausea, vomiting, headaches induced in the inhabitants around the site.

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**Project proponent carries out the following checks to curb the problem:**

- ❖ Pre - employment medical check-up at the time of employment.
- ❖ Annual medical check-up for all employees.
- ❖ First aid training for to the employees.
- ❖ Monitoring of occupational hazards like noise, ventilation, chemical exposure to be carried out at frequent intervals, the records of which to be documented.

**Mitigation measure -**

All precautionary measures should be taken to avoid foreseeable accidents like spillage, Fire and explosion hazards and to minimize the effect of any such accident and to combat any emergency at site level. Some of the preventive safety measures to be taken to minimize the risk of accident with respect to technical safety, organizational safety and personal safety are listed below:

- ❖ All reasonably practicable measures to minimize the risk of such accident in Compliance with the legal obligation under the relevant safety.
- ❖ Safety features such as fire extinguishers, fire hydrant system and suitable Personal Protective Equipment (PPE) to be provided. Regular operations and testing of fire extinguishers to be carried out.
- ❖ Training of workers and staff to be given for safe waste, fire fighting, first aid and integrating safety, in all activities.
- ❖ Accident / Incident reporting system and information of employees about the same to be done for better awareness.
- ❖ Personal Protective Equipment (PPE) like goggles, safety shoes, helmet, apron, earplugs, facemask & clothing to be provided to employees as per the job requirements.

**8.3.3.3 Leachate and Storm Water Management during Monsoon**

- ❖ Leachate treatment plant is designed to accept excess leachate generated during the monsoon period.
- ❖ A very critical aspect in wastewater management would be minimization of generation of leachate/ wastewater.
- ❖ To minimize the same, we propose to keep a maximum portion of the landfill covered especially during the monsoon, thus minimizing the generation of leachate.

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- ❖ Water collected in the pond shall be tested for storm water quality parameters and if it meets the discharge standards shall be discharged, otherwise the same shall be considered as leachate and sent to the leachate treatment plant.

#### **8.4 BASIS OF PLAN AND HANDLING OF EMERGENCY: -**

- ❖ It is not possible to envisage and detail every action, which should be taken during an emergency. The basic philosophy is to get key personnel of necessary discipline who have the knowledge and background to assess the situation and give directions as per the objectives as quickly as possible.
- ❖ The plan identifies the services/departments required to combat emergencies and also identifies the key persons to discharge the duties.
- ❖ Key personnel have been identified for emergencies and are responsible for providing necessary assistance.
- ❖ Messages via telephones are restricted to key personnel only. This is required to keep the telephones free for key personnel to contact for necessary feed-back.
- ❖ Senior person who arrives on scene is automatically in charge for the service group. He should not leave the site without entrusting the charge to his deputy. All the key personnel should be available at the main control room. All key personnel of other services to report to main site controller, whom to coordinate between various departments and outside agencies

#### **Personal Protective Equipment**

- ❖ Face masks
- ❖ Hand gloves
- ❖ Gum boots
- ❖ Goggles
- ❖ Helmets
- ❖ Safety belts
- ❖ Aprons

#### **Equipment list**

- ❖ Internal / External telephone
- ❖ Portable alarm
- ❖ Torches
- ❖ Emergency cupboard with necessary PPE

# **CHAPTER 9**

## **PROJECT BENEFITS**



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### 9.1 INTRODUCTION

The proposed Municipal Corporation the "Authority" intends for Implementation of Remediation and Reclamation of Existing Dumpsite at Village Meghpur Palwal Haryana ("Dumpsite") and construction, operation and maintenance of Sanitary Landfill at sanitary landfill site at the Village Meghpur Palwal Haryana ("Sanitary Landfill Site").

### 9.2 BENEFITS OF BIOMINING

The benefit of bio-mining lies in abatement of ongoing and future pollution and ill health and in the recovery and re-use of valuable space. This is ideally for continued long-term waste management since public consent for new waste sites is increasingly difficult because of earlier visible mis-management of a virgin site. We shall ensure advance demarcation and declaration of a buffer zone of no new habitation for upto 500 meters around the cleared site to prevent real-estate activity from encroaching the buffer as soon as the dump is removed.

Cleared dumps are not permitted for habitation for at least 15 years (SWM Rules Schedule I. Permissible options are reuse for SWM, open stadia, sports grounds, parks and gardens, parking lots, container yards, warehouses of non-flammables and similar facilities where people are not living or working all day and night. Bio-remediation and bio-mining of MSW projects may not be economically viable but are mandatory to improve waste management ecosystems across India.

### 9.3 COMPOST PRODUCTION

The proposed project will have direct and indirect economic benefits in form of employment, development of ancillaries. Besides the compost production would add to the revenue to the operator of the landfill. The production of compost shall also enhance the crop productivity and improvement in the soil texture and enhancement of soil nutrients. The compost produced from the composting pads can be used as soil conditioner that improve soil quality. This compost has the ability to help regenerate poor soil by increasing nutrient content in soil and retain moisture.

The following benefits are being envisioned: -

- ❖ Use of compost produced as manure to the crops.
- ❖ Generation of revenue through the sale of compost produced from the MSW processing and disposal facility.

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#### **9.4 BENEFITS OF LANDFILL**

Landfills minimize the natural impact of solid waste on the environment by the following ways: -

- ❖ Isolation of inert waste through containment
- ❖ Elimination of polluting pathways

#### **9.5 RECYCLING**

A number of recyclable materials, for example paper, glass, plastic, rubber, ferrous and non-ferrous metals present in the MSW are suitable for recovery and reuse. This will benefit rag pickers.

