HARYANA STATE POLLUTION CONTROL BOARD
C-11, SECTOR-6, PANCHKULA
Ph-0172-577870-73, Fax No. 2581201
E-Mail: hspcbcoordination@gmail.com
Website: hspcb.org.in

Dated: 05/07/2023

To

The Director General,
Information, Public Relations
& Cultural Affairs Department,
Haryana, Chandigarh.

Subject: Submission of draft EIA Report of Public Hearing of implementation of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Ramsinghpura Village, Rewari, Haryana.

Kindly refer to the subject noted above.

I have been directed to enclose herewith an advertisement regarding Public Hearing Notice to be held on **07.08.2023 at 11:00 AM** at the site of the project of "*regarding Implementation of Remediation and Reclamation of Existing Dump site and construction, operation and maintenance of Sanitary Landfill at Ramsinghpura village, Distt. Rewari, Haryana*" for publication in the following leading newspapers on DAVP rates:-

1. One major national daily newspaper.
2. One Regional Vernacular daily Newspaper in Hindi.

This advertisement should appear on or before 06.07.2023 in the above said two leading newspapers only and bills of above two newspapers on DAVP rates may be sent to this office at the earliest, the bill payment of above said notice will be made for two newspaper only.
DA/-Advertisement

Sr. Env. Engineer (HQ)
For Member Secretary

Copy to :-

A copy of the above is forwarded to the following for information and necessary action:-

1. The Deputy Commissioner, Rewari.
2. The Chairman, Zila Parishad, District Rewari.
3. The Executive Officer, Municpal Council Rewari for display on notice board
4. The Joint Director, District Industries Centre, District Rewari.
5. The Regional Officer, Rewari Haryana State Pollution Control Board, SCO

D-6 & D-7, Suncity Commercial Complex, Sector-6, Block Rewari alongwith copy of EIA report & Executive Summary and CD for sending the same to the concerned authorities mentioned above to place the same in their offices for consultation of the general public during office hours.

6. Executive Officer, Municipal Council, Distt. Rewari.
7. The Sr. Env. Engineer (IT) HSPCB (HQ) for uploading the notice on the website of the Board.

DA/-Advertisement

Sr. Env. Engineer (HQ)
For Member Secretary

Copy to:-

A copy of the above is forwarded to the following for information please:-

1. The Additional Chief Secretary to Govt. Haryana, Environment Department, Chandigarh.
2. The Director General, Environment Department, Haryana at Sector 17, Chandigarh.
3. P.S. to Chairman/ P.A. to Member Secretary, HSPCB, Panchkula.

DA/-Advertisement

Sr. Env. Engineer (HQ)
For Member Secretary

Digitally Signed by Sanjiv Kumar
Date: 05-07-2023 14:32:36
Reason: Approved

HARYANA STATE POLLUTION CONTROL BOARD
C-11, SECTOR-6, PANCHKULA
Ph-0172-577870-73, Fax No. 2581201
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Notice for Public Hearing

It is for the information of concerned that Municipal Council Rewari has proposed a project regarding implementation of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Ramsinghpura village, Rewari, Haryana and going to conduct of Public Hearing for obtaining Environmental Clearance.

The project proponent mentioned above has applied to the Haryana State Pollution Control Board for conducting the Public Hearing for obtaining Environmental Clearance as per EIA notification dated 14th September, 2006 for the proposed project. Accordingly, the Public Hearing for the above said project has been fixed on **07.08.2023 at 11.00 AM** at village Ramsinghpura, District Rewari Haryana.

Copies of executive summary of the project report and EIA study report, submitted by the project proponent, are available in the Head Office of the Board and on the website of the Board i.e. https://hspcb.org.in/ as well as in the following offices, which can be perused during office hours, on any working day:-

1. Deputy Commissioner, Rewari.
2. Chairman, Zila Parishad, District Rewari.
3. Executive Engineer, Municipal Council, Rewari.
4. Joint Director, District Industries Centre, District Rewari.
5. Regional Officer, Rewari, Haryana State Pollution Control Board, SCO D-6 & D-7, Suncity Commercial Complex, Sector-6, A- Block, Rewari.

Notice is hereby given to all concerned to file suggestions, views, comments and objections, if any, on the above said proposed project, to the Chairman, Haryana State Pollution Control Board, C-11, Sector-6, Panchkula as well as Regional Officer, Rewari, Haryana State Pollution Control Board, at SCO D-6 & D-7, Suncity Commercial Complex, Sector-6, A- Block, Rewari i.e. within 30 days of the publication of this notice. Besides, a Public Hearing will also be held on the Date, Time & Venue mentioned above at the proposed site of the project, which can be attended by any person including Environmental Groups, bonafide residents and others, located at the project site/sites of displacement/sites likely to be affected. Oral/Written suggestions, if any can also be made during the Public Hearing.

No TA/DA will be admissible for attending the Public Hearing.

Pardeep Kumar, IAS
Member Secretary

2778021/2023/Estt.Br

21/4/23

From

Executive Officer

Municipal Council

Rewari

To

The Member Secretary
Haryana State Pollution Control Board
C-11, Sec- 6, Panchkula,
Haryana-134109

Sub: - Submission of Draft EIA (Environmental Impact Assessment) Report for Conducting Public Hearing for "Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Ramsinghpura, Bawal Haryana.

Ref.: - Terms of Reference (TOR) Issued by SEAC Haryana, vide Proposal number IA/HR/MIS/259055/2022; Dated 29th June, 2022.

Respected Sir,

1. With reference to the above subject matter 'EIA Consultant of Municipal Council Rewari has completed the baseline monitoring and formatted the draft EIA/EMP report in accordance with the terms of reference prescribed by MoEF&CC.
2. As per EIA Notification 2006, our project requires Public Hearing for this purpose we are submitting the following documents for Rewari district in the state of Haryana.

a. Hardcopy of draft EIA /EMP report
b. Hardcopy of executive summary in Hindi & English

3. We request your good office to acknowledge the above-mentioned documents and start the process for Conducting Public Hearing for our Proposed Sanitary landfill Project.
Fess submitted dated 9/02/2023 at Haryana State Pollution Control Board C-11, Sec- 6, Panchkula Haryana

Executive Officer
Municipal Council, Rewari

Encl: *As above*

Executive Summary in (Hindi)

For

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

at

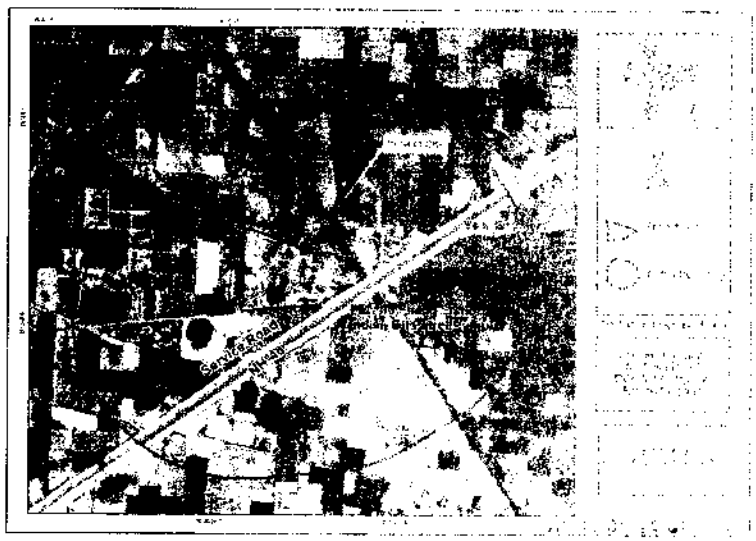
Ramsinghpura village, Bawal, Haryana, ("Sanitary Landfill Site").

कार्यकारी सारांश

परियोजना का परिचय (Introduction of the Project)	नगर परिषद "प्राधिकरण" मौजूदा डंपसाइट के सुधार और सुधार के कार्यान्वयन और रामसिंहपुरा गांव बावल, हरियाणा ("स्वच्छता लैंडफिल साइट") में सेनेटरी लैंडफिल के निर्माण, संचालन और रखरखाव का प्रस्ताव रखता है। MCR एमसीआर के वर्तमान अनुमान (2021) के अनुसार, 81 टीपीडी कचरा उत्पन्न हो रहा है जिसमें आवासीय, वाणिज्यिक, धार्मिक, खाद्य [illegible] सड़क पर सफाई करने वाला कचरा शामिल है। **परियोजना की आवश्यकता और क्षेत्र के लिए इसका महत्व** **(Need of Project and its Importance to Region)** खुले क्षेत्रों में ठोस कचरे का संचय एक आंखों की रोशनी, घटती आंचल 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 अरुचिकर 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 प्रक्रियाएं अपनाई जाएंगी और उपयुक्त विक्रेताओं को आरडीएफ और रीसाइक्लिंग [illegible] जाएगी।
परियोजना विवरण (Project description)	**परियोजना का प्रकार (TYPE OF PROJECT)** प्रस्तावित परियोजना आइटम 7 (i) (सामान्य नगरपालिका [illegible] सुविधाएं) के अंतर्गत आती है और अनुसूची के तहत एक [illegible] और आइटम 7 (i) 'सामान्य नगरपालिका ठोस अपशिष्ट [illegible] (CMSWMF)' की श्रेणी 'बी' के अंतर्गत आती है। ईआईए अधिसूचना, [illegible] और उसके बाद के संशोधनों की अनुसूची, और [illegible] आवश्यकता है। हालाँकि, सामान्य स्थिति है परियोजना स्थल से 2 किमी के दायरे में [illegible] कारण लागू। इसलिए, परियोजना 'ए' (A) श्रेणी के [illegible] ईएसी द्वारा केंद्रीय स्तर पर मूल्यांकन की आवश्यकता होती है। **अपशिष्ट मात्रा (WASTE QUANTITY)** MCR एमसीआर के वर्तमान अनुमान (2021) के अनुसार, [illegible] उत्पन्न हो रहा है जिसमें आवासीय, वाणिज्यिक, [illegible] सड़क पर सफाई करने वाला कचरा शामिल है।
साइट सेटिंग (Site Setting)	परियोजना स्थल एनएच-8 के पास स्थित है। [illegible] हवाई अड्डा इंदिरा गांधी अंतरराष्ट्रीय हवाई अड्डा नई दिल्ली है [illegible] की हवाई दूरी पर स्थित है। साइट लैंडलॉक है और [illegible] एनएनडब्ल्यू (NNW) दिशा में निकटतम हवाई अड्डा है। साइट [illegible] और समुद्र या जलमार्ग से दूर है। **परियोजना स्थल का उपग्रह दृश्य (Satellite view of the project site)** जिला मोटे तौर पर यमुना उप बेसिन के भारत-गंगा के [illegible]

है। इसमें विशाल जलोढ़ और [illegible] हैं जो कभी-कभी उड़ती हुई रेत की [illegible] ऊंचाई प्राप्त करते हैं, लेकिन [illegible] मीटर होती है। कुछ टिब्बे [illegible] हवा की दिशा के आधार पर प्रकृति को बदलते हैं। यह [illegible] अरावली श्रृंखला का हिस्सा है और [illegible] घास के मैदान हैं। क्षेत्र में भूमि की [illegible] में औसत समुद्र तल से 262 मीटर तक भिन्न होती है।



क्रमांक	मानदंड	मानदंड दूरी	[illegible] दूरी
1	निकटतम नदी से दूरी	100 मीटर	[illegible] में 25.42 [illegible]
2	निकटतम तालाब से दूरी	200 मीटर	[illegible] किमी (S.W)
3	निकटतम राजमार्ग से दूरी (NH-2)	200 मीटर	[illegible] (उत्तर-पूर्व)

				राजस्थान/हरियाणा राज्य सीमा - 2 किमी (एसएसडब्ल्यू) (SSW)
	4	निकटतम बस्ती से दूरी	200 मीटर	गॉव ओढ़ी के पास -1km (W) दिशा
	5	निकटतम सार्वजनिक पार्कों से दूरी	200 मीटर	महात्मा गांधी मेमोरियल हर्बल पार्क - उत्तर पश्चिम दिशा में 9.61 कि.मी (NNW).
	6	निकटतम जल आपूर्ति कुओं से दूरी	200 मीटर	
	7	निकटतम हवाई अड्डों/एयरबेस से दूरी	20 किमी	आईजीआई हवाई अड्डा - 75.5 किमी (पूर्वोत्तर) (NE)

क्षेत्र में पर्यावरण सेटिंग (Environment Setting in area)

भूमि की आवश्यकता (Land requirement)	प्रस्तावित परियोजना 1 वर्ष के लिए 14.625 एकड़ के कुल क्षेत्रफल में 81 टीपीडी एसडब्ल्यूएम की सेनेटरी लैंडफिल सुविधा के रखरखाव के लिए है। जिला मोटे तौर पर यमुना उप बेसिन के भारत-गंगा के जलोढ़ मैदान का हिस्सा है। इसमें विशाल जलोढ़ और रेतीले इलाके हैं और बीच-बीच में कटी हुई लकीरें हैं जो कभी-कभी उड़ती हुई रेत से ढकी होती हैं। बालू के टीले 30 मीटर की ऊंचाई प्राप्त करते हैं, लेकिन परिवेश के संबंध में औसतन उनकी ऊंचाई 7 मीटर होती है। कुछ टिब्बे हल्की वनस्पति का समर्थन करते हैं जबकि अन्य हवा की दिशा के आधार पर प्रकृति को बदलते हैं। पहाड़ी श्रृंखलाएं महान अरावली श्रृंखला का हिस्सा हैं और इसमें बहुमूल्य खनिज भंडार और प्राकृतिक घास के मैदान हैं। क्षेत्र में भूमि की ऊंचाई उत्तर में 232 मीटर से

	लेकर दक्षिण में औसत समुद्र तल से 262 मीटर तक भिन्न होती है। क्षेत्र का मुख्य ढाल उत्तर की ओर है। परियोजना स्थल एनएच-8 के पास स्थित हैं। परियोजना स्थल से निकटतम हवाई अड्डा इंदिरा गांधी अंतर्राष्ट्रीय हवाई अड्डा नई दिल्ली है जो 75.5 किमी की हवाई दूरी पर स्थित है। साइट लैंडलॉक है और समुद्र या जलमार्ग से दूर है। एनएनडब्ल्यू दिशा में निकटतम हवाई अड्डा है। साइट लैंडलॉक है और समुद्र या जलमार्ग से दूर है।
आधारभूत पर्यावरण की स्थिति (Baseline Environmental Conditions)	
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 मार्च से मई 2022 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।	
तलरूप (Topography)	जिले की स्थलाकृति अरावली पर्वतमाला के बीहड़ पहाड़ी इलाकों का प्रतिनिधित्व करती है। इस क्षेत्र को चतुष्कोणीय और उप-हाल के समय के दौरान लंबे समय तक शुष्कता का सामना करना पड़ा है और एओलियन कार्रवाई द्वारा परिदृश्य को बहुत संशोधित किया गया है। स्थलरूप के विकास में नदी चक्र का प्रभाव भी स्पष्ट होता है। जिले का परिदृश्य निराला है। इसकी विविध स्थलाकृति है जिसमें घाटियाँ, लहरदार भूमि, रेत के टीले और जलोढ़ मैदान शामिल हैं। अरावली पर्वतमाला जिले के दक्षिणी और पश्चिमी भागों में स्थित है और पूरे जिले में बहुत कम फैली हुई है। इस क्षेत्र को चतुष्कोणीय और उप-हाल के समय के दौरान लंबे समय तक शुष्कता का सामना करना पड़ा है और एओलियन कार्रवाई द्वारा परिदृश्य को बहुत संशोधित किया गया है। रेवाड़ी जिले में पड़ने वाली साहिबी नदी के जलग्रहण क्षेत्र को पांच अलग-अलग परिदृश्यों में विभाजित किया जा सकता है: - ए) अरावली की पहाड़ियां बी)

	बाढ़ के मैदान सी) फुट हिल्स डी) एओलियन मैदान और रेत के टीले ई) जलोढ़ जमा
भूगर्भशास्त्र (Geology)	यह जिला अरावली पर्वत की प्री-कैम्ब्रियन चट्टानों के भूगर्भीय क्षेत्र में आता है। इनका प्रतिनिधित्व दिल्ली सुपर ग्रुप ऑफ रॉक्स (2500-1600 मिलियन वर्ष) द्वारा किया जाता है, जो हरियाणा राज्य के दक्षिणी भाग तक ही सीमित हैं। इसमें अलवर समूह की चट्टानें हैं, जो अजेबगढ़ समूह की चट्टानों से साथ रेवाड़ी के कुछ हिस्सों में समानांतर पृथक पहाड़ियों के रूप में विकसित हुआ है। समूह के प्रमुख रॉक प्रकारों में शेल, स्लेट, फ़िलाइट, पेलिटिक शिस्ट, क्रिस्टलीय और अशुद्ध लिमस्टोन, मार्बल्स, कैल्क-स्किस्ट शामिल हैं, जो पतले बेड वाले क्वार्टजाइट्स के अंतर्संबंधों के साथ हैं।
भू-जल विज्ञान (Geo-hydrology)	जिला चतुर्धातुक युग के भारत-गंगा के जलोढ़ मैदान पर कब्जा कर लिया है, और घग्घर बेसिन में पड़ता है। क्षेत्र में प्रमुख भूजल जलाशय चतुष्कोणीय आयु के असमेकित जलोढ़ निक्षेप हैं। कठोर चट्टानों में भी कुछ मात्रा में भूजल होता है जो जोड़ों, फ्रैक्चर और दरारों के माध्यम से प्रसारित होता है। सबसे ज्यादा भू-जल क्षेत्र का एक भाग अग्निमय परिस्थितियों में होता है, जबकि गहरे जल वाले क्षेत्रों में जो अभेद्य मिट्टी से ढके होते हैं, यह स्थानीय रूप से सीमित परिस्थितियों में अर्ध-सीमित होता है। हैंडपंपों और उथले नलकूपों द्वारा उथले जलभृतों का दोहन किया जा रहा है, जिनका व्यापक रूप से घरेलू उद्देश्यों के लिए उपयोग किया जाता है। सीजीडब्ल्यूबी ने 16 अन्वेषणात्मक बोरवेल और 5 पीज़ोमीटर को चित्रित किया है और संभावित जलभृत क्षेत्रों का निर्धारण और जलभृत विशेषताओं का मूल्यांकन किया है। चंदनवास में 203.85 मीटर की गहराई तक सबसे गहरा पतला छेद ड्रिल किया गया था। जलोढ़ में मोटे से लेकर बहुत महीन और बजरी, गाद और कंकड़ के साथ

	अलग-अलग अनुपात में मिट्टी होती है। पारगम्य दानेदार क्षेत्र जिसमें रेत और कभी-कभी मोटे रेत और बजरी शामिल हैं। उनकी पार्श्व और ऊर्ध्वाधर सीमा सीमित है। बोरहोल डेटा से पता चलता है कि जिला क्षेत्र में रेत समूह पर संरचनाओं का मिट्टी समूह हावी है। क्षेत्र में गहरे नलकूपों का निर्वहन 358 और 2911 एलपीएम के बीच होता है। संप्रेषणीयता मान 110 से 1060 m2/दिन तक और भंडारण क्षमता 1.14*10-3 से 4.36*10-3 तक होती है।
मिट्टी (Soil)	जिले में दो प्रकार की मिट्टी है - उष्णकटिबंधीय शुष्क भूरी और शुष्क भूरी मिट्टी। शुष्क भूरी मिट्टी क्षेत्र के प्रमुख भागों में पाई जाती है जबकि उष्णकटिबंधीय शुष्क भूरी मिट्टी जिले के उत्तर पूर्वी भाग में पाई जाती है।
पानी की गुणवत्ता (Water Quality)	भूजल के विश्लेषण के परिणाम इंगित करते हैं कि ❖ पीएच मान 7.11 से 7.65 है जो 6.5 से 8.5 के निर्दिष्ट मानक के भीतर है। ❖ टीडीएस 892 से 1842 mg/l के रूप में देखा गया था। ❖ क्लोराइड 146 से 342 mg/l के रूप में पाए गए। ❖ सल्फेट 118 से 276.4 mg/l पाया गया। यह देखा गया है कि सल्फेट सीमा के भीतर है। ❖ कुल कठोरता 136 से 278 mg/l के बीच होती है। ❖ धातु: लोहा 0.11 -0.27 mg/l के बीच पाया जाता है।
परिवेशी वायु गुणवत्ता निगरानी (Ambient Air Quality Monitoring)	परिवेशी वायु गुणवत्ता निगरानी से पता चलता है कि सभी 10 वायु गुणवत्ता निगरानी स्टेशनों के लिए PM10 की न्यूनतम और अधिकतम सांद्रता क्रमशः 78.6 ug/m^3 और 223.4 ug/m^3 पाई गई, जबकि PM2.5 के लिए 51.1 ug/m^3 और के बीच भिन्न होता है 104.3 ug/m^3.

	जहाँ तक गैसीय प्रदूषकों SO2, NO2, और CO का संबंध है, NAAQ के तहत निर्धारित सीमाएँ किसी भी स्टेशन पर आवासीय और ग्रामीण क्षेत्रों के लिए मानकों को कभी भी पार नहीं किया गया है। ❖ NO2 की न्यूनतम और अधिकतम सांद्रता 10.7 ug/m^3 और 46.5 ug/m^3 पाई गई। ❖ SO2 की न्यूनतम और अधिकतम सांद्रता 5.2 ug/m^3 और 25.4 ug/m^3 पाई गई ❖ CO की न्यूनतम और अधिकतम सांद्रता क्रमशः 0.6 mg/m^3 और 2.86 mg/m^3 पाई गई। निष्कर्ष ❖ बेसलाइन मॉनिटरिंग परिणाम से, यह देखा गया है कि मॉनिटर किए गए पैरामीटर (PM10, PM2.5, SO2, NO2,) अध्ययन अवधि के दौरान NAAQS, 2009 के अनुसार अनुमेय सीमा के भीतर हैं।
शोर Noise	शोर का स्तर दिन और रात के समय क्रमशः 48.8-65.5 डीबी (ए) और 40.5-53.3 डीबी (ए) पाया गया है। परियोजना स्थल के लिए दिन में शोर का उच्च स्तर निर्माण के कारण और संचालन और वाहन गतिविधियों को जिम्मेदार ठहराया जा सकता है
जैविक पर्यावरण (Biological Environment)	रामसिंहपुरा गांव, रेवाड़ी, हरियाणा राज्य में मौजूदा डम्पसाइट के उपचार और सुधार की प्रस्तावित स्थापना और सेनेटरी लैंडफिल के निर्माण, संचालन और रखरखाव के 10 किमी अध्ययन क्षेत्र की मौजूदा स्थिति का आकलन करने के लिए जैविक पर्यावरण के लिए बेसलाइन अध्ययन किया गया था। 102 पौधों की प्रजातियाँ हैं और जीवों की 31 प्रजातियाँ दर्ज की गई हैं। कोई अनुसूचित I प्रजाति का आकलन नहीं किया गया है।
Socio-economic Profile of The	ऊपर की गई व्याख्या के आधार पर, प्राथमिक सर्वेक्षण (हितधारकों के साथ

Area	बातचीत, एफजीडी, सामुदायिक 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 सुविधाएं प्रमुख समस्याएँ हैं। अध्ययन क्षेत्र के अधिकांश लोगों की आजीविका श्रम कार्य, कृषि, पशुपालन और नौकरियों पर निर्भर करती है। नल का पानी, नलकूप, हैंडपंप और कुएं अध्ययन क्षेत्र में पीने के पानी के स्रोत हैं। भारत में, ग्रामीण क्षेत्रों में भी कोरोनावायरस (कोविड -19) महामारी का समग्र बोझ सबसे अधिक है, और अध्ययन क्षेत्र भी खांसी और बुखार के सामान्य मामले सामने आए हैं।
पर्यावरण प्रभाव आकलन (Environmental Impact Assessment)	
निर्माण चरण (Construction Phase)	**पानी की गुणवत्ता (Water Quality)** एक तालाब की उपस्थिति है जो पश्चिम दिशा में 0.9 किमी है। लैंडफिल क्षेत्र के पश्चिमी दिशा में मौजूद तालाब को प्रदूषित कर सकता है। **शमन के उपाय (Mitigation Measures)** ❖ पश्चिम में मौजूद तालाब हाइड्रोलिक ढाल के खिलाफ है क्योंकि क्षेत्र में पश्चिम से पूर्व की ओर ढाल है। परियोजना स्थल से कोई सतही जल पश्चिम दिशा की ओर नहीं बहेगा। अत: पश्चिम दिशा में स्थित तालाब पर प्रभाव नहीं पड़ेगा ❖ 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। ❖ प्रवाह की रुकावट से बचने के लिए तूफान के पानी की नालियों की नियमित सफाई की जाएगी। ❖ यदि कोई संदूषण हो तो तालाब के पानी की नियमित रूप से निगरानी की जाएगी।

हवा की गुणवत्ता: (Air Quality):

वायु गुणवत्ता प्रभाव प्रकृति में अस्थायी होगा और निर्माण समाप्त होने पर बंद हो जाएगा। परियोजना विकासकर्ता द्वारा एक धूल और उत्सर्जन नियंत्रण योजना तैयार और कार्यान्वित की जाएगी।

शोर: (Noise):

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 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।

श्रम शिविर के मुद्दे: (Labour Camp Issues):

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।

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।

भौतिक सांस्कृतिक और पुरातात्विक संसाधनों को नुकसान (Damage to Physical cultural and archaeological resources):

साइट के भीतर कोई भौतिक सांस्कृतिक संसाधन नहीं है और इसलिए यह मुद्दा महत्वपूर्ण नहीं है।

यातायात से संबंधित प्रभाव: (Traffic related Impact):

	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।
ऑपरेशन चरण (Operation Phase)	SWM, नियमों के अनुसार, केवल निष्क्रिय सामग्री का निपटान 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 प्रबंधन और निपटान; (6) लैंडफिल लीचेट से प्रभाव। इन प्रभावों पर निम्नलिखित अनुभागों में विस्तार से चर्चा की गई है। **लैंडफिल गैस से प्रभाव (Impacts from landfill gas)** 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। **डीजी सेट (DG set)** DG set बिजली की विफलता के समय अपने सामयिक संचालन के दौरान वायु प्रदूषण का उत्सर्जन करेगा।
	तेल/रसायनों का रिसाव और रिसाव (Spillage and leakage of oil/chemicals): 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। **घरेलू तरल और ठोस अपशिष्ट का निर्वहन: (Discharge of domestic liquid &**

	solid waste): 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
	लैंडफिल से लीचेट (Leachate from landfill): 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 विकासकर्ता को पर्याप्त तरीके से लीचेट प्रबंधन की योजना बनानी होगी।
क्लोजर और पोस्ट क्लोजर चरण की गतिविधियाँ (Closure and post closure phase activities)	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। 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।
सामुदायिक मुद्दे (Community Issues)	**मच्छरों, वैक्टर और मक्खियों का प्रजनन (Breeding of mosquitoes, vectors and flies)** यह एक प्रतिकूल प्रभाव होगा, क्योंकि लैंडफिल साइट पर प्रजनन का जोखिम होगा। **आवासीयऔर व्यावसायिक क्षेत्र में कूड़ा-करकट करना (Littering of waste in residential and commercial area)** 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।

	लैंडफिल में अनधिकृत प्रवेश (Unauthorized entry in landfill) लैंडफिल साइट के संचालन से अनधिकृत प्रवेश हो सकता है जिससे दुर्घटनाएं हो सकती हैं और घुसपैठियों के स्वास्थ्य पर प्रभाव पड़ सकता है। **स्थानीय समुदाय में रोग होने की दर में बढ़ोतरी (Increase in disease occurrence rate in local community)** वर्तमान में साइट के आसपास कोई महत्वपूर्ण बंदोबस्त नहीं है, हालांकि, लैंडफिल साइट के चालू होने के बाद इसमें बढ़ोतरी 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। **(निर्माण श्रमिकों और श्रमिक शिविरों के बीच सामाजिक संघर्ष) (Social conflict among construction workers and labour camps)** 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। **लैंडफिल गैस से स्वास्थ्य पर प्रभाव (Health impact from landfill gas)** लैंडफिल साइट में अनधिकृत व्यक्ति लैंडफिल गैस से स्वास्थ्य प्रभाव के संपर्क में आ सकते हैं। **मैला ढोने वालों का स्वास्थ्य और सुरक्षा (Health and safety of scavengers)** 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।
पर्यावरण प्रबंधन योजना (Environmental Management Plan)	
पर्यावरण प्रबंधन योजना	▪ संभावित प्रतिकूल प्रभावों को कम करने और सकारात्मक प्रभावों को बढ़ाने के लिए ध्वनि पर्यावरण प्रबंधन योजनाएं तैयार और कार्यान्वित की जाएंगी।

(Environmental Management Plans)	ईएमपी को साइट पर संयंत्र गतिविधियों के निम्नलिखित चरणों के लिए विकसित किया गया है। ❖ परियोजना तैयार करने का चरण ❖ परियोजना निर्माण चरण ❖ परियोजना संचालन चरण ❖ प्लांट क्लोजर और पोस्ट क्लोजर स्टेज 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।
न्यूनीकरण उपायों के कार्यान्वयन और निगरानी के लिए संस्थागत ढांचा (Institutional Framework for Implementation & Monitoring of Mitigation Measures)	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। पूर्व-निर्माण कार्य शुरू करने से पहले ईएमपी और स्वास्थ्य और सुरक्षा योजना के सभी आवश्यक घटक चालू होंगे। परियोजना के परिचालन चरण के लिए ईएसएमपी 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।
कॉर्पोरेट पर्यावरण उत्तरदायित्व (सीईआर) (Corporate Environment Responsibility (CER)	CER सीईआर अधिसूचना दिनांक 1 मई 2018 के तहत कंपनी अपनी परियोजना लागत का 2% खर्च करेगी, जो 8 लाख 4 हजार 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।
निष्कर्ष (Conclusion)	**बेहतर रहने की स्थिति (Better Living Conditions)** ✓ कोई खुला डंपिंग नहीं। ✓ हवा, पानी और मिट्टी के दूषित होने की संभावना कम करें। ✓ उत्सर्जन गंध कम करें। ✓ समाज के जीवन स्तर में सुधार करना और सुरक्षित और स्वच्छ वातावरण प्रदान करना। **प्रत्यक्ष और अप्रत्यक्ष रोजगार के अवसर (Direct & indirect employment opportunities)** ✓ परियोजना का विकास निर्माण और संचालन दोनों चरणों के दौरान स्थानीय कुशल, अकुशल और अर्धकुशल लोगों को रोजगार के अवसर प्रदान करेगा। ✓ परियोजना के निर्माण चरण के दौरान अप्रत्यक्ष रोजगार भी उत्पन्न हो सकता है।

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR

ENVIRONMENTAL CLEARANCE

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

FOR

Implementation of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Ramsinghpura village, Rewari, Haryana

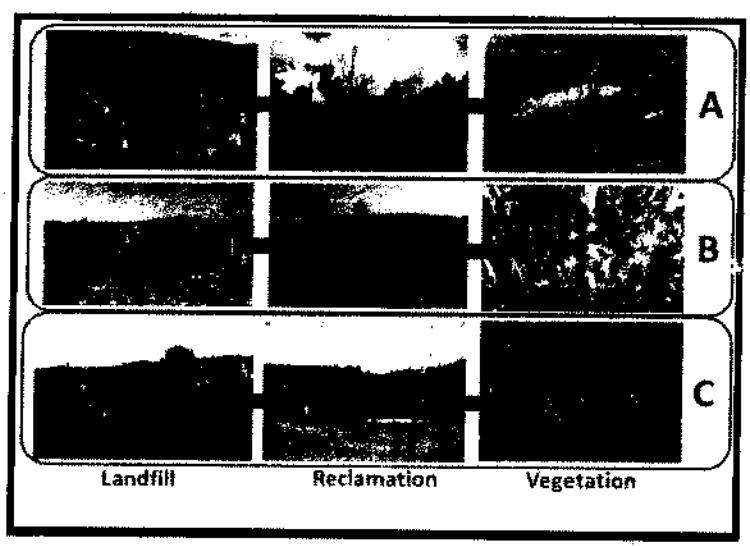
AREA-14.625 ACRES

Category of the project- "A" Project schedule 7(i) (General Condition Applies)

Interstate boundary within 2 km radius area from the project site

PROJECT PROPONENT

MUNICIPAL COUNCIL REWARI



Consultant

AMALTAS

Amaltas Enviro Industrial Consultant LLP.

(NABET Accredited EIA Consultants Organization)

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

2925, Sec.-46, Gurugram- 120001

STUDY PERIOD – MARCH– MAY 2022

NABET ACCREDITATION CERTIFICATE

Quality Council of India

National Accreditation Board for Education & Training

Certificate of Accreditation

Amaltas Enviro Industrial Consultants LLP

#2925 – Basement, Sector-46, Gurugram, Haryana-122003

Accredited as Category – 'A' organization under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations: Version 3 for preparing EIA/EMP reports in the following sectors:

Sl. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1.	Mining of minerals- opencast mining only	1	1 (a) (i)	A
2.	Synthetic organic chemicals industry	21	5 (f)	A
3.	Bio-medical waste treatment facilities	32A	7 (da)	B
4.	Highways,	34	7 (f)	A
5.	Common Municipal Solid Waste Management Facility (CMSWMF)	37	7 (i)	B
6.	Building and construction projects	38	8 (a)	B
7.	Townships and Area development projects	39	8 (b)	B

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RA AC Minutes dated July 26, 2019 and Supplementary Assessment minutes dated April 25, 2020 and August 28, 2020 posted on QCI-NABET website.

The Accreditation shall remain in force subject to continued compliance to the terms and conditions mentioned in QCI-NABET's letter of accreditation bearing no. QCI/NABET/ENV/ACO/19/1046 dated August 28, 2019. The accreditation needs to be renewed before the expiry date by Amaltas Enviro Industrial Consultants LLP, Gurugram following due process of assessment.

Sr. Director, NABET
Dated: June 14, 2021

Certificate No.
NABET/EIA/1821/RA 0141 (Rev.01)

Valid till
30.12.2021

For the updated List of Accredited EIA Consultant Organizations with approved Sectors please refer to QCI-NABET website.

National Accreditation Board for Education and Training

QCI/NABET/ENV/ACO/23/2740

April 19, 2023

To

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

Sub.: Extension of Validity of Accreditation till July 18, 2023 – 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 18, 2023 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

Institute of Town Planners India, 6th Floor, 4-A, Ring Road, I.P Estate, New Delhi-110 002, India
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TOR ISSUED BY EAC

DATED 29TH JUNE 2022

For

Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill

At

Ramsinghpura Village Rewari, Haryana

SCOPE OF THE STUDY (COMPLIANCE OF TERMS OF REFERENCE)

Point wise compliance of ToR points issued by MoEF & CC, Delhi with vide letter no F.No. (IA/HR/MIS/259055/2022; **F.No. 21-41/2022-IA-III Dated 29th June, 2022** for the project of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Ramsinghpura, Rewari Haryana.

TABLE NO-1.1 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.	MOUs for the same attached as **Annexure-1.**
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	Refer Chapter 2: Closure of Existing Dump Site

S. No.	Conditions	Details
	exiting site including disposal of accumulated wastes and capping.	
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.	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.	Noted
11	Waste management facilities should maintain safe distance from the nearby pond.	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 and 8.4: 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,	Not applicable since no river exists within a 1 Km radius or a 5 km radius of the study area. Refer Chapter 4: Description of the Environment Details of drainage and flood details provided in Chapter

S. No.	Conditions	Details
	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.	
18	Details of effluent treatment and recycling process	Refer Chapter 3, Project Description
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-1.2 STANDARD TERMS OF REFERENCE

S. No.	Terms of Reference	Compliance to terms of references
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 Bawal dumpsite is located is owned by MC, Rewari and has been used for open dumping of mixed MSW since the years About 0.6 lakh ton of MSW has already been deposited at the Dumpsite. At present, the Dumpsite receives an estimated 81Tons of Municipal Solid Waste ("MSW") per day. The decade population of the year 2021 is 42369 (Dharuhera) 179745 (Rewari) 24100 (Bawal). 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., 30.09.2023.
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.	**Chapter 4** in the report presents the latest topographical map from Survey of India covering 10 km radius from the project location. Para In chapter 4 presents all the significant site features such as distance from nearest town/railway station/airportetc. No negative impacts have been envisaged due to the proposed MSW project activity. Chapter 4 present more details.
3	Examine and submit details of alternative technologies viz. RDF shall also be evolved.	No alternatives 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.

S. No.	Terms of Reference	Compliance to terms of references
		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 locations around the proposed site within 10 km radius. All samples were analysed for physical and chemical characteristics including nitrates and phosphates. **Table 4.8** (Chapter 4) presents the locations from where the water samples were taken. **Table 4.9** (Chapter 4) presents analysis results of ground water samples.
6	Examine and submit details of the odourcontrol 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/pond 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.
8	Submit the criteria for assessing waste generation. Any segregation of hazardous and bio-medical wastes	At present, the Dumpsite receives an estimated 81 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.

S. No.	Terms of Reference	Compliance to terms of references
		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 detailed layout of the project including green belt, roads, processing facilities Sanitary Landfill, Composting processing etc.). The land breakup details are provided in **Chapter 3.**
10	Submit a copy of the land use certificate from the competent authority.	The land is provided by Municipal Council Rewari for development of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Ramsinghpura, Bawal Dumpsite, copy of the land
11	NOC from local or nearest airport within 20 km and any flight funnel restrictions.	Indira Gandhi International Airport New Delhi situated at an aerial distance of 75.5 km in North East direction. 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 to avoid transport of fill material.
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 hydrologyand water regime and impact on the same. Impact is given in **Chapter-5.**

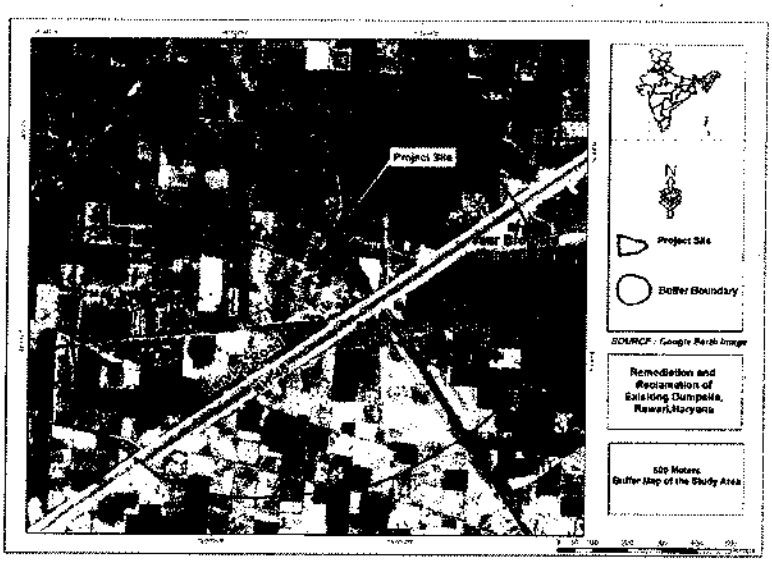
S. No.	Terms of Reference	Compliance to terms of references
16	Submit a copy of detailed plan of waste management	**Chapter 3** presents detailed information on the plan of waste management systems & presents the process flow chart information and material mass balance of MSW processing information.
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** present 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 effected people, if any.	No Rehabilitation and Resettlement (R&R) is required to establish the proposed facility. The land is provided by Municipal Council Rewari for Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Ramsinghpura, Bawal.
20	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.
21	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 SEIAA and not on the basis of Minutes of the Meeting available on the web-site	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.
22	A detailed draft EIA/EMP report should be prepared in accordance with the	Noted and followed.

S. No.	Terms of Reference	Compliance to terms of references
	above additional TOR and should be submitted to the ministry in accordance with the Notification.	
23	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.
24	Any further clarification on carrying out the above studies includinganticipated impacts due to the projectand mitigative	All the studies/activities suggested in the TOR were completed in detail and presented in the EIA report.
	Ministry website "http://moef.nic.in/Manual/Commo	

EXECUTIVE SUMMARY

Introduction of the Project	Municipal Council the "Authority" intends for Implementation of Remediation and construction, operation and maintenance of Sanitary Landfill at the Ramsinghpura Village Bawal, Haryana. As per the current estimates (2021) of the Municipal council Rewari, about 81 tons of solid waste is generated daily in Rewari. 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). Due to a large number of small-scale industrial units in the town, industrial solid waste also enters illegally into municipal stream. **Need of Project and its Importance to 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 RDF & recycling material to the appropriate vendor.
Project description	**TYPE OF PROJECT** 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' of item 7(i) 'Common Municipal Solid Waste Management Facility (CMSWMF)' of the Schedule to the EIA Notification, 2006 and its subsequent

from the project site.

	Therefore, the project comes under category 'A' and requires appraisal at Central level by sectoral EAC. **WASTE QUANTITY** As per the current estimates (2021) of the Municipal Council Rewari, about 81 tons of solid waste is generated daily in Rewari. 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 project site is situated near NH-8. Nearest airport from project site is Indira Gandhi International Airport New Delhi situated at an aerial distance of 75.5 km. The site is landlocked and away from sea or waterways.in NNW direction is the nearest airport. The site is landlocked and away from sea or waterways. **Satellite view of the Project Site** The district broadly forms part of Indo-Gangetic alluvial plain of Yamuna sub basin. It has vast alluvial and sandy tracts and is interspersed strike ridges which are occasionally covered with blown sand. The Sand dunes attain a height of 30m but on an average they have height of 7 m with respect to surroundings. Some of the dunes support light vegetation where as others are of shifting nature depending upon the direction of wind. The hill ranges are part of great Aravalli chain and contain valuable mineral deposits and natural meadows. The elevation of land in the area varies from 232 m in the north to 262 m above mean sea level in south. 

	S. No.	Criteria	Criteria distance	Available distance from proposed SLF site
Environment Setting in area	1	**Distance from nearest River**	**100 meters**	Sahibi River – 25.42 Km in North direction
	2	**Distance from Nearest Pond**	**200 meters**	Pond Near Village odhi 0.9 Km in W direction
	3	**Distance from nearest Highway (NH-2)**	**200 meters**	SH-15 3.5 km (W) Rajasthan/Haryana State Boundary – 2km (SSW)
	4	**Distance from nearest habitation**	**200 meters**	Near Village odhi -1km (W) direction
	5	**Distance from nearest Public Parks**	**200 meters**	Mahatma Gandhi Memorial Herbal Park – 9.61 Km in NNW direction
	6	**Distance from nearest Water supply wells**	**200 meters**	-
	7	**Distance from nearest Airports/Airbase**	**20 km**	IGI Airport -75.5 km (NE)
Land requirement	The proposed project is for maintenance of Sanitary landfill facility of 81 TPD of SWM in total area of 14.625 Acres for 1 years. The district broadly forms part of Indo-Gangetic alluvial plain of Yamuna sub basin. It has vast alluvial and sandy tracts and is interspersed strike ridges which are occasionally covered with blown sand. The Sand dunes attain a height of 30m but on an average they have height of 7 m with respect to surroundings. Some of the dunes support light vegetation where as others are of shifting nature depending upon the direction of wind. The hill ranges are part of great Aravalli chain and contain valuable mineral deposits and natural meadows. The elevation of land in the area varies from 232 m in the north to 262 m above mean sea level in south. The master slope of the area is towards the north. The project site is situated near NH-8. Nearest airport from project site is Indira Gandhi International Airport New Delhi situated at an aerial distance of 75.5 km. The site is landlocked and away from sea or waterways.in NNW direction is the nearest airport. The site is landlocked and away from sea or waterways.			
Baseline Environmental Conditions				

Executive Summary

The field studies carried out during **March to May 2022** 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.

Topography	The topography of the district is represented by rugged hilly terrain of Aravali ranges. The region has suffered a prolonged period of aridity during the quaternary and sub-recent times and the landscape has been greatly modified by Aeolian action. The effect of fluvial cycle in developing the landform is also pronounced. The landscape of the district is peculiar. It has varied topography comprising valleys, undulating lands, sand dunes and alluvial plains. The Aravali ranges lie in the southern and western parts of the district and thinly spread throughout the district. The region has suffered a prolonged period of aridity during the quaternary and sub-recent times and the landscape has been greatly modified by Aeolian action. The catchments area of Sahibi river, which falls in Rewari district, can be divided into five distinct landscapes: - a) Aravali Hills b) Flood Plains c) Foot Hills d) Aeolian Plains and Sand Dunes e) Alluvium Deposits
Geology	The district falls in the geological domain of Pre-Cambrian rocks of Aravali Mountains. These are represented by Delhi Super Group of rocks (2500-1600 million years), which are confined to the southern part of the state of Haryana. It consists of Alwar group of rocks, which are overlain by rocks of Ajebgarh group. The Ajebgarh group of rocks is mostly developed in the form of hill ranges as well as parallel isolated hillocks in parts of Rewari. The dominant rock types of the group include shale, slate, phyllite, pelitic schist, crystalline and impure limestones, marbles, calc-schist with intercalations of thinly bedded quartzites.
Geo-hydrology	The district is occupied by Indo-Gangetic alluvial plain of Quaternary age, and falls in Ghaggar basin. The principal ground water reservoirs in the area are unconsolidated alluvial deposits of quaternary age. Hard rocks also have some amount of ground water which circulate through joint, fractures & cracks. Over most part of the area ground water occurs under phreatic conditions, whereas in deeper water bearing zones which are overlain by impermeable clay it occurs under semi confined to locally confined conditions. The shallow aquifers are being tapped by the handpumps and shallow tubewells, which are widely used for the domestic purposes. CGWB has drilled 16 exploratory borewells and 5 piezometers to delineate and determine potential aquifer zones, evaluation of the aquifer characteristics. The deepest slim hole was drilled upto the depth of 203.85 m at Chandanwas.

	Alluvium comprises very fine to coarses and, gravel, silt and clay with kankar in varying proportions. The permeable granular zones comprising sand and occasionally coarse sand and gravel. Their lateral and vertical extent is limited. The borehole data reveals that clay group of formations dominate over the sand group in the district area. The discharge of deep tubewells in the area varies between 358 and 2911 lpm. The transmissivity values range from 110 to 1060 m^2/day and storability ranges from 1.14*10-3 to 4.36*10-3.
Soil	The district has two types of soils – tropical arid brown and arid brown soils. The arid brown soils are found in major parts of the area whereas tropical arid brown soils are found in north eastern part of the district.
Water Quality	The analysis results of Ground Water indicates that the ❖ pH value is 7.11 to 7.65 which is well within the specified standard of 6.5 to 8.5. ❖ The TDS was observed as 892 to 1842 mg/l. ❖ The chlorides were found as 146 to 342 mg/l. ❖ The sulphate was found as 118 to 276.4 mg/l. It is observed that sulphate is within limits. ❖ Total hardness ranges between 136 to 278 mg/l. ❖ Metals: Iron is found in between 0.11 -0.27 mg/l.
Ambient AirQuality Monitoring	Ambient Air Quality Monitoring reveals that the **minimum** and **maximum concentrations** of **PM_{10}** for all the 10 Air Quality monitoring stations were found to be **78.6 µg/m³** and **223.4 µg/m³** respectively, while for **$PM_{2.5}$** varies between **51.1 µg/m³**and **104.3 µg/m³**. As far as the gaseous pollutants SO_2, NO_2, & CO 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_2** were found to be **10.7 µg/m³** and **46.5** **µg/m³** respectively. The **minimum** and **maximum concentrations of SO_2**were found to be **5.2 µg/m³** and **25.4 µg/m³** respectively. The **minimum** and **maximum concentrations of CO** were found to be **0.6 mg/m³** and **2.86mg/m³**respectively. **Conclusion** From the baseline monitoring result, it is observed that the monitored parameters (PM10, PM2.5, SO2,NO2,) are within the permissible limits as per NAAQS, 2009 during the study period.

Noise	The noise levels are found to be 48.8-65.5 Db(A) and 40.5-53.3 Db (A) for day and night time respectively. The high levels of noise in day for project site can be attributed due to construction and operation and vehicular activities.
Biological Environment	Baseline study for the biological environment was conducted to assess the existing condition of the 10 km study area of the proposed Establishment of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Ramsinghpura village, Rewari, Haryana state. There are 102 plant species and 31 species of fauna has been recorded. There is no scheduled I species assessed.
Socio-economic profile of the area	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.
Environmental Impact Assessment	
Construction Phase	**Water Quality:** There is presence of one pond which is 0.9 km in west direction. The landfill may pollute pond which is present in western direction of the area. **MITIGATION MEASURES** ❖ The pond present in west is against the hydraulic gradient as the area is having gradient from west to east. No surface water will flow to west direction from project site. Hence, there will not be impact on pond present in westerndirection. ❖ 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 be monitored for contaminations if any. **Air Quality**: 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. **Noise**: 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. 1km 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. **Labour Camp Issues:** 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. **Damage to Physical cultural and archaeological resources:** There is no physical cultural resource within the site and hence this issue is not significant. **Traffic related Impact:** 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.
Operation Phase	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 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. **Impacts from landfill gas** 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. **DG set:** DG set will emit air pollution during its occasional operation in times of power failure.
	Spillage and leakage of oil/chemicals: 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. **Discharge of domestic liquid & solid waste:** 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 good house-keeping and sanitation purposes. **Leachate from landfill:** 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.
Closure and post closure phase activities	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. 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.
Community Issues	**Breeding of mosquitoes, vectors and flies** This will be an adverse impact, as landfill site will cause risk of breeding. **Littering of waste in residential and commercial area**

	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. **Unauthorized entry in landfill** Operation of the landfill site may cause unauthorized entry which may lead to accidents and health impact of intruders. **Increase in disease occurrence rate in local community** 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. **Social conflict among construction workers and labour camps** 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. **Health impact from landfill gas** Unauthorised persons in the landfill site may be exposed to the health impact from landfill gas. **Health and safety of scavengers** Scavenging activity if done in uncontrolled manner without PPEs (Personal Protective Equipment) will cause health and safety concerns for scavengers.
Environmental Management Plan	
Environmental Management Plans	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. ❖ Project preparation stage ❖ Project construction stage ❖ Project operation stage ❖ Plant closure and post closure stage 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.

Institutional Framework for Implementation & Monitoring of Mitigation Measures	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. All the necessary components of EMP and Health and Safety Plan will be operational before starting pre-construction work. 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 processes monitoring steps vis-à-vis safe and environment friendly operation of the plant.
Corporate Environment Responsibility (CER)	Under CER notification dated 1st may 2018 the company shall spend 2% of its project cost, which comes 8 lakhs 4 thousand; 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.
Conclusion	**Better Living Conditions** ❖ No open dumping. ❖ Reduce the chances of air, water & soil contamination. ❖ Reduce Emission Odour. ❖ Improve the living standard of society & will provide safe & hygienic surroundings. **Direct & indirect employment opportunities** ❖ Development of project will provide employment opportunity to local skilled, unskilled & semiskilled people during both construction & operation phase. ❖ Indirect employment may also generate during construction phase of project.

CHAPTER 1

INTRODUCTION

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 14th 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 14th, 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.

TOR was issued vide letter no F.No. (IA/HR/MIS/259055/2022; **F. No. 21-41/2022-IA-III Dated 29th June, 2022** for preparation of an Environmental Impact Assessment (EIA).

1.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

Municipal solid waste management is an obligatory function of the urban local bodies in India. As per the definition provided by the Solid Waste Management Rules, 2016 of Government of India, solid waste (SW) means and includes solid or semi-solid domestic waste, sanitary waste, commercial waste, Institutional waste, catering and market waste and other non-residential wastes, street sweepings, silt removed or collected from the surface drains, horticulture waste, agriculture and dairy waste, treated bio-medical waste excluding industrial waste, bio-medical waste and e-waste, battery waste, radio-active waste generated in the area under the local authorities and other entities mentioned in rule 2;. With growing population and increasing waste generation, solid waste management has become a major environmental issue. ULBs across India face similar challenges in handling and disposal of municipal solid waste: lack of adequate financial and human resources, poor technology and lack of public participation to list a few. Solid waste management system in Rewari is the responsibility of Municipal Council Rewari (MCR). Existing solid waste management system of Rewari is presented in this section.

Municipal Council the "Authority" intends for Implementation of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at sanitary landfill site at the Village Ramsinghpura Rewari Dumpsite ("Sanitary Landfill Site").

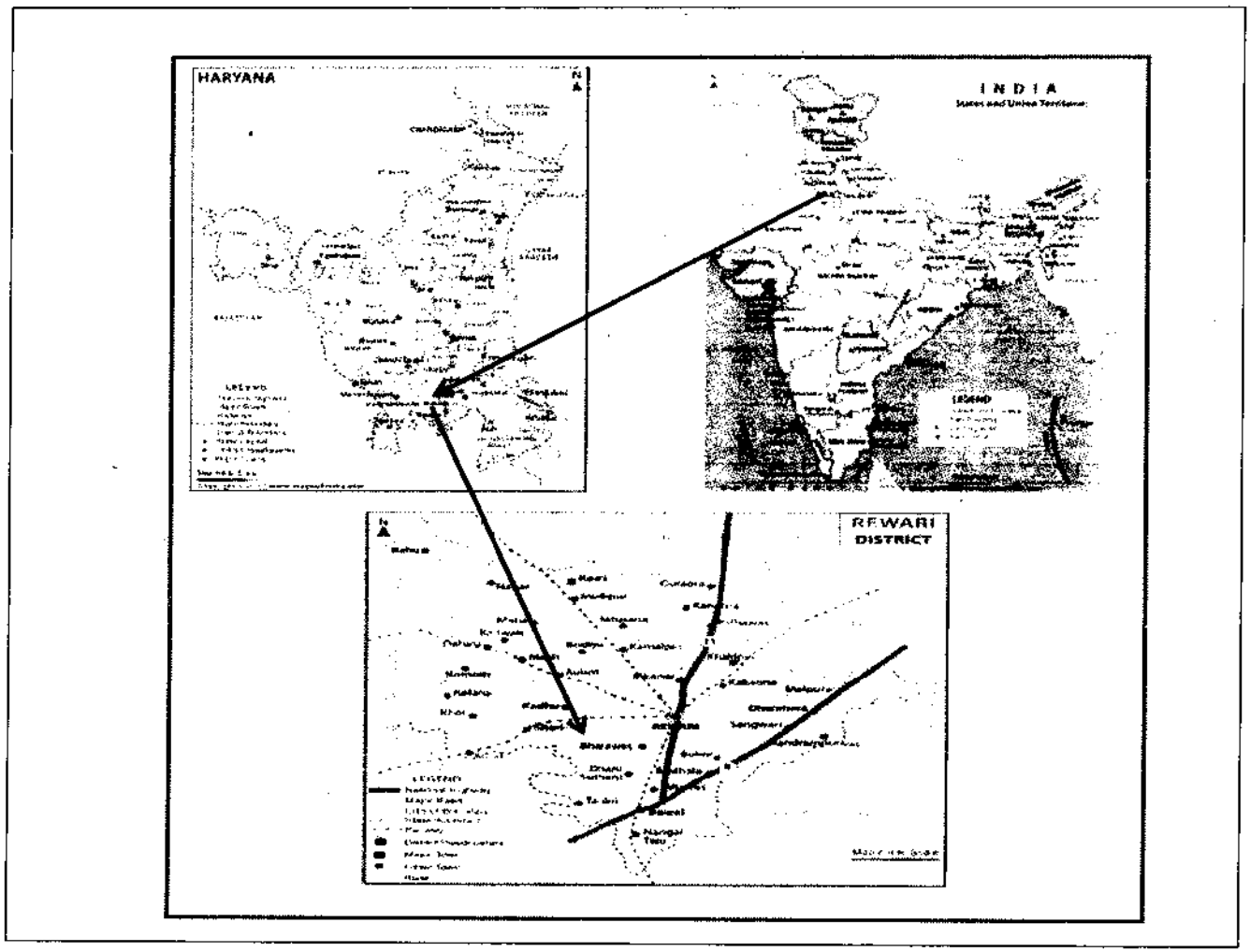
Identification of project proponent

Applicant	Authorized signatory
Municipal Council Rewari	Mr. Hemant Yadav (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 Ramsinghpura village, Rewari, Haryana.
A.	**Nature of the Project**	**Size of the Project**
	Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Ramsinghpura village, Rewari, Haryana.	**14.625 Acre**
B	**Location Details**	
1.	Village	Near Ramsinghpura
2.	Tehsil	Bawal
3.	District	Rewari
4	State	Haryana

5.	Latitude & Longitude	**Coordinates Points**	**Latitude**	**Longitude**
		1.	28^{0}03'42.93"N	76^{0}32'31.29"E
		2.	28^{0}03'42.48"N	76^{0}32'26.23"E
		3.	28^{0}03'46.44"N	76^{0}32'25.75"E
		4.	28^{0}03'47.14"N	76^{0}32'27.85"E
		5.	28^{0}03'48.81"N	76^{0}32'27.86"E
		6.	28^{0}03'47.51"N	76^{0}32'33.06"E
		7.	28^{0}03'45.42"N	76^{0}32'35.71"E
6.	Toposheet No.	53 D12		
C	**Environmental Settings of the Area**			
1.	Ecological Sensitive Areas	No		
2.	River / water body	**River/ water body**	**Distance**	**Direction**
		-	-	-
3.	Nearest Town / City	Rewari, 16.1 Km		
4.	Nearest Railway Station	Bawal, 3 Km (ENE)		
5.	Nearest Airport	Delhi 75.5 Km (NE)		
6.	State Boundary	Inter State boundary of Haryana and Rajasthan lies at a distance of 2 km from project site (SSW)		
7.	Seismic Zone	Zone – IV		
D	**Cost Details**			
1.	Total Project Cost	4.02 Cr.		
E	**Requirements of the Project**			
1.	Water Requirement	40 KLD		
2.	Man Power Requirement (Skilled and unskilled persons)	Approx. 20-25		



IGURE 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 RDF & recycling material to the appropriate vendor.

1.4 OBJECTIVE OF EIA STUDY

Rewari is an ancient city and known as Brass City. Rewari has a variety of industries, from cottage industries to small-scale integrated units and automobiles and auto ancillary industries. The traditional industries are brass metalwork and ornamental shoes (Tilledar Jooti) Rewari has kept the traditional art of Tilledar Jooti alive and is famous for such ornamental local shoes. World's largest production of motor cycles is in Hero Moto Corp. Dharuhera plant. Due to rapid urbanization huge amount of waste is generated every year. So, management of waste is of utmost importance. The project seeks to improve and develop a socially and environmentally sustainable system of solid waste management which will reduce the associated environmental and public health risks. The project intends to create a socially, economically and environmentally viable solid waste management system to develop an environmentally and aesthetically sound MSW dumping site. The major objective is to improve 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, RDF & Recycling unit. The objective of the project study is to design an integrated solid waste management system to manage the existing dump waste on 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 projectsite.
- Develop Environmental Management Plan (EMP) and Environmental Monitoring Plan;
- Undertake hazard identification and develop Disaster Management Plan; and identify projectbenefit.
- 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 MoEF & CC Delhi.

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 project, 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 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

2.1 BACKGROUND

The Ramsinghpura (Bawal) site is located near Bawal NH 8 in Rewari at Bawal, Rewari, Haryana. The height of the Ramsinghpura (Bawal) Dumpsite is 1.22 meters, to 3.20 m and depth is 0.00 meters and total area is about 14.625 acre (59184.82 sq.m). This land where Ramsinghpura (Bawal) Dumpsite is located is owned by MC Rewari and has been used for open dumping of mixed MSW since the year 2015. About 0.6 lakh ton of MSW has already been deposited at the Ramsinghpura (Bawal) Dumpsite. At present, the Ramsinghpura (Bawal) Dumpsite receives an estimated 81 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 Bawal Rewari dump site, which is not an engineered landfill. It causes many environmental issues. The Site needs a well-defined scientific closure 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. Some extra care may have to be taken during slope of stabilization. The excavation and relocation of old MSW 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

site is located near Bawal NH 8 in Rewari within $28^{0}03'45.44$ "N latitude and $76^{0}32'31.29$" E longitude at Bawal, Rewari, Haryana. The site is easily approachable by NH-8. The nearest railway station is Bawal Railway Station. Indira Gandhi International airport is the nearest airport at an aerial distance of 75.5 km.

Concept and Methodology of Closure Work

As mentioned earlier, the open dumpsite has been in operation since 2015 and waste has been spread all over the area in an unplanned, haphazard manner. 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 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 (Geotechnical Study, Contour Survey, Baseline Environmental Monitoring, MSW Composition)
2. Waste Shifting & Grading
3. Slope Formation & compaction of waste
4. Storm water Gutters
5. Liner Installation
6. Cover Soil spreading
7. Surface drains on slopes
8. Vegetation on capping

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 Rewari and it is in operation since 2015.
- Total volume of MSW dumped is approx. 0.6 lakh ton.
- Contour survey shows that, the natural ground is sloping towards east.
- It can be seen from the contour survey that waste has reached a height of approx 3-6 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 approx on 14.625 acres of land Bye & large in all area of varying depth.
- To scientifically cap the land, waste need to be spread on approx 6.6 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 dumpsite has been carried out. It is estimated from AutoCAD 3D modelling, approximately 4.09 lakh ton of waste volume is lying at existing site. This excess waste will be mined to recover soil & gravel required for cover of dumpsite.

Volume of Existing waste at site : 0.6 lakh 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 - 200mm 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.

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 $1x10^{-13}$ 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. Destructive and non-destructive seam tests will be performed according to the following protocol:

TABLE 2.1: SITE TEST AND FREQUENCY

Test type	Frequency
Non-Destructive Test	100 % testing (Full length)

Destructive Test	1 per 500 feet length or 1 sample per crew member per day, whichever produces the maximum number of samples

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 though the layer. Drainage layer is embedded into 400 gsm Geotextile from both sides, 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 oferosion 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.

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.

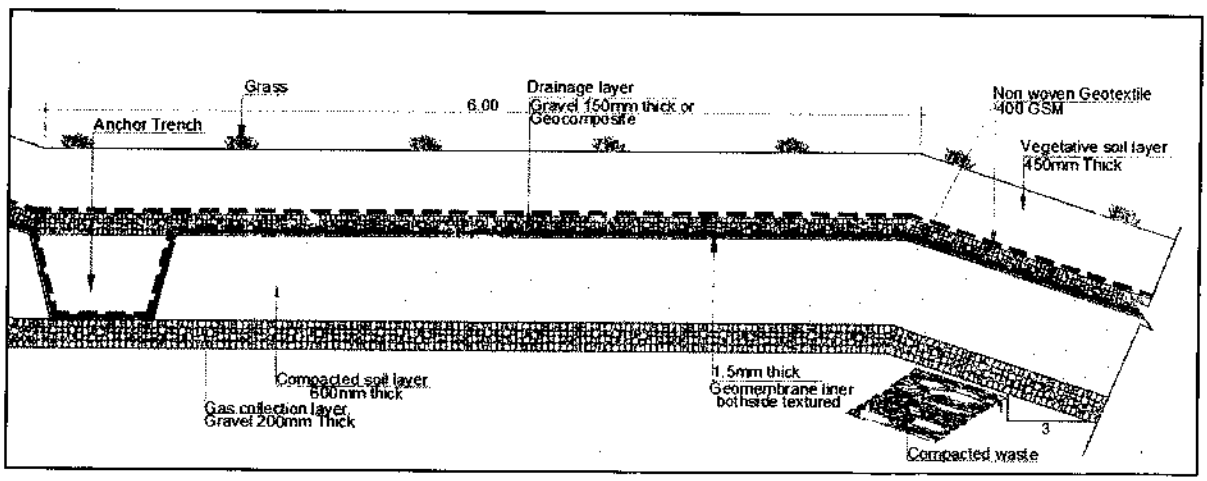


FIGURE 2.1: SECTION OF CLOSURE OF EXISTING DUMP

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 Ramsinghpura Bawal
- 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.

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.

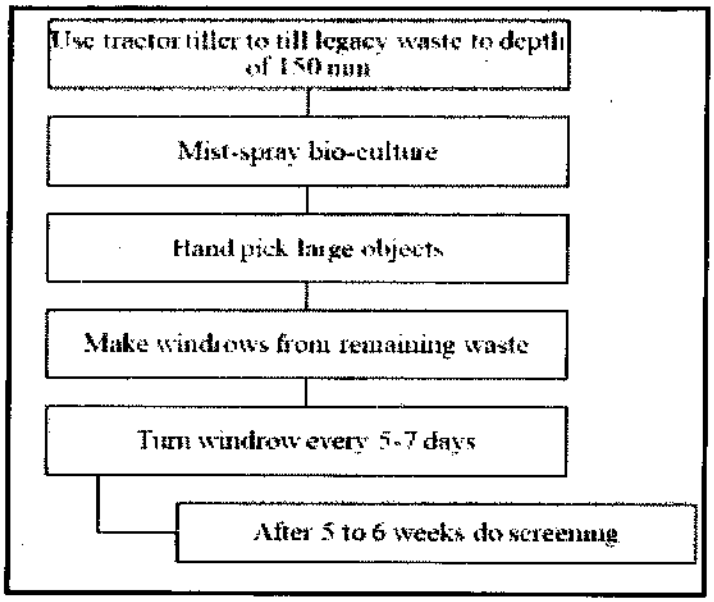


FIGURE 2-2: SCHEMATIC REPRESENTATION OF BIO-MINING THROUGH TRACTOR TILLER BY WINDROWS

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.

(ii) Capping with solid waste cover or solid waste cover enhanced with geomembrane to enable collection and flaring / utilisation of greenhouse gases.

(iii) Capping 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

The type of treatment facilities to be used depends on the leachate characteristics and volume. Typically, treatment may be required (prior to discharge) to reduce the concentration of biodegradable and non-biodegradable organic material, specific hazardous constituents, ammonia and nitrate ions, sulphides, odorous compounds and suspended solids. The biochemical oxygen demand (BOD) and nitrogen load are critical and should be considered before assessing.

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. 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. 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 proposedstorm 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. 4.8 acres (approx 33%) of the total project site area.

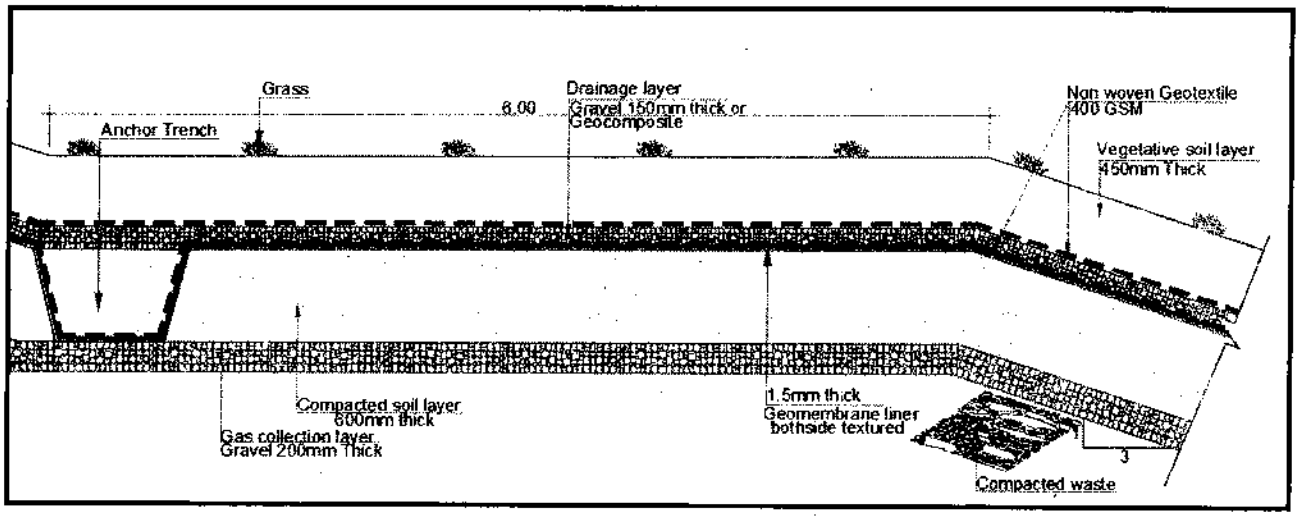


FIGURE 2.3: SECTION ON CLOSURE WITH VEGETATIVE SOIL LAYER

CHAPTER 3

DESCRIPTION ON THE PROPOSED PROJECT ACTIVITIES AND FACILITIES

3.1 TYPE OF PROJECT

As per the EIA notification dated 14th 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". However, General Condition is applicable due to the presence of interstate boundary within 2km radius area from the project site. Therefore, the project comes under category 'A' and requires appraisal at Central level by sectoral EAC.

This project is Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Meghpur Rewari Dumpsite. 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 neglection 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 Rewari Dumpsite.

3.3 LOCATION OF THE PROJECT

The project site is situated near NH 8. Nearest airport from project site is Indira Gandhi International Airport New Delhi situated at an aerial distance of 75.5 km. 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
Rajasthan/Haryana State Boundary	2km SSW direction
SH-15	3.5 km W direction
Metalled Road towards Bawal	1.5 km SE direction
Unmetalled Road	0.1 km SE direction

TABLE 3-2: COORDINATE OF THE PROJECT SITE

Coordinates Points	Latitude	Longitude
A.	28°03'42.93"N	76°32'31.29"E
B.	28°03'42.48"N	76°32'26.23"E
C.	28°03'46.44"N	76°32'25.75"E
D.	28°03'47.14"N	76°32'27.85"E
E.	28°03'48.81"N	76°32'27.86"E
F.	28°03'47.51"N	76°32'33.06"E
G.	28°03'45.42"N	76°32'35.71"E

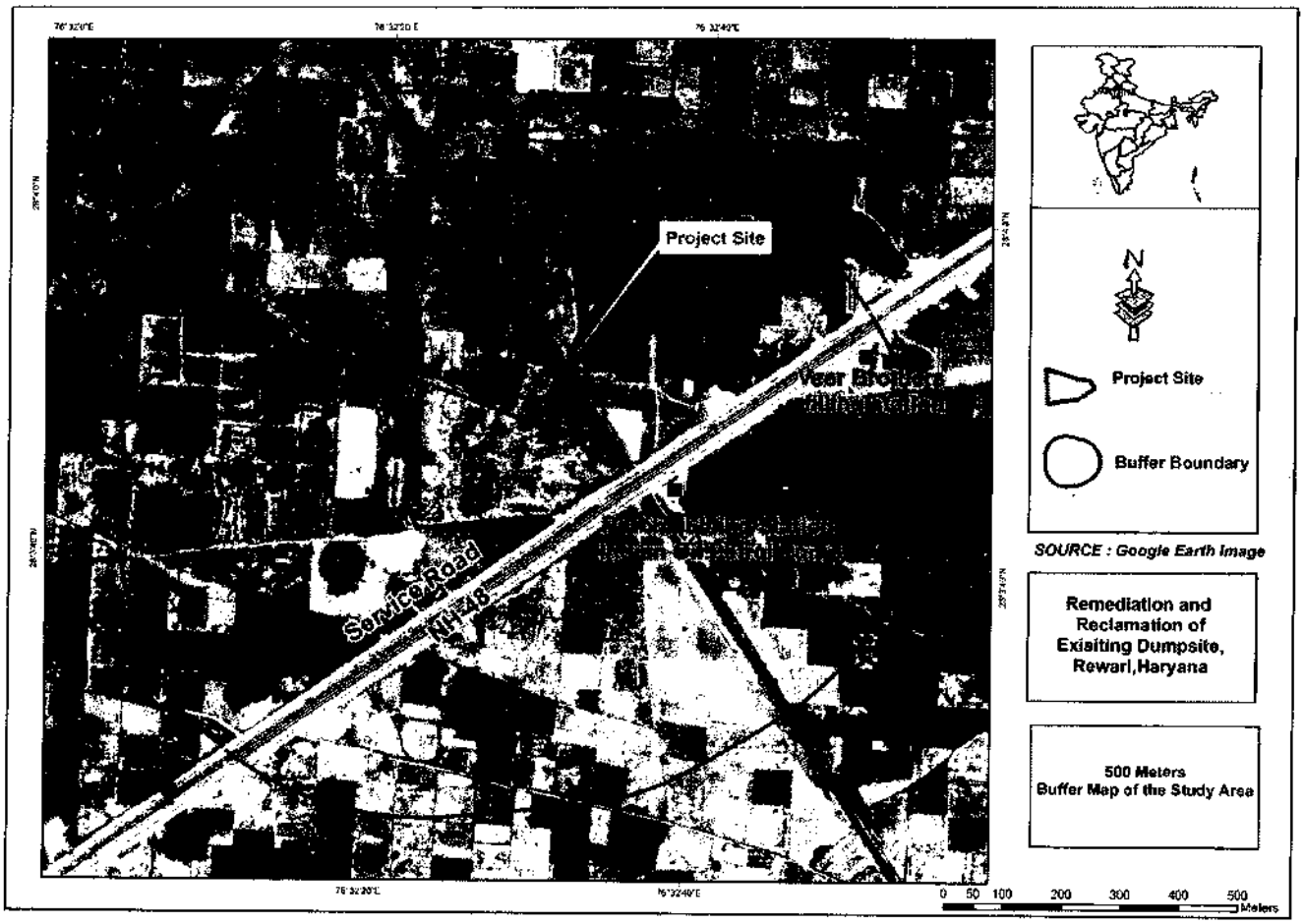


FIGURE 3.1: GOOGLE IMAGE OF THE AREA

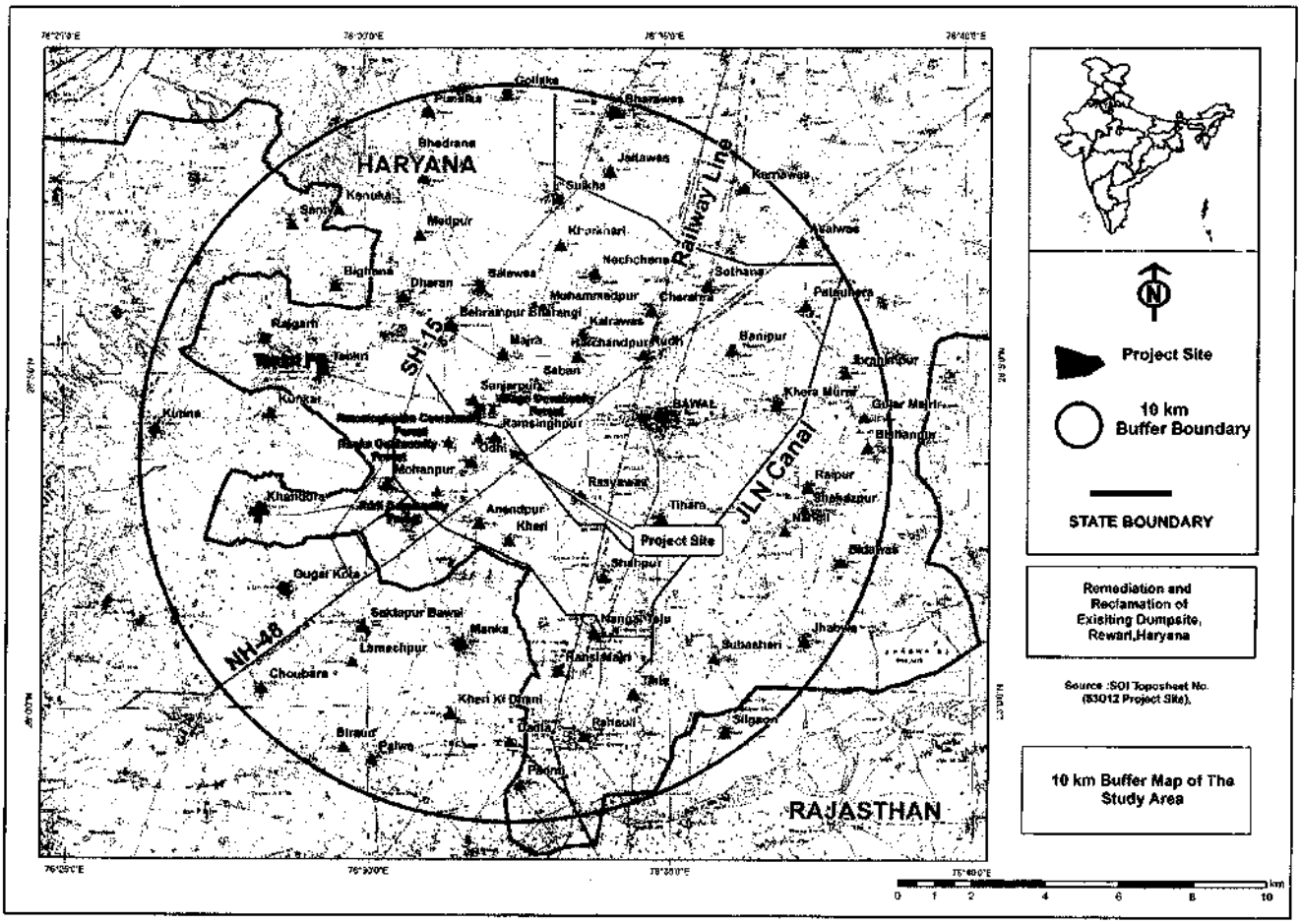


FIGURE 3.2: KEY PLAN OF THE AREA

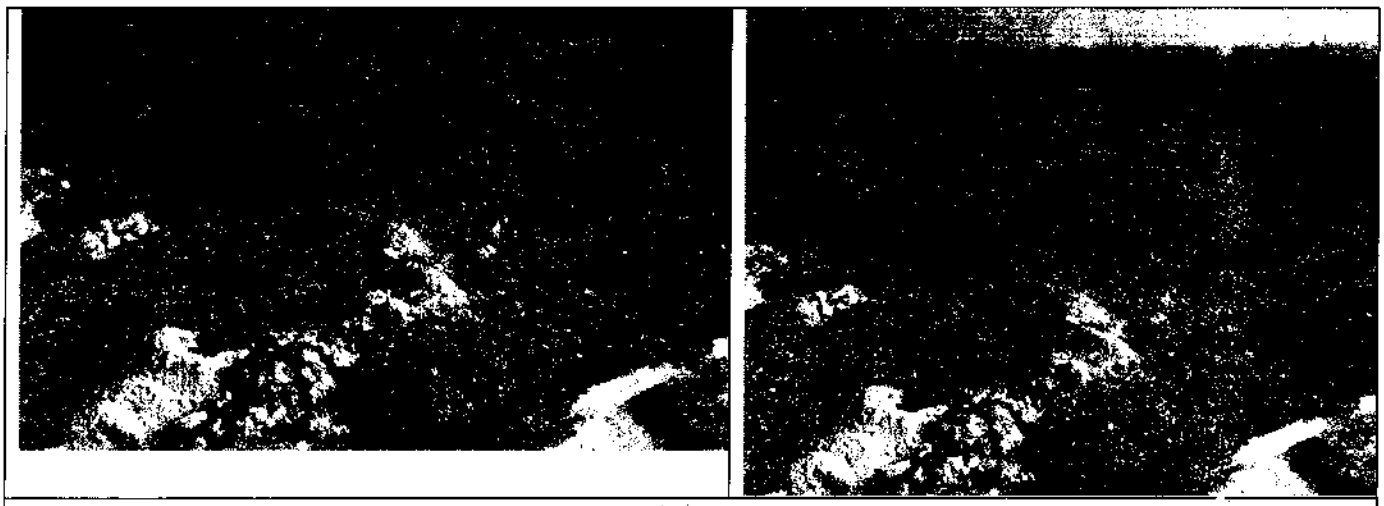


FIGURE 3.3: SITE PICTURES

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

Size & Nature of deposit

The proposed project is for maintenance of Sanitary landfill facility of 81 TPD of SWM in an area of 14.625 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 PMC, about 81 tons of solid waste is generated daily in Rewari. 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). Due to a large number of small-scale industrial units in the town, industrial solid waste also enters illegally into municipal stream.