#### **9.6 IMPROVEMENT IN PHYSICAL INFRASTRUCTURE:**

The proposed project is expected to yield a positive impact on the socio economic Environment. It helps sustain the development of this area including further development of physical infrastructural facilities. The following physical infrastructure facilities will improve due to proposed project.

- ❖ Road transport facilities
- ❖ Housing facilities
- ❖ Water supply and sanitation
- ❖ Power

#### **9.7 IMPROVEMENT IN SOCIAL INFRASTRUCTURE**

Agriculture & plantation are one of the basic sectors of employment for the local people in this area. The project will lead to indirect and direct employment opportunity. Employment is expected during operation period, garbage lifting and other ancillary Services. Employment in these sectors will be temporary or contractual and involvement of unskilled labour will be more. A major part of this labour force will be mainly from local villagers who are expected to engage themselves both in agriculture and project activities. This will enhance their income and lead to overall economic growth of the area.

#### **EMPLOYMENT POTENTIAL**

In this project number of skilled and unskilled local workers will be employed. The project will generate direct and indirect employment. Preference will be given to the local people for employment based on their educational qualifications and experience. Manpower requirement for the proposed project will be approx. 2000 people during operation phase. The laborer's will also get trainings for skill development.

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The local people will also be preferred for contract jobs during operational stages of the project.

### 9.8 OTHER PROJECT BENEFITS

**Benefit to the Urban Local Body:** Due to implementation of this project, the ULB will comply with the Solid Waste Management Rules 2016. Sanitary Landfill sites attract the provision of EIA notification 2006. Under the SWM Rules, 2016, provisions have been made to manage old dumps of MSW.

Recently, Hon'ble NGT alarmed that due to incremental growth of Municipal Solid Waste (MSW), these MSW dumps are converting into virtual mountains. Hon'ble NGT further directed that every city/town should adhere to clause 'J' of Schedule-I of SWM Rules, 2016.

**Organised of Legacy waste:** The legacy waste shall be processed properly which will provide the recycled products, soil/Good earth, recycling/ Road making/co-processing (RDF) Fuel (as a source of alternative fuel from waste).

**Compost Facility:** The segregated waste will have composting facility (to obtain composted fertilizer).

**Environmental Benefits:** Regular monitoring of the surrounding will keep the area environmentally safe and under any adverse circumstance, immediate measures will be taken and enacted upon.

The overall effect will improve buying power of employees and thus a higher standard of living viz. better education, improved health and sanitation facilities housing and acquisition of consumer durable. This is envisaged as a major positive benefit.



# **CHAPTER 10**

## **ENVIRONMENTAL MANAGEMENT PLAN**

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Environmental Management Plan (EMP) is a site-specific plan developed to ensure that the project is implemented in an environmentally sustainable manner.

This EMP also describes the role and responsibilities of staff supervising the project from Head office, personnel deployed at the project site and contractors, if any, who will be responsible for implementing this EMP.

#### **Environmental and Social Management Cell**

For the effective and consistent functioning of the project, an Environmental Management Cell (EMC) will be established for the project.

The major duties and responsibilities of Environmental Management Cell will be as follows

- ❖ To implement the environmental management plan.
- ❖ To assure regulatory compliance with all relevant rules and regulations.
- ❖ To ensure regular operation and maintenance of pollution control devices.
- ❖ To minimize environmental impacts of operations as by strict compliance to the EMP.
- ❖ To initiate environmental monitoring as per approved schedule
- ❖ Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit.
- ❖ Maintain documentation of good environmental practices and applicable environmental laws as ready reference.
- ❖ Maintain environmental related records.

#### **10.1 ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION PHASE**

Although the impacts on the environment during the construction phase would be temporary in nature and are expected to culminate on completion of the construction activities, implementation of management plans for various environmental attributes will further reduce the impact in terms of its spread, duration and intensity.

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TABLE-10.1 ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION PHASE

S. No.	Potential impacts	Mitigation measures
1.	Fugitive emission from construction activity.	<p>Wet suppression will be applied to all inactive disturbed surface areas on a daily basis especially during dry and windy days.</p> <p>Limited vehicular movement will be permitted on disturbed soils</p> <p>Vehicle speeds on unpaved roads will be restricted 25 kmph;</p> <p>Contractors will be required to maintain valid Pollution under Control certificates issued by Transport Department and proper maintenance records for their fleet;</p> <p>Haul trucks will be covered with suitable covering material like tarpaulin sheets to prevent fugitive emissions during transportation of construction materials.</p>
2.	Noise due to Construction activities (such as excavation, grading, erecting equipment, piling, etc).	<p>The construction areas to be provided with sheet barriers or temporary walls along the boundary close to any habitations;</p> <p>Rubber padding to be provided in the construction machinery for vibration control;</p> <p>Regular maintenance of its vehicles and repair of its equipment/ machinery will be undertaken;</p>
3.	Potential run-off from site and percolation of used oil/ oil and grease generated from the vehicles. Contamination of surface And groundwater resources.	<p>Awareness on optimal water consumption will be provided to the labourers.</p> <p>An impervious cover will be provided over the adjacent storm water drain to prevent the surface runoff carrying the construction waste materials/ other pollutants to enter the drain.</p>
4.	Removal of flora at site due to clearing of vegetation	<p>The area has devoid of dense vegetation, waste is dumped on the site from many years. No vegetation needs to be removed. 35 % of the total project area i.e. 2.19 acres of land will be developed as green belt.</p>

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S. No.	Potential impacts	Mitigation measures
		The green belt will be developed considering the native species and CPCB guidelines will be followed.
5.	Disruption of traffic and marginal increase in potential for traffic related	Movement of traffic entering the site shall be properly managed to ensure minimum disturbance to community; Dedicated entry and exit points to be provided within the Site.
6.	Occupational Health and Safety	The construction staff and contractors involved in the construction activities will be trained on the necessary precaution and safety practices prior to commencement of construction activity; All required Personal Protection Equipment will be used by the workers at site and their use to be supervised; Proper signage will be provided in places of excavated areas; Workers will be provided with required PPEs and first aid to be used at site;

**TABLE 10.2 ENVIRONMENTAL MANAGEMENT PLAN IN OPERATIONAL PHASE**

S. No.	Component	Potential impact identified	Suggested Management Plan
1.	Ambient Air Quality	Vehicular emissions Dust and particulates Emissions Gas emission	<ul style="list-style-type: none"> <li>❖ Internal roads will be concreted / asphalted to reduce dust emissions;</li> <li>❖ Thick green belt will be provided along the internal roads and plant boundary which will limit the spread of dust and odour;</li> <li>❖ Proper gas management plan.</li> <li>❖ Post closure monitoring of ambient air</li> </ul>

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S. No.	Component	Potential Impact Identified	Suggested Management Plan
			quality at site should be undertaken as per the requirements of SWM Rules, 2016.
2.	Soil Quality	Contamination of soil due to Leachate. Spillage from used oil from DG set	<ul style="list-style-type: none"> <li>❖ Design parameters for facility already include impermeable concrete windrow pad, drainage network, leachate collection and treatment system.</li> <li>❖ Ensure that the surface runoff from paved areas is collected in storm water drains and does not flow to landscaped areas;</li> <li>❖ It is recommended that the closed landfill should have provisions for HDPE Liner beneath it to check leachate percolation into soil and ground water.</li> </ul>
3.	Ambient Noise Quality	Potential increase in noise levels in adjoining areas due to operating equipment's. Impact on avifaunal species due to increased noise	<ul style="list-style-type: none"> <li>❖ Acoustic enclosures, rubber paddings and linings will be provided for all noise producing equipment's such as shredders, DG sets etc.</li> <li>❖ Proper plantation will be done in barrier of project site.</li> <li>❖ Proper maintenance of machineries such as diesel and exhausts silencers, etc.</li> </ul>



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S. No.	Component	Potential Impact Identified	Suggested Management Plan
			<ul style="list-style-type: none"> <li>❖ Working hours of the workers employed in high noise areas will be rotated;</li> <li>❖ Earplugs/muffs, or other hearing protective wear will be provided to those working very close to the noise generating machinery;</li> <li>❖ Periodic monitoring of noise levels on site and at nearby receptors will be carried out to ensure compliance with Noise Pollution (Regulation &amp; Control) Rules 2000.</li> </ul>
4.	Water Resources and Quality	Fresh water demand of the Project. Inadequate management of Storm water. Leachate generation from windrows compost pads mixed waste storage pits and closed landfill.	<ul style="list-style-type: none"> <li>❖ Recycling and reuse of leachate will be carried out to minimize fresh water requirement.</li> <li>❖ Provisions to be made for rainwater harvesting from rooftop, paved areas and landscaping areas.</li> <li>❖ Leachate from the waste tipping areas will be collected separately and conveyed via leachate collection drain up to leachate collection sump.</li> <li>❖ Quality of groundwater should be monitored and analyzed against IS: 10500 standards for drinking water prior to use.</li> </ul>

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S. No.	Component	Potential impact identified	Suggested Management Plan
5.	Traffic & Transport	Increase in traffic volume	A proper traffic management plan will be implemented to mitigate adverse impacts, if any on existing traffic and transport scenario.
6.	Ecology	Disturbance to local birds and small mammals in the adjoining areas	<ul style="list-style-type: none"> <li>❖ A green belt will be developed along the periphery of the proposed project which will limit noise reaching outside the project boundary and provide habitat to small birds and mammals;</li> <li>❖ Native species and healthy seedlings will be planted filled with topsoil;</li> <li>❖ Attempts will be made to ensure that all open spaces, where tree plantation may not be possible, will be covered with shrubs and grass to prevent erosion of topsoil.</li> </ul>
7.	Socioeconomic aspect	<p>Disturbance to community due to increased noise levels, odour, air emissions and traffic.</p> <p>More employment Opportunities Formalization of ragpickers Participatory role of Residents Improve aesthetics of area.</p>	<ul style="list-style-type: none"> <li>❖ Legacy of waste shall be managed properly which will greatly reduce foul smell and reduce impact from odours.</li> <li>❖ Vehicles/trucks moving through roads will be covered and the operations will be restricted to day time.</li> <li>❖ Maximum efforts will be made to provide job opportunities to local residents</li> </ul>

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S. No.	Component	Potential impact identified	Suggested Management Plan
			during construction and operation phase. ❖ Awareness campaigns to be organized emphasizing the need of sorting at source, waste collection and participatory role of residents in waste management in an area.