TABLE- 3.3 WASTE GENERATION DETAILS

Description	Waste Generation approx.	Unit
Residential	60.75	TPD
mandis (sabji, fruit and anaj)	2.43	TPD
Commercial	12.15	TPD
Religious Place	1.62	TPD
Street sweeping	4.05	TPD
Total Waste Generation	**81**	TPD

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 Ramsinghpura (BAWAL) Dumpsite. The reasonable steps shall be taken to ensure that there is control ofodour, dust and treatment generated leachate, flies, rodents and bird menace and fire hazardsin and around the 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 endeavours shall be made to maximize the utilization of theWaste from the Bawal 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 soilenricher/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 operationsrequire special handling and disposal requirements, precautions must be taken while excavating as it releases gases like methane, Sulphur dioxide and other gases which causesexplosion and fire.

There 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. 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 so as to achieve the total reclamation of land based on the estimatedquantum of waste at Dumpsite. There shall be the provision of weighbridge to measurethe quantity of various components of waste at dumpsite, processed in terms of sorting and segregated materials, RDF, compost material, and inserts 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. The alternate uses for C&D waste asper 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**

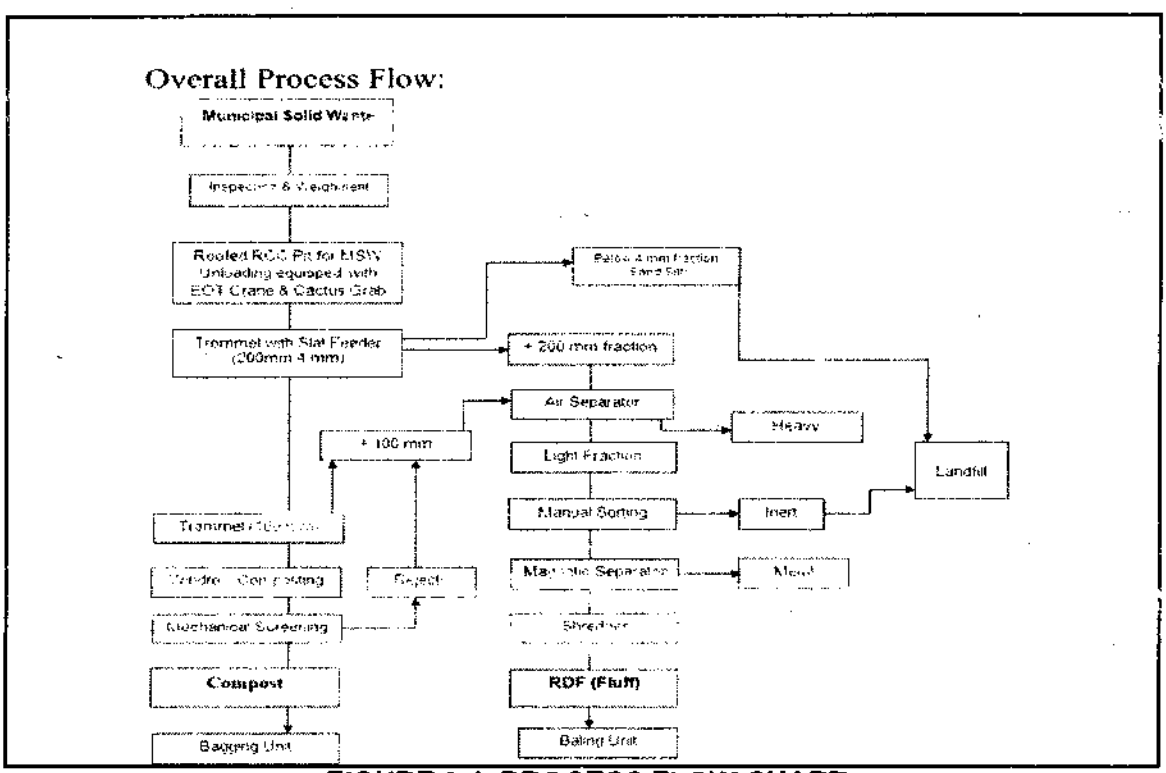


FIGURE 3.4: PROCESS FLOW CHART

TABLE 3-4: PHYSICAL CHARACTERISTICS

S. No.	Depth (m) from Top of the Dump Site	A1 (0.2m)	A2 (2.4m)	A3 (4.6m)	A4 (6.8m)	A5 (8.10m)
	Date of Sample Collection	05.02.21	05.02.21	05.02.21	05.02.21	05.02.21
1	Kitchen Waste	0	0	0	0	0
2	Dry Sugar Canes	0	0	0	0	0

3	Coconut Shell/Hair	19	16	5	2	0
4	Straw/Hey	0	0	0	0	0
5	Flowers	0	0	0	0	0
6	Green Leaves/Green Matter	19	0	0	0	0
7	Dry Leaves/Dry Matter	0	0	0	0	0
8	Wooden Piece	4	6	3	2	2
9	Broom	0	0	0	0	0
10	Cardboard (Wooden)	0	0	0	0	0
11	Paper/Cardboard	0	0	0	0	0
12	Textile/Cotton/Jute	45	40	35	30	20
13	Rubber/Leather/Tyre	7	6	7	6	5
14	Polythene/Plastic	135	90	70	50	35
15	PVC	60	48.7	36.6	56.5	40.2
16	Thermocol	3	2	1	0.5	0.3
17	Metals	4	3	2	1	0.5
18	Glass	2	2	1	1	1
19	Inert and Other	163	190	64	60	14
20	Sand/Soil/Earth	320.4	446.6	475.2	486.6	510
21	Stones/Brick/Concrete	210	187.8	188.4	243.5	189.6
22	Ceramic and Other	0	0	0	0	0
23	Human Hair	0	0	0	0	0
24	Batteries	0	0	0	0	0

TABLE 3-5: CHEMICAL CHARACTERISTICS

1	- Moisture Content, % By mass	36	40	38	26	40	41	32	36	37	40
2	IP Calorific value,	1510	1316	1460	1530	1304	1378	1300	1500	1512	1360
3	pH (1.10)	6.00	6.60	6.80	6.15	6.62	6.45	6.16	6.70	6.75	6.85
4	Bulk Density, kg/3										
5	Organic carbon % by mass	5.2	5.36	6.32	6.32	5.21	4.12	6.37	5.32	4.63	5.13
6	Nitrogen (as n %) by mass	0.29	0.44	0.43	0.51	0.39	0.46	0.52	0.39	0.43	0.46
7	Phosphate (as P2o5)	0.39	0.42	0.49	0.46	0.41	0.43	1.16	0.46	0.36	0.52
8	Potash (as k20)20%by mass	0.56	2.13	2.13	4.02	0.76	2.08	0.82	0.83	1.57	1.52
9	C/N ration	16.3:2	13.8:3	15.5:3	11.7:6	12.8:3	8.6:8	8.7:9	8.6:3	11.4:5	15.4:2
10	Conductivity, µs/cm	2896	3165	2760	2436	2362	1836	3156	3364	1763	2063
11	Total Solids% by mass	53.2	57.3	63.9	65.7	53.9	56.6	72.46	61.9	54.6	44.8
12	Chloride, %by mass	1.63	1.63	1.32	1.33	1.76	1.13	0.92	1.13	1.63	1.25
13	Sulphur, %by mass V	0.86	0.49	0.96	0.73	0.72	0.71	1.36	1.13	0.86	0.79
14	COD, mg/kg	463.16	603.46	599.8	263.16	156.78	746.13	426.13	419.7	736.29	645.9
15	Arsenic (as AS), mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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																		

3.5 PROPOSED LAND BREAKUP FOR SOLID WASTE MANAGEMENT FACILITY

The proposed project is for maintenance of Sanitary landfill facility of 81TPD of SWM in total area of 14.625 Acres for 1 years. Area breaks up details is given in **Table 3-6.**

TABLE 3-6: AREA BREAK-UP DETAILS

Description	Area (Acre)	Area sq. m.
RDF Storage Area	2	8093.651
Windrows/composting	4	16187.3
SLF	0.5	2023.413
other infrastructure such as road, parking etc.	1.32	5341.809
Office facility	0.04	161.873
Green Area	4.8	19424.76
Plant (Machinery Area)	2	8093.651
Total Area	**14.6**	**59,184.82**

3.6 QUANTITY OF WASTE TO BE GENERATED

The details about the population and waste generation for Proposed Cluster are given in **Table 3.7**

TABLE 3-7: PROJECTED POPULATION AND WASTE GENERATION

Decades	Population (3 ULBs Rewari, Bawal and Dharuhera)	Waste Generation (Tonnes/Day)
2001	**14335 (D) 125021(R) 11750 (B)**	**30**
2011	**30344 (D) 143021(R) 16776 (B)**	**45**
2021	**42369 (D) 179745 (R) 24100 (B)**	**81**

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.

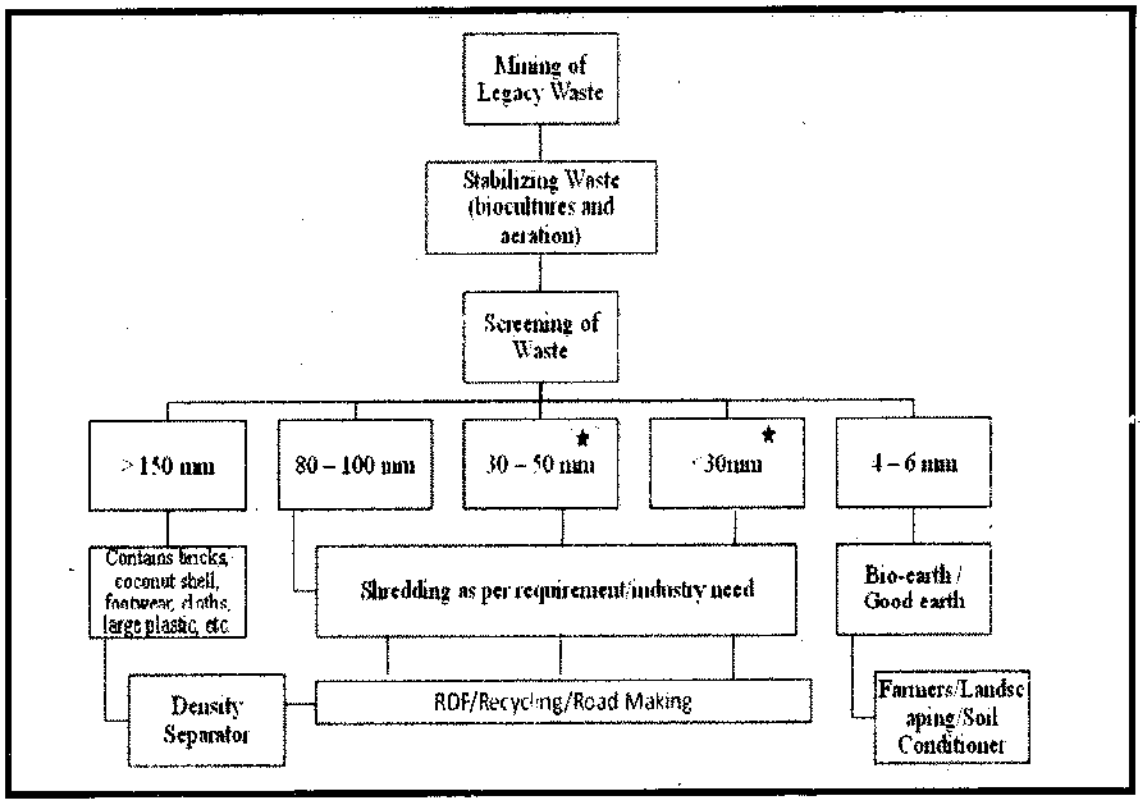


FIGURE-3.5 OVERVIEW OF BIO REMEDIATION AND BIO MINING OF LEGACY WASTE

3.8 TREATMENT PROCESS OF LEGACY WASTE

- Local Body (LB) shall make a time bound plan to execute the bio-mining process.
- Volume of waste to be determined through contour survey (Total Station Survey) and site measurements.
- 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.
- Initial baseline survey has been done.
- Sprinkle the newly exposed surfaces with a composting bio culture solution.
- Usually, the top layer has several materials in the active biological state. This layer shall be stabilised through composting bio-cultures, as well as herbal/biological sanitizers if found necessary for odour control.
- Waste pickers or labour shall be manually pick out bulky waste.
- 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.
- Trommels and/or Horizontal Screens or other types of screens for the purpose of screening shall be used.
- The recyclables recovered from the bio-mining process shall be sent for recycling as per the quality of the material.

- Non-Recyclable plastic material shall be sent for road making or to RDF units or cement plants.
- The recovered earthy fines shall preferably be used for landscaping or gardening or road medians within the Local Body or the site.
- 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.
- The heavy fractions may be sand and gravel usable for road shoulders or for plinth filling.
- 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).

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 adump 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.

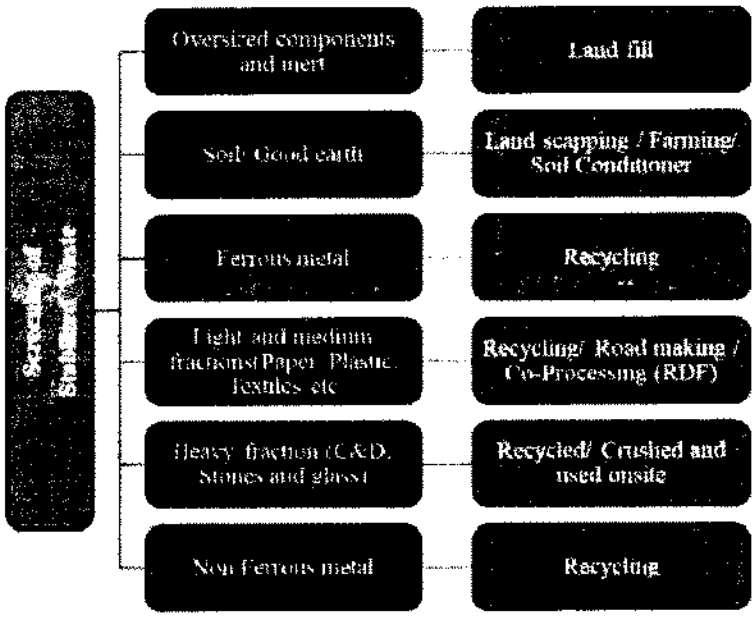


FIGURE-3.6 SCHEMATIC REPRESENTATION OF SCREEN COMPONENTS AND ITS SUSTAINABLE DISPOSABLE

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 withinoculumsandturnedperiodicallytoprovideproperaerationandtemperaturecontrol.
- Systematic turning of the material, which mixes the different components and aerates the 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 materiel 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 n pit for further treatment.
- On7th 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 in organic 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. -20mm 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 suspicioning the mind of the end-user about quality of the final product. to achieve this, are finement section is in corporate in the machine line.

- Highly suitable to deal with put prescribe fraction of MSW that cause 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 leach at generation from Land Filling.
- Entire system is indigenous with local availability of spares and expertise.
- It is first significant tap 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, Composition sect 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 land fill capacity.
4. Improve the efficiency in compost manufacturing by removing non degradable, non-combustible materials, such as plastics, metal sand 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 commonly used at many landfill sites.

Processing Equipment's for Processing of Legacy Waste

A. Screening
- ❖ Trommel
- ❖ Vibrating Screen
- ❖ Disc/ Star

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., whitegoods) also may need to be sorted out be for processing them in ed 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 back fill 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 & inserts 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.

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.

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.

i. 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 soils to rage

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
- Site administration office for site management with all support services
- Amenity block with toilets and washing facilities
- Provision of first aid facilities
- 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 Landfill gas collection and treatment location sand
- ❖ 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 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 $1x\ 10^{-9}$ m/sec. detailed geo- technical investigations, by excavating top soil should be carried out to assess the 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 though 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 1×10^{-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

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 minimize 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) geo-membrane or geo-synthetic liners, or equivalent, overlying 90 cm of soil (clay or amended soil) having permeability coefficient not greater than 1×10^{-7} cm/sec.

iv. The highest level of water table shall be at least two meters below the base of clay oramended 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.

Arrangement shall be made to prevent leachate runoff from landfill area entering in any drain, stream, river, lake or pond.

Step: 1 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 MSperforated 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 collect in the feed sump.

Step: 2 Secondary Treatments

- **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 collect in the feed sump.

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

Step: 3 Tertiary Treatments

- **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 is collected in this chamber. This treated water can be utilized for irrigation/ gardening.

Step: 5 Sludge Dewatering System

- Sludge collected from Primary Tube settler and secondary Tube settler will flow to sludge drying beds by gravity where dewatering is done by Solar Evaporation.
- Extra Sludge is collected in Sludge holding Tank.
- After dewatering, sludge will be disposed at sanitary landfill.

V. 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.

VI. 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.

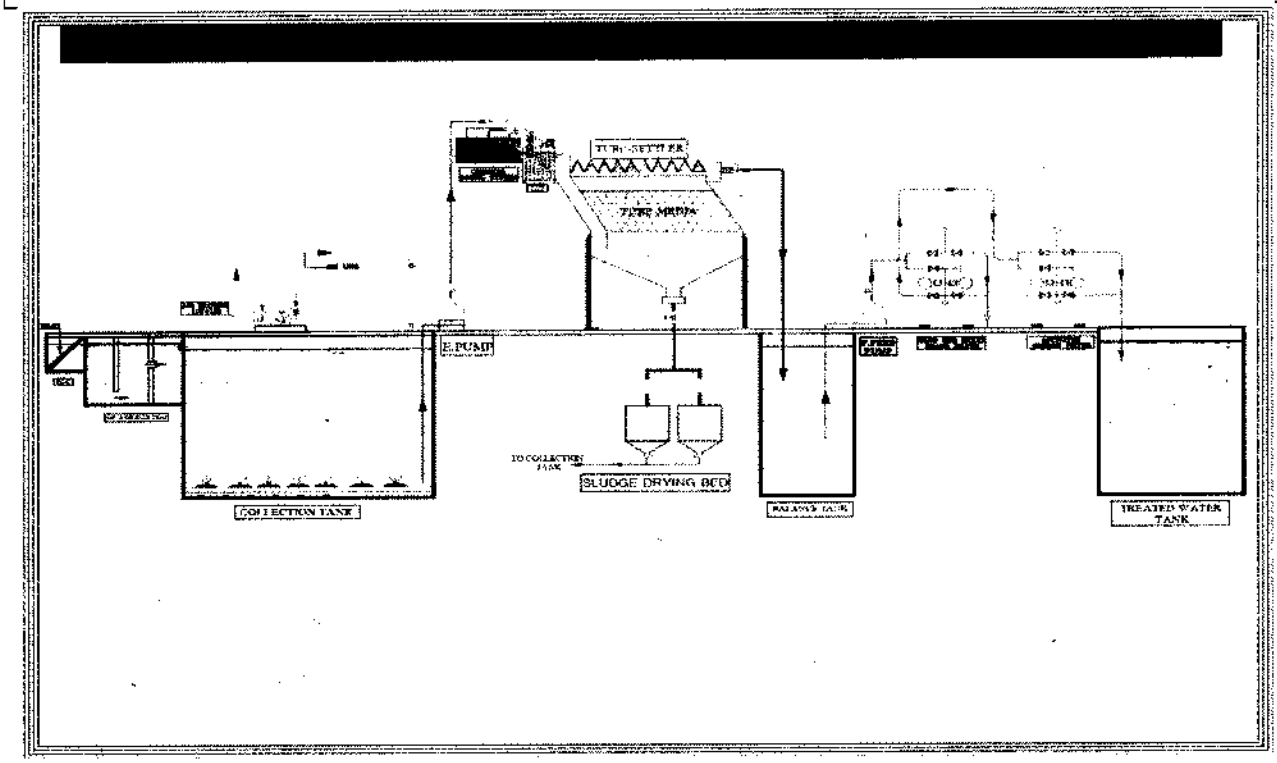


FIGURE- 3.7 LEACHATE SCHEMATIC PLAN

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:

i. The processing of waste will be done in completely covered sheds.

ii. Enzymes will be sprayed over the waste in order to decompose & dry the organic matter. The drying of the organic matter also reduces the bad odour from.

iii. The whole shed area will be maintained under negative pressure by sucking the unpleasant air and methane gases by network of ducts

iv. The air from waste processing area shall be passed where the odour gases are treated with odour neutralizers.

v. 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 throughput 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.

vi. Frequent cleaning of the areas which will be used for waste movement into the plant like vehicle moving path, weighbridge, unloading areas, etc.

vii. 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 40 KLD.

TABLE 3-8: WATER BREAK UP

Description	Water Quantity
Water sprinkling	10 KLD
Water consumption for labor	1 KLD
Horticulture	29 KLD
Total Water Requirement	**Approx. 40 KLD**

3.12.3. Power requirement

During operation phase the required power shall be 49 KW and the source of power shall be DHBVN. 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 utilised 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 utilised 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.

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.

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

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 Village Ramsinghpura District-Rewari, Haryana, in accordancewith the guidelines issued by the MoEF & CC, CPCB, and SPCB during the study period (March- May. 2022).

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 Village Ramsinghpura District-Rewari, 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.

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. Secondary meteorological data of the nearest IMD station. Weather monitoring station is operated by HSPCB along withtheir AAQMS. It monitors wind speed, wind direction, relative humidity, ambient temperature, solar radiation and atmospheric pressure. Hourly average data of each parameter download from this station

using link https://app.cpcbccr.com/ccr/#/caaqm-dashboard-all/caaqm-landing/data. 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 (PM_{10}, $PM_{2.5}$, SO_2, NO_2, 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 (L max, L min, Leq)	SOP/Noise/01/01.04.2020
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 ecosystem sustainability, 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

❖ **Topography**

Rewari district alongwith Gurgaon and Mahendergarh, falls in Zone 3. The topography of the district is represented by rugged hilly terrain of Aravali ranges. The region has suffered a prolonged period of aridity during the quaternary and sub-recent times and the landscape has been greatly modified by Aeolian action. The effect of fluvial cycle in developing the landform is also pronounced. The landscape of the district is peculiar. It has varied topography comprising valleys, undulating lands, sand duns and alluvial plains. The Aravali ranges lie in the southern and western parts of the district and thinly spread throughout the district. The region has suffered a prolonged period of aridity during the quaternary and sub-recent times and the landscape has been greatly modified by Aeolian action. The effect of fluvial cycle in developing the landform is also pronounced. The catchments area of Sahibi river, which falls in Rewari district, can be divided into five distinct landscapes: -

a) Aravali Hills b) Flood Plains c) Foot Hills d) Aeolian Plains and Sand Dunes e) Alluvium Deposits

Source: http://dcmsme.gov.in/old/dips/har_rewari.pdf

❖ **Geology**

The district falls in the geological domain of Pre-Cambrian rocks of Aravali Mountains. These are represented by Delhi Super Group of rocks (2500-1600 million years), which are con Land use/Land Cover of study area.

Source:https://krishi.icar.gov.in/jspui/bitstream/123456789/6760/1/Sheti%20Et%20al%20%20Technical%20_Bulliten.pdf

The satellite based remote sensing is a sustainable global information system because it has 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 4.2:**

TABLE 4.2: DETAIL OF LAND USE/LAND COVER

S. No.	LU/LC Class	Area (Ha.)	Area in %
1.	Settlement	1072.9	1.65
2.	Water Bodies	190.32	0.29
3.	Dry Channel	631.53	0.97
4.	Forest	555.19	0.85
5.	Open Land	1505.54	2.32
6.	Open Scrub	31.64	0.04
7.	Vegetation	28436.7	43.85
8.	Agricultural Land	32423.82	50
	Total		**100**

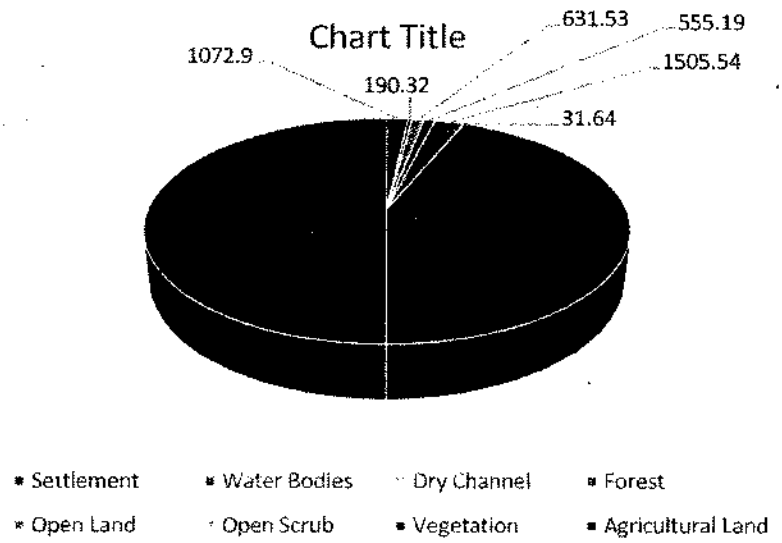


FIGURE 4-1: LAND USE/LAND COVER OF 10 KM OF STUDY AREA

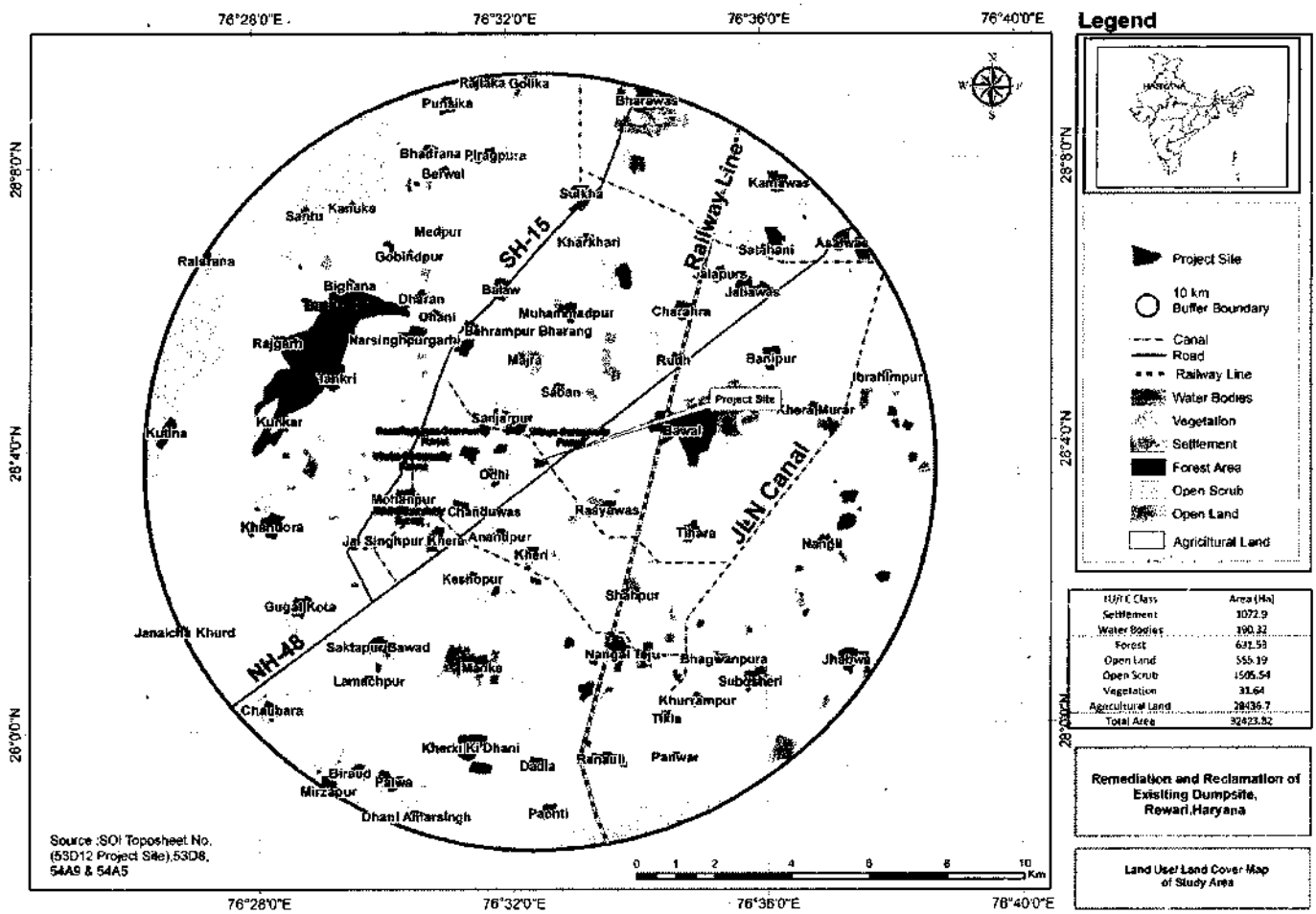


FIGURE 4.2: LAND USE / LAND COVER MAP PATTERN OF THE STUDY AREA

Land form, Land Use and Land Ownership

The proposed facilities will be developed inside the existing area available with the Municipal council Rewari.

Seismicity of the area

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

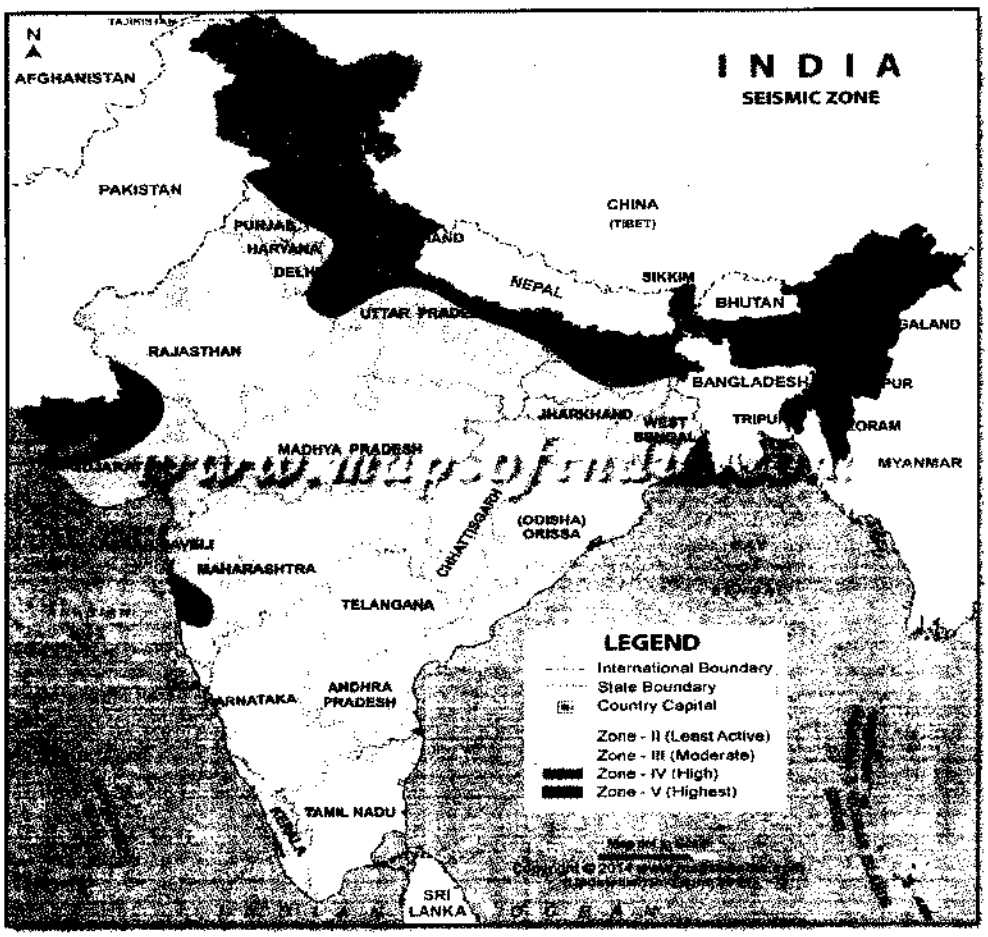


FIGURE 4.3: SEISMIC MAP OF INDIA

Following is 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 includes 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.

4.4.2 Soil quality

The Soil texture of the district varies from **sandy to loamy sand**. The district has around 90% soils under loamy-sand texture.

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	Direction	Distance
SQ1	Project Site	Center	0
SQ2	Odhi	1.15	W
SQ3	Kalrawas	3	NNE
SQ4	Raipur	7.7	E
SQ5	Bawal	3.8	NE
SQ6	Rasiawas	1.8	SE
SQ7	Kankar Ki Dhani	6.3	W
SQ8	Anandpur	2	SSW
SQ9	Harchandpur	2.3	NE
SQ10	Sanjarpur	1.3	NNW

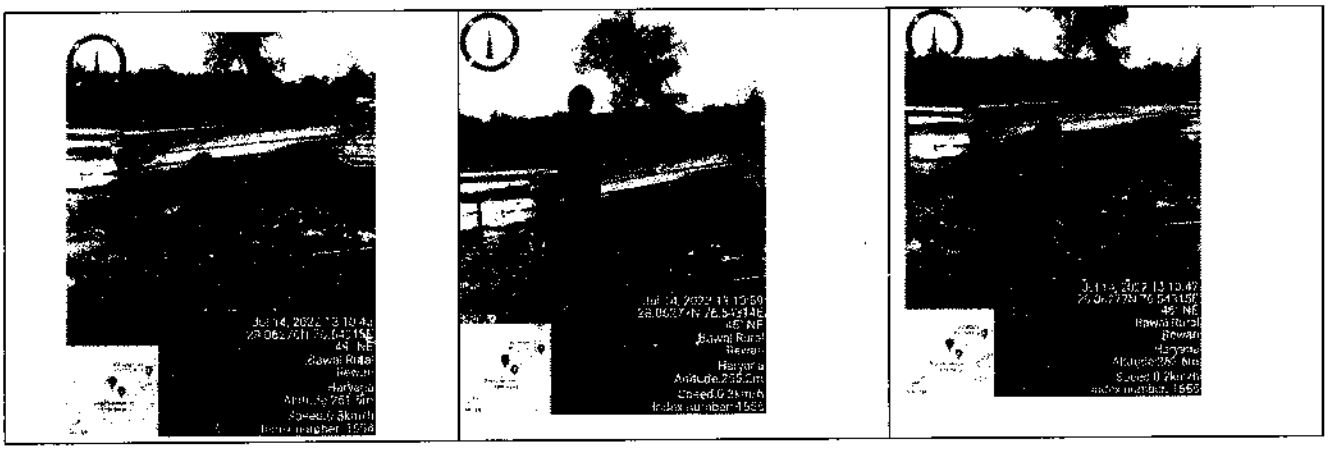


FIGURE 4.4: SOIL MONITORING PHOTOGRAPHS OF STUDY AREA

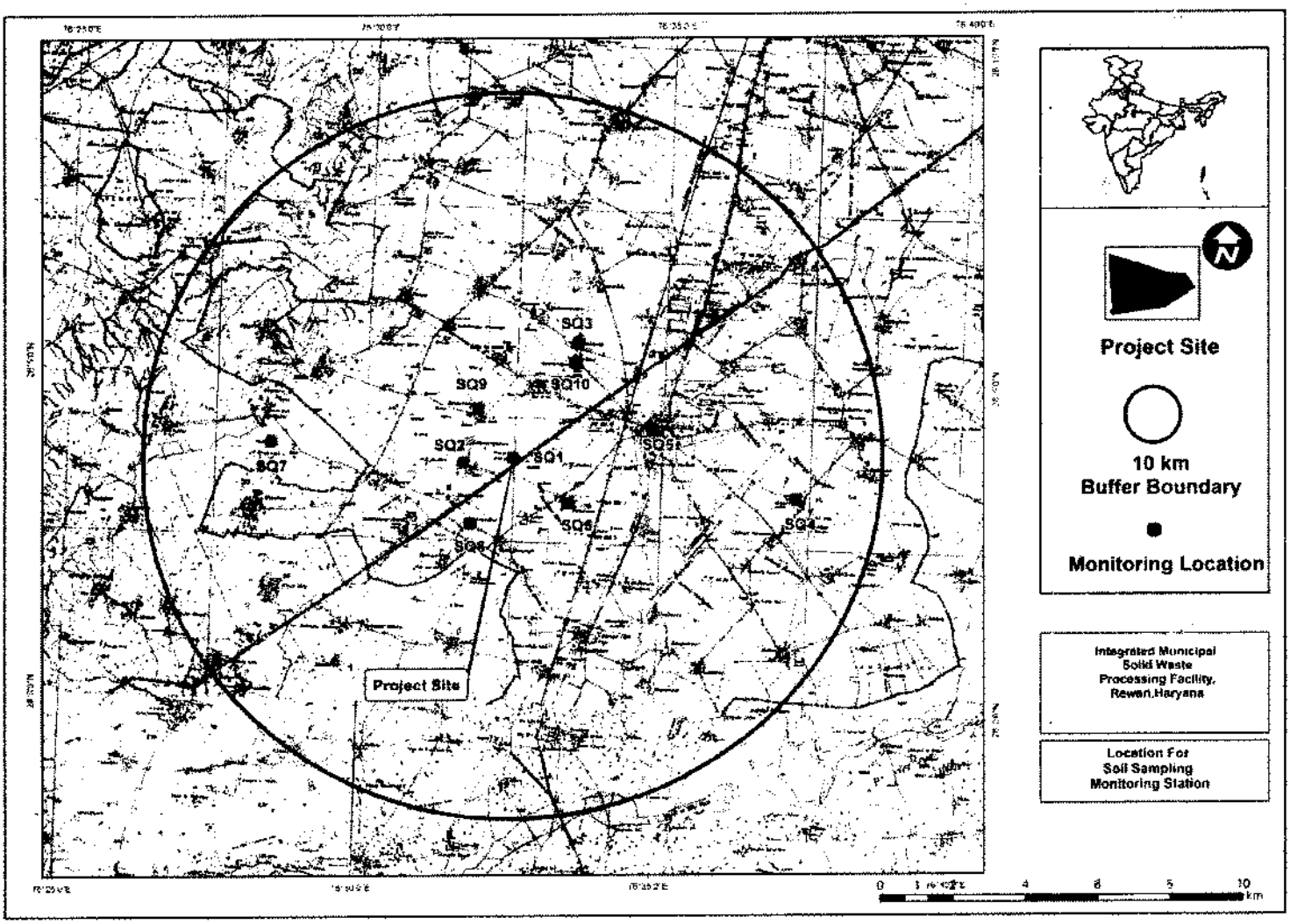


FIGURE 4.5: SOIL MONITORING LOCATION MAP

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,
S. No.	Soil Test	Classification
		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

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 Corporation 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.

TABLE 4.5: ANALYSIS RESULTS OF SOIL SAMPLES

S. No.	Parameters	S1-Near Project Site	S2-Odhi	S3-Kalrawas	S4-Raipur	S5-Bawal	S6-Rasiawas	S7-Kankar ki Dhani	S8-Anandpur	S9-Harchandpur	S10-Sanjarpur
	Physical Characteristics										
1	Colour	Light Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown	Brown
2	Textural class	Silt clay	Sandy Clay	Sandy Clay	Sandy clay	Sandy Clay	Sandy clay	Sandy Clay	clay	Clay	Clay
3	Bulk Density -gm/cc	1.36	1.38	1.32	1.34	1.32	1.35	1.32	1.38	1.36	1.38
4	Water Holding Capacity (%)-V/V	48	54.4	53.3	49.8	51.1	49.6	45.4	49.9	51.5	52.5
5	**Particle Size Distribution**										
	Sand (% w/w)	28.5	38.8	37.6	39.6	38.3	37.5	38.6	32.5	33.5	33.8
	Slit (% w/w)	41.6	26.6	26.7	27.9	28.2	26	27.1	25.3	26.6	26.6
	Clay (% w/w)	29.9	34.6	35.7	32.5	33.5	36.5	34.3	42.2	39.9	39.6
	Chemical Characteristics										
6	pH (1:2 Suspension)	7.92	7.45	7.65	7.26	6.85	7.05	7.14	7.18	7.24	7.23
7	Electrical Conductivity (1:2)-umho/cm	388	312	276	294	232	243.5	276	216	232	276
8	Organic Carbon (% w/w)	3.77	2.56	2.43	1.89	1.56	1.94	1.64	1.36	1.43	1.56
9	Organic Matter (% w/w)	6.30	4.28	4.06	3.16	2.61	3.24	2.74	2.27	2.39	2.61
10	Exchangeable Calcium (mg/100 gm)	90.80	123.20	145.40	151.30	143.50	115.40	114.30	123.50	127.60	132.30
11	Exchangeable Magnesium (mg/100 gm)	47.1	56.5	65.6	67.3	56.5	86.6	56.4	76.6	67.6	69.8
12	Cation Exchange Capacity (meq/100 gm)	4.74	6.22	7.29	7.55	6.79	7.41	5.94	7.03	6.93	7.20

13	**Iron (mg/kg)**	786.6	898.6	822.4	745.4	854.6	985.5	776.4	788.5	676.5	698.8
14	**Lead (mg/kg)**	8.7	4.4	5.7	6.5	9.6	11.2	9.9	8.6	7.8	8.7
15	Moisture Content (w/w)	14.5	**11.5**	12.2	12.5	13.3	13.8	11.6	12.2	11.7	14.5
	Available Nutrients (Kg/Ha)										
16	Nitrogen	342.5	433.2	467.6	455.8	487.6	459.3	366.4	453.6	565.4	576.8
17	Phosphorus	77.5	56.6	59.9	53.3	65.5	57.8	52.2	56.5	49.9	56.5
18	Exchangable Potassium	112.2	135.4	132.6	134.6	145.4	119.7	116.5	123.2	135.4	143.4
19	SAR (meq/kg)1/2	0.05	0.08	0.09	0.10	0.08	0.09	0.08	0.07	0.10	0.10
20	Boron (mg/kg)	16.5	19.9	16.7	17.6	16.5	12.4	15.5	14.4	12.7	13.2
21	Exchangable Sodium (mg/100 gm)	6.8	12.1	15.4	16.3	13.2	15.4	11.5	11.8	15.4	16.5
22	Zinc (mg/kg)	89.5	76.6	68.8	74.4	65.5	55.4	66.8	57.7	34.4	38.7
23	Exchangable Potassium(mg/kg)	82.50	99.56	97.50	98.97	106.91	97.32	90.31	93.33	99.56	105.44

Analysis Result

Notes:

1. The results given above are related to the tested sample; as received & mentioned parameters the customer asked for the above tests only.

2. Responsibility of the Laboratory is limited to the invoiced amount only.

3. This test report will not be generated again, either wholly or in part, without prior written permission of the laboratory

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 6.85 to 7.92 which show that the soils are moderately alkaline in nature. Water holding capacity of the soil samples collected were found to be low ranging from 45.4 to 54.4 %. Exchangeable Potassium value ranging from 82.50 to 106.9 mg/kg. & Phosphorous varies from 49.9 to 77.5 mg/kg.

4.4.3 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.

4.4.3.1 Hydrology

Figure 4.6 represent the drainage pattern of the study area. The study area is part of Yamuna Basin. Parallel type of drainage pattern is observed in study area. The study area comprises canal network of Rewari Lift Irrigation project.

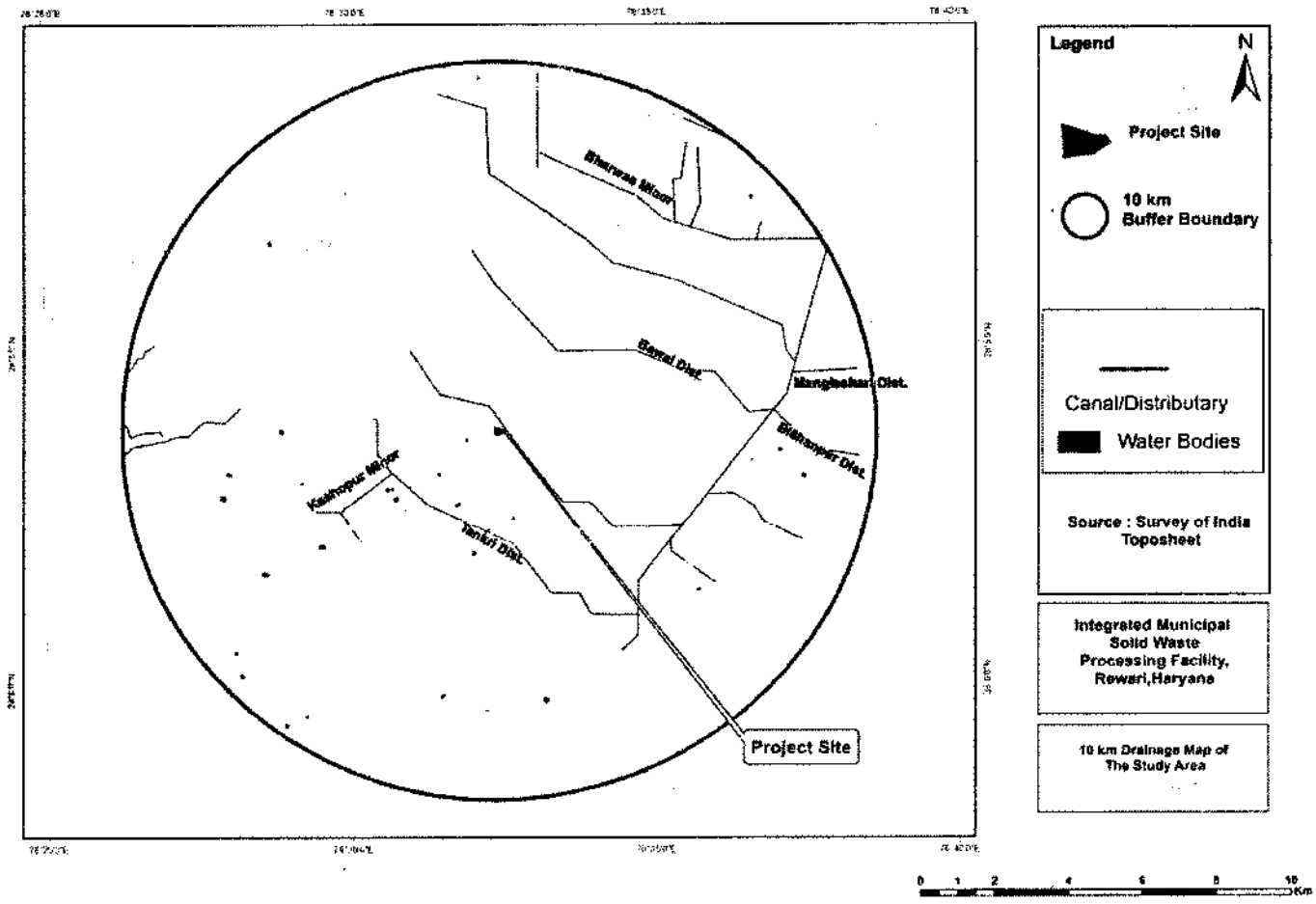


FIGURE 4.6: DRAINAGE PATTERN PRESENT IN THE STUDY AREA WITHIN 10 KM RADIUS

4.4.3.2 Hydrogeology

The district is occupied by Indo-Gangetic alluvial plain of Quaternary age, and falls in Ghaggar basin. The principal ground water reservoirs in the area are unconsolidated alluvial deposits of quaternary age. Hard rocks also have some amount of ground water which circulate through joint, fractures & cracks. Over most part of the area ground water occurs under phreatic conditions, whereas in deeper water bearing zones which are overlain by impermeable clay it occurs under semi confined to locally confined conditions. The

shallow aquifers are being tapped by the handpumps and shallow tubewells, which are widely used for the domestic purposes. CGWB has drilled 16 exploratory borewells and 5 piezometers to delineate and determine potential aquifer zones, evaluation of the aquifer characteristics. The deepest slim hole was drilled upto the depth of 203.85 m at Chandanwas.

Alluvium comprises very fine to coarse sand, gravel, silt and clay with kanker in varying proportions. The permeable granular zones comprising sand and occasionally coarse sand and gravel. Their lateral and vertical extent is limited. The borehole data reveals that clay group of formations dominate over the sand group in the district area. The discharge of deep tubewell in the area varies between 358 and 2911 lpm. The transmissivity values ranges from 110 to 1060 m2 /day and storability ranges from 1.14*10-3 to 4.36*10-3 .

4.4.3.3. Site Specific Hydrogeology

The elevation of the water table in the district varies from 220 m to 280 m above mean sea level. The highest elevation is in the southern part and the lowest in the northeastern part and reflects the topographic gradients. The hydraulic gradient in the southern part is steep, whereas, in the northeastern part, it is gentle. The overall flow of ground water is from southwest to northeast direction. Availability of water resources. The blockwise ground water resource potential in the district has been assessed as per GEC-97. The stage of ground water development ranges between 50% (Bawal) to 194% (Khol). The net ground water resource of Rewari district have been estimated to be 279.98 MCM and the gross ground water draft of the district is 313.71 mcm leaving behind a shortfall of (-)33.87 MCM. The stage of ground water development in the district is 112%.

Source: http://harenvironment.gov.in/sites/default/files/Rewari%20DEP.pdf

4.4.3.4. Flood risk and causes of flood in the district

In general, there is no flood like situation during the Monsoon Season. There are two main streams, viz. the Sahibi and the Krishanavati enter the district from Rajasthan. All these cause floods in the rainy season and have been a source of damage in the district. The district was flooded due to heavy rains in the catchments area of river Sahibi which is situated in the Southeastern part of the district. Maximum discharge was experienced in the year 1977 in this river and many villages of the district were affected during the period. Keeping in view the flood loss in the region, Masani Barrage constructed of in 1980 but after the construction of Masani Barrage, the river has ceased to carry the run-off because of the reason that a number of check dams have been constructed by Rajasthan Govt. across certain tributaries which used to carry water in river Sahibi. The last flood was observed in the Year 1995-96 with local affects along Sahibi River basin due to sudden discharge in the order of 50,000 Cs was received in District Rewari due to failure of series of earthen check Bunds in Alwar District, Rajasthan due to Cloud Burst. This type of situation can also arise in the future as well.

In addition to this, flood water also enters in Rewari Town passing through villages Nangli Godha,

Bharawas, Chhuriawas and Dhamlawas whenever there is heavy rain in the Aravali foothills of Tankri area. However, Rewari drain has been constructed and made functional to intercept this flood water and allowed to flow in JLN Canal avoiding inundation of Rewari Town.

Source: http://hdma.gov.in/sites/default/files/DMCell/FloodControlOrders/Rewari.pdf

4.4.3.5. Site Specific Ground Water Table Scenario:

he depth to water level ranges from 6.67 to 26.31 m bgl during pre-monsoon period and 6.79 to 25.14 m bgl during post monsoon period. The seasonal fluctuation varies from 4m to (-) 2 m in the area. The long-term water levels trend indicates average fall varies between 0.25m/ year to 1.50 m/year.

(Source: http://cgwb.gov.in/District_Profile/Haryana/Rewari.pdf).

4.4.3.6. Assessment of Water Resources:

The blockwise ground water resource potential in the district has been assessed as per GEC-97. The stage of ground water development ranges between 50% (Bawal) to 194% (Khol). The net ground water resource of Rewari district have been estimated to be 279.98 MCM and the gross ground water draft of the district is 313.71 mcm leaving behind a shortfall of (-)33.87 MCM. The stage of ground water development in the district is 112%.

(Source: http://cgwb.gov.in/District_Profile/Haryana/Rewari.pdf).

4.4.3.7. Surface Water & Ground Water

There is presence of ground water sources in project site. Surface water is not available in 10 km radius area. Sampling of ground water from 10 locations of the study area have been taken for monitoring the ground water quality.

a) Methodology

Water samples were collected from 10 locations (10 Ground water). Samples were collected as per IS: 3025 (Part 1) methodology. 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 surface water sampling stations are described in **Table-4.6.**

TABLE 4.6: LOCATION OF GROUND WATER SAMPLING IN THE STUDY AREA

Station Code	Location
GW1	Project Site
GW2	Odhi
GW3	Kalrawas
GW4	Ralpur
GW5	Bawal
GW6	Rasiawas
GW7	Kankar Ki Dhani
GW8	Anandpur
GW9	Harchandpur
GW10	Sanjarpur

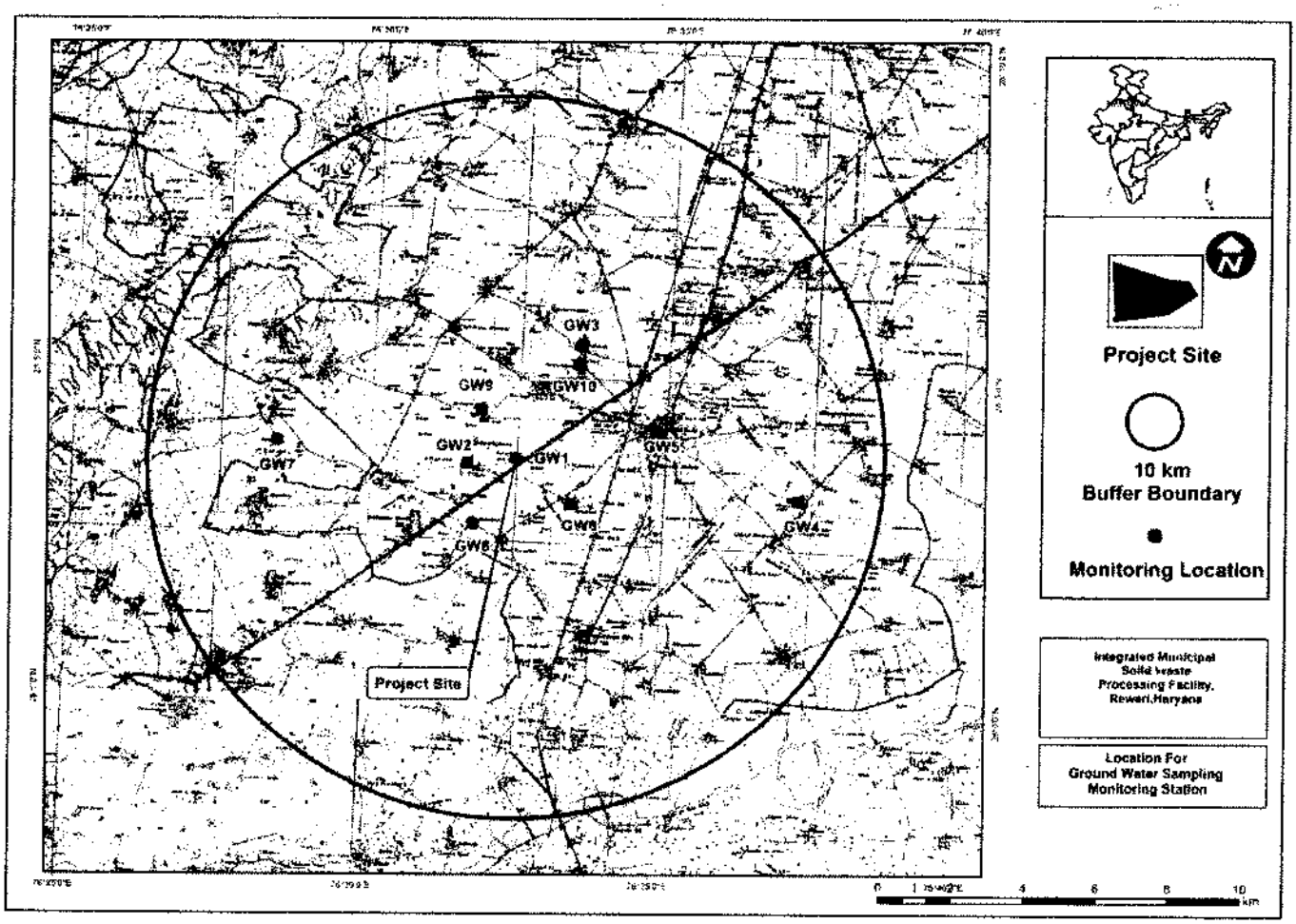


FIGURE 4.7: GROUND WATER MONITORING LOCATION MAP

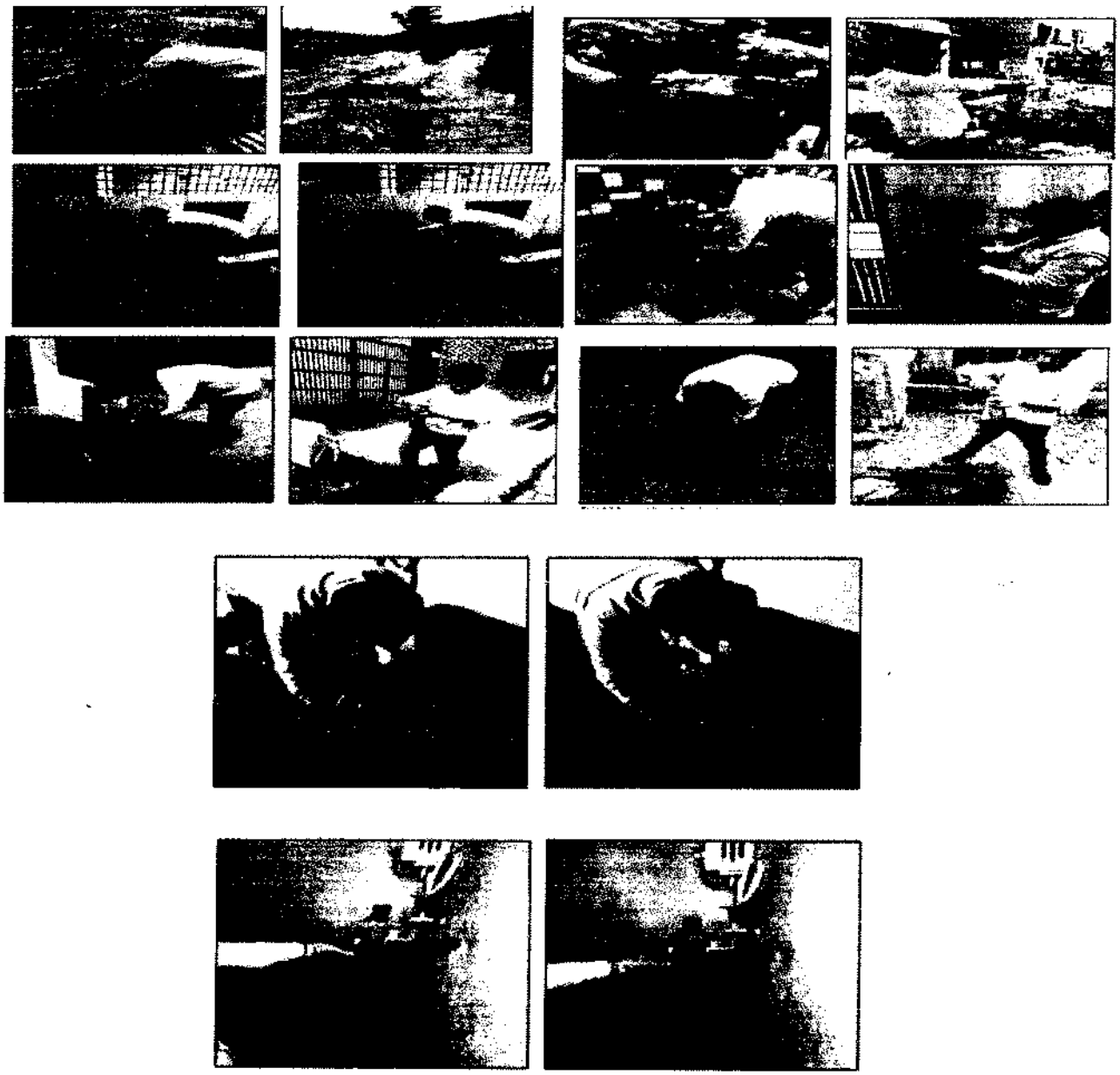


FIGURE 4.7: GROUND WATER MONITORING PICTURES

b) Analysis Report of Water Quality is given in Table 4.7.

TABLE 4.7: ANALYSIS RESULTS OF GROUND WATER SAMPLES

S. N.	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
			Desirable Limit	Permissible Limit	Project Site	Odhi	Kalrawas	Raipur	Bawal	Rasiawas	Kankar ki Dhani	Anandpur	Harchandpur	Sanjarpur
1	Color	Hazen	5	15	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
2	Odour	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
3	Taste	-	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity	NTU	1	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
5	Conductivity	umho/cm			2629.00	2155.00	1867.00	1754.00	1565.30	1455.00	1402.00	1885.40	1988.00	1688.00
6	pH(Lab)	-	6.5-8.5	No Relaxation	7.54	7.32	7.28	7.14	7.15	7.11	7.12	7.56	7.45	7.65
7	TDS	mg/l	500	2000	1842	1655	1226	1088	944	898	892	1234	1234	1342
8	Total Hardness (as CaCO3)	mg/l	200	600	278	244	188	182	157	146	136	234	244	256
9	Aluminium (as Al)	mg/l	0.03	0.2	0.07	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
10	Ammonia (as Total ammonia)	mg/l	0.5	No Relaxation	<0.1	<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	1	<0.05	<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	1	0.11	0.06	0.05	0.05	0.06	0.05	0.04	0.07	0.09	0.11
13	Calcium (as Ca)	mg/l	75	200	40.08	38	36	32	30	28	30	44	42	46
14	Magnesium (as Mg)	mg/l	30	100	43.21	36.21	23.81	24.79	19.93	18.47	14.82	30.13	33.78	34.26

5	Chlorides (as Cl)	mg/l	250	1000	342.89	314.00	236.00	214.00	198.00	188.0	.00	146.00	244.00	288.00
6	Copper (as Cu)	mg/l	0.05	1.5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0	.01	<0.01	<0.01	<0.01
7	Fluoride (as F)	mg/l	1	1.5	1.38	1.14	1.12	1.15	1.12	1.16	14	1.36	1.26	1.32
8	Iron (as Fe)	mg/l	1	Relaxation	0.27	0.19	0.14	0.11	0.12	0.13	12	0.15	0.18	0.19
9	Manganese (as Mn)	mg/l	0.1	0.3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0	.01	<0.01	<0.0	<0.01
10	Mineral oil	mg/l	0.5	relaxation	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	.1	<0.1	<0.1	<0.1
11	Nitrate (as NO3)	mg/l	45	Relaxation	15.2	14.7	12.7	11.8	12.8	12.2	1.9	19.9	21.2	23.6
12	Sulphate (as SO4)	mg/l	200	400	276.4	244	168.5	134.5	128	124	18	165.7	163.3	166
14	Alkalinity as CaCO3	mg/l	200	600	904	658	486	389.6	347	342	36	466	424	488
15	Phenolic compounds (as C6H5OH)	mg/l	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.00	001	<0.001	<0.001	<0.001
16	Zinc (as Zn)	mg/l	5	15	0.11	<0.05	<0.05	<0.05	<0.05	<0.0	.05	<0.05	<0.05	<0.05
17	Cadmium (as Cd)	mg/l	0.003	relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.00	001	<0.001	<0.001	<0.001
18	Cyanide (as CN)	mg/l	0.05	relaxation	<0.002	<0.002	<0.002	<0.002	<0.002	<0.00	002	<0.002	<0.002	<0.002
19	Lead (as Pb)	mg/l	0.01	relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0	.01	<0.01	<0.01	<0.01
20	Mercury (as Hg)	mg/l	0.001	relaxation	<0.001	<0.001	<0.001	<0.001	<0.001	<0.00	001	<0.001	<0.001	<0.001
21	Nickel (as Ni)	mg/l	0.02	relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0	.01	<0.01	<0.01	<0.01
22	Total arsenic (as As),	mg/l	0.01	relaxation	<0.01	<0.01	<0.01	<0.01	<0.01	<0.0	.01	<0.01	<0.01	<0.01

3	**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	<0.01
	Microbiological Parameter													
4	**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/100ml
5	**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/100ml

BDL: Below Detection limit.

Notes:

1. *The results given above are related to the tested sample, as received & mentioned parameters. The customer asked for the above tests only.*
2. *Responsibility of the Laboratory is limited to the invoiced amount only.*
3. *This test report will not be generated again, either wholly or in part, without prior written permission of the laboratory.*
4. *This test report will not be used for any publicity/legal purpose.*
5. *The test samples will be disposed off after two weeks from the date of issue of test report, unless until specified by the customer.*

Analysis result:

- The analysis results indicate that the pH value is 7.11 to 7.65 which is well within the specified standard of 6.5 to 8.5.
- The TDS was observed as 892 to 1842 mg/l.
- The chlorides were found as 146 to 342 mg/l.
- The sulphate was found as 118 to 276.4 mg/l. It is observed that sulphate is within limits.
- Total hardness ranges between 136 to 278 mg/l.
- Metals: Iron is found in between 0.11 -0.27 mg/l.

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CHAPTER 4 DESCRIPTION OF THE ENVIRONMENT

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. Secondary meteorological data of the nearest IMD station. Weather monitoring station is operated by HSPCB along with their CAAQMS. It monitors wind speed, wind direction, relative humidity, ambient temperature, solar radiation and atmospheric pressure. Wind rose diagram and wind class frequency plot of summer season (March – May 2022) are shown in Fig **4.10.** It is found that wind is dominantly blowing from Northwest side during the study period with a wind speed of 0.5-1.0m/s (65.5%), 1-2 m/s (28%) and 2-4 m/s (4.8%). The calm wind condition was found 1.4%.

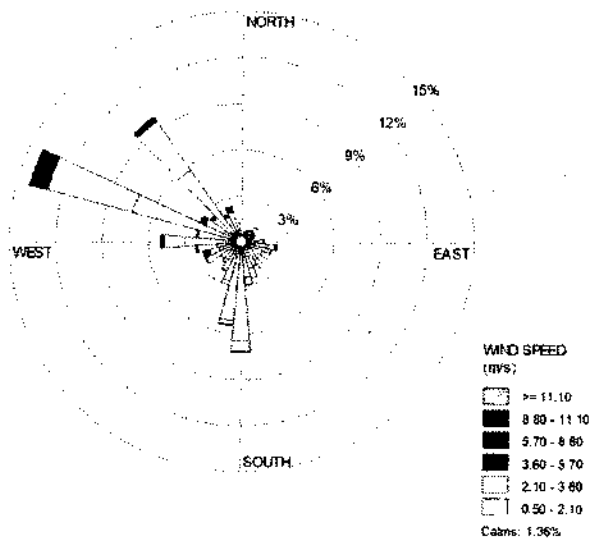


FIGURE 4.10: DIAGRAM OF STUDY AREA (March-May 2022)

b) Climate and Rainfall

The climate of Rewari district can be classified as tropical steppe, Semi-arid and hot which is mainly dry with very hot summer and cold winter except during monsoon when moist air of oceanic origin penetrates into the district. There are four seasons in a year. The hot weather season starts from mid-March to last week of the June followed by the south west monsoon which lasts upto September. The transition period from September to October forms the post monsoon season. The winter season starts late in November and remains upto first week of March.

The normal monsoon and annual rainfall of the district is 489 mm and 553 mm, respectively, which is unevenly distributed over the area 23 days. The south west monsoon sets in from last week of June and withdraws in end of September, contributing about 88% of annual rainfall. July and August are the wettest months. Rest 12% rainfall is received during non-monsoon period in the wake of western disturbances and thunderstorms. Generally, rainfall in the district increases from southwest to northeast. The mean minimum and maximum temperature in the area ranges from 5.6° C to 41° C during January and May or June respectively.

(Source: http://cgwb.gov.in/District_Profile/Haryana/Rewari.pdf).

4.4.4.1 Ambient air quality monitoring

Ambient air quality monitoring was carried out during the study period **(March- May 2022)** 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.

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.

4.4.4.2 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 stationswere 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: -

TABLE 4.8: AIR SAMPLING LOCATIONS

Station Code	Location
AAQ1	Project Site
AAQ2	Odhi
AAQ3	Kalrawas
AAQ4	Raipur
AAQ5	Bawal
AAQ6	Rasiawas
AAQ7	Kankar Ki Dhani
AAQ8	Anandpur
AAQ9	Harchandpur
AAQ10	Sanjarpur

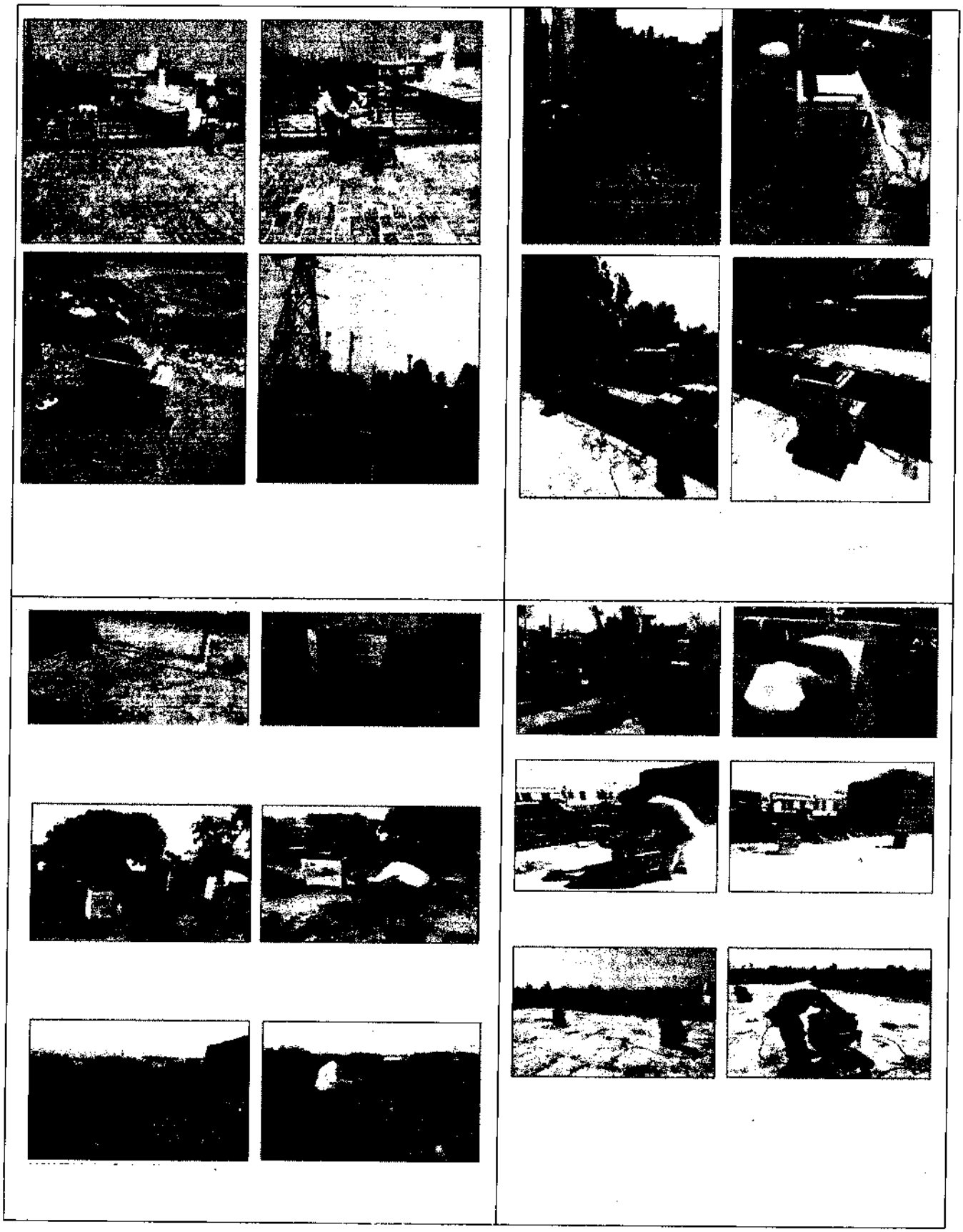


FIGURE 4.11: AMBIENT AIR MONITING PICTURES

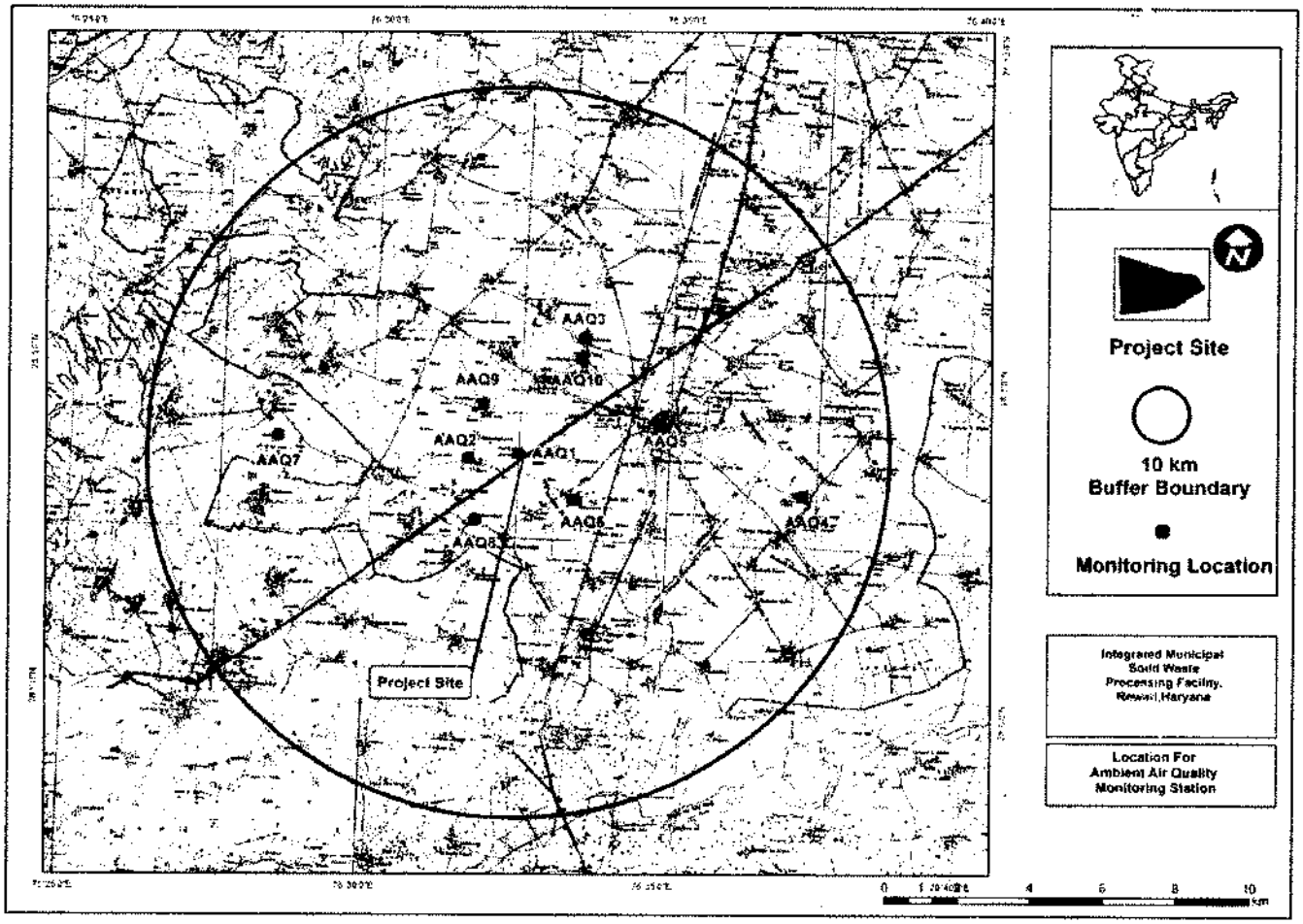


FIGURE 4.12: AMBIENT AIR SAMPLING LOCATION IN THE STUDY AREA

4.4.4.3 Air Quality Standards

The National Ambient Air Quality Standards for the above-mentioned pollutants, notified vide NAAQS Notification dated 18th November, 2009, are presented in **Table 4.9**.