Besides the above management measures for various environmental and social parameters, have also been formulated.

### 10.2 LEACHATE MANAGEMENT PLAN

Leachate is the water-based complex liquid, comprising of innumerable organic and inorganic compounds, which percolates through waste heap and accumulates at the bottom. Leachate when escapes to nearby environment poses an enormous threat to the groundwater and surface water contamination hence making the process of Leachate Management exceptionally critical.

While the characteristic of leachate depends considerably on the waste deposit, age of the landfill, temperature and moisture content, it is significantly concentrated in terms of toxic chemicals and thus the treatment of leachate becomes crucial in preventing the high-risk contamination.

Leachate management follows the hierarchal procedure comprising of followings:

- ❖ **Leachate Collection & Treatment:** by incorporating proper drainage system to collect the leachate from the bottom and efficiently treating to comply with the standards before disposing the treated liquid waste into streams.
- ❖ **Leachate Minimization:** by re-circulating the collected leachate onto the composting heap.

### 10.3 GREENBELT DEVELOPMENT PLAN

Greenbelt has been planned in the periphery of the proposed project site which alongwith the other planned green areas within the site, will cover about 35 % of the total project area. The closed landfill cover will also be provided with green vegetation. The development of a greenbelt will help in noise attenuation and also to arrest particulate pollution to a small extent. Plants serve as a sink for pollutants, act as a barrier to break the wind speed as well as allow

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the dust and other particulates to settle. The plant species suitable for greenbelt development need to be selected based on the following criteria:

- ❖ Fast growing, non-edible perennial plants.
- ❖ ability to thrive on low-nutrient soil
- ❖ Thick canopy cover;
- ❖ Large leaf area index;
- ❖ High sink potential;
- ❖ Efficient in absorbing pollutants without significantly affecting their growth; and
- ❖ Suitable for the local seasons.

#### Post-Plantation Care

- ❖ Watering at least once a week during dry spells.
- ❖ Organic fertilizer and manure.
- ❖ Weeding thrice in the first year and twice a year, during the subsequent two years and soil working
- ❖ Plugging and mulching.
- ❖ Protection from pests.
- ❖ Pruning and thinning

**PROPOSED PLANTATION-** about 2.7 -acre areas will be covered under plantation which is full fill 30% of plantation. Proposed plantation species are given below-

**TABLE NO-10.3 PROPOSED PLANTED SPECIES**

S. No.	Local Name of proposed Planted species.	Botanical Name
1	Amaltas	<i>Cassia fistula</i>
2	Jand	<i>Prosopis cineraria</i>
3	Jarul	<i>Lagerstroemia speciosa</i>
4	Kachnar	<i>Bauhinia purpurea</i>
5	Kadam	<i>Anthocephalus cadamba</i>
6	Karanj	<i>Pongamia pinnata</i>
7	Kura	<i>Holarrhena pubescens</i>

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S. No.	Local Name of proposed Planted species.	Botanical Name
8	Kusum	<i>Schleichera oleosa</i>
9	Maharukh	<i>Ailanthus exelsa</i>
10	Neem	<i>Melia azedarach</i>
11	Papri	<i>Pongamia glabra</i>
12	Shisham	<i>Dalbergia sissoo</i>
13	Siris	<i>Albizia lebbek</i>
14	Poplar	<i>Populus deltoides</i>
15	Jand	<i>Prosopis cineraria</i>
16	Khejri	<i>Prosopis juliflora</i>
17	Putrajiva	<i>Putranjiva roxburghii</i>
18	Jhau	<i>Salix tetrasperma</i>
19	Barna	<i>Crateva nurvala</i>

#### 10.4 OCCUPATIONAL HEALTH & SAFETY MANAGEMENT PLAN

The Occupation Health & Safety Management Plan (OHSMP) is applicable for all project operations which have the potential to adversely affect the health and safety of construction workers, MSW facility operators and other labours.

The Occupation Health & Safety Management Plan (OHSMP) have been formulated to address the occupational health and safety related impacts that may arise from proposed project activities particularly during waste handling and segregation, waste unloading, processing and disposal.

##### Management Measures

- ❖ Providing workers with appropriate protective clothing, gloves, respiratory face masks and slip-resistant shoes for waste transport workers and hard-soled safety shoes for all workers.
- ❖ The workplace shall be equipped with fire detectors, alarm systems and fire-fighting equipment. The equipment shall be periodically inspected and maintained in good working condition.
- ❖ Providing adequate personnel facilities, including washing areas and areas to change clothes before and after work.
- ❖ All the employees shall be required to undergo a medical check-up before joining the facility.

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- ❖ First aid facilities required to attend immediately for meeting emergency situations shall be made available at the facility.

### **10.5 COMMUNITY HEALTH & SAFETY MANAGEMENT PLAN**

The Community Health & Safety Management Plan shall be applicable construction as well as operation phase so as to minimize adverse impacts on health and safety of nearby community.



# **CHAPTER 11**

## **SUMMARY & CONCLUSION**

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### 11.1 INTRODUCTION

Municipal Corporation the "Authority" intends for Implementation of Remediation and Reclamation of Existing Dumpsite at Village Meghpur Palwal Haryana ("Dumpsite") and construction, operation and maintenance of Sanitary Landfill at sanitary landfill site at the Village Meghpur Palwal Haryana ("Sanitary Landfill Site").

The site is close to Sohna- Palwal Road towards East North East direction. The nearest railway station is Palwal Railway Station – 4.58 Km in East direction. IGI Airport 46.13 Km in NNW direction is the nearest airport. In short, the objective of the project is to introduce appropriate technologies for management of legacy waste so as to prevent the environment from causing pollution and health hazards. The EMP has been prepared with a view to ultimately ensure that the adverse impacts are minimized.

### 11.2 IDENTIFICATION OF PROJECT & PROJECT COMPONENT IDENTIFICATION OF PROJECT-

The state of Haryana generates about 5,380 Tonnes per day (TPD) of Municipal Solid Waste and this quantity is likely to be more than 7,675 TPD by 2042, assuming the rate of increase of per capita waste generation is in proportion to increase in urban population. Directorate of Urban Local Bodies (DULB), in its endeavor to provide people safe, clean and healthy environment, has proposed to set up cluster based integrated solid waste management facilities in the ULBs of Haryana in Public Private Partnership mode. The government of India through Solid Waste Management Rules, 2016 has set the baseline for the modus operandi of SWM in the country.

Municipal Council the "Authority" intends for Implementation of Remediation and Reclamation of Existing Dumpsite at Meghpur village, Haryana and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Haryana ("Sanitary Landfill Site").

There are 31 wards in the Palwal city with the total population of 10, 42,708 as per 2011 census and approx. all 31 wards including commercial and public places are covered under door to door collection.

Municipal Council the "Authority" intends for Implementation of Remediation and Reclamation of Existing Dumpsite at Village Meghpur Palwal, Haryana and construction, operation and maintenance of Sanitary Landfill at Village Meghpur Palwal, Haryana ("Sanitary Landfill Site"). The waste generation is approx. 100 TPD which includes residential, commercial, religious, food market and street sweeping waste.



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### Identification of project proponent

<b>Applicant</b>	<b>Authorized signatory</b>
Municipal Council Palwal	Mr. Mahinder (Executive Engineer)

**TABLE-11.1: SUMMARY OF THE PROJECT**

<b>S. No.</b>	<b>Particulars</b>	Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Meghpur village, Palwal, Haryana.		
<b>A.</b>	<b>Nature of the Project</b>	<b>Size of the Project</b>		
	Remediation and Reclamation of Existing Dumpsite	9.1 Acre		
<b>B</b>	<b>Location Details</b>			
1.	Village	Meghpur		
2.	District	Palwal		
3.	State	Haryana		
5.	Latitude & Longitude	<b>Coordinates Points</b>	<b>Latitude</b>	<b>Longitude</b>
		1.	28° 9'13.34"N	77°17'35.89"E
		2.	28° 9'13.31"N	77°17'43.10"E
		3.	28° 9'6.19"N	77°17'38.07"E
		4.	28° 9'9.18"N	77°17'31.83"E
		5.	28° 9'10.08"N	77°17'31.80"E
		6.	28° 9'10.06"N	77°17'33.26"E
		7.	28° 9'11.69"N	77°17'33.28"E
		8.	28° 9'11.70"N	77°17'34.71"E
6.	Toposheet No.	H 43 X 4, H43 X 8		
<b>C</b>	<b>Environmental Settings of the Area</b>			
1.	Ecological Sensitive Areas	No		
2.	River / water body	<b>River/ water body</b>	<b>Distance</b>	<b>Direction</b>
		-	-	-
3.	Nearest Town / City	2 km in East direction		
4.	Nearest Railway Station	Palwal Railway Station – 4.58 Km in East direction.		
5.	Nearest Airport	IGI Airport – 46.13 Km in NNW direction.		
6.	State Boundary	SH-22A 2.23 Km in East direction, NH-2 (Delhi-Kolkata Highway 2.74 Km in ENE direction)		
7.	Seismic Zone			

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D	<b>Cost Details</b>	
1.	Total Project Cost	
E	<b>Requirements of the Project</b>	
1.	Water Requirement	3 KLD
2.	Man Power Requirement (Skilled and unskilled persons)	

### 11.3 NEED OF PROJECT

Accumulation of solid waste in open areas is an eyesore, diminishing real estate and property value, a breeding ground for insects and other vectors (rats and mice, wild and domesticated animals, as well as humans who may come in contact with contaminated wastes). It also causes Odour nuisance, reflects the unorganized nature of the community and creates poor environment for growing children. Improper and unorganized disposal of Municipal Solid Waste due to lack of any plan for its proper management led to various fatal diseases both communicable and non-communicable among human beings and animals. Municipal Solid Waste Management deals with the control of generation, storage, collection, transport, treatment and disposal of solid waste in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics and other environmental considerations. For improving the current dumping of Municipal Solid Waste proper treatment will be done for improving the situation. Following processes will be adopted like composting, sanitary landfill at site and RDF & recycling material to the appropriate vendor.

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#### 11.4 LAND DETAILS

The proposed project is located at village Meghpur Palwal Haryana. The site is close to Sanoli Road site towards South direction. The site is close to Sohna- Palwal Road towards East North East direction. The nearest railway station is Palwal Railway Station – 4.58 Km in East direction. IGI Airport 46.13 Km in NNW direction is the nearest airport.