TABLE 4.9: 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_2), µg/m³	Annual*	50	20
		24 Hours**	80	80
2.	Nitrogen dioxide (NO_2), µg/m³	Annual*	40	30
		24 Hours**	80	80
3.	Particulate matter PM_{10}, µg/m³	Annual*	60	60
		24 Hours**	100	100
4.	Particulate matter	Annual*	40	40

	$PM_{2.5}$, µg/m³	24 Hours**	60	60
S. No.	**Pollutant**	**Time weighted Average**	**Concentration in air**	
			Industrial, residential, rural and other areas	**Ecologically sensitive area (notified by Central Govt.)**
5.	Ozone (O_3), µg/m³	8 Hours**	100	100
		1 Hours**	180	180
6.	Lead (Pb), µg/m³	Annual*	0.50	0.50
		24 Hours**	1.00	1.00
7.	Carbon monoxide (CO), mg/m³	8 Hours**	02	02
		1 Hour**	04	04
8.	Ammonia (NH_3), µg/m³	Annual*	100	100
		24 Hours**	400	400
9.	Benzene (C_6h_6), µg/m³	Annual*	05	05
10.	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m³	Annual*	01	01
11.	Arsenic (As), ng/m³	Annual*	06	06
12.	Nickel (Ni) ng/m³	Annual*	20	20

** Annual arithmetic means 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*

TABLE 4.10: AMBIENT AIR QUALITY RESULT

Stations	Parameters	PM2.5 (µg/m³)	PM10 (µg/m³)	SO2 (µg/m³)	NOx (µg/m³)	CO (mg/m³)	CH4 (µg/m³)	H2S (µg/m³)
	Limit as per NAAS/CPCB	60	100	80	80	4	-	-
AAQ1	**Project Site**							
	Max.	104.3	223.4	25.4	46.5	2.86	3.2	24.4
	Min.	78.5	167.5	16.5	39.6	1.7	1.9	11.5
	Average	94.5	192.6	21.1	42.71	2.3	3.0	19.1
	98 Percentile	104.3	217.8	25.4	46.5	2.8	3.1	24.4
AAQ2	**Odhi Village**							
	Max.	73.3	144.5	16.9	38.4	1.57	BDL	BDL
	Min.	53.6	97.6	6.2	17.8	0.9	BDL	BDL
	Average	68.33	127.09	11.6	27.59	1.3	BDL	BDL
	98 Percentile	73.3	144.5	16.9	38.4	1.6	BDL	BDL
AAQ3	**Kairawas**							
	Max.	69.4	127.8	9.4	26.6	1.09	BDL	BDL
	Min.	52.8	81.8	5.2	11.9	0.6	BDL	BDL

Stations	Parameters	PM2.5 (µg/m³)	PM10 (µg/m³)	SO2 (µg/m³)	NOx (µg/m³)	CO (mg/m³)	CH4 (µg/m³)	H₂S (µg/m³)
	Limit as per NAAS/CPCB	60	100	80	80	4	-	-
	Average	60.79	104.75	7.0	16.8	0.9	BDL	BDL
	98 Percentile	69.4	127.8	9.4	26.6	1.1	BDL	BDL
AAQ4	**Raipur**							
	Max.	72.2	132.3	12.6	25.4	1.23	BDL	BDL
	Min.	51.1	91.3	6.1	12.9	0.8	BDL	BDL
	Average	62.108	108.50	8.9	19.4	1.0	BDL	BDL
	98 Percentile	72.2	132.3	12.6	25.4	1.2	BDL	BDL
AAQ5	**Bawal**							
	Max.	82.2	133.8	14.4	29.4	1.43	BDL	BDL
	Min.	55.4	91.3	5.2	12.8	0.8	BDL	BDL
	Average	67.733	115.44	10.0	21.52	1.1	BDL	BDL
	98 Percentile	82.2	133.8	14.4	29.4	1.4	BDL	BDL
AAQ6	**Rasiawas**							
	Max.	75.5	136.9	9.9	23.9	1.32	BDL	BDL
	Min.	53.5	92.8	5.7	11.5	0.8	BDL	BDL
	Average	66.3	115.73	7.9	17.88	1.1	BDL	BDL
	98 Percentile	75.5	136.9	9.9	23.9	1.3	BDL	BDL
AAQ7	**Kankar Ki Dhani**							
	Max.	73.3	128.8	10.3	24.4	1.27	BDL	BDL
	Min.	51.1	89.4	5.7	12.5	0.6	BDL	BDL
	Average	61.396	106.00	7.8	18.35	1.1	BDL	BDL
	98 Percentile	73.3	128.8	10.3	24.4	1.3	BDL	BDL
AAQ8	**Anandpur**							
	Max.	76.9	128.8	16.5	36.4	1.15	BDL	BDL
	Min.	51.2	84.8	5.2	14.3	0.7	BDL	BDL
	Average	65.02	110.3	9.8	24.59	0.9	BDL	BDL
	98 Percentile	76.9	128.8	16.5	36.4	1.2	BDL	BDL
AAQ9	**Harchandpur**							
	Max.	72.2	125.3	11.8	28.8	1.1	BDL	BDL
	Min.	51.2	83.3	5.3	10.7	0.8	BDL	BDL
	Average	61.8	104.6	7.3	17.04	0.9	BDL	BDL
	98 Percentile	72.2	125.3	11.8	28.8	1.1	BDL	BDL
AAQ10	**Sanjarpur**							
	Max.	72.2	125.4	16.5	27.7	1.0	BDL	BDL
	Min.	54.3	78.6	5.6	12.6	0.8	BDL	BDL
	Average	63.51	106.0	8.7	19.25	0.9	BDL	BDL
	98 Percentile	72.2	125.4	16.5	27.7	1.0	BDL	BDL

4.4.4.4. Interpretation

- Ambient Air Quality Monitoring reveals that the **minimum** and **maximum concentrations** of **PM_{10}** for all the 10 Air Quality monitoring stations were found to be **78.6 µg/m³** and **223.4 µg/m³** respectively, while for **$PM_{2.5}$** varies between **51.1 µg/m³** and **104.3 µg/m³**.
- As far as the gaseous pollutants SO_2, NO_2, & CO 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_2** were found to be **10.7 µg/m³** and **46.5 µg/m³** respectively.
- The **minimum** and **maximum concentrations of CO** were found to be **0.6 mg/m³** and **2.86 mg/m³** respectively.

4.4.5 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.

4.4.5.1 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 14th February, 2000 under the Environment Protection Act (1986). These standards are given in **Table-4.11**.

TABLE 4.11: AMBIENT NOISE QUALITY STANDARDS

Area Code	Category of Area	Noise dB(A) Leq	
		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 up to 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.*

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.

4.4.5.2 Noise Monitoring Locations

The statistical analysis (**Table-4.13**) is done for recorded noise levels at 10 locations. The location of Noise Quality Monitoring stations is depicted in **Table 4.12**

TABLE 4.12: AMBIENT NOISE QUALITY MONITORING STATION

Station Code	Location
NQ1	Project Site
NQ2	Odhi
NQ3	Kalrawas
NQ4	Ralpur
NQ5	Bawal
NQ6	Rasiawas
NQ7	Kankar Ki Dhani
NQ8	Anandpur
NQ9	Harchandpur
NQ10	Sanjarpur

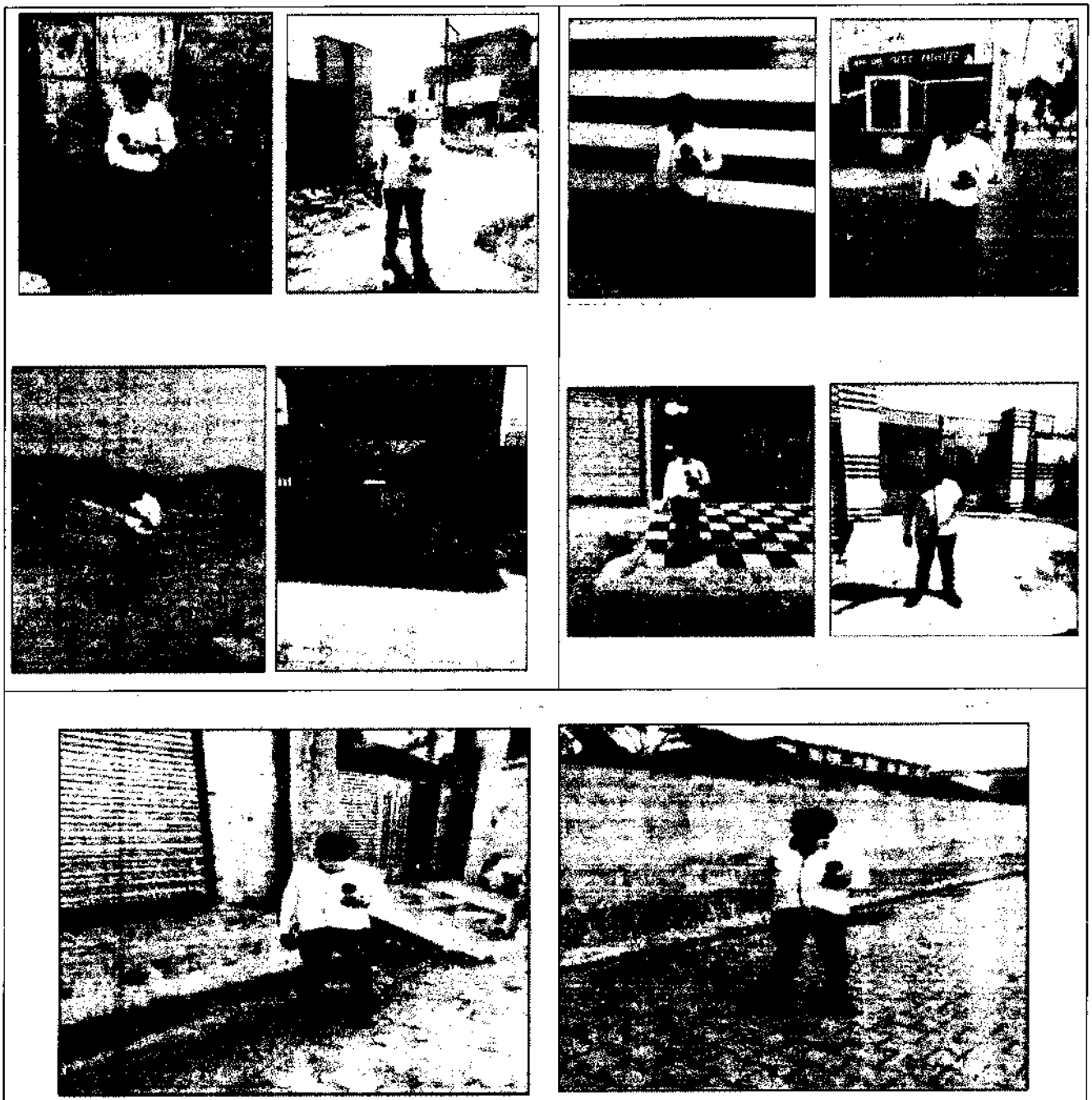


FIGURE 4.13: NOISE MONITORING PICTURES

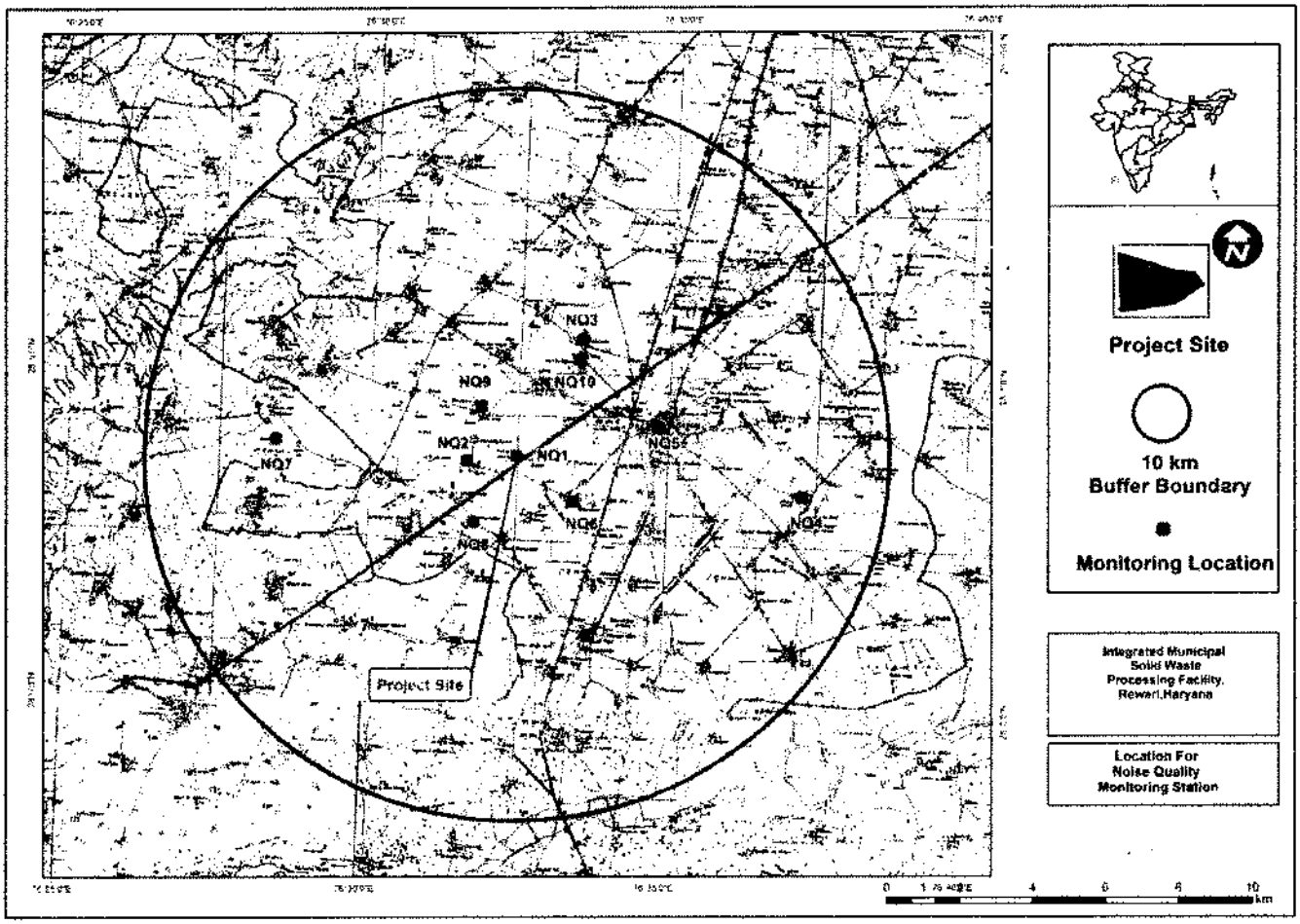


FIGURE 4.14: LOCATION MAP SHOWING NOISE MONITORING LOCATIONS

4.4.5.3. 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 ten (10) locations covered under the study.

4.4.5.4 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 4.13: AMBIENT NOISE QUALITY MONITORING DATA

S.No.1			Noise Level in Db(A)				
	Location-Project Site		May-22				
			Leq Day	Leq Night	Lmax	Lmin	Leq
	ANQ-1	21-May-22	65.5	53.3	72.3	38.9	64.3
	Limits - Industrial Area		75	70			
	Location-Odhi	Co-ordinate- 28° 3'40.16"N, 76°31'38.25"E	May-22				
			Leq Day	Leq Night	Lmax	Lmin	Leq
	ANQ-2	22-May-22	53.2	42.9	62.4	38.9	51.2
	Limits - Residential Area		55	45			
S.No.3			Noise Level in Db(A)				
	Location-Kalrawas	Co-ordinate- 28° 5'12.29"N, 76°33'30.61"E	May-22				
			Leq Day	Leq Night	Lmax	Lmin	Leq
	ANQ-3	23-May-22	53.3	43.5	58.7	41.1	52.2
	Limits - Residential Area		55	45			
S.No.4			Noise Level in Db(A)				
	Location-Raipur	Co-ordinate- 28° 3'15.70"N, 76°37'15.94"E	May-22				
			Leq Day	Leq Night	Lmax	Lmin	Leq
	ANQ-4	23-May-22	48.8	42.3	56.6	41.1	51.9
	Limits - Residential Area		55	45			
S.No.5			Noise Level in Db(A)				
	Location-Bawal	Co-ordinate- 28° 4'16.99"N, 76°34'51.84"E	May-22				
			Leq Day	Leq Night	Lmax	Lmin	Leq
	ANQ-5	24-May-22	54.5	40.5	58.7	38.7	53.3
	Limits - Residential Area		55	45			

S.No.6			Noise Level in Db(A)				
	Location-Rasiawas	Co-ordinate- 28° 3'7.71"N, 76°33'26.44"E	May-22				
			Leq Day	Leq Night	Lmax	Lmin	Leq
	ANQ-6	24-May-22	53.2	41.1	57.7	39.6	52.2
	Limits - Residential Area		55	45			
S.No.7			Noise Level in Db(A)				
	Location-Kankar Ki Dhani	Co-ordinate- 28° 3'53.12"N, 76°28'23.86"E	May-22				
			Leq Day	Leq Night	Lmax	Lmin	Leq
	ANQ-7	25-May-22	50.6	42.2	58.7	37.6	53.3
	Limits - Residential Area		55	45			
S.No.8			Noise Level in Db(A)				
	Location-Anandpur	Co-ordinate- 28° 2'45.69"N, 76°31'46.70"E	May-22				
			Leq Day	Leq Night	Lmax	Lmin	Leq
	ANQ-8	26-May-22	53.4	42.3	57.8	38.3	52.4
	Limits - Residential Area		55	45			
S.No.9			Noise Level in Db(A)				
	Location-Harchandpur	Co-ordinate- 28° 4'25.69"N, 76°33'56.84"E	May-22				
			Leq Day	Leq Night	Lmax	Lmin	Leq
	ANQ-9	26-May-22	54.3	42.9	59.8	41.1	53.5
	Limits - Residential Area		55	45			
S.No.10			Noise Level in Db(A)				
	Location-Sanjarpur	Co-ordinate- 28° 4'25.20"N, 76°33'52.12"E	May-22				
			Leq Day	Leq Night	Lmax	Lmin	Leq
	ANQ-10	27-May-22	53.7	44.2	58.7	41.7	52.5
	Limits - Residential Area		55	45			

Interpretation

- The noise levels are found to be 48.8-65.5 Db(A) and 40.5-53.3 Db(A) for day and 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.

4.4.6 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.

The animal and plant communities exist in their natural habitats in well-organized manner. Their natural settings can be disturbed by any externally induced anthropological activities or by naturally induced calamities or disaster. So, once this setting is disturbed, it becomes practically impossible or takes a longer time to come to its original state. The sensitivity of animal and plant species to the changes occurring in their existing ecosystem can therefore, be used for the monitoring of Environmental Impact studies.

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

4.4.6.1 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.

4.4.6.2 Study Approach & Methodology adopted

The baseline study for existing ecological environment was carried out during winter season (March- May 2022). 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 area and the buffer area in the 10 km radius of the project site.

4.4.6.3 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.

4.4.6.4 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.

4.4.6.5 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.

4.4.6.6 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 2021.

Photographic documentation

During the field visits, surveys, individual and group discussions and personal interaction with local villagers were made and incorporated in the report.

4.4.6.7 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 environmental study of proposed Implementation of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Ramsinghpura, Rewari Dumpsite ("Sanitary Landfill Site") of Haryana state. This study has been done during March – May 2022. in following monitoring locations of 10 km radius study area **(Table-4.14).**

TABLE 4.14: SAMPLING LOCATIONS FOR BIOLOGICAL ENVIRONMENT

S. No.	Station Code	Locations	GPS	Direction	Distance (Km)
1	TE-1	Core Zone		-	
2	TE-2	Odhi	28° 3'40.16"N, 76°31'38.25"E	W	1.15
3	TE-3	Rasiawas	28° 3'7.71"N, 76°33'26.44"E	SE	1.8
4	TE-4	Sanjarpur	28° 4'25.20"N, 76°31'52.12"E	NNW	1.3
5	TE-5	Harchandpur	28° 4'25.69"N, 76°33'56.84"E	NE	2.3
6	TE-6	Bawal	28° 4'16.99"N, 76°34'51.84"E	NE	3.8
7	TE-7	Raipur	28° 3'15.70"N, 76°37'15.94"E	E	7.7
8	TE-8	Anandpur	28° 2'45.69"N, 76°31'46.70"E	SSW	2.0

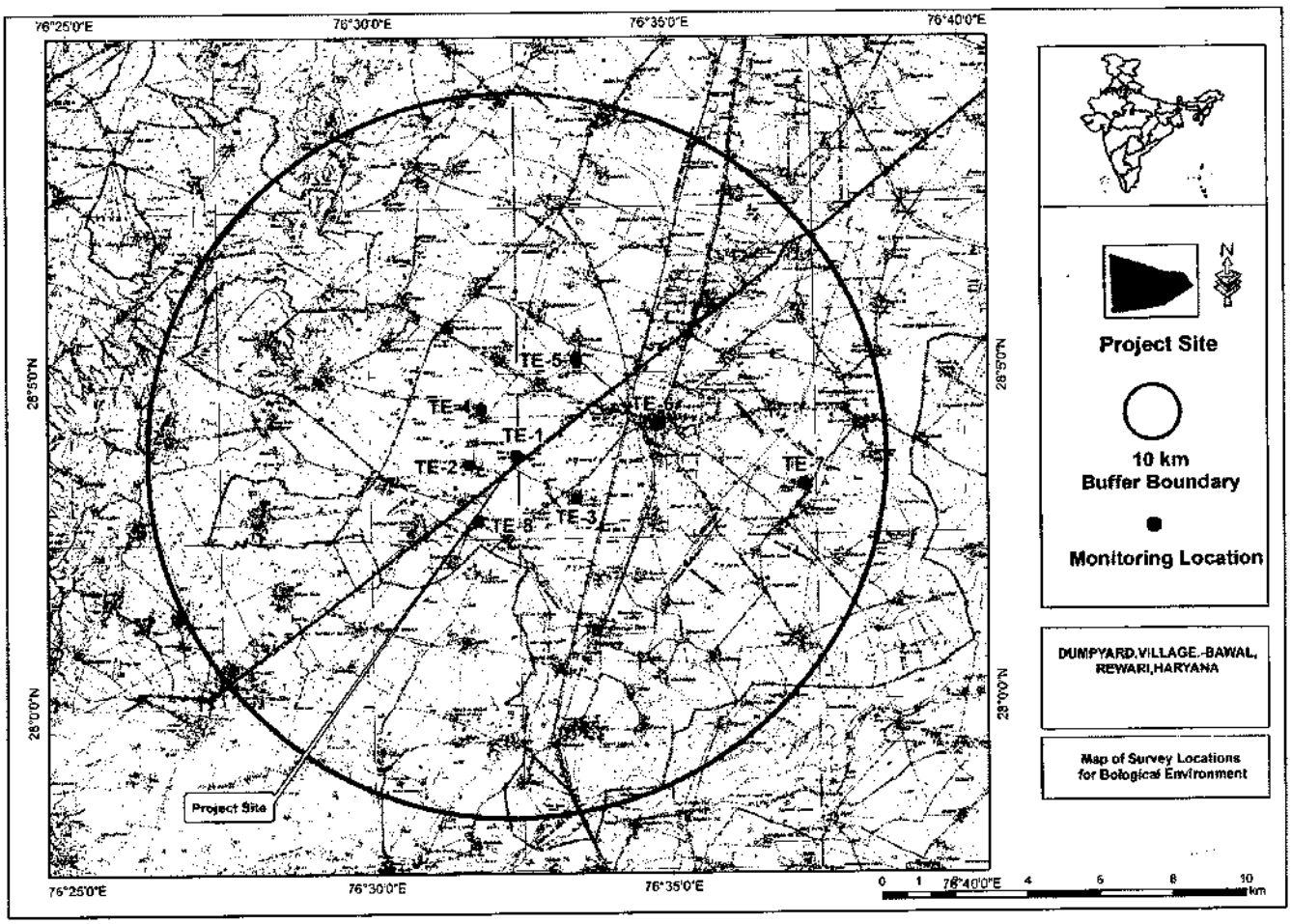


FIGURE 4.15: MAP OF SURVEY LOCATIONS OF BIOLOGICAL ENVIRONMENT

General Information about District

Rewari district lies between 27 ° 46'; 28° 28' North latitudes and 76 ° 15'; 76 ° 51' East longitudes. Total geographical area of the district is 1594 sq.km. The Rewari district is divided into three sub-divisions (tehsils) namely Bawal, Kosli and Rewari comprising five-community development blocks viz. Bawal, Jatusana, Khol, Nahar and Rewari for the purpose of administration. The district headquarters, Rewari town falls in Rewari Tehsil. The main streams in the district are Sahibi and Krishnawati rivers. Sahibi River is an ephemeral river and rises from Mewat hills in Jaipur Alwar in Rajasthan and after gathering water from several tributaries, forms a broad stream and enters the district near Ranawi after which it enters Rajasthan and then re-enters Haryana near village Jaithal. The district, except in its Eastern part is flat and sandy and absorbs all the rain water. Tropical arid brown soils (Ustocheept, haplustarp and most of the soils are of medium texture loamy sand. The organic content of the soil rages sand upto 0.40%. The available phosphorus in the soils ranges ground 21.5 kg/hectare. Soils have moderate salinity hazards, high salinity and moderate alkalinity hazard in the major part of the area.

The climate of Rewari district is tropical steppe, Semiarid and hot which is mainly dry with very hot

summer and cold winter except during monsoon when moist air of oceanic origin penetrates into the district. There are four seasons in a year. The hot weather season starts from mid-March to last week of the June followed by the south west monsoon which lasts upto September. The winter season starts late in November and remains upto first week of March. The normal annual rainfall of the district is 489 mm and 553 mm, respectively. The south west monsoon sets in from last week of June and withdraws in end of September, contributing about 88% of annual rainfall. July and August are the wettest months. Rest 12% rainfall is received during non-monsoon period in the wake of western disturbances and thunderstorms. Generally, rainfall in the district increases from southwest to northeast. The mean minimum and maximum temperature in the area ranges from 5.6 ° C to 41 ° C during January and May or June respectively.

Terrestrial Ecology

In district Rewari, the total forest area is 4051.32 ha. (2001) which is (2.61%) of the State Forest area and 2.69% of the total geographical area of the district. Out of the total forest cover, reserved forest is 514.04 hect., 3537.14 hect is protected forest (comprising 1678.46 hect on road sides, 269.9 hect rail sides, 1471.57 canal embankments, and 115.51 hect on the bandhs. 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.

4.4.6.8 Observations and Results

Core Zone: Proposed establishment of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Ramsinghpura village, Rewari, Haryana.

Buffer Zone: A total of 102 floral species have been recorded during survey from the 10 km study area out of which 31 are Trees, 20 are shrubs, 35 herbs, 9 grasses, 6 species of Climbers and one parasite plant are given in **Table-4.15.**

TABLE-4.15: 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	*Acacia nilotica* (L.) Delile	Kikar	Fabaceaae	NA
2	*Ailanthus excelsa* Roxb.	Arusa	Simaroubaceae	NA
3	*Ailanthus altitissima* (Mill.)Sumgle	Arusa	Simaroubaceae	NA
4	*Albizia lebbeck* (L.) Benth.	Kala Siris	Fabaceaae	NA
5	*Alstonia scholaris* (L.) R. Br.	Chitvan	Apocynaceae	NA
6	*Azadirachta indica* A.Juss. i	Neem	Meliaceae	NA
7	*Bauhinia variegata* L.	Kachnar	Leguminosae	LC

8	*Bombax ceiba* L.	Semal	Malvaceae	NA
9	*Cassia fistula* L.	Amaltas	Leguminosae	NA
10	*Cassia siamea* Lam.	Cassia	Leguminosae	NA
11	*Cassia tomentosa* L.f.	Chilla	Leguminosae	NA
12	*Dalbergia sissoo* DC.	Shisham	Leguminosae	NA
13	*Delonix regia* (Hook.) Raf.	Gulmohar	Leguminosae	LC
14	*Eucalyptus triticornis*	Nilgiri/Safeda	Mytraceae	NA
15	*Ficus benghalensis* L.	Bargad/Bar	Moraceae	NA
16	*Ficus racemosa* L.	Gular	Moraceae	NA
17	*Ficus religiosa* L.	Peepal	Moraceae	NA
18	*Kigelia pinnata* (Jacq.) DC.	Balamkheera	Bignoniaceae	NA
19	*Mangifera indica* (Linn.)	Aam	Anacardiaceae	NA
20	*Melia azedarach* (Linn.)	Bakain	Meliaceae	NA
21	*Morus alba* L.	Shahtut	Moraceae	NA
22	*Peltophorum pterocarpum* (DC.) K.Heyne	Peltophorum	Leguminosae	NA
23	*Pithecellobium dulce*	Jungle Jalebi	Fabaceae	NA
24	*Pongamia pinnata (L.) Pierre*	Kanji	Leguminosae	NA
25	*Prosopis cineraria*	Jand/ Saingri	Fabaceae	NA
26	*Prosopis chilensis* Stuntz.	Vilayati Kikar	Fabaceae	NA
27	*Prosopis juliflora* (Sw.) DC.	Kejri	Leguminosae	NA
28	*Salvadora oleoides Decne*	Kateli	Tree	NA
29	*Spathodea campanulata* P.Beauv.	Spathodia	Bignoniaceae	NA
30	*Tecoma stans* (L.) Juss. ex Kunth	Tecoma	Bignoniaceae	NA
31	*Tectona grandis* L.f.	Teak	Verbenaceae	NA

(B) Shrubs:

S. No.	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
1	*Barlaria priontis* L.	Pila Bansa	Acanthaceae	NA
2	*Bougainvillea glabra* Choisy	Bouganvillia	Nyctaginaceae	NA
3	*Cascabela thevetia* L.	Pili kaner	Asteracece	NA
4	*Cestrum noctornum* L.	Rat ki Rani	Solanaceae	NA
5	*Clearodendrum phlomidis L. f.*	Arno	Lamiaceae	NA

6	*Ehretia laevis* Roxb.	Chhara	Boraginaceae	NA
7	*Euphorbia milli var splendence* (Bojer Ex. Hook.)	Milli	Euphorbiaceae	NA
8	*Euphorbia nerifolia* L.	Thor	Euphorbiaceae	NA
9	*Euphorbia royleana* Boiss.	Danda Thor	Euphorbiaceae	NA
10	*Euphorbia tirucalli* L.	Brasingha	Euphorbiaceae	NA
11	*Hibiscus rosa-sinensis* L.	Gurhal	Malvaceae	NA
12	*Lantana camara* L.	Saptrangi	Verbenaceae	NA
13	*Nerium Oleander* L.	Lal Kaner	Apocynaceae	NA
14	*Opuntia dillenii* (Ker Gawl.)	Nagphani	Cactaceae	NA
15	*Pithecellobium dulce* (Roxb.) Benth.	Vilayati Imli	Leguminosae	NA
16	*Ricinus communis* (Linn.)	Arandi	Euphorbiaceae	NA
17	*Rosa indica* L.	Gulab	Rosaceae	NA
18	*Senna occidentalis* (L.) Link	Ritwa	Leguminosae	NA
19	*Tabernimontana diverculata (L.) R.Br. Ex Roem.*	Chandani	Apocynaceae	NA
20	*Ziziphus mauritiana Lam.*	Jharberi	Rhamnaceae	NA

(C) Herb:

S. No.	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
1	*Ageratum conyzoides* (L.) L.	Sahdevi	Asteraceae	NA
2	*Alternanthera sessilis* (L.) R.Br. ex DC.	Garundi	Amaranthaceae	NA
3	*Amaranthus viridis* L.	Jangli Choulai	Amaranthaceae	NA
4	*Biophytum sensitivum* (L.) Don.	Lajalu	Oxalidaceae	NA
5	*Blumea lacera* (Burm.f) DC.	Kukrondha	Asteraceae	NA
6	*Chrysopogon zizanioides* (L.)	Khus Khus	Poaceae	NA
7	*Cleome viscosa* L.	Hurhur	Cleomaceae	NA
8	*Croton bomplandianus* Baill.	Ban tulsi	Euphorbiaceae	NA
9	*Cyanodon dactylon* L.	Dub	Poaceae	NA
10	*Desmostachya bipinnata* (L.) Stapf.	Dabh	Poaceae	NA
11	*Echinops echinatus* Roxb.	Oontkanteli	Asteracae	NA
12	*Epipremnum aureum* (Linden & Andre)	Money Plant	Araceae	NA
13	*Helianthus annus* L.	Sunflower	Asteraceae	NA
14	*Ipomoea pestigridis* L.	Billi Ke Ladoo	Convolvulaceae	NA
15	*Justicia adhatoda* L.	Safed bansa	Acanthaceae	NA
16	*Kalanchoe blossfeldiana* Poelin.	Kalanchoe	Crassulaceae	NA

17	*Launaea procumbens* (Roxb.) Ramayya & Rajagopal	Van Gobhi	Asteraceae	NA
18	*Leucas aspera* (Willd.) Link	Gumma Buti	Lamiaceae	NA
19	*Oxalis corniculata* L.	Amrul Sak	Oxalidaceae	NA
20	*Parthenium hysterophorus* L.	Gajar Ghass	Asteraceae	NA
21	*Phyla nodiflora* (L.) Greene	Jal Buti	Verbinaceae	NA
22	*Phyllanthus amarus* Schumach. & Thonn.	Bhui Aonla	Phyllanthaceae	NA
23	*Physalis minima* L.	Bandhapariya	Solanaceae	NA
24	*Plumbago zeylanica* L.	Chitrak	Plumbaginaceae	NA
25	*Polianthera tuberosa* L.	Rajnigandha	Asparagaceae	NA
26	*Portulaca oleracea* L.	Khulpha	Portulacaceae	NA
27	*Saccharum bengalense* Retz.	Jhunda, Sarkanda	Poaceae	NA
28	*Saccharum spontaneum* L.	Kaans	Poaceae	NA
29	*Salvia splendence* Sellow ex Schuil.		Lamiaceae	NA
30	*Sanseviera trifasciata* Prains.	Snake Plant	Asparagaceae	NA
31	*Tagetus erecta* L	Genda	Asteraceae	NA
32	*Trianthema portulacastrum* L.	Horse Purslane	Aizoaceae	NA
33	*Tribulus terrestris* L.	Gokhru	Zygophyceae	NA
34	*Tridax procumbens* (L.) L.	Mexican Daisy	Asteraceae	NA
35	*Triumfetta rhomboidea Jacq.*	Chikti	Malvaceae	NA

(D) Climbers:

S. No.	Botanical Name	Common Name	Family	IUCN Status
1	*Combretum indicum* (L.) DeFilipps	Guruvela	Combretaceae	NA
2	*Cyclea peltata* (Lam.) Hook.f. & Thomson	Path	Menispermaceae	NA
3	*Ipomoea cairica* (L.) Sweet.	Railway Creeper	Convolvulaceae	NA
4	*Ipomoea coccinea* L	Gowri Beeja	Convolvulaceae	NA
5	*Tinospora cordifolia L.*	Giloy	Menispermaceae	NA
6	*Tylophora indica* (Burm. f.) Merr.	Dambel	Apocynaceae	NA

(E) Grasses:

S. No	SCIENTIFIC NAME	LOCAL NAME	FAMILY	IUCN STATUS
1	*Bothriochloa pertusa (L.) A.Camus*	Choti Jurgi	Poaceae	NA
4	*Chloris barbata Sw.*	Grass	Poaceae	NA
6	*Cynodon dactylon (Linn.) Pers.*	Doob	Poaceae	NA
7	*Dactyloctenium aegyptium (L.) Willd.*	Bhond Grass	Poaceae	NA
8	*Dendrocalamus strictus (Roxb.) Nees*	Bans	Poaceae	NA
9	*Dichanthium annulatum (Forsk) stapf*	Jurgi	Poaceae	NA
10	*Echinochloa colona (L.) Link*	Corn Panicgrass	Poaceae	NA
11	*Saccharum munja Roxb.*	Munj	Poaceae	NA
12	*Saccharum spontaneum L.*	Kaans	Poaceae	NA

(F) Parasite:

S. No	SCIENTIFIC NAME	LOCAL NAME	FAMILY	Habit
1	*Cuscuta reflexa* Roxb.	Amarbel	Cosnopulaceae	Parasite

TABLE-4.16: DIFFERENT HABITAT COMPOSITION OF FLORAL DIVERSITY OF BUFFER ZONE

Habit	No of Sp.
C	6
S	20
H	35
T	31
G	9
P	1
	102

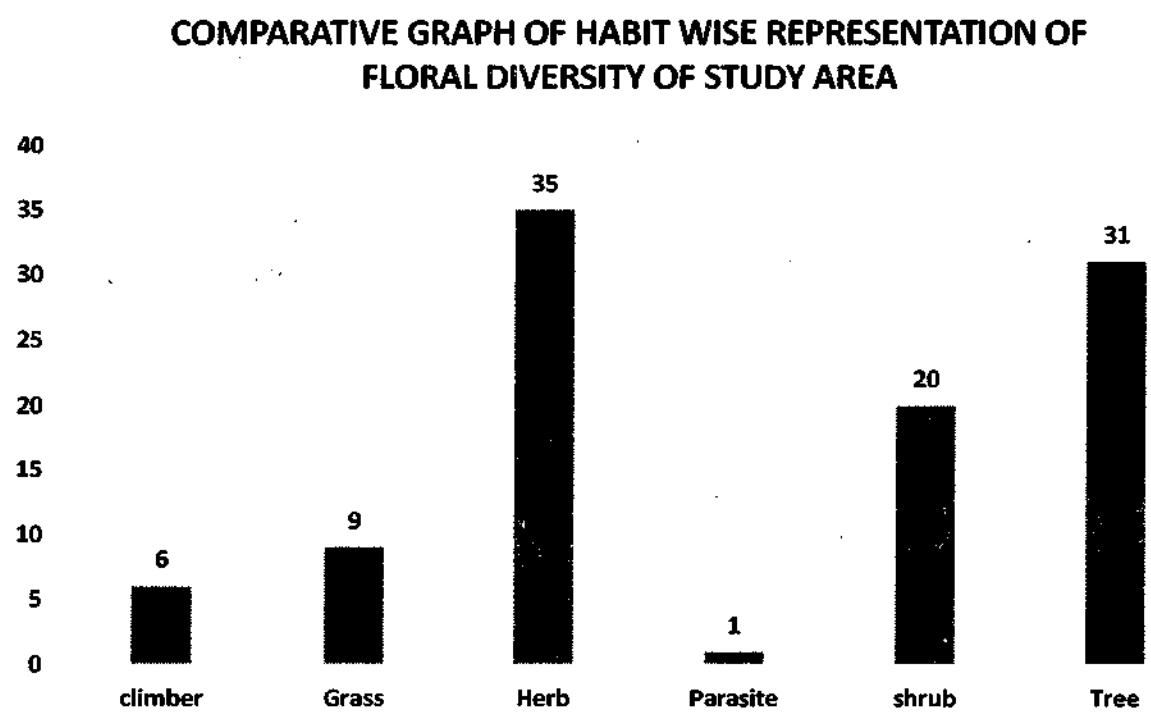


FIGURE-4.16: COMPARATIVE GRAPH OF HABIT WISE REPRESENTATION OF FLORAL DIVERSITY OF STUDY AREA

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 (published research papers and local inhabitants). The study area has mammals like Neelgay and Indian Fox, etc. 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. Total 31 faunal species have been encountered in the study area out of which 8 Mammals, 6 Herpatofauna and 17 aves species were recorded from the 10 km study area which are given in below **Table-4.17.**

TABLE-4.17: FAUNAL SPECIES DIVERSITY IN THE CORE AND BUFFER ZONE (10 KM STUDY AREA).