**TABLE 11.2: AREA BREAK UP OF PROPOSED FACILITY**

S. No.	Description	Area sq. m.	Area (Acre)
1	Plant area (Machinery area)	500	0.12
2	Office building	100	0.02
3	Common toilets	100	0.02
4	Internal approach road	800	0.19
5	Horticulture	11,153	2.7
6	SLF	2,000	0.49
7	Guard room/wb room	30	0.007
8	Vehicle parking	150	0.03
9	Windrow area	18,000	4.4
10	Storage area	4,333	1.07
	<b>Total Area</b>	<b>37,176.86</b>	<b>9.1</b>

#### 11.5 DESCRIPTION OF PROPOSED SITE FACILITY: -

##### Water Requirement

**Construction Phase-** During construction phase water will be require about 0.5 KLD which will be brought from ground water.

**Operational Phase-** Total water requirement in the project during operational phase will be about 3 KLD which will met from ground water.

##### Water Break up

Processing consumption	1 KLD
Water consumption for labor	0.5 KLD
Horticulture	1.5 KLD
<b>Total Water Requirement</b>	<b>3 KLD</b>

##### Power requirement

During operation phase the required power shall be 50 KW and the source of power shall be UHBVN. In case of emergency a backup generator will also be provided of 15 KVA.

**Manpower requirement:** - Approx 10-12 Skilled and unskilled persons will be required.

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### 11.6 BASELINE MONITORING STATUS

The generation of primary data as well as collection of secondary data and information from the site and surroundings was carried out during post-monsoon i.e. (Oct.-Dec. 2021). Map showing monitoring location (Air, Water Soil & Noise) is shown in Figure in EIA/VEMP report.

- ❖ Water Environment (surface and ground water)
- ❖ Air Environment
- ❖ Noise Environment
- ❖ Soil Environment
- ❖ Biological Environment
- ❖ Socio- Economic Environment

#### 11.6.1 WATER ENVIRONMENT-

In order to conduct EIA Studies, baseline data pertaining to water environment of the proposed project was carried out evaluating the basic characteristics, drainage pattern, and hydrology. Water Environment of the area has been studied by locating ground water sources.

##### Conclusion:

The analysis results of ground water indicate that the pH value is 7.16 to 7.86 which is well within the specified standard of 6.5 to 8.5. The TDS was observed as 432 to 1880 mg/l. The chlorides were found as 56.20 to 454 mg/l. The sulphate was found as 43.3 to 166.6 mg/l. It is observed that sulphate is within limits. Total hardness ranges between 210 to 920 mg/l. Metals Iron is found in between 0.16 to 0.89 mg/l.

#### 11.6.2 AIR ENVIRONMENT

- ❖ Ambient Air Quality Monitoring reveals that the **minimum and maximum concentrations of PM<sub>10</sub>** for all the 10 Air Quality monitoring stations were found in the range of **81.3 µg/m<sup>3</sup> and 397.4 µg/m<sup>3</sup>** respectively, while for **PM<sub>2.5</sub>** varies between **47.4 µg/m<sup>3</sup> and 176.4 µg/m<sup>3</sup>**.
- ❖ As far as the gaseous pollutants SO<sub>2</sub> and NO<sub>2</sub> are concerned, the prescribed limits under NAAQ Standards for residential and rural areas has never surpassed at any station.
- ❖ The **minimum and maximum concentrations of NO<sub>2</sub>** were found to be **5.2 µg/m<sup>3</sup> and 49.7 µg/m<sup>3</sup>** respectively.
- ❖ The **minimum and maximum concentrations of SO<sub>2</sub>** were found to be **5.2 µg/m<sup>3</sup> and 24.3 µg/m<sup>3</sup>** respectively.

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- ❖ The **minimum** and **maximum concentrations of CO** were found to be **0.5 mg/m<sup>3</sup>** and **3.5 mg/m<sup>3</sup>** respectively.

#### **11.6.2 NOISE ENVIRONMENT**

The noise levels are found to be 51.3-68 db(A) for day and 42.2-52.8 db(A) night time respectively. The high levels of noise in day for project site can be attributed due to construction and operation and vehicular activities. The noise levels at all location are well below the NAAQS standards.

#### **11.6.3 SOIL ENVIRONMENT**

The result obtained is compared with the standard soil classification as given in Agriculture Handbook. Samples collected from identified locations indicate that the pH value is ranging between 6.98 to 8.09 which show that the soils are slightly alkaline in nature. Water holding capacity of the soil samples collected were found to be low ranging from 44.7 to 54.2%. Exchangeable Potassium value ranging from 112.6 to 152.5 kg/ha & Phosphorous varies from 25.5 to 49.8 kg/ha.

#### **11.6.4 BIOLOGICAL ENVIRONMENT**

The baseline study was conducted for the evaluation of the floral and faunal biodiversity within the existing environment of the study area (10 Km radius from the lease mine area) and it comprises of total 187 floral species have been recorded during survey from the 10 km study area out of which 59 are Trees, 32 are shrubs, 63 herbs, 15 grasses, 17 species of Climbers and one parasite species are existing within the 10 km periphery fore core. There is no any endemic, endangered or protected floral species was recorded.

Among the faunal groups 68 faunal species have been encountered in the study area out of which 15 Mammals, 11 Herpatofauna, 9 Butterfly and 33 aves species were recorded from 10 km vicinity area. Only 5 schedule -II SPECIES VIZ. *Canis aureus* (Jackal), *Macaca mulata* (Monkey), *Presbytis entellus* (Common Langur), *Daboia russelli* (Russell's viper), (Indian Cobra) and *Ramphotyphlops braminus* (Common worm snake) were documented. *Pavo cristatus* only one schedule-I species been found from 10 km study area.

The Palwal district the major crops are paddy, jowar, bajra, makai and sugarcane in kharif seasons, while that of Rabi seasons crops are wheat, barley, sunflower, arahar, mung, chana, masoor, rapeseed, pea and bar seem. The other crops grown are sugarcane, oilseeds and pulses. Horticultural and vegetable crops are also cultivated in the district.

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There is no Biosphere Reserve, National Parks, Wildlife Sanctuary, Tiger Reserve and Elephant -Reserve within 10 km radius of the project site. The nearest protected areas Asola Bhatti Wildlife sanctuary which is ~37.74 km away from away from project site

#### **11.6.5 SOCIO- ECONOMIC ENVIRONMENT**

Based on the interpretation made above, primary survey (interaction with stakeholders, FGD, community consultation and discussion with an influential person of the study area) and secondary sources, the significant observations and gap in the study area poor sanitation and improper drainage system. Sanitation employment and Medical facilities are substantial problems seen in the study area.

The Livelihood of most people in the study area depends on labor work, Agriculture, cattle rearing and jobs. Tap water, tube well, hand pump and wells are the sources of drinking water in the study area. In India, rural areas also have the highest overall burden of coronavirus (Covid-19) epidemic, and the study area also has been reported in general cases of cough and fever.

The people have a mixed opinion about the new proposed project. People want employment for local people in the industry. CER activities carried out in village development through the industry. According to villagers, the industry will take proper action to air, water, and noise and land pollution.

The socio-economic study revealed that the youth in the project area is devoid of employment opportunities. They can be a potential source of workers with minimum handholding and vocational education skills, hence Youth empowerment programs through awareness creation about various government schemes, providing appropriate opportunities with relevance to their qualification and skills, conducting skills inculcating programs etc.

#### **11.7 ENVIRONMENT MONITORING PLAN**

The major construction activities involved in setting up the unit are construction of sheds for treatment units, major components in the industry is landfill. The construction activities require mobilization of construction material and equipment. The construction activities are expected to last for few months.

During construction phase of landfill at every stage quality of construction will be monitored viz. base preparation, liners quality, drainage layers, leachate collection system, storm water management system, gas vent systems, etc.

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**TABLE 11.3 ENVIRONMENTAL MEASURES DURING OPERATION PHASE**

S. No	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
1)	Air Emissions	Gas quality from landfill areas	VOC, H <sub>2</sub> S	As per CTE norms given by SPCB or EO norms given by MoEF & CC and CPCB protocol.
		Stack emissions from DG sets	As per CTE conditions PM, SO <sub>2</sub> , NO <sub>x</sub>	
		AAQ within the Project premises.	As per CTE conditions / NAAQ Standards	
		All vehicles to be PUC Certificate.	Vehicle logs to be maintained	
		Meteorological data	Wind speed, direction, temp., relative Humidity and rainfall.	
2)	Noise	Noise generated from operations to be monitored	Spot noise level recording	Periodic during operation phase Once in month by third party
3)	Waste water Discharge (leachate)	Compliance to wastewater discharge standards	pH, TSS, TDS, BOD, COD and Oil & grease (heavy metals if required)	Daily at regular intervals Once in a month by third party
4)	Solid waste/Hazardous Waste	Check compliance to SWM rules	Quality & quantity monitoring	Periodically /CPCB norms.
13)	Ground Water Quality	Monitoring ground water quality, through piezometers	As per CPCB guidelines	Periodically & as Per CPCB norms.
5)	Flora and Fauna	Vegetation, greenbelt / green cover development	No. of plants, species	Once a year
6)	Soil quality	Checking & Maintenance of good soil quality around	Physico-chemical parameters and Metals.	Once a year
7)	Health	Employees and migrant labour health check ups	All relevant parameters (BP, HIV, Chest X-ray, Eye vision, etc.) and HIV for workers	Regular check-ups as per Factories act.

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### 11.8 RISK ANALYSIS

The principal objective of the risk assessment study is to identify and quantify the major hazards and the risk associated with various operations of the proposed project, which may lead to emergency consequences (disasters) affecting the public safety and health.

All necessary measures to minimize the risk due to the proposed project will be taken during design stage and also during operation period viz. fire & safety control measures, Emergency preparedness plan, disaster management plan, etc.

### 11.9 PROJECT BENEFITS

The proposed project will have direct and indirect economic benefits in form of employment, development of ancillaries. Besides the compost production would add to the revenue to the operator of the landfill. The production of compost shall also enhance the crop productivity and improvement in the soil texture and enhancement of soil nutrients. The compost produced from the composting pads can be used as soil conditioner that improve soil quality. This compost has the ability to help regenerate poor soil by increasing nutrient content in soil and retain moisture.

The following benefits are being envisioned: -

- ❖ Use of compost produced as manure to the crops.
- ❖ Generation of revenue through the sale of compost produced from the MSW processing and disposal facility.