(A) Mammals

S. No.	Scientific Name	English Name	Status/Schedule
1	*Bandicota indica*	Greater bandicota rat	IV
2	*Bosephalus tragocamelus*	Blue bull	III
3	*Canis aureus*	Jackal	II
4	*Herpestes edwerdsii*	Common Mangoose	II
5	*Lepus nigricollis*	Indian Hare	IV
6	*Mus booduga*	Indian field rat	IV
7	*Naemorhedus sumatransis*	Shrow	IV
8	*Vulpes bengalensis*	Indian fox	II

(B) Herpatofauna

S. No.	Scientific Name	English Name	Status/Schedule
1	*Bungarus caeruleus*	Common Indian Krait	IV
2	*Calotes versicolor*	Common garden lizard	--
3	*Hemidactylus flaviviridis*	Common Indian House Gecko	-
4	*Mabuya carinata*	Brahminy skink	-
5	*Naja naja*	Indian Cobra	II
6	*Varanus sp.*	Monitor Lizard	IV

(C) Aves

S. No.	Scientific Name	English Name	Status/Schedule
1	*Acridotheres ginginianus*	Bank Myna	Schedule-IV
2	*Acridotheres tristis*	Common Myna	Schedule-IV

3	*Aethopyga siparaja*	Sungbird	Schedule-IV
4	*Anthus rufulus*	Pipet	Schedule-IV
5	*Apus affinis*	House swift	Schedule-IV
6	*Apus apus*	Common swift	Schedule-IV
7	*Ardeola grayii*	Pond heron	Schedule-IV
8	*Bubulcus ibis*	Cattle Egret	Schedule-IV
9	*Columba livia*	Rock Pigeon	Common
10	*Coracias benshalensis*	Indian roller	Schedule-IV
11	*Dicrirus macrocercus*	Black Drongo	Schedule-IV
12	*Saxicoloides fulicata*	Indian Robin	Schedule-IV
13	*Streptopelia chinensis*	Spotted Dove	Schedule-IV
14	*Streptopelia decaocto*	Ring dove	Schedule-IV
15	*Turdoides caudatus*	Common Babbler	Schedule-IV
16	*Turoides striatus*	Jungle babbler	Schedule-IV
17	*Vanellus indicus*	Red wattled lapwing	Schedule-IV

(D) Fishery

Major fishes are Common Carp, Silver Carp, Grass Carp, and varieties of catfish are sold as food fish in the district.

Endangered Species

31 species of vertebrates could be seen in the vicinity of the proposed project. It was observed that out of 31 not a soul species as Schedule I under Wildlife Protection Act, 1972 has been recorded.

Agricultural Crops

The agriculture constitutes the main source of economy, and most of the area fit for agriculture is being cultivated. The total irrigated area of 1430 sq.km in Rewari district is irrigated by shallow nd deep tube wells. Central Ground Water Board (CGWB) has carried out ground water exploration and various Hydrogeological studies in the district. So far ,16 exploratory wells and 5 Piezometers have been drilled in the district.

The combative of land use area between 10 km study area Vegetables, Cereals, Fruit, are common in agricultural practices at Rewari district. The major crops grown in the area are given below in **table-4.18.**

TABLE-4.18: CROPPING PATTERN OF STUDY AREA

Group	Local Name	Botanical Name	Family
Cereals	Wheat	*Triticum aestivum* L.	Poaceae
Minor Millets	Bajra	Pennisetum glaucum (L.) R.Br.	Poaceae
	Barley	*Hordeum vulgare*	Poaceae
Oilseed	Sarson	*Brassica oleracea* L.	Brassicaceae
Cashcrop	Cotton	*Gossypium herbaceum* L.	Malvaceae
Vegetables	Tad Kakri	*Cucumis melo* L.	Cucurbitaceae
	Kheera	*Cucumis sativus* L.	Cucurbitaceae
	Tomato	*Solanum melongena* L.	Solanaceae

	Lady Finger	*Abelmoschus esculentus* (L.) Moench	Malvaceae
	Chilli	*Capsicum annuum* L.	Solanaceae
	Muli	*Raphanus raphanistrum subsp. sativus (L.) Domin*	Convolvulaceae
	Gajar	*Daucus carota* L.	Brassicaceae
	Cauliflower	*Brassica oleracea* L.	Brassicaceae
	Peas	*Pisum sativum* L.	Fabaceae
Horti-fruits	Mango	*Mangifera indica* L.	Anacardiaceae
	Aonla	Phyllanthes emblica L.	Phyllanthaceae
	Ber	*Ziziphus jujuba* Mill.	Rhamnaceae
	Lemon	*Citrus limon* (L.) Osbeck	Rutaceae

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 is Nahar Wildlife Sanctuary which is ~40 km away from project site, Bhindawas Bird Sanctuary- Ramasar Wetland is ~51km and Khaparwa Lake wildlife and Bird Sanctuary ~54 km away from project site (Figure-:4.17).

Conclusion

Baseline study for the biological environment was conducted to assess the existing condition of the 10 km study area of the proposed Establishment of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Ramsinghpura village, Rewari, Haryana state. There are 102 plant species and 31 species of fauna has been recorded. There is no scheduled I species assessed.

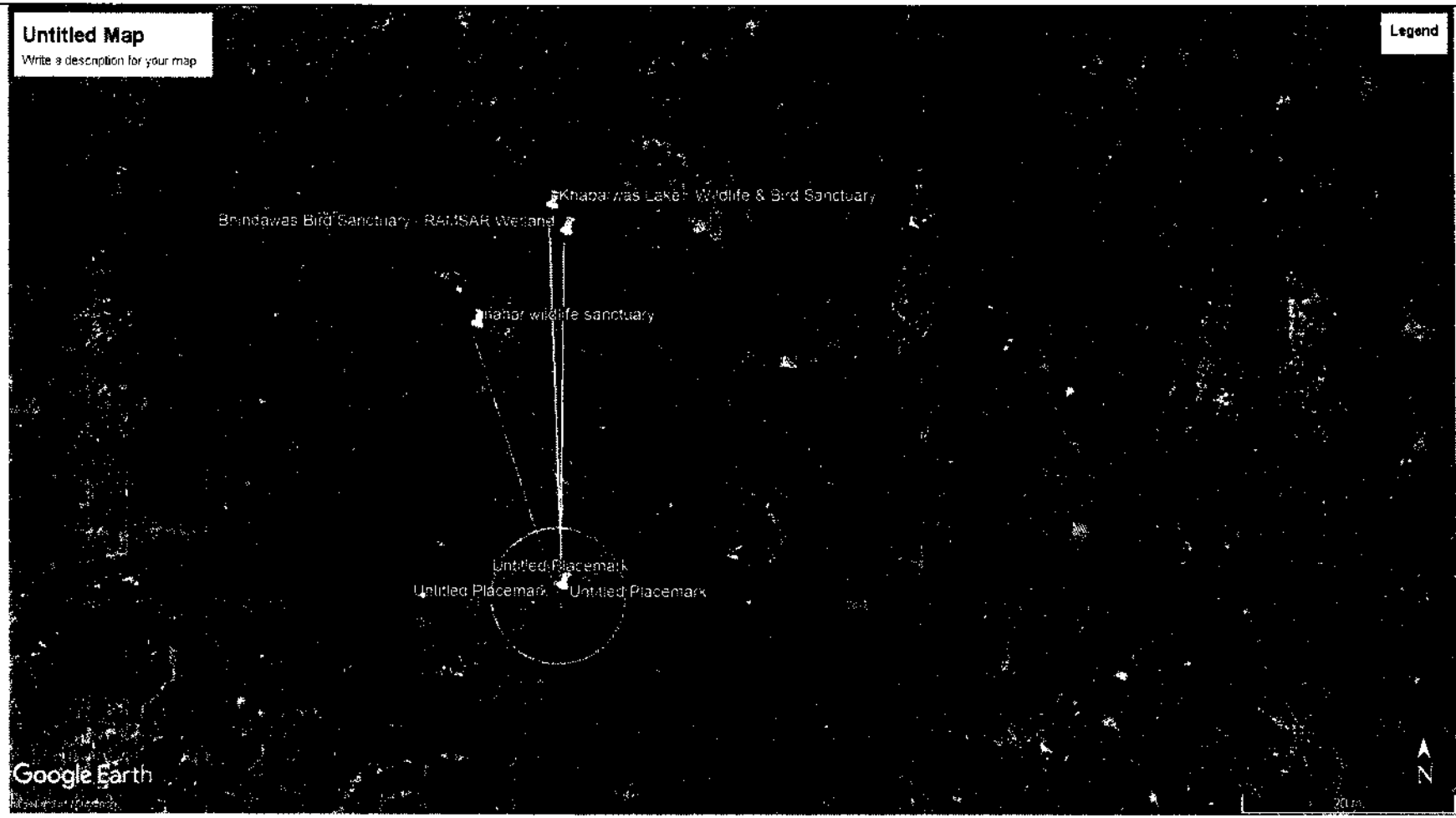


FIGURE 4.17 GOOGLE MAP SHOWING PROTECTED AREAS FROM PROJECT SITE

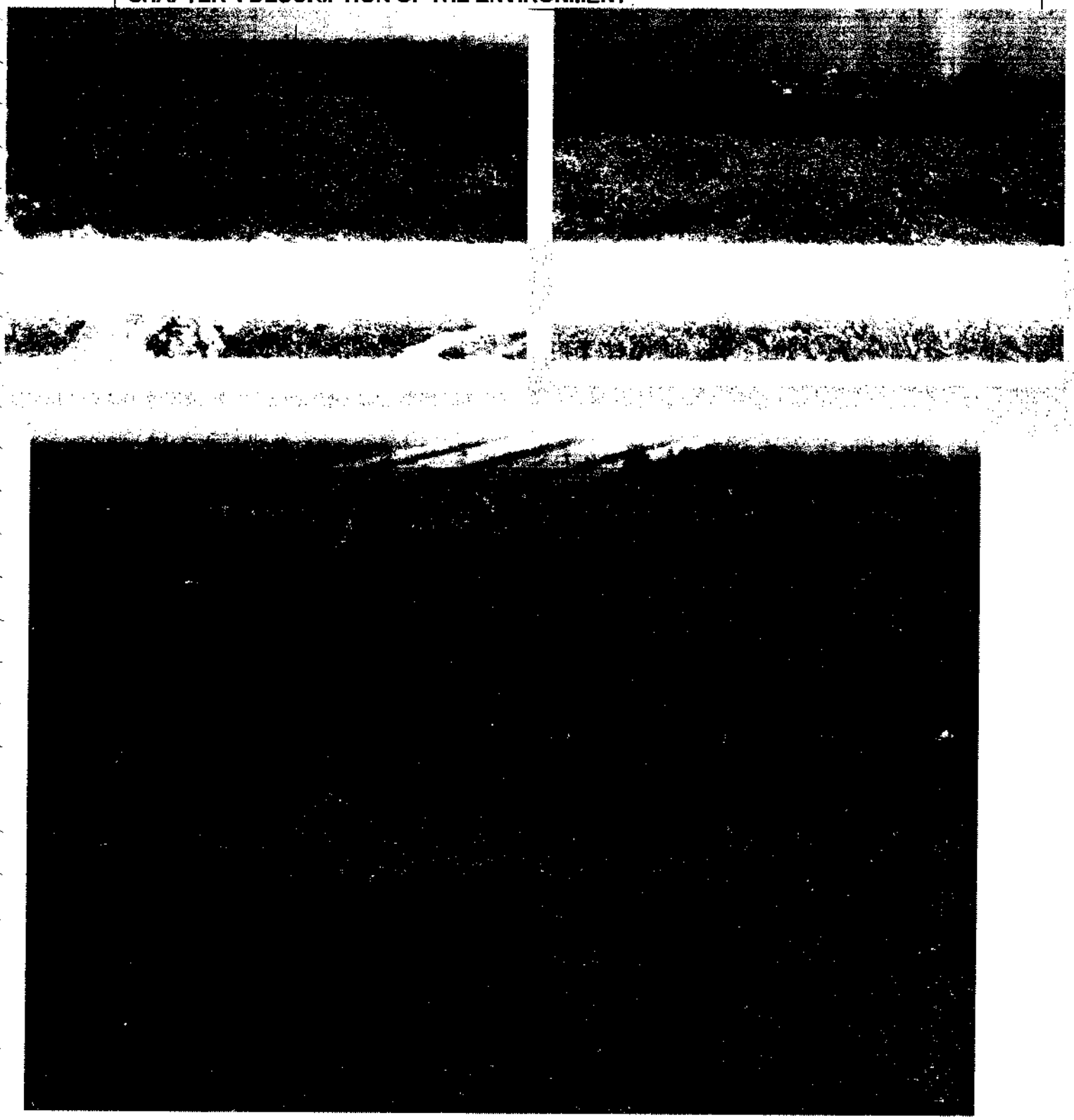


FIGURE 4.18: PHOTOGRAPHIC PLATE

4.4.7 SOCIO ECONOMIC ENVIRONMENT OF THE STUDY AREA

4.4.7.1 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 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 4.19.**

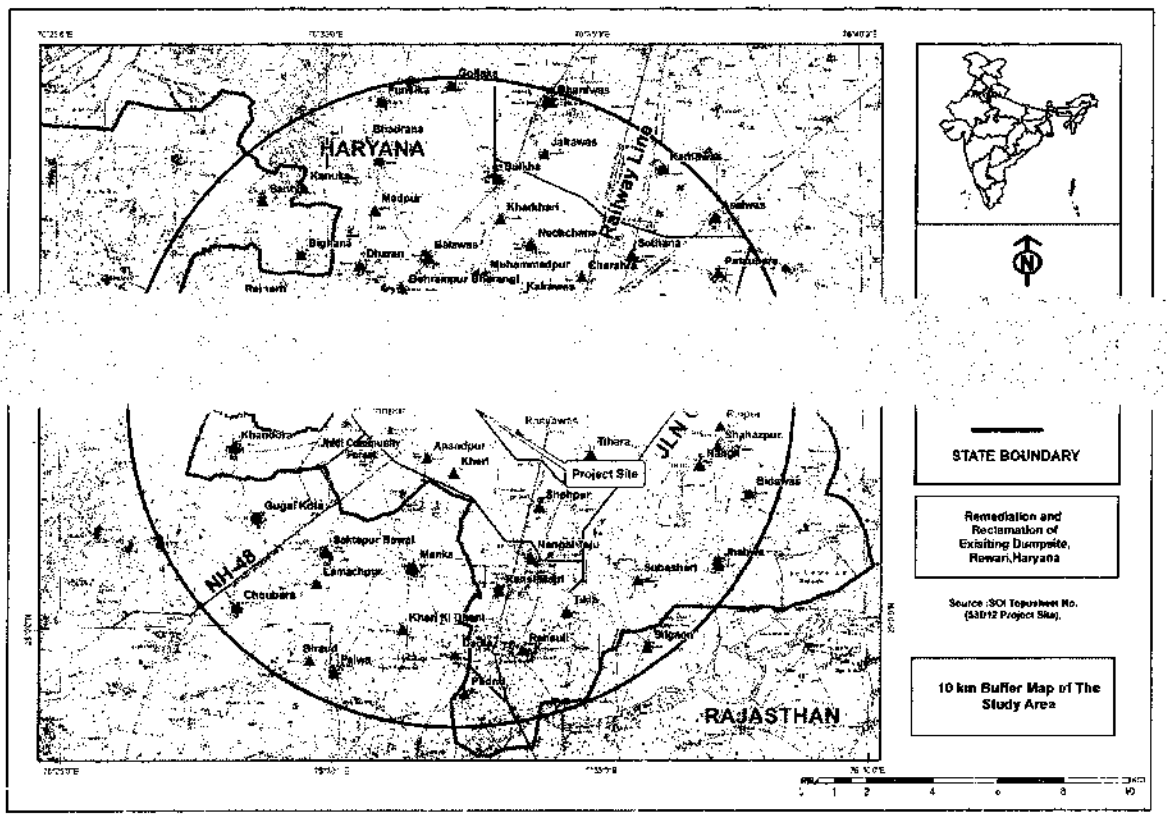


FIGURE 4.19: VILLAGE MAP OF THE STUDY AREA

4.4.7.2 Reconnaissance

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

4.4.7.3 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.

4.4.7.4 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
- ❖ Cultural Attributes
- ❖ Salient Observations
- ❖ Socio-economic status in relation with 'Quality of Life'

4.4.7.5 Demographic Structure

The demographic structure of the study area was derived primarily from data of Census records Haryana and Rajasthan two state of Rewari and Alwar two district covering four tehsil and 91 villages. The demographic structures of each village in the study area as per Census 2011 are presented in **Table 4.20**. Summary of demographic structure is presented in **Table 4.19.**

TABLE 4.19: DEMOGRAPHIC STRUCTURE OF VILLAGE IN THE STUDY AREA

S. No.	Villages	Area (ha.)	No. of Household	Total Population			0-6 Child Population			Scheduled Cast			Scheduled Tribes		
				Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
State-Haryana, District- Rewari, Tehsil- Bawal															
1.	Patuhera	421	381	2344	1214	1130	358	200	158	544	272	272	0	0	0
2.	Asalwas	429	330	2034	1079	955	360	199	161	433	224	209	0	0	0
3.	Banipur	202	378	2197	1160	1037	304	160	144	602	323	279	0	0	0
4.	Suthana	168	299	1594	911	683	239	141	98	263	136	127	0	0	0
5.	Jalalpur	118	165	837	414	423	125	62	63	324	157	167	0	0	0
6.	Dhani Suthani	22	26	147	83	64	10	6	4	0	0	0	0	0	0
7.	Nechana	546	497	3039	1651	1388	336	191	145	508	297	211	0	0	0
8.	Sulkha	794	663	3590	1899	1691	434	235	199	1095	576	519	0	0	0
9.	Pragpura	155	149	742	398	344	75	45	30	101	53	48	0	0	0
10.	Badhrana	355	308	1632	854	778	223	117	106	305	159	146	0	0	0
11.	Berwal	176	203	1143	606	537	132	76	56	373	199	174	0	0	0
12.	Kanuka	272	209	1129	597	532	159	88	71	249	132	117	0	0	0
13.	Gobindpur	107	35	189	99	90	14	7	7	0	0	0	0	0	0
14.	Dharan	452	495	2541	1340	1201	316	184	132	560	309	251	0	0	0
15.	Aram Nagar	89	89	442	234	208	43	26	17	11	4	7	0	0	0
16.	Balawas	375	387	2022	1077	945	200	117	83	534	291	243	0	0	0
17.	Mohamadpur	293	351	1961	1047	914	256	146	110	471	250	221	0	0	0
18.	Kalrawas	204	230	1239	657	582	169	101	68	210	114	96	0	0	0
19.	Chirhara	220	241	1313	701	612	198	113	85	65	32	33	0	0	0
20.	Jaliawas	151	203	1188	614	574	147	75	72	128	61	67	0	0	0
21.	Ibrahimpur	236	247	1326	699	627	188	100	88	303	159	144	0	0	0
22.	Mangaleshwar	252	202	1325	690	635	205	98	107	277	150	127	0	0	0
23.	Gujar Majri	238	368	2065	1102	963	322	164	158	486	247	239	0	0	0
24.	Bishanpura	309	132	841	436	405	155	82	73	0	0	0	0	0	0
25.	Khera Murar	306	354	2325	1217	1108	360	197	163	317	163	154	0	0	0
26.	Bawal (Rural)	1874	58	385	206	179	56	32	24	1	1	0	0	0	0

27.	Rudh	201	169	1176	641	535	163	87	76	156	87	69	0	0	0
28.	Harchandpur	273	336	1696	952	744	226	130	96	936	516	420	0	0	0
29.	Saban	417	248	1272	656	616	171	88	83	272	136	136	0	0	0
30.	Asrakamajra	261	191	976	518	458	138	83	55	322	168	154	0	0	0
31.	Sanjarpur	243	276	1393	744	649	169	91	78	374	207	167	0	0	0
32.	Behrampur Bharangi	235	301	1480	787	693	197	105	92	228	123	105	0	0	0
33.	Narsinghpur Garhi	230	169	936	502	434	119	74	45	50	33	17	0	0	0
34.	Rajgarh	738	665	3589	1883	1706	488	278	210	493	265	228	0	0	0
35.	Tankri	983	806	4286	2277	2009	538	286	252	961	509	452	0	0	0
36.	Mohanpur	261	319	1621	824	797	209	114	95	121	62	59	0	0	0
37.	Jai Singhpur Khera	409	366	1999	1037	962	247	133	114	456	242	214	0	0	0
38.	Keshopur	96	135	713	370	343	87	52	35	122	64	58	0	0	0
39.	Anandpur	217	258	1379	750	629	163	91	72	84	45	39	0	0	0
40.	Chanduwas	111	90	481	245	236	67	38	29	7	5	2	0	0	0
41.	Odhi	249	290	1481	751	730	199	106	93	714	355	359	0	0	0
42.	Ramsinghpura	139	55	276	136	140	21	10	11	13	6	7	0	0	0
43.	Rasiawas	272	614	2897	1577	1320	443	234	209	1429	768	661	0	0	0
44.	Kheri Dharchana	130	0	0	0	0	0	0	0	0	0	0	0	0	0
45.	Kheri Dalusingh	173	194	937	486	451	129	68	61	156	85	71	0	0	0
46.	Shahpur	215	249	1653	883	770	226	128	98	435	227	208	0	0	0
47.	Tihara	286	331	1969	1047	922	250	138	112	439	232	207	0	0	0
48.	Dulhera Khurd	304	172	848	456	392	161	84	77	735	393	342	0	0	0
49.	Nangli Parsapur	131	154	800	434	366	90	50	40	233	121	112	0	0	0
50.	Nangal Shahbazpur	185	287	1591	831	760	221	118	103	159	80	79	0	0	0
51.	Raipur	265	355	2109	1116	993	266	146	120	295	155	140	0	0	0
52.	Bidawas	282	296	1630	842	788	201	109	92	365	171	194	0	0	0
53.	Birjhabuwa	303	0	0	0	0	0	0	0	0	0	0	0	0	0
54.	Jhabuwa	664	526	3026	1633	1393	443	254	189	317	165	152	0	0	0
55.	Dulhera Kalan	414	114	550	283	267	68	41	27	539	281	258	0	0	0

56.	Dhar Chana	297	158	886	453	433	117	54	63	75	42	33	0	0	0
57.	Shekhpur	241	227	1204	648	556	141	77	64	457	234	223	0	0	0
58.	Nangal Ugra	202	183	1038	550	488	155	93	62	188	100	88	0	0	0
59.	Nangal Teju	197	242	1306	676	630	193	117	76	534	279	255	0	0	0
60.	Saidpur Alias Jaitpur	126	103	588	311	277	88	51	37	137	63	74	0	0	0
61.	Subasheri	354	244	1326	705	621	160	103	57	391	206	185	0	0	0
62.	Khurampur	229	222	1225	656	569	200	105	95	238	128	110	0	0	0
63.	Teekla	189	189	1145	604	541	150	87	63	169	92	77	0	0	0
64.	Rughnathpur	132	83	471	241	230	50	27	23	0	0	0	0	0	0
65.	Ransi Majri	132	197	1102	578	524	126	75	51	157	89	68	0	0	0
66.	Ranoli	270	160	927	463	464	113	60	53	0	0	0	0	0	0
67.	Panwar	274	187	1084	556	528	164	92	72	142	71	71	0	0	0
68.	Pawti	472	173	964	483	481	126	62	64	171	84	87	0	0	0
69.	Bawal (City)	360	2962	16776	8828	7948	2346	1295	1051	2721	1402	1319	0	0	0
Sub Total		**20956**	**20296**	**112396**	**59398**	**52998**	**15213**	**8396**	**6817**	**23951**	**12600**	**11351**	**0**	**0**	**0**
State-Haryana, District- Rewari, Tehsil- Rewari															
70.	Punsika (56)	179	266	1312	680	632	138	75	63	165	87	78	0	0	0
71.	Rajyaka (57)	163	281	1417	746	671	149	87	62	279	141	138	0	0	0
72.	Goliaka (58)	246	208	1091	585	506	119	72	47	192	105	87	0	0	0
73.	Jaitrawas (143)	377	388	2115	1088	1027	239	130	109	632	318	314	0	0	0
74.	Bharawas (145)	1115	915	4728	2480	2248	530	297	233	1208	634	574	0	0	0
75.	Karnawas (151)	327	416	2223	1196	1027	250	134	116	227	116	111	0	0	0
Sub Total		**2407**	**2474**	**12886**	**6775**	**6111**	**1425**	**795**	**630**	**2703**	**1401**	**1302**	**0**	**0**	**0**
State-Rajasthan, District- Alwar, Tehsil- Behror															
76.	Santo	402	303	1591	841	750	186	110	76	252	131	121	15	8	7
77.	Beeghana Jat	441	167	1038	527	511	161	90	71	325	166	159	0	0	0
78.	Raisarana	585	383	2217	1163	1054	302	164	138	542	290	252	0	0	0
79..	Kuteena	933.94	699	3931	2020	1911	604	317	287	360	186	174	113	53	60
80.	Kankar	750.88	603	3319	1770	1549	454	268	186	555	293	262	325	172	153
81.	Googal Kota	835.45	582	3313	1747	1566	437	251	186	633	335	298	226	118	108

82.	Jonaycha Khurd	528	549	2910	1504	1406	305	177	128	273	146	127	103	55	48
83.	Chaubara	479.63	413	2313	1207	1106	315	168	147	555	282	273	0	0	0
Sub Total		**4955.9**	**3699**	**20632**	**10779**	**9853**	**2764**	**1545**	**1219**	**3495**	**1829**	**1666**	**782**	**406**	**376**
State-Rajasthan, District- Alwar, Tehsil- Mandawar															
84.	Bawad	390	604	3313	1745	1568	367	199	168	500	264	236	65	34	31
85.	Manka	1071.82	385	1994	1079	915	251	137	114	723	399	324	165	88	77
86.	Lamachpur	277	120	629	326	303	89	51	38	89	44	45	0	0	0
87.	Mirzapur	391	296	1615	864	751	175	106	69	290	167	123	83	43	40
88.	Beerod	367	303	1598	873	725	207	123	84	193	111	82	68	34	34
89.	Palawa	505	486	2511	1348	1163	289	163	126	316	167	149	6	2	4
90.	Gadli	262	256	1379	729	650	177	103	74	341	178	163	30	17	13
91.	Dadhiya	302	302	1475	739	736	128	74	54	228	124	104	125	51	74
Sub- Total		**3565.82**	**2752**	**14514**	**7703**	**6811**	**1683**	**956**	**727**	**2680**	**1454**	**1220**	**542**	**269**	**273**
Total		**31884.72**	**29221**	**160428**	**84655**	**75773**	**21085**	**11692**	**9393**	**32829**	**17284**	**15545**	**1324**	**675**	**649**

Source: *Primary Census Abstract 2011, Rewari & Alwar District, State Haryana & Rajasthan*

TABLE 4.20: SUMMARY OF DEMOGRAPHIC STRUCTURE IN STUDY AREA

Demographic Parameters	Details
No. of States	2
No. of District	2
No. of Tehsil	4
No. of Villages	91
Total Area of surveyed village (ha)	31,884.72
Total No. of Households	29,221
Total Population	1,60,428
Density of Population (per km^2)	503
Sex Ratio (No. of female\ 1000 males)	895
Child Population	21,085 (13.14%)
Scheduled Castes	32,829 (20.46%)
Scheduled Tribes	1,324 (0.83%)
Literacy	1,09,175 (68.05%)
Male	65,622 (40.90%)
Female	43,553 (27.15%)

Source: *Primary Census Abstract & DCHB 2011, Rewari & Alwar District, State Haryana & Rajasthan*

4.4.7.6 Salient Features of Demographic Structure

Sex ratio (number of females per thousand of males) in the region is recorded as 895 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, Bawal 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, Dhani Suthani village is likely to have very low population density. The reason for this could be lack of facilities like education, health, sanitation and banking.