### 11.10 ENVIRONMENT MANAGEMENT PLAN

The Environmental Management Plan (EMP) is required to ensure sustainable development in the area of the proposed project site. Hence, it needs proper Environmental Management Plan (EMP) to meet these objectives. The purpose of the Environmental Management Plan is to minimize the potential environmental impacts from the project and to mitigate the adverse impacts. Details of Environment Management Plan are given below-

**TABLE 11.4 MITIGATION MEASURE PROPOSED DURING OPERATION PERIOD**

S. No.	Component	Potential Impact Identified	Suggested Management Plan
1.	Ambient Air Quality	Vehicular emissions Dust and particulates Emissions Gas emission.	<ul style="list-style-type: none"> <li>❖ Internal roads will be concreted / asphalted to reduce dust emissions;</li> <li>❖ Thick green belt will be provided along the internal roads and plant boundary which will limit the spread of dust and odour;</li> </ul>



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S. No.	Component	Potential impact identified	Suggested Management Plan
			<ul style="list-style-type: none"> <li>❖ Proper gas management plan.</li> <li>❖ Post closure monitoring of ambient air quality at site should be undertaken as per the requirements of SWM Rules, 2016.</li> </ul>
2.	Soil Quality	Contamination of soil due to Leachate. Spillage from used oil from DG set	<ul style="list-style-type: none"> <li>❖ Design parameters for facility already include impermeable concrete windrow pad, drainage network, leachate collection and treatment system.</li> <li>❖ Ensure that the surface runoff from paved areas are collected in storm water drains and does not flow to landscaped areas;</li> </ul>
			<ul style="list-style-type: none"> <li>❖ It is recommended that the closed landfill should have provisions for HDPE Liner beneath it to check leachate percolation into soil and ground water.</li> </ul>
3.	Ambient Noise Quality	Potential increase in noise levels in adjoining areas due operating equipment's.  Impact on avifaunal species due to increased noise	<ul style="list-style-type: none"> <li>❖ Acoustic enclosures, rubber paddings and linings will be provided for all noise producing equipment's such as shredders, DG sets etc.</li> <li>❖ Proper plantation will be done in barrier of project site.</li> <li>❖ Proper maintenance of machineries such as diesel and exhausts silencers, lubrication of conveyer trolleys, etc.</li> <li>❖ Working hours of the workers employed in high noise areas will be rotated;</li> <li>❖ Earplugs/muffs, or other hearing protective wear will be provided to those working very close to the noise generating machinery;</li> </ul> <p>Periodic monitoring of noise levels on site and at nearby receptors will be carried out to ensure compliance with Noise Pollution</p>

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S. No.	Component	Potential Impact Identified	Suggested Management Plan
			(Regulation & Control) Rules 2000.
4.	Water Resources and Quality	Fresh water demand of the Project. Inadequate management of Storm water. Leachate generation from windrows compost pads, mixed waste storage pits and closed landfill.	<ul style="list-style-type: none"> <li>❖ Recycling and reuse of leachate will be carried out to minimize fresh water requirement.</li> <li>❖ Provisions to be made for rainwater harvesting from rooftop, paved areas and landscaping areas.</li> <li>❖ Leachate from the waste tipping areas will be collected separately and conveyed via leachate collection drain up to leachate collection sump</li> <li>❖ Quality of groundwater should be monitored and analyzed against IS : 10500 standards for drinking water prior to use.</li> </ul>
5.	Traffic & Transport	Increase in traffic volume	<ul style="list-style-type: none"> <li>❖ A proper traffic management plan will be implemented to mitigate adverse impacts, if any on existing traffic and transport scenario.</li> </ul>
6.	Ecology	Disturbance to local birds and small mammals in the adjoining areas.	<ul style="list-style-type: none"> <li>❖ A green belt will be developed along the periphery of the proposed project which will limit noise reaching outside the project boundary and provide habitat to small birds and mammals;</li> <li>❖ Native species and healthy seedlings will be planted filled with topsoil;</li> <li>❖ Attempts will be made to ensure that all open spaces, where tree plantation may not be possible, will be covered with shrubs and grass to prevent erosion of topsoil.</li> </ul>

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S. No.	Component	Potential Impact Identified	Suggested Management Plan
7.	Socioeconomic aspect	Disturbance to community due to increased noise levels, odour, air emissions and traffic. More employment Opportunities Formalization of rag pickers Participatory role of Residents Improve aesthetics of area	<ul style="list-style-type: none"> <li>❖ Legacy of waste shall be managed properly which will greatly reduce foul smell and reduce impact from odours.</li> <li>❖ Vehicles/ trucks moving through community roads will be covered and the operations will be restricted to day time.</li> <li>❖ Maximum efforts will be made to provide job opportunities to local residents during construction and operation phase.</li> <li>❖ Awareness campaigns to be organized emphasizing the need of sorting at source, waste collection and participatory role of residents in waste management in an area.</li> </ul>



# **CHAPTER 12**

## **DISCLOSURE OF CONSULTANTS ENGAGED**

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### 12.1 DISCLOSURE OF CONSULTANTS ENGAGED

<b>Project Name:</b> Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Meghpur Patwal Haryana		
<b>Name and address of the Consultant</b>	Amaltas Enviro Industrial Consultants LLP, 2925, Sec.-46, Gurugram- 120001 India	QCI-NABET Accredited.
<b>Laboratory for Base line data generation</b>	Creative Analytical Lab & Consultant (ISO 9001: 2015 Certified Co.), E-177, UGF Street No-13 Rajapuri, New Delhi - 110059	MoEF & NABL Accredited Laboratory

#### Following Coordinators & Functional Area Experts:

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Amaltas Enviro Consultants has got accreditation from QCI as per MoEF & CC, Govt requirements.