4.4.7.7 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.**

TABLE 4.21: INFRASTRUCTURE RESOURCE BASE OF THE STUDY AREA

S. No.	Villages	Education	Medical	Water	Sanitation	Communication	Transportation	Road	Bank	Power	SHG
1.	Patuhera	PPPS,GPS,GMS	NA	TWT,TWU,UW,HP, TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
2.	Asalwas	GPS,GMS,GSS	NA	TWT,UW,HP,TW/B	CD,OPDU,OKD	TP,PCO	GBS,PBS,TRC,NH,SH	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
3.	Banipur	GPS,GMS,GSS,GSSS	D,VH	TWT,UW,HP,TW/B	OD,OPDU	SPO,TP	GBS,PBS,TRC,NH,SH	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
4.	Suthana	GPS,GMS,GSS,GSSS	D	TWT,UW,HP,TW/B	OD,OPDU	SPO,TP, PCO	GBS,PBS,TRC,NH	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
5.	Jalalpur	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
6.	Dhani Suthani	NA	NA	TWT,UW,HP,TW/B	OD,OPDU	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
7.	Nechana	GPS,GMS,GSS,GSSS	PHSC	TWT,UW,HP,TW/B	OD,OPDU	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
8.	Sulkha	PPPS,GPS,GMS,PMS,GSS,PSS,GSSS,PSSS	VH,PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	SPO,TP, PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	CB,ACS	PSDU,PSAU, PSCU,PSAU	SHG
9.	Pragpura	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC,CPR	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
10.	Badhrana	PPPS,GPS,GMS,GSS,GSSS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	PO,TP	GBS,PBS,T,V,CPR,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
11.	Berwal	PPPS,GPS,GMS,GSS,GSSS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,T,V,CPR,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
12.	Kanuka	PPPS,GPS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,T,V,CPRTRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
13.	Gobindpur	PPPS,GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,T,V,CPR,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
14.	Dharan	GPS,GMS.GSS	D,VH	TWT,UW,HP,TW/B	OD,OPDU,OKD	PO,SPO, TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
15.	Aram Nagar	PPPS,GPS,PPS,GMS,PMS,PSS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,T,V,CPR,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
16.	Balawas	PPPS,GPS,GMS,GSS,GSSS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC,A/MA,T,V,CPR,SH	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
17.	Mohamadpur	GPS,GMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	A/MA,TRC,GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
18.	Kalrawas	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC,CPR	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
19.	Chirhara	GPS,GMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG

20.	Jaliawas	GPS, GMS, GSS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC,NH,SH	BTPR,GKR,WBM,F	CB,COB,ACS	PSDU,PSAU,PSCU,PSAU	SHG
21.	Ibrahimpur	NA	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC,CPR	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
22.	Mangaleshwar	NA	D,VH	TWT,UW,HP,TW/B	OD,OPDU,OKD	SPO,TP,PCO	GBS,PBS,T,V,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
23.	Gujar Majri	GPS,PPS,GMS,PMS,GSS,PSS,GSSS,PSSS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
24.	Bishanpura	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
25.	Khera Murar	GPS,PPS,GMS,PMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
26.	Bawal (Rural)	GPS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
27.	Rudh	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
28.	Harchandpur	GPS,GMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
29.	Saban	GPS,GMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC,NH	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
30.	Asrakamajra	PPPS,GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
31.	Sanjarpur	GPS,GMS,GSS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
32.	Behrampur Bharangi	GPS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
33.	Narsinghpur Garhi	PPPS,GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
34.	Rajgarh	GPS,GMS,GSS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	SPO,TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
35.	Tankri	PPPS(2),GPS,PPS(2),GMS,PMS(2),GSS,GSSS	PHC,PHSC,VH	TWT,UW,HP,TW/B	OD,OPDU,OKD	SPO,TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	CB	PSDU,PSAU,PSCU,PSAU	SHG
36.	Mohanpur	GPS,GMS,GSS,GSSS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	SPO,TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
37.	Jai Singhpur Khera	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	PO,SPO,TP,PCO	GBS,PBS,TRC,SH	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
38.	Keshopur	GPS	PHSC,M&CWC	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
39.	Anandpur	GPS,GMS	PHSC,VH	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
40.	Chanduwas	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC,SH,NH	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG

41.	Odhi	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC,NH,SH	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
42.	Ramsinghpur	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
43.	Rasiawas	GPS,GMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
44.	Kheri Dalusingh	GPS,PPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP.PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
45.	Kheri Dharchana	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
46.	Shahpur	GPS,GMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC,A/MA	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
47.	Tihara	GPS,GMS,GSS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC,T,V,CPR	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
48.	Dulhera Khurd	GPS,GMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC,T	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
49.	Nangli Parsapur	GPS,GMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC,A/MA,T,V,CPR,SH	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
50.	Nangal Shahbazpur	GPS,GMS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	PO,TP,PCO	GBS,PBS,TRC,SH	BTPR,GKR,WBM,F	COB	PSDU,PSAU,PSCU,PSAU	SHG
51.	Raipur	GPS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
52.	Bidawas	GPS,GMS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC,CPR	BTPR,GKR,WBM,F	ACS	PSDU,PSAU,PSCU,PSAU	SHG
53.	Birjhabuwa	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
54.	Jhabuwa	PPPS,GPS,GMS,GSS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	PO,SPO,TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
55.	Dulhera Kalan	GPS,PPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
56.	Dhar Chana	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
57.	Shekhpur	GPS,GMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
58.	Nangal Ugra	GPS,GMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
59.	Nangal Teju	GPS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	PO,TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	COB	PSDU,PSAU,PSCU,PSAU	SHG
60	Saldpur Alias Jaitpur	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG
61.	Subasheri	GPS,GMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG

62.	Khurampur	NA	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
63.	Teekla	NA	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
64.	Rughnathpur	PPPS,PPS,PMS,PSS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
65.	Ransi Majri	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC,RS	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
66.	Ranoli	GPS,GMS	VH	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,A/MA,TRC,SH	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
67.	Panwar	PPPS,GPS,PPS,GMS,PMS,PSS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
68.	Pawti	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,-PCO	GBS,PBS,TRC,SH	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
69.	Bawal (City)	GPS,PPS(3),GMS,PMS(3),GSS,PSS(3),GSSS,DC	AH,D(2), M&CWC, VH	OHT,TW/B	CD,OD	DNA	GBS,PBS,T, A/MA	BTPR,GKR,WBM,F	NB(4), CB,COB(2), ACS	PSDU,PSIU,PSCU,PSAU	DNA
70.	Punsika	GPS,GMS,GSS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	SPO,TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU PSCU,PSAU	SHG
71.	Rajyaka	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
72.	Goliaka	GPS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
73.	Jaitrawas	PPPS,GPS,PPS,GMS,PMS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC,SH	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
74.	Bharawas	PPPS,GPS,PPS,GMS,PMS,GSS,PSS	PHC,PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	PO,TP,PCO	GBS,PBS,A/MA,RS,TRC,SH	BTPR,GKR,WBM,F	NA	PSDU,PSAU, PSCU,PSAU	SHG
75.	Karnawas	PPPS,GPS,PPS,GMS,PMS,GSS,PSS,GSSS	PHSC,VH	TWT,UW,HP,TW/B	OD,OPDU,OKD	SPO,TP, PCO	GBS,PBS,TRC,CPR,SH	BTPR,GKR,WBM,F	CB,ACS	PSDU,PSAU, PSCU,PSAU	SHG
76.	Santo	PSSS,GPS,GMS,PMS,GSS,PSS,GSSS,PSSS	PHSC,M &CWC	TWT,UW,HP,TW/B	CD,OD,OPDU, OKD	SPO,TP, PCO	T,V,TRC	BTPR,GKR,WBM,F	ACS	PSDU,PSAU	NA
77.	Beeghana Jat	GPS,GMS	PHSC	TWT,UW,HP,TW/B	OD,OPDU,OKD	TP,PCO	PBS,T,V,TRC	GKR,WBM,F	NA	PSDU,PSAU	NA
78.	Raisarana	PSSS,GPS,GMS,PMS,GSS,GSSS	PHSC,M &CWC	TWT,UW,HP,TW/B	OD,OPDU,OKD	SPO,TP, PCO	PBS,A/MA,T,VTRC	BTPR,GKR,WBM,F	COB, ACS	PSDU,PSAU	NA
79.	Kuteena	PSSS,GPS(3),PPS(2),GMS(2),PMS(2),GSS,GSSS	PHC,PHSC,M&CWC,VH	TWT,UW,HP,TW/B	CD,OD,OPDU, OKD	PO,SPO, TP,PCO	GBS,PBS,A/MA,T ,V,TRC	BTPR,GKR,WBM,F	CB,COB,ACS	PSDU,PSAU, PSCU,PSAU	SHG
80.	Kankar	PSSS,GPS(3),PPS(1),GMS(1),PMS(1),GSS,GSSS	PHC,PHSC,M&CWC	TWT,UW,HP,TW/B	CD,OD,OPDU, OKD	PO,SPO, TP,PCO	GBS,PBS,A/MAT, V,TRC	BTPR,GKR,WBM,F	CB,COB	PSDU,PSAU, PSCU,PSAU	SHG
81.	Googal Kota	PSSS,GPS(2),PPS(2),GMS(2),PMS(2),GSS,GSSS	M&CWC	TWT,UW,HP,TW/B	CD,OD,OPDU, OKD	SPO,TP, PCO	GBS,PBS,TRC,A/MA,T,V,NH,SH	BTPR,GKR,WBM,F	CB,COB	PSDU,PSAU, PSCU,PSAU	SHG

82.	Jonaycha Khurd	PHSC,M&CWC,D	TWT,UW,HP,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	CB,COB,ACS	PSDU,PSAU,PSCU,PSAU	NA	NA
83.	Chaubara	PSSS,GPS,GNAS,NNAS,GSS,GSSS	NA	TWT,UW,HP,TW/B	OD,OPDU,OKD	SPO,TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	NA
84.	Bawad	GPS,GMS,GSSS	M&CWC,D	TWT,UW,HP,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	CB,COB	PSDU,PSAU	SHG
85.	Manka	PPPS,GPS,PPS,GMS,PMS,PSS,GSS,GSSS,PSSS	PHSC	TWT,UW,HP,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU	NA
86.	Lamachpur	GPS	NA	TWT,UW,HP,TW/B	CD,OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC,SH	GKR,WBM,F	NA	PSDU,PSAU	NA
87.	Mirzapur	GPS,GMS	NA	TWT,UW,HP,TW/B,T/P/L	CD,OD,OPDU,OKD	SPO,TP,PCO	GBS,PBS,TRC,SH	GKR,WBM,F	NA	PSDU,PSAU	NA
88.	Beerod	GPS,GMS	NA	TWT,UW,HP,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO	GBS,PBS,TRC,SH	BTPR,GKR,WBM,F	NA	PSDU,PSAU	NA
89.	Palawa	PSSS(3),GPS(2),PPS(3),GMS(2),PMS(3),GSS(2),PSS(3),PSSS(3)	PHSC,M&CWC	TWT,UW,HP,TW/B	CD,OD,OPDU,OKD	SPO,TP,PCO	GBS,PBS,TRC,SH	GKR,WBM,F	ACS	PSDU,PSAU	NA
90.	Gadli	PPPS,GPS,PPS,GMS	NA	TWT,UW,HP,TW/B	CD,OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC,SH	GKR,WBM	NA	PSDU,PSAU,PSCU,PSAU	NA
91.	Dadhiya	GPS,GMS,GSS(2),PSS,GSSS,PSSS	NA	TWT,UW,HP,TW/B	CD,OD,OPDU,OKD	TP,PCO	GBS,PBS,TRC	BTPR,GKR,WBM,F	NA	PSDU,PSAU,PSCU,PSAU	SHG

Source: *District Census Handbook 2011, Rewari & Alwar District, State Haryana & Rajasthan*

Abbreviations:

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

4.4.7.8 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 8 villages of the study area. 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 and 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 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 62 villages within the Study Area; Socio-Economic Survey was conducted in 7 representative villages which were approximately over 10% of the villages in the Study Area.

4.4.7.9 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 Rewari at a distance of 16.50 km respectively from the project site.

b) **Medical Facilities**: In the study area list of villages with thirty-six (36) government health services available and fifty-five (55) villages lacking medical facilities **Table 4.21** is given in. Hospitals and other better medical facilities were also available.

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 private bus 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 Rewari city as a purpose of employment and some to other states.

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 rural 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. Rewari 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.

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.

4.4.7.10 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.
- ❖ 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 4.22**

TABLE 4.22: SUMMARY OF ECONOMIC ATTRIBUTES IN STUDY AREA

Demographic Parameters	Details
Total Worker	64,622 (40.28%)
Marginal Worker	19,456 (12.13%)
Non-Worker	95,806 (59.72%)
Main Worker	45,166 (28.15%)
Cultivators	18,237 (41.00%)
Agriculture	2,977 (7.00%)
Household	1,242 (1.00%)
Others	22,710 (51.00%)

Source: *Primary Census Abstract & DCHB 2011, Rewari & Alwar District, State Haryana & Rajasthan*

Health Status

Diarrhea / Cholera, Malaria, Could, 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.

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^{th} factor assigned by j^{th} respondent

$\sum Qlij$ = Subjective quality index for i^{th} factor assigned by all respondents in an area

Wi = Relative weightage of the i^{th} factor

Objective Quality of Life Index

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

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^{th} objective indicator

Wi = Normalized weight for i^{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 4.23.**

TABLE 4.23: VILLAGE-WISE QUALITY OF LIFE INDEX IN THE STUDY AREA

S. No.	Name of Villages	Quality of Life		
		Subjective	Objective	Cumulative
1.	Ramsinghpura	0.49	0.51	0.50
2.	Sanjarpur	0.50	0.52	0.51
3.	Odhi	0.51	0.53	0.52
4.	Chanduwas	0.49	0.51	0.50
5.	Rasiawas	0.52	0.54	0.53
6.	Kheri Dalusingh	0.50	0.52	0.51
7.	Harchandpur	0.51	0.53	0.52
8.	Saban	0.51	0.53	0.52
Average		**0.50**	**0.52**	**0.51**

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

QoL (S) = 0.50

QoL (O) = 0.52

QoL (C) = 0.51

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. Health, 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.

4.4.7.11 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 Rewari 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 Rewari 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 4.24.**

TABLE 4.24: CER ACTION PLAN

Cost of Proposed Project: 4, 02, 00,000. Cost of the (at least 2 % of the project cost): 8, 04,000

Year of Implementation	Amount in Lakhs	Activity	Particulars	Amount (Approx.)
2021-2022	8,04,000	Organizing Health Check-up camp for the Workers of sanitary landfill project.	Normal Health Checkup	1,20,000/
			CBC Tests	80,000/
		Greenbelt development. Development of greenbelt around the open space near the project site as well as in some schools.	Plantation (685 No)	2,40,000
			Soil	30,000
			Transporting Charges	8,000
		Providing Scholarship to Primary school student located at Rewari village	Providing Scholarship (50 No. of Student)	70,000
		Providing basic amenities to	Semi Fowler Hospital Beds (12 no.)	96,000/-

Year of Implementation	Amount in Lakhs	Activity	Particulars	Amount (Approx.)
		PHC located at Tankri village	Transporting Charges	10,000/-
		Providing Employment enhancing vocational skills conducting training programs to poor and unemployed youth, women and worker by Rewari Municipal Council Rewari. Conducting sanitation awareness programs for people in the study area and workers working in the project.	Sewing Machine	1,10,000
			sanitation awareness programs	40,000

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

CHAPTER 5

ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

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 endeavour 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, top soil 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, 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.

site gets collected to working pit and if any over flow 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.

5.2.3 Impact of Noise levels

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

- Foundation works
- Fabrication of structures
- Plant erection
- Operation of construction equipment
- Movement of vehicles etc.

Mitigation Measures – Noise

All noise generating equipment will be used during day time for brief period of its requirement. Proper enclosures will be used for reduction in noise levels, where ever 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.

5.2.4 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, sand stone)
- 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. The most of the solid waste material can be used for filing/ 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 sothat the waste does not get scattered.
- Attempts will be made to keep the waste segregated into different heaps as far as possible sothat 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.
- 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 [illegible] 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 collected properly collected,stored and disposed.
- ❖ The entire plant site area is well drained and thus there is no leaching of any substances in caseof 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.

5.3.2 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. Also, 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.

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 western direction of the area.

MITIGATION MEASURES

- The pond present in west is against the hydraulic gradient as the area is having gradient from west to east. No surface water will flow to west direction from project site. Hence, there will not be impact on pond present in western 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 be monitored for contaminations if any.

IMPACT ON HYDROGEOLOGY

The water requirement of the project will be 40 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.

5.3.3 Impact on air environment and mitigation measures

Air Quality Impact Assessment due to proposed Landfill Activities in Rewari

The creation of solid waste management facility and its dumping at existing dumping site is directly and indirectly impact the air quality at local level. If SW not collects properly, then it will be burned at different location on the street and responsible for generation of air pollution. The collection and proper disposal of SW at site shift the air pollution from city to a particular location which many times outside the city. The dumping of SW at landfill 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 landfill 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 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. The site is located in hilly regions and, therefore, 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 100 m^2.

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 (March – May 2022) are shown in Fig 1. It is found that wind is dominantly blowing from Northwest side during the study period with a wind speed of 0.5-1.0m/s (65.5%), 1-2 m/s (28%) and 2-4 m/s (4.8%). The calm wind condition was found 1.4%. Further, meteorological data are summarized in in Table 5.1.

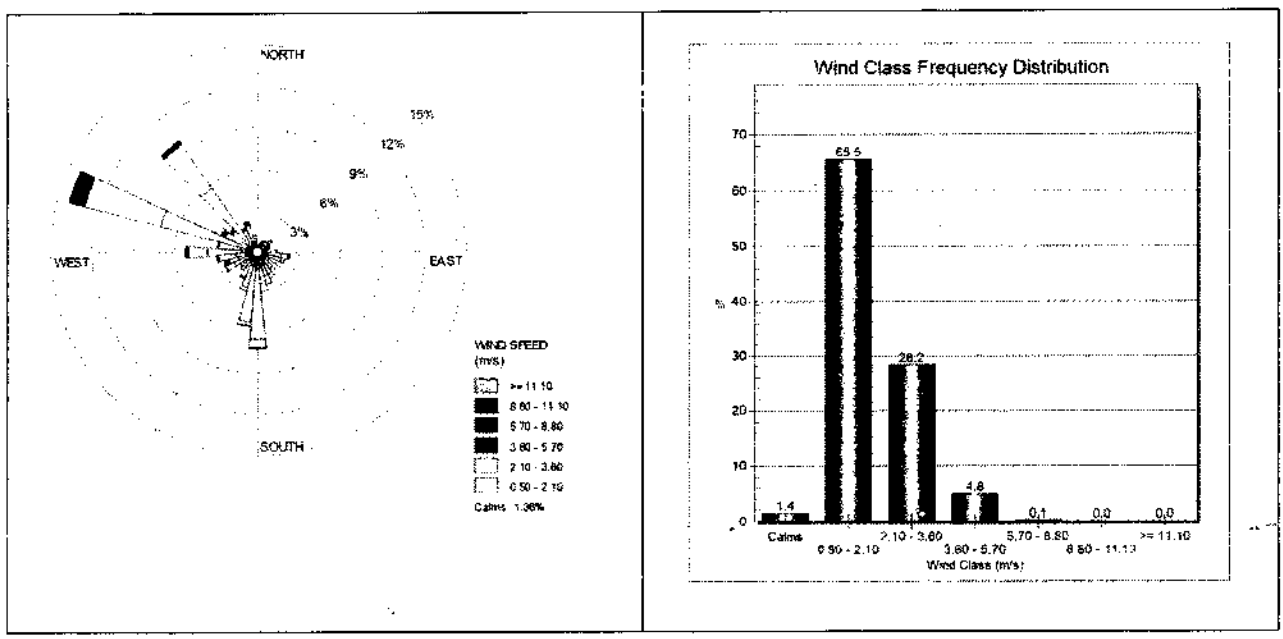


FIGURE.5.1. WIND ROSE DIAGRAM AND WIND CLASS FREQUENCY DISTRIBUTION PLOT OF THE STUDY PERIOD

Table 5.1: Summary of Meteorological Parameter during March-May 2022

Parameters	Relative Humidity (%)	Wind Speed (m/s)	Ambient temperature (degree C)
Minimum	10	0.17	12.05
Maximum	85	6.07	45.05
Average	32	1.84	30.72

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 (6 No.), Hywa (4 No.) JCB Crain (3 Nos.), Warior (1 No), Poclain (2 Nos.) and one DG set for emergency purpose. All vehicles are diesel operated and consume ~2500 KL of diesel in a particular year. The details of emission load and emission rates are given below:

S. No.	Vehicle Name/Number	Number of vehicles	Qty of diesel per year	Emission norms (g/kwh)				Engine Power (KW)	For Emission load (g/day)			
				PM*	NOx	SO2	CO		PM	NOx	SO2*	CO
1	Tractor	6	150000	0.4	4.7	-	5	37-75	58	677	5	720
2	HYWA	3	500000	0.4	4.7	-	5	37-75	38	451	18	480
3	JCB	2	500000	0.3	4.0	-	5	75-130	22	288	18	360
4	Poclain	2	750000	0.3	4.0	-	5	75-130	14	192	27	240
5	Warrior	1	400000	0.3	4.0	-	5	75-130	7	96	14	120
6	DG Set	1	200000	0.3	4.0	-	5	65	7	96	7	120
Total (g/day)									146	1800	90	2040

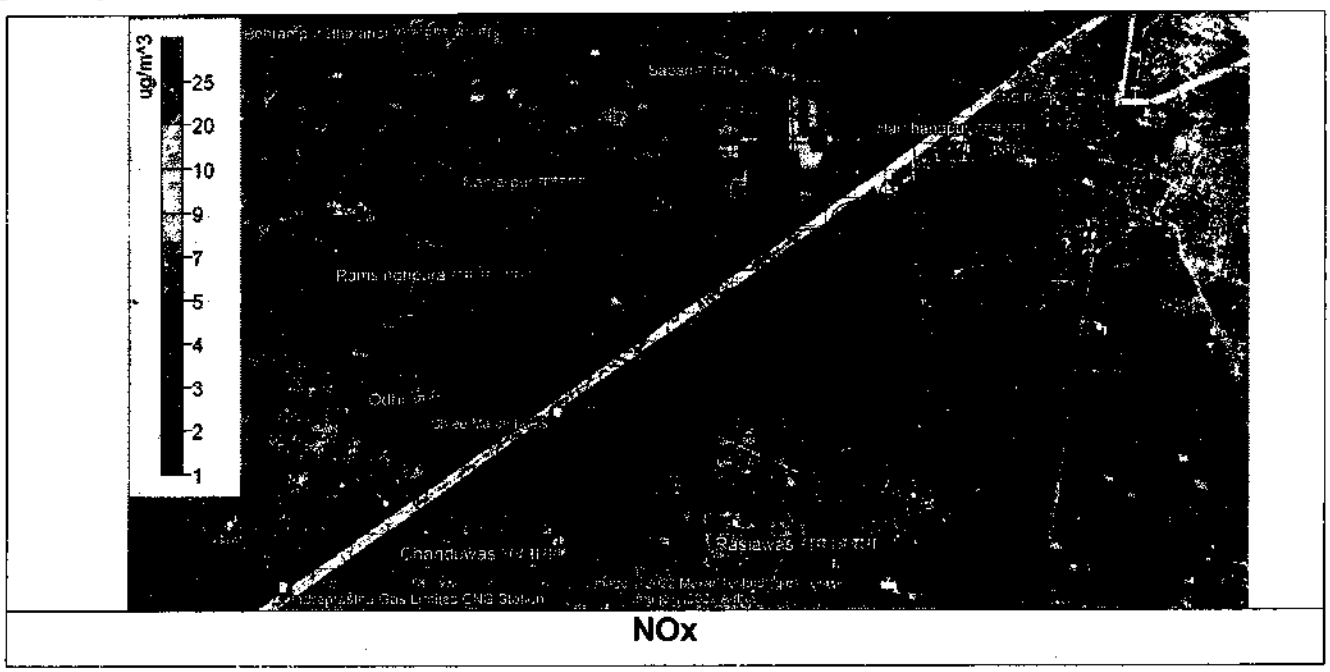
*SO_2 emission load calculated based on sulphur content, which is considered at 10ppm, Emission norms for nonroad vehicles/diesel operated machines, notified in year 2006.

#The PM_{10} and $PM_{2.5}$ emission factors are not available. Therefore, the above PM emission factor is considered at PM_{10} and its 70% is considered as $PM_{2.5}$ considering the control combustion in vehicles engine.

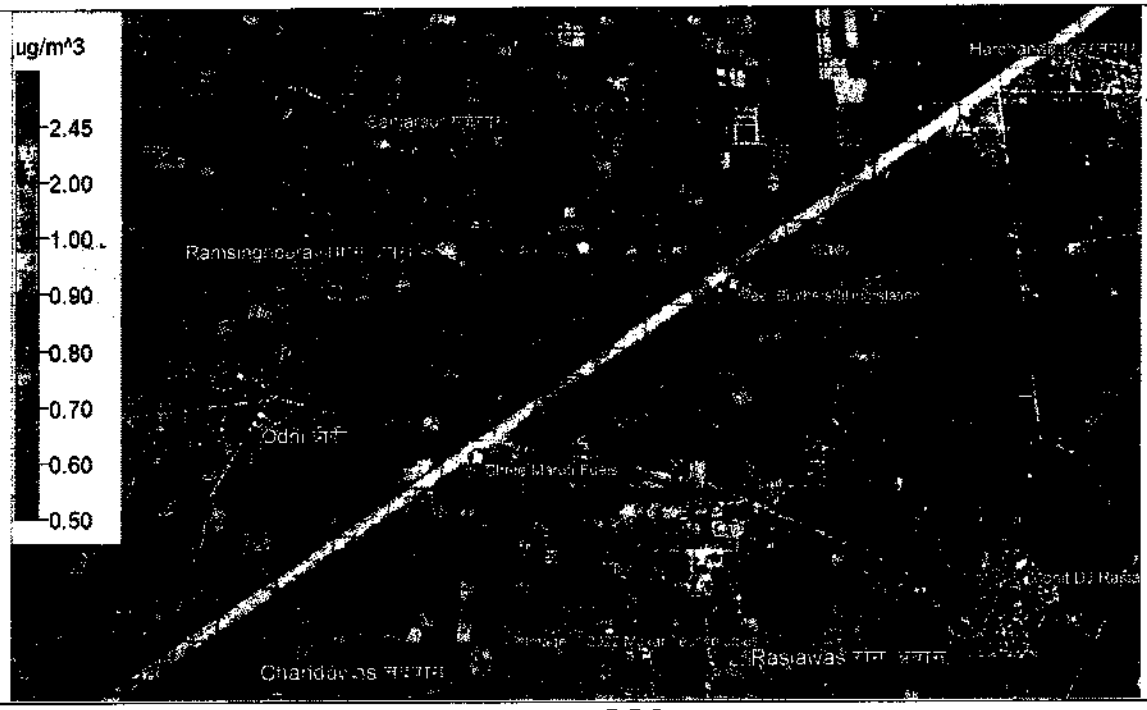
norms for nonroad vehicles/diesel operated machines, notified in year 2006

Predicted Concentration due to Emission from MSW site

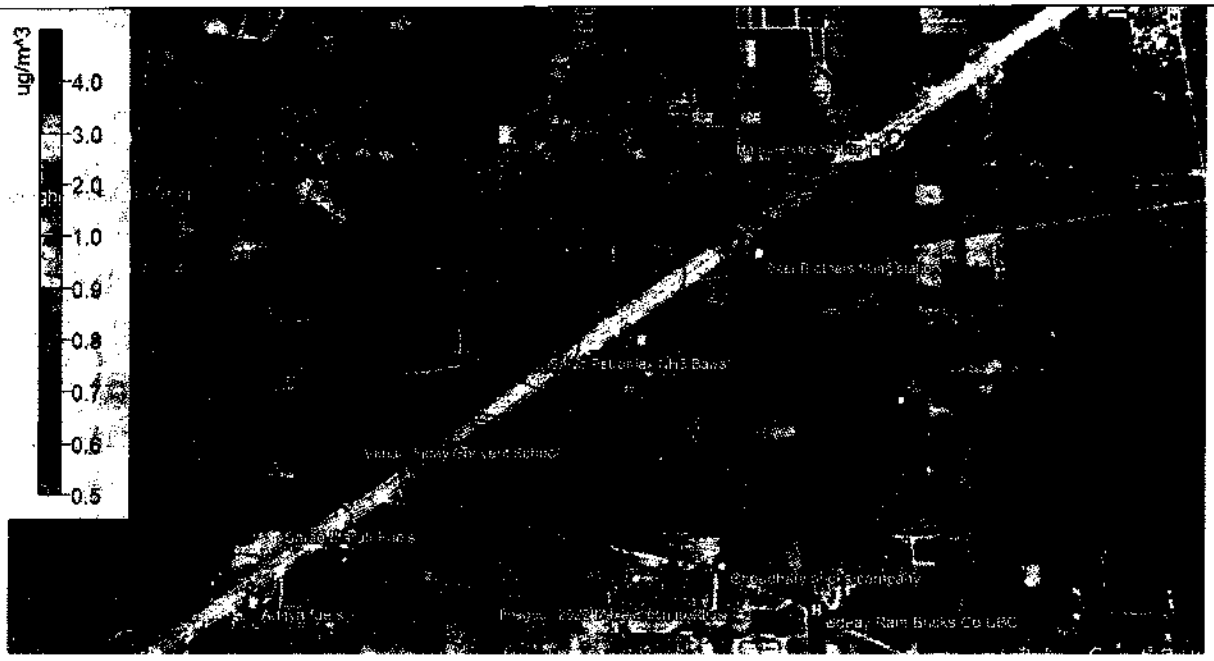
The AERMOD prediction results for NOx, SO2, PM10, PM2.5 and CO with Max. Ground level concentration will be 25 µg/m³, 2.5µg/m³, 4.1 µg/m³, 2.8 µg/m³ and 48 µg/m³, respectively at premises of the landfill site. The spatial distribution of concentration of selected pollutant emitted from landfill site is shown in Fig 5.2, which indicates that maximum concentration limited to 200 m around the site. The contribution from the landfill site is negligible outside the premises except NOx which is also not more than 5 µg/m³ up to 1 km radius and will be negligible beyond 1 km. There will be negligible addition to the baseline level outside the site boundary.



NOx

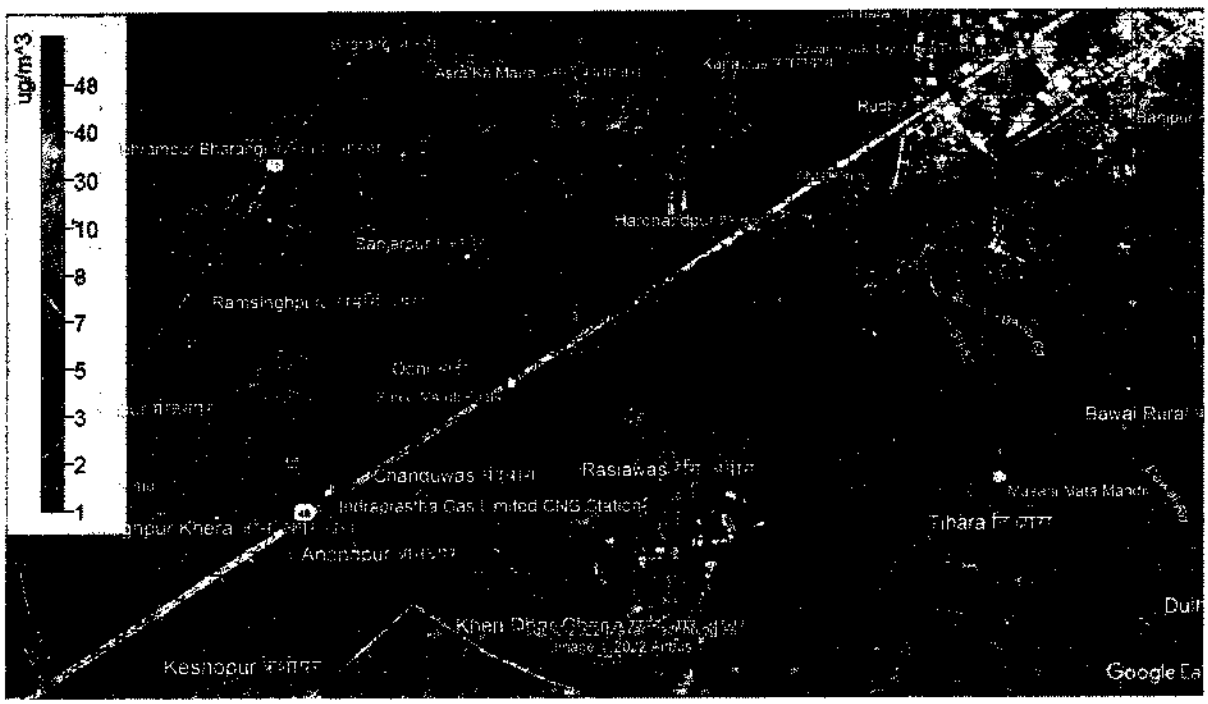

ug/m^3
2.45
2.00
1.00
0.90
0.80
0.70
0.60
0.50
Ramsinghpura
Chandarkas

SO2


ug/m^3
4.0
3.0
2.0
1.0
0.9
0.8
0.7
0.6
0.5

PM_{10}

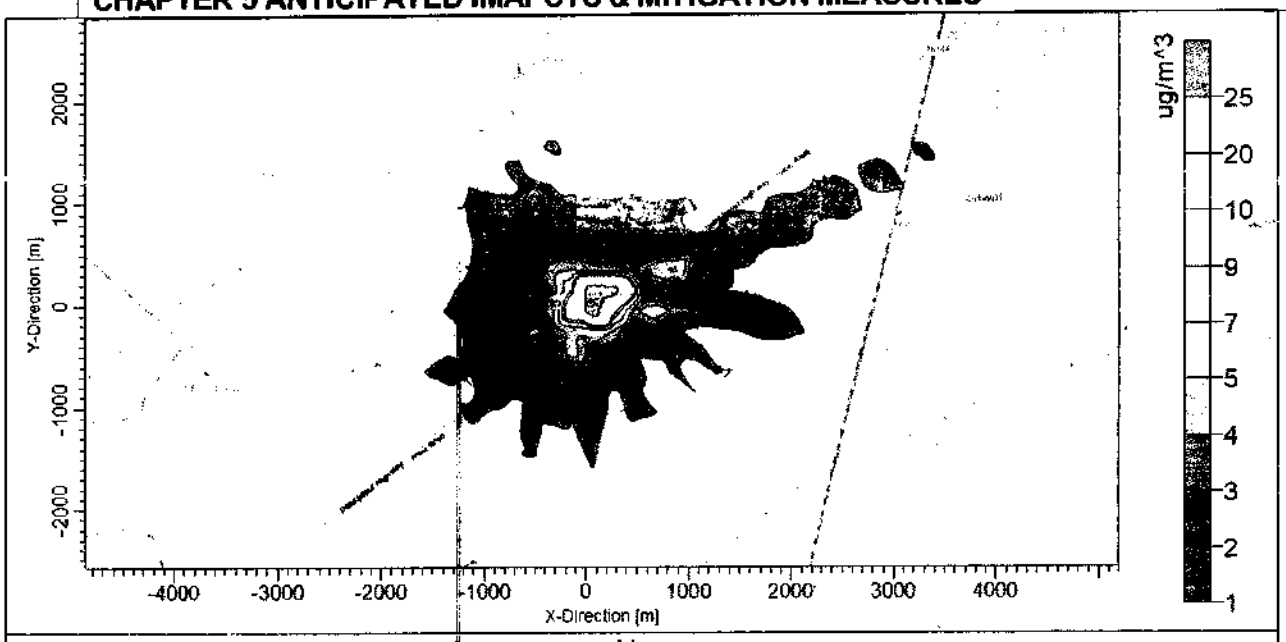
$PM_{2.5}$



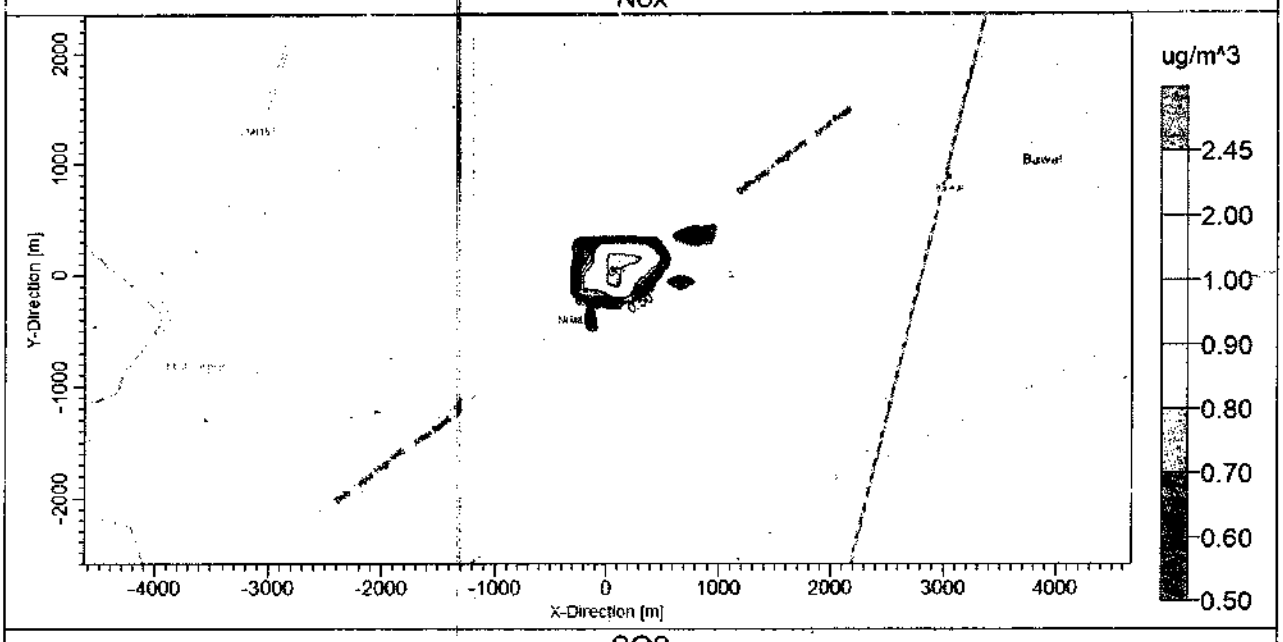
CO

FIGURE.5.2

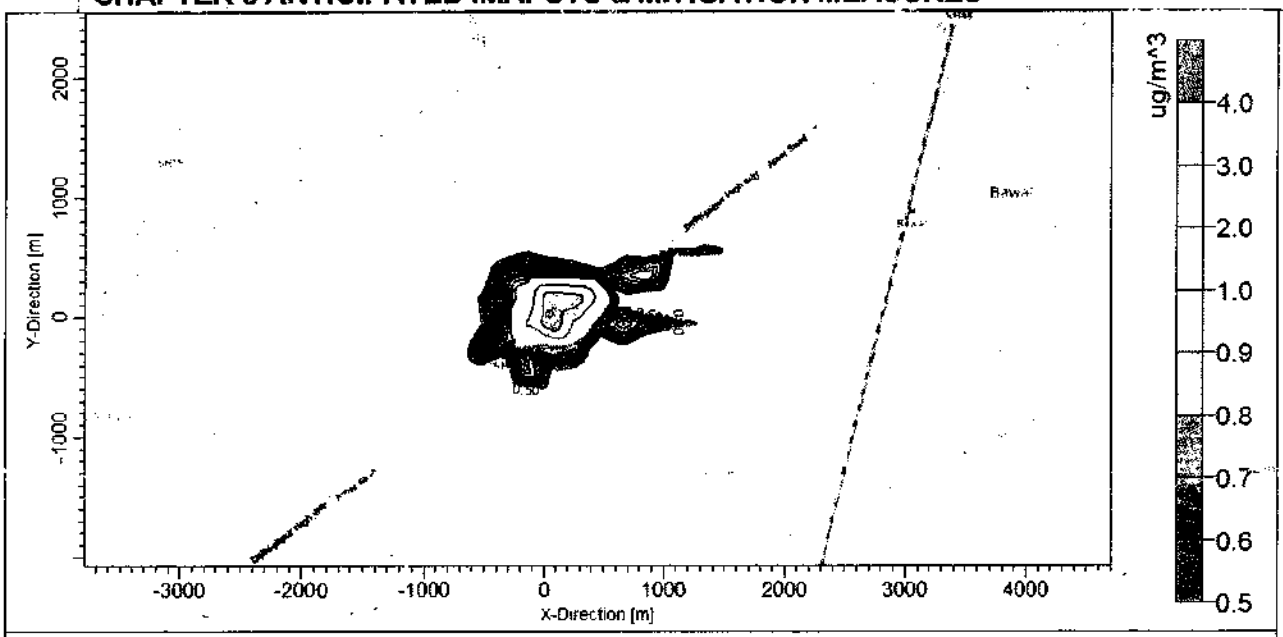
POLLUTANT ISOPLETH OF THE PREDICTED CONCENTRATION FROM LANDFILL EMISSION


Y-Direction [m]
X-Direction [m]
ug/m^3
25
20
10
9
7
5
4
3
2
1

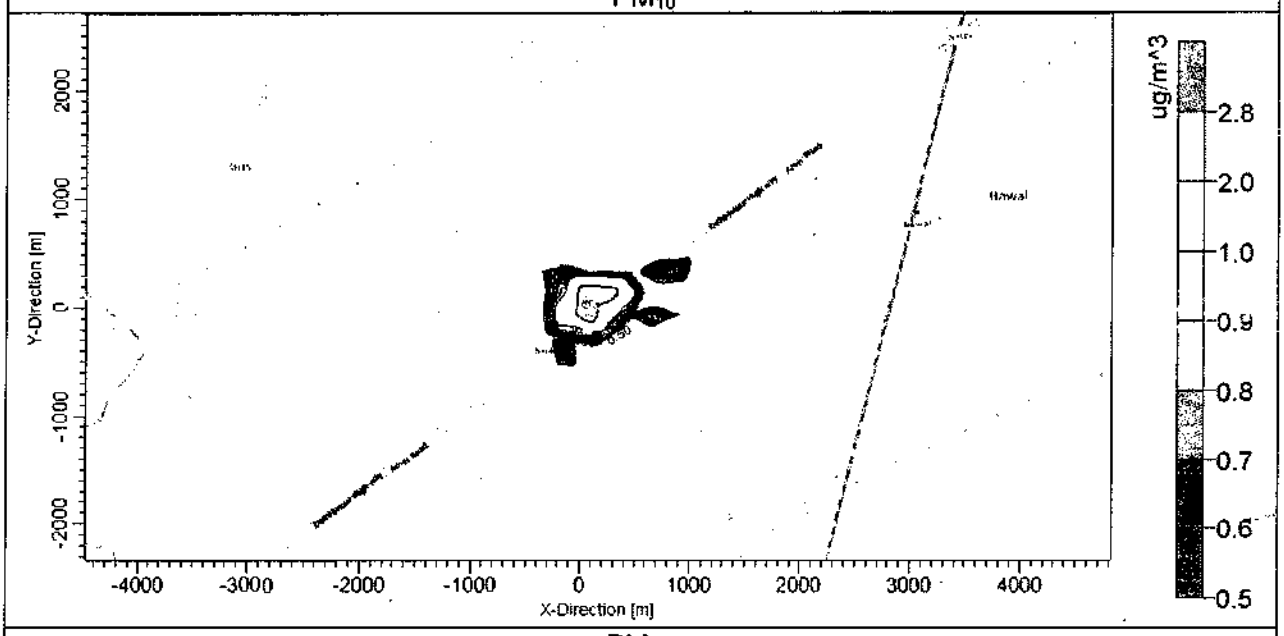
Nox


Y-Direction [m]
X-Direction [m]
ug/m^3
2.45
2.00
1.00
0.90
0.80
0.70
0.60
0.50

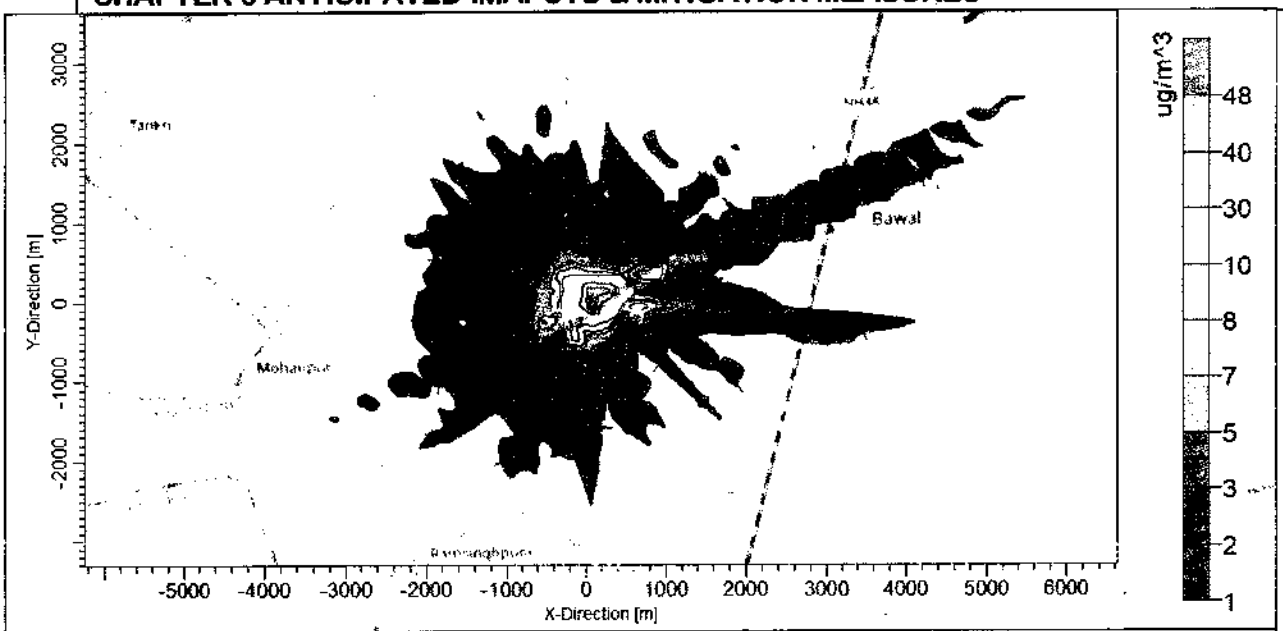
SO2


Y-Direction [m]
X-Direction [m]
ug/m^3
4.0
3.0
2.0
1.0
0.9
0.8
0.7
0.6
0.5
Bawal

PM_{10}


Y-Direction [m]
X-Direction [m]
ug/m^3
2.8
2.0
1.0
0.9
0.8
0.7
0.6
0.5
Bawal

$PM_{2.5}$



CO

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.

5.3.4 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. The mitigation measures will include job rotation and provision of earmuffs in high noise areas.
- Plantation will be done in around the project site.

5.3.5 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 track roads forconstruction
- 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;

5.3.6 Impact on socio economic environment & mitigation measure

Critical analysis of socio-economic profile of the area vis-à-vis its scenario with expansion 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 be benefited 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

Negative impact in construction phase

- **Increased transportation**

For construction activity, loading unloading of material will increase 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 nuisances 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 be performed

- **Generation of waste will be decreased**

Negative impact in operation phase

- **Impact on transportation**

In operation phase, loading unloading of material will increase 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

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

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

- **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 villages.

CHAPTER 6

ANALYSIS OF ALTERNATIVES

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 meters away from river, 200 meters from a pond, 200 meters 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.
- 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 SLF site
1	**Distance from nearest River**	**100 meters**	Sahibi River – 25.42 Km in North direction
2	**Distance from Nearest Pond**	**200 meters**	Pond Near Village odhi 0.9 Km in W direction
3	**Distance from nearest Highway (NH-2)**	**200 meters**	SH-15 3.5 km (W) Rajasthan/Haryana State Boundary – 2km (SSW)
4	**Distance from nearest habitation**	**200 meters**	Near Village odhi -1km (W) direction
5	**Distance from nearest Public Parks**	**200 meters**	Mahatma Gandhi Memorial Herbal Park – 9.61 Km in NNW direction
6	**Distance from nearest Water supply wells**	**200 meters**	-
7	**Distance from nearest Airports/Airbase**	**20 km**	IGI Airport -75.5 km (NE)

Alternate technology: -

About 0.6 lakh ton of MSW has already been deposited at the Ramsinghpura (Bawal) Dumpsite. At present, the Ramsinghpura (Bawal) Dumpsite receives an estimated 81 tons of Municipal Solid Waste ("MSW") per day. The waste generation from the 3 ULBs is approx. 81 TPD which includes residential, commercial, religious, food market and street sweeping waste. The reasonable endeavours shall be made to maximize the utilization of the Waste from the Ramsinghpura Bawal Dumpsite and for this purpose shall ensure that at least 80% of the Waste is utilized / reused so as to produce products/outputs such as soil enricher/compost, recyclables, RDF and products from construction and demolition waste and rest 20 % waste shall be treated in sanitary landfill site.

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 minimized 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.
- The good quality earth in C&D can also be used for preparation of embankments of Sanitary landfill.
- C & D material can be utilized 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 utilized especially during rainy season for internal road works in SLF

CHAPTER 7

ENVIRONMENTAL MONITORING PROGRAMME

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 lack between commencements 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.

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 andregulations.
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 aroundthe 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

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.

7.2.5 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

7.2.6 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.**

TABLE -7.1 ENVIRONMENTAL MEASURES DURING CONSTRUCTION

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 specifieddesign 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 (SOx, HC, CO, NOx)	Periodic emission monitoring
		Ambient air quality within the premises & adjacent villages of the Proposed unit to be monitored.	PM10, PM2.5, SOx, NOx, 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 (earmuffs, 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

S. No	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
		Noise to be monitored in ambient air within the plant premises.	Instant Noise recording	As per CPCB/SPCB 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/	Periodic during Construction
			manuals	activities
		Vehicle trips to be minimized to the extent possible.	Vehicle logs	
3)	Soil Erosion	Protect topsoil stockpile.	Site boundaries not extended /Breached as per plan document Effective cover in Place.	Periodic during Construction activities
4)	Waste waterDischarge	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 EffluentManagement	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

S. No	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
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 ofeach waste arising.	Comprehensive Waste Management Plan should be in place and available for Inspection onsite. 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

7.2.7 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.

TABLE 7.2 ENVIRONMENTAL MEASURES DURING OPERATION PHASE

S.No.	Potential Impact	Detailed Action to be Followed as	Parameters for Monitoring	Frequency of Monitoring
1)	Air Emissions	Gas quality from landfill areas	2S	
		Stack emissions from DG sets	As per CTO conditions PM, SOx, NOx	
		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 /CPCB norms.
5)	Ground Water Quality	Monitoring ground water quality, through piezometers	As per CPCB guidelines	Periodically & as Per CPCB norms.
6)	Flora and Fauna	Vegetation, greenbelt / green cover development	No. of plants, species	Once a year

S.No.	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
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.

7.2 (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, H2S	As per CFE conditions given bySPCB or EC conditions given byMoEF & 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 waste water 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 andFauna	Vegetation, greenbelt /Green cover development.	No. of plants, species	Once a year

S. No	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
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.

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_2, ,NO_2	As per MSW (M&H) Rules, 2016 and Air (Prevention and Control of Pollution) Rules, 1984	24 hrs sampling for PM, and SOX & NOx	Contractor through approved monitoring agency
	Construction Phase	PM10, PM2.5, SO_2, ,NO_2		24 hrs sampling for PM, and SOX & NOx	Contractor through approved monitoring agency
	Operation Phase	PM10, PM2.5, SO_2, ,NO_2		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, Fe, 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

Environmental Management	Project Phase	Monitoring			Institutional Responsibility
		Parameters	Standards	Frequency	
	Construction Phase	pH, Total Dissolved Solids (TDS), heavy metals like As, Cd, Cr, Co, CN. Pb, Hg, Ni, Zn	As per SWM Rules, 2016 and Water quality standards by CPCB/	6 Samples in Pre monsoon and 6 samples in post monsoon during operation phase	Contractor through approved monitoring agency
		Nitrate, Fe, Chloride, Phenolic Compounds and Sulphate etc.,	IS 10500:1991		
	Operation Phase	Do	As per MSW (M & H) Rules, 2016 and Water quality standards by CPCB/IS10500:1991		
Noise	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	

Environmental Component	Project Phase	Monitoring			Institutional Responsibility
		Parameters	Standards	Frequency	
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	Contractor through approved monitoring agency
	Operation Phase	Do	As per Environment (Protection) Act, 1986 and as per SWM Rules,2016	Representative samples form in and around project site Twice a year	Contractor through approved monitoring agency
Leachate	Operation Phase	Suspended solid, Dissolved solid, pH, Ammonical Nitrogen, Total Kjeldahl 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

Environmental Components	Project Phase	Monitoring			Institutional Responsibility
		Parameters	Standards	Frequency	
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 Habitants, 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

7.3 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.

7.4 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
Total		**19.0**	**3.5**

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
Total		**2.45**

ADDITIONAL STUDIES

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,
- ❖ 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 are 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 itmay spread outside the premises, it is called as off-site disaster.

On-site Disaster Management Plan-

(A) 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.
- Communication.
- Medical care.
- Mutual aid..
- Public relation.
- Protection of vital records.
- Training.
- Periodical revision of plan

Action Plan for on-site Disaster Management Plan: -

8.1.3 Control Centre

This is the main center from where the operations to handle the emergency are directed and coordinated. Facilities to be made available in the control center 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.

TABLE 8.1 KEY PERSONS AND THEIR RESPONSIBILITIES DURING EMERGENCY

S. No.	Key Person	Responsibilities
	Site Main Controller	❖ 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.). ❖ Ensure that key persons are called in. ❖ Give guidance and direction in vital and important activities to control the emergency situation. ❖ Direct to close down and evacuation of the plants in consultation with Incident controller and key personnel. ❖ Inform the government authorities such as Collector, MC, Factory Inspector, Health Officer & Medical Officer and request them for their help as situation demands. ❖ Give prime importance to human life and guidance in

S. No.	Key Person	Responsibilities
		organizing the rescue operations as well as ensure whether injured people getting proper medical attention in time. ❖ Always be in touch with the Incident Controller to get further progress and decide further plan. ❖ On completion of emergency situation declare the normalcy through Administrative Officer. ❖ Control the re-occupation of the affected areas on discontinuation of emergency. ❖ Do not permit to re-start the plant unless it is safe. ❖ Give authentic statement of the incident to news media & government authorities.
	Incident Controller	❖ Take the charge of situation and assess the magnitude of the event. ❖ 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. ❖ Provide advice and guide to the fire fighting and rescuing squad and fire brigade while they arrive. ❖ Establish communication with emergency control centre. ❖ Report on all significant developments to the emergency control centre through phone/messenger. ❖ Ensure that evacuation of the areas in the factory getting affected is complete. ❖ 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.
	Technical Staff / Departmental Head	❖ As soon as informed, rush to the spot and take charge of the situation till senior group arrives. ❖ Ensure that emergency siren is raised which gives information to security, safety, administration staff and technical staff. ❖ On arrival of Incident Controller, inform him about the gravity of the situation and then to work under his guidance to control the situation.

S. No.	Key Person	Responsibilities
		❖ Ensure that only experienced and essential people remains at the location for controlling, ❖ while others to be evacuated from the scene
	Employees Near the Spot (Incident Area)	❖ Tackle the emergency as per laid down procedures for the area bearing in mind the requirements of the situation called for by the progress of the emergency. ❖ Remove all non-essential employees (who are not assigned any emergency duty) to evacuate the area and gather at the specified assembly points. ❖ Stop the operations as per the information of the Incident Controller.
	Employees Of Other Department	❖ 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. ❖ Approach the spot from up wind direction and assemble at safe place near to the spot taking in to consideration the wind direction. ❖ Extend help to control the situation as per the instruction and guidance given by the senior persons controlling the operation.
	Personnel Officer	❖ Basically, he will work as a Liaison Officer and will station at emergency control center during emergency. He will work under the direction of Site Controller.
		❖ To ensure that the casualties receive adequate attention at first aid centre, also ensure additional help if require from government authorities or outside agencies. ❖ Arrange transport facility for injured personnel to get timely medical help. ❖ He will also arrange for head count at assembly points and will inform Site controller. ❖ Also be in touch with the security and other departments for help. ❖ Will check the roll call from time office for availability of trained personnel during emergency situation at the site. ❖ Determine the need to inform statutory authorities of the

S. No.	Key Person	Responsibilities
		accident and fill the necessary forms for submission with consultation of the Site Controller. ❖ When emergency is prolonged, arrange for the relief of personnel as well as inform the families of injured persons and ❖ Organize refreshments / catering facility. ❖ When emergency declared immediately rushed to emergency control centre.
	Administrative Officer	❖ When emergency declared, immediately rushed to the emergency control centre and establish contact with Site Main Controller. ❖ Ensure the communication between site controller and incident controller. Keep messenger for communication. ❖ Make arrangement to send portable megaphone ❖ and torches to the Incident Controller if required. ❖ On receiving instructions from Site Controller, organize transportation for the evacuation of people from the assembly points. ❖ As per instructions from Site Controller will inform to head office, insurance surveyor, other relevant authorities and neighbouring areas. ❖ On getting instructions from site controller / incident controller, he will be in touch with other Industries for help in emergency. ❖ Will arrange to announce necessary instructions for all personnel. ❖ Ensure that telephone operator keeps the EPABX free to extend possible for incoming calls. ❖ Ensure that press and other media do not publish unauthentic news.
	Engineering ServicesKey Personnel	❖ When emergency declared, immediately proceed to Emergency Control Centre. ❖ Ensure the availability of electrical wiremen, utility, maintenance employees and drivers. ❖ Ensure the water supply & electric power generator in case of power failure.

S. No.	Key Person	Responsibilities
		❖ Be in touch with the site controller / incident controller to extend help as and when required. ❖ Arrange the vehicle as per required by ❖ administrative /personnel officer.
	Security & Fire In-Charge	❖ On getting instruction from site controller/incident controller, cordon the affected area to maintain law and order. ❖ As per instruction from site controller/ incident controller, arrange to use the fire extinguishers. ❖ 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. ❖ If any press reporter and local leader come at the main gate, take them to administration office. ❖ Do not allow any vehicle to park at the main gate or nearby at main road. ❖ Assure that the entrance of the gate is clear for thorough fare. In similar way control/ guide internal traffic for smooth operations. ❖ Act according instructions given by personnel and administrative officer. ❖ Ensure that all essential personnel evacuated and assembled at assembly points. ❖ Arrange effective security nearby the incident place
	First Aid Attendants	❖ As per the instructions given by incident controller, arrange the supply of additional emergency related equipment to the incident place. Give necessary First Aid treatment to the affected persons immediately. ❖ Inform the personnel and administration officer regarding the severity of injury and advice for further medical help if necessary. ❖ Ask for additional trained first-aider, if required. On arrival of doctor, assist him to give medical treatment to the affected people.
	Safety Officer	❖ On hearing emergency siren rush to the spot and assume the position of incident controller and take care of the

S. No.	Key Person	Responsibilities
		situation till senior personnel arrives and on their arrival work with them in team, extending their own expertise. ❖ Give instructions and guideline to the people involved in control measures. As well as help in providing required PPE. ❖ Give instructions to the safety attendants. ❖ Brief the site main controller about the progress of control measures. ❖ Advise site controller regarding type of help required fromoutside. ❖ Give instructions to other department through internal phones /Communication Officer. ❖ Make arrangement to carry out monitoring whenever necessary and appraise results to the concerned seniors.
	Driver	❖ On getting information from communication officer remain alert and wait for further instructions along with Ambulance van to meet with emergency. ❖ Extend help to shift the injured people from site of incident to first-aid and if required to hospital ❖ through ambulance / other vehicle.
	Electrical /Utility Personnel	❖ 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. ❖ Ensure that the D.G. Set is in running condition. ❖ Extend help to the Utility operator in maintaining adequate supply of water and others under guidance of supervisors

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:

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 chemicalaccidents at a site in the state.
- ❖ Continuously monitor the post-accident situation arising out of a major chemical accident in thestate 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.
- ❖ 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 areport 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 dove tailing 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. 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, 1989AS 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.

TABLE-8.2 IDENTIFICATION OF HAZARDS

S. No.	Hazard Name	Operability/ Condition/ Cause and Consequence	Control measures/ Action required
1.	**Physical hazards**		
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.	❖ Periodic mixing of composting material and maintenance of the proper water content should be done to control windrow compost Temperature and prevent fires. ❖ 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. ❖ Portable fire extinguishers and fire control equipment in proper working condition, at the operating area of the facility.
	Fire Hazard,	Possible causes of fires at composting facilities include: - ❖ spontaneous combustion due to rise in temperature ❖ Lightning strikes. ❖ Cigarettes, ❖ Build-up of particulate matter near engine manifolds and exhaust pipes of processing equipment. ❖ Explosion due to build- up of methane inside the closed landfill in lack of adequate number of gas venting apparatus.	❖ Unauthorised access to the premises to be prevented. ❖ Banning lighting cigarettes, fires onsite ❖ Regular monitoring of the quantity of gas being vented

S. No.	Hazard Name	Operability/ Condition/ Cause and Consequence	Control measures/ Action required
	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.	❖ When approaching operating equipment, the approach should be made from the front and within view of the operator, preferably making eye contact. ❖ Heavy equipment should be equipped with a backup alarm that alerts workers.
	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.
	Chemical Hazards		
	Confined spaces/ covered compost pads (CO_2, CH_4)	❖ Since a closed shed is proposed for the compost plant, it may be considered that the workers entering the facility enter a Confined space. ❖ Elevated levels of CO_2 may accumulate during composting process. ❖ It is also typical for some ammonia gas to be generated during composting. ❖ Exposure to ammonia vapors may occur,	❖ Prior to each entry into the enclosed or tented area, the 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.

S. No.	Hazard Name	Operability/ Condition/ Cause and Consequence	Control measures/ Action required
		especially during waste turning operations. ❖ Although aerobic conditions should be maintained in the compost, if anaerobic conditions are allowed to develop, methane and hydrogen sulphide may be generated.	
	Inhalation/ ingestion/ skin contact	❖ 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.	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 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.	❖ Workers should minimize contact with acidic or corrosive chemical materials by using mechanical chemical delivery methods. ❖ Where contact is required, workers should wear gloves (e.g. nitrile) and other personal protective equipment that is resistant to the Materials handled. ❖ All chemical reagents used in composting should be segregated to prevent accidental mixing of reactive

S. No.	Hazard Name	Operability/ Condition/ Cause and Consequence	Control measures/ Action required
			❖ chemicals, especially Ammonium nitrate fertilizers and fuels.
	Biological Hazards		
	Allergies from pathogen and airborne dust	During dry and windy periods microbe-entrained dusts may become airborne from soil agitation. - Exposure to mold spores, including Aspergillus fumigates and thermophilic actinomycetes, may occur during compostingoperations. - Inhalation of pathogenic microbes may cause allergic Reactions or illness.	❖ Periodic application of water to the active area. ❖ Personal protective equipment, such as rubber gloves, should be 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.

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 suchas 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 Electrocution.
	Decontaminate flooded rooms. Carry out official instruction over the radio or by loud speaker.
Landslides	These are likely during monsoon or in heavy downpour 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 whenthere 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.

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.

8.3.5 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.

8.3.6 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.

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, firefighting, 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.

8.3.7 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.
- 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

9.1 INTRODUCTION

The proposed Municipal Corporation the "Authority" intends for Implementation of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at sanitary landfill site at the Ramsinghpura, Rewari Dumpsite ("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 zoneof 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.

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

- 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.

9.8 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. 10-12 people during operation phase. The laborer's will also get trainings for skill development. The local people will also be preferred for contract jobs during operational stages of the project.

9.9 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.

Organized 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

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 asready 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.

TABLE-10.1 ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION PHASE

S. No.	Potential Impacts	Mitigation measures
1.	Fugitive emission from construction activity.	Wet suppression will be applied to all inactive disturbed surface areas on a daily basis especially during dry and windy days. Limited vehicular movement will be permitted on disturbed soils Vehicle speeds on unpaved roads will be restricted 25 kmph; Contractors will be required to maintain valid Pollution under Control certificates issued by Transport Department and proper maintenance records for their fleet; Haul trucks will be covered with suitable covering material like tarpaulin sheets to prevent fugitive emissions during transportation of construction materials.
2.	Noise due to Construction activities (such as excavation, grading, erecting equipment, piling, etc).	The construction areas to be provided with sheet barriers or temporary walls along the boundary close to any habitations; Rubber padding to be provided in the construction machinery for vibration control; Regular maintenance of its vehicles and repair of its equipment/ machinery will be undertaken;
3.	Potential run-off from site and percolation of used oil/ oil and grease generated from the vehicles. Contamination of surface and ground water resources.	Awareness on optimal water consumption will be provided to the labourers. An impervious cover will be provided over the adjacent storm water drain to prevent the surface runoff carryingthe construction waste materials/ other pollutants to enter the drain.
4.	Removal of flora at site due to clearing of vegetation	The area has devoid of dense vegetation, waste is dumped on the site from many years. No vegetation needs to be removed. 33 % of the total project area i.e., 4.8 acres of land will be developed as green belt. The green belt will be developed considering the native species and CPCB guidelines will be followed.

S. No.	Potential Impacts	Mitigation measures
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.	Parameter	Potential Impact	Proposed Mitigation Measures
1.	Ambient Air Quality	Vehicular emissions Dust and particulates Emissions Gas emission	❖ 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 SWM Rules, 2016.
2.	Soil Quality	Contamination of soil due to Leachate. Spillage from used oil from DG set	❖ Design parameters for facility already include impermeable concrete windrow pad, drainage network, leachate collection and treatment system. ❖ Ensure that the surface runoff from paved areas is collected in storm water drains and does not flow to landscaped areas; It is recommended that the closed landfill should have provisions for HDPE Liner beneath it to check leachate percolation into soil and ground water.
3.	Ambient Noise Quality	Potential increase in noise levels in adjoining areas due operating equipment's. Impact on avifaunal species due to increased noise	❖ 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. ❖ Proper maintenance of machineries such as diesel and exhausts silencers, etc. ❖ 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;

			❖ 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.
4.	Water Resources and Quality	Fresh water demand of the Project. Inadequate management of Storm water. Leachate generation from windrows compost pads mixed waste storagepits and closed landfill.	❖ Recycling and reuse of leachate will be carried out to minimize freshwater requirement. ❖ Provisions to be made for rainwater harvesting from rooftop, paved areas and landscaping areas. ❖ Leachate from the waste tipping areas will be collected separately and conveyed via leachate collection drain up to leachate collection sump. ❖ Quality of groundwater should be monitored and analyzed against IS:10500 standards for drinking water prior to use.
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	❖ 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; ❖ Native species and healthy seedlings will be planted filled with topsoil; ❖ 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.

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 ResidentsImprove aesthetics of area.	❖ Legacy of waste shall be managed properly which will greatly reduce foul smell and reduce impact from odours. ❖ Vehicles/ trucks moving through roads will be covered and the operations will be restricted to day time. ❖ Maximum efforts will be made to provide job opportunities to local residents 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 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 4.8-acre areas will be covered under plantation which is full fill 33% 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	*Cassia fistula*
2	Jand	*Prosopis cineraria*
3	Jarul	*Largerstroemia speciosa*
4	Kachnar	*Bauhinia purpurea*
5	Kadam	*Anthocephalus cadamba*
6	Karanj	*Pongamia pinnata*
7	Kura	*Holarrhena pubescens*
8	Kusum	*Schleichera oleosa*
9	Maharukh	*Ailanthes exelsa*
10	Neem	*Melia azedarach*
11	Papri	*Pongamia glabra*
12	Shisham	*Dalbergia sissoo*
13	Siris	*Albizia lebbeck*
14	Poplar	*Populus deltoides*
15	Jand	*Prosopis cineraria*
16	Khejri	*Prosopis juliflora*
17	Putrajiva	*Putranjiva roxburghii*
18	Jhau	*Salix tetrasperma*
19	Bama	*Crateva nurvala*

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.
- First aid facilities required to attend immediately for meeting emergency situations shall be made available at the facility.

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

11.1 INTRODUCTION

Municipal Corporation the "Authority" intends for Implementation of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at the Village Ramsinghpura, Rewari Dumpsite ("Sanitary Landfill Site").

The project site is situated near NH-8. Nearest airport from project site is Indira Gandhi International Airport New Delhi situated at an aerial distance of 75.5 km. In short, the objective of the project is to introduce appropriate technologies for management of legacywaste so as to prevent the environment from causing pollution and health hazards. The EMP has beenprepared with a view to ultimately ensure that the adverse impacts are minimized.

11.2 IDENTIFICATION OF PROJECT & PROJECT ROPONENT IDENTIFICATION OF PROJECT-

Municipal solid waste management is an obligatory function of the urban local bodies in India.As per the definition provided by the Solid Waste Management Rules, 2016 of Government ofIndia, solid waste (SW) means and includes solid or semi-solid domestic waste, sanitary waste, commercial waste, Institutional waste, catering and market waste and other non- residential wastes, street sweepings, silt removed or collected from the surface drains, horticulture waste, agriculture and dairy waste, treated bio-medical waste excluding industrialwaste, bio-medical waste and e-waste, battery waste, radio-active waste generated in the area under the local authorities and other entities mentioned in rule 2;. With growing population andincreasing waste generation, solid waste management has become a major environmental issue. ULBs across India face similar challenges in handling and disposal of municipal solid waste: lack of adequate financial and human resources, poor technology and lack of public participation to list a few. Solid waste management system in Rewari is the responsibility of Municipal Council Rewari (MCR). Existing solid waste management system of Rewari ispresented in this section.

Municipal Council the "Authority" intends for Implementation of Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at sanitary landfill site at the Village Ramsinghpura Rewari Dumpsite ("Sanitary Landfill Site").

Identification of project proponent

Applicant	Authorize signatory
Municipal Council Rewari	Mr. Hemant Yadav (Executive Engineer)

TABLE-11.1: SUMMARY OF THE PROJECT

S. No.	Particulars	Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Ramsinghpura village, Rewari, Haryana.
A.	**Nature of the Project**	**Size of the Project**
	Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Ramsinghpura village, Rewari, Haryana.	**14.625 Acre**
B.	**Location Details**	
1.	Village	Near Ramsinghpura
2.	Tehsil	Bawal
3.	District	Rewari
4	State	Haryana
5.	Latitude & Longitude	**Coordinates Points** / **Latitude** / **Longitude** 8. / 28°03'42.93"N / 76°32'[illegible]"E 9. / 28°03'42.48"N / 76°32'[illegible]"E 10. / 28°03'46.44"N / 76°32'[illegible]"E 11. / 28°03'47.14"N / 76°32'[illegible]"E 12. / 28°03'48.81"N / 76°32'[illegible]"E 13. / 28°03'47.51"N / 76°32'[illegible]"E 14. / 28°03'45.42"N / 76°32'[illegible]"E
6.	Toposheet No.	53 D12
C	**Environmental Settings of the Area**	
1.	Ecological Sensitive Areas	No
2.	River / water body	**River/ water body** / **Distance** / **Direction** - / - / -
3.	Nearest Town / City	Rewari, 16.1 Km
4.	Nearest Railway Station	Bawal, 3 Km (ENE)
5.	Nearest Airport	Delhi 75.5 Km (NE)
6.	State Boundary	Inter State boundary of Haryana and Rajasthan lies at a distance of 2 km from project site (SSW)
7.	Seismic Zone	Zone – IV
D	**Cost Details**	
1.	Total Project Cost	4.02 Cr
E	**Requirements of the Project**	
1.	Water Requirement	40 KLD
2.	Man Power Requirement (Skilled and unskilled persons)	Approx. 20-25

11.3 NEED OF PROJECT

Until the 1970s, there were few dumpsites exists in India. Since Vedic times, household discards were mostly food waste, which went back to the soil along with stable wastes via compost pits. These discards were collected by farmers, they convert it into compost and utilize it in farming and transport their produce to town/city. With the introduction of plastic in the seventies the composition of waste started changing and people started discarded plastic along with kitchen waste. These plastics blanketed the fields and made them infertile, as less rain could enter and seeds could not 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 decades of neglection these open dumps have grown larger and higher, becoming potential sources of pollution.

The heaps of garbage continuously creating the pollution. Recently, Hon'ble NGT observed that due to incremental growth of Municipal Solid Waste (MSW), these MSW dumps are transforming into virtual mountains. Hon'ble NGT further directed that every city/town should adhere to rule '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 Rewari Dumpsite.

11.4 LAND DETAILS

The proposed project is located at village Ramsinghpura Rewari Dumpsite. The site is easily approachable by NH-8. The nearest railway station is Bawal Railway Station, Indira Gandhi International airport is the nearest airport at an aerial distance of 75.5 km.

TABLE 11.2: AREA BREAK UP OF PROPOSED FACILITY

Description	Area (Acre)	Area sq. m.
RDF Storage Area	2	[illegible]
Windrows/composting	4	[illegible]
SLF	0.5	[illegible]

other infrastructure such as road, parking etc.	1.32	[illegible]
Office facility	0.04	[illegible]
Green Area	4.8	[illegible]
Plant (Machinery Area)	2	[illegible]
Total Area	**14.6**	[illegible]

11.5 DESCRIPTION OF PROPOSED SITE FACILITY: -

Water Requirement

Construction Phase- During construction phase water will be require about 1 KLD which will be brought from hired tankers.

Operational Phase- Total water requirement in the project during operational phase will be [illegible] KLD which will met from hired tankers.

TABLE 11.3: WATER BREAK UP

Description	**Water Quantity**
Water sprinkling	10 KLD
Water consumption for labor	1 KLD
Horticulture	29 KLD
Total Water Requirement	**Approx. 40 KLD**

Power requirement

During operation phase the required power shall be 49 KW and the source of power shall be [illegible] 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.

11.6 BASELINE MONITORING STATUS

The generation of primary data as well as collection of secondary data and information [illegible]

- ❖ Water Environment (surface and ground water)
- ❖ Air Environment
- ❖ Noise 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 indicates that the pH value is 7.11 to 7.66 which is found within the specified standard of 6.5 to 8.5.
- The TDS was observed as 892 to 1842 mg/l.
- The chlorides were found as 146 to 342 mg/l.
- The sulphate was found as 118 to 276.4 mg/l. It is observed that sulphate is within limit
- Total hardness ranges between 136 to 278 mg/l.
- Metals: Iron is found in between 0.11 -0.27 mg/l.

11.6.2 AIR ENVIRONMENT

Ambient Air Quality Monitoring reveals that the **minimum** and **maximum concentrations** of [illegible] the 10 Air Quality monitoring stations were found to be **78.6 µg/m³** and **223.4 µg/m³** respectively. For **$PM_{2.5}$** varies between **51.1 µg/m³** and **104.3 µg/m³**.

As far as the gaseous pollutants SO_2, NO_2 & CO are concerned, the prescribed limits under National Ambient Air Quality Standards for residential and rural areas has never surpassed at any station.

The **minimum** and **maximum concentrations of NO_2** were found to be 10.7 µg/m³ and [illegible] µg/m³ respectively.

The **minimum** and **maximum concentrations of SO_2** were found to be 5.2 µg/m³ and 26.4 µg/m³ respectively.

The **minimum** and **maximum concentrations of CO** were found to be 0.5 mg/m³ and [illegible] **mg/m³** respectively.

Conclusion

From the baseline monitoring result, it is observed that the monitored parameters ([illegible], NO_2,) are within the permissible limits as per NAAQS, 2009 during the study period.

11.6.3 NOISE ENVIRONMENT

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.

- The noise levels are found to be 48.8-65.5 Db(A) and 40.5-53.3 Db(A) for day and night time respectively.
- The high levels of noise in day for project site can be attributed due to construction activities and vehicular activities.
- The noise levels at all location are well below the NAAQS standards.

11.6.4 BIOLOGICAL ENVIRONMENT

The biological study of the area has been conducted in order to understand the ecological status of the existing flora and fauna to generate baseline information and evaluate the probable impacts on the biological environment. There is no Bio-sphere Reserve, National Park, Wildlife Sanctuary, Tiger Reserve and Elephant Reserve within 10 km radius of the project site.

11.6.5 SOCIO- ECONOMIC ENVIRONMENT

- Based on the interpretation made above, primary survey (interaction with stakeholders, community consultation and discussion with an influential person of the study area) and secondary sources, the significant observations and gap in the study area pertain to poor and improper drainage system. Sanitation employment and medical facilities are substandard which can be 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 communicable diseases. 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 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 assistance for skill development vocational education skills, hence Youth empowerment programs through awareness programs about various government schemes, providing appropriate opportunities with relaxation in the 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 various units, major components in the industry are landfill. The construction activities require movement 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 like base preparation, liners quality, drainage layers, leachate collection system, storm water drainage system, gas vent systems, etc.

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_2S	As per [illegible] given by [illegible] EC [illegible] CPCB [illegible]
		Stack emissions from DG sets	As per CTE conditions PM, SO_2, NO_x	
		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 [illegible] operation [illegible] Once in [illegible] third party
3)	Wastewater Discharge (leachate)	Compliance to wastewater dischargestandards	pH, TSS, TDS, BOD, COD and Oil & grease (heavy metals if required)	Daily at [illegible] intervals Once in a [illegible] third party
4)	Solid waste/Hazardous Waste	Check compliance to SWM rules	Quality & quantity monitoring	Periodical [illegible] CPCB [illegible]
5)	Ground Water Quality	Monitoring ground water quality, through piezometers	As per CPCB guidelines	Periodically [illegible] Per [illegible] norms.
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	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 [illegible] as per [illegible]

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 [illegible] of the landfill. The production of compost shall also enhance the crop productivity and improve [illegible] the soil texture and enhancement of soil nutrients The compost produced from the composting [illegible] can be used as soil conditioner that improve soil quality. This compost has the ability to [illegible] 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 [illegible] 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 [illegible] environmental impacts from the project and to mitigate the adverse impacts. Details of Environmental Management Plan are given below-

TABLE 11.4 MITIGATION MEASURE PROPOSED DURING OPERATION PERIOD

1.	Ambient Air Quality	Vehicular emissions Dust and particulates Emissions Gas emission.	❖ 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 SWM Rules, 2016.
2.	Soil Quality	Contamination of soil due to Leachate. Spillage from used oil from DG set	❖ Design parameters for facility already include impermeable concrete windrow pad, drainage network, leachate collection and treatment system. ❖ Ensure that the surface runoff from paved areas is collected in storm water drains and does not flow to landscaped areas; ❖ It is recommended that the closed landfill should have provisions for HDPE Liner beneath it to check leachate percolation into soil and ground water.

3.	Ambient Noise Quality	Potential increase in noise levels in adjoining areas due operating equipment's. Impact on avifaunal species due toincreased noise	❖ 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. ❖ Proper maintenance of machineries such as diesel and exhausts silencers, lubrication of conveyer trolleys, etc. ❖ 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; ❖ 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.
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.	❖ Recycling and reuse of leachate will be carried out to minimize fresh water requirement. ❖ Provisions to be made for rainwater harvesting from rooftop, paved areas and landscaping areas. ❖ Leachate from the waste tipping areas will be collected separately andconveyed via leachate collection drain up to leachate collection sump ❖ Quality of groundwater should be monitored and analyzed against IS 10500 standards for potable water prior to use.
5.	Traffic & Transport	Increase in traffic volume	❖ A proper traffic management plan will be implemented to mitigate [illegible]

6.	Ecology	Disturbance to local birds and small mammals in the adjoining areas.	❖ 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; ❖ Native species and healthy seedlings will be planted filled with topsoil; ❖ 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.
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	❖ Legacy of waste shall be managed properly which will greatly reduce foul smell and reduce impact from odours. ❖ Vehicles/ trucks moving through community roads will be covered and the operations will be restricted to day time. ❖ Maximum efforts will be made to provide job opportunities to local residents 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.

CHAPTER 12

DISCLOSURE OF CONSULTANTS ENGAGED

DISCLOSURE OF CONSULTANTS ENGAGED

Project Name:	Remediation and Reclamation of Existing Dumpsite and construction, operation and maintenance of Sanitary Landfill at Village Ramsinghpura, Rewari Dumpsite.	
Name and address of the Consultant	Amaltas Enviro Industrial Consultants LLP, 2925, Sec.-46, Gurugram-120001 India	QCI-NABET Accredi...
Laboratory for Base line data generation	Creative Analytical Lab & Consultan... (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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Team Member	Jyoti Mehandia	
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Amaltas Enviro Industrial Consultants has got accreditation from QCI as per MoEF & ... requirements.