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**Haryana State Pollution Control Board**  
C-11, Sector-6, Panchkula  
Website – [www.hspcb.org.in](http://www.hspcb.org.in)  
E-Mail - [hspcb.ho@gmail.com](mailto:hspcb.ho@gmail.com)  
Tele No. – 0172-2577870-73

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09-05-2024

To

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

**Sub: Public hearing Sand Mining (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 M/T/Year production over and area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana- Regarding Draft EIA (Environment Impact Assessment) Report for conducting Public Hearing a perprovision of EIA notification 2006 (amended thereof) M/s Minerio Mining Private Limited.**

I have been directed to enclose herewith an advertisement regarding Public Hearing to be held on **12.06.2024 at 12:00 PM** in respect to Environment Clearance for the unit M/s Minerio Mining Private Limited as per provision of EIA notification 2006 (amended thereof) for publication in the following leading newspapers on DAVP rates:-

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

The advertisement should appear on or before **11.05.2024** in the above said two newspapers only and bill 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 newspapers only.

It is further, informed that Ministry of Environment of Forest & Climate Change Govt. of India has clarified vide Memo No. F.No. 19-206/2018-IA.III dated 10.04.2019 that publication of Public Notice for public Hearing does not violate the model code of conduct during the election (copy enclosed).

**DA/Advertisement**

Signed by

Vikas Chand

Date: 09-05-2024 15:00:51

Env Engineer (HQ)  
For Member Secretary

**CC:**

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

1. Deputy Commissioner, Palwal.
2. The Chairman, Zila Parishad, District, Palwal.
3. Municipal Council / Corporation District, Palwal for display on Notice Board.
4. District Development and Panchayat Officer, Palwal
5. Deputy Director, District Industries Centre, Palwal.

**DA/Advertisement.**

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

**CC:**

A copy of the above is forwarded to the following alongwith copy of EIA report and 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:-

1. Regional Officer, Haryana State Pollution Control Board, II-Floor, HSVP Office Complex, Near Gymkhana Club, Sector-12, Palwal-121102.
2. M/s Minerio Mining Private Limited First Floor, MCD No-1A, Bhogal, Samman Bazar Road, New Delhi, South East-110014 Haryana.
3. Sr. EE (IT) to ensure that the notice is uploaded on the website of the Board.

**DA/Advertisement.**

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

**CC:**

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

1. The Additional Chief Secretary to Govt. Haryana, Environment, Forests & Wildlife Department.
2. The Director General, Environment, Forests & Wildlife Department, Haryana.
3. PS to Chairman / PA to Member Secretary.

**DA/Advertisement**

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

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**HARYANA STATE POLLUTION CONTROL BOARD**  
**C-11, SECTOR-6, PANCHKULA**  
**Website-www.hspcb.org.in**  
**E-Mail- hspcbSolidwaste@gmail.com**  
**Tele Fax No. - 0172-2577870-73**

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**Notice for Public Hearing**

It is for the information of all concerned regarding conducting the Public Hearing for obtaining Environment Clearance for Sand Mining (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 M/T/Year production over and area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal, State Haryana. The project is covered under the ambit of Environment Impact Assessment Notification dated 14th Sep, 2006 issued by the Ministry of Environment, Forest and Climate Change Department, GOI, thus required to obtain Environmental Clearance. The detail unit/project and date, time & venue of Public Hearing is given as under:

<b>Sr. No.</b>	<b>Name of Unit</b>	<b>Date of Public Hearing</b>	<b>Time of Public Hearing</b>	<b>Venue of Public Hearing</b>
1.	M/s Minerio Mining Private Limited First Floor, MCD No-1A, Bhogal, Samman Bazar Road, New Delhi, South East-110014 Haryana, as per TORs issued by the Member Secretary, Government of India State Level Environment Impact Assessment Authority Haryana vide their letter no. SEIAA/HR/2023/439 dated 23.11.2023	<b>12.06.2024</b>	<b>12:00 PM</b>	Village Thanthri & Rajupur Khadar, Tehsil & District Palwal

As a part of procedure for seeking the Environmental clearance, notified by the Ministry of Environment, Forest & Climate Change Department, Govt. of India, New Delhi vide Notification No. S.O. 1533 (E), dated 14.9.2006, the project proponent mentioned above have applied to the Haryana State Pollution Control Board, for conducting a Public Hearing so as to obtain views, suggestions and objection, if any, **of the nearby Public on the proposed project. Copies of executive summary of the project and EIA study report, submitted by the project proponent, are available in the following officers which can be perused during office hours, on any working day :-**

- 1 Deputy Commissioner, Palwal.
- 2 Regional Officer, Haryana State Pollution Control Board, , II- Floor, HSVP Office Complex, Near Gymkhana Club, Sector-12, Palwal-121102.
- 3 O/o Chairman, Zila Parishad, Palwal.
- 4 O/o Commissioner, Municipal Council, Palwal.
- 5 District Development and Panchyat Officer, Palwal.
- 6 Deputy Director, District Industries Centre, Palwal.

Notice is hereby given to all concerned to file suggestions, views, comments and objections, if any, on the proposed project, to the Chairman, Haryana State Pollution Control Board, C-11, Sector-6, Panchkula as well as Regional Officer, Haryana State Pollution Control Board, II- Floor, HSVP Office Complex, Near Gymkhana Club, Sector-12, Palwal-121102 within 30 days of the publication of this notice. Besides, a Public Hearing also will be held on the Date, Time & Venue mentioned above **at the proposed site** of the project, which can be attended by any person including bonafide residents, Environmental Groups, and others, located at the project site/sites of displacement/sites likely to be affected. Oral/Written suggestions, if any be admissible for attending the Public Hearing.

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

**Pardeep Kumar, IAS**  
**Member Secretary**

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PAN : AAPCM1108D

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E-mail : [elitemining2020@gmail.com](mailto:elitemining2020@gmail.com)

# MINERIO MINING PRIVATE LIMITED

H OFFICE : 1<sup>st</sup> floor, MCD office – 1A  
Samman Bazar Road, Bhogal,  
New Delhi -110014

SITE ADDRESS :  
1<sup>st</sup> floor, MCD office – 1A  
Samman Bazar Road, Bhogal,  
New Delhi -110014

Ref. No.

Date: 19.01.2024

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

Sub.: Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana- Regarding Submission of Draft EIA (Environment Impact Assessment) Report for Conducting Public Hearing as per provision of EIA Notification 2006 (amended thereof)

Ref.: State Level Environment Impact Assessment Authority, Haryana- ToR Letter File No. SEIAA/HR/2023/439 dated 23.11.2023.

Sir,

With reference to above mentioned subject, M/s Minerio Mining Private Limited has proposed Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana. M/s Minerio Mining Private Limited has appointed Parivesh Environmental Engineering Services, a NABET accredited consultant vide NABFT /EIA/2124/IA 0092(Rev.01), for conducting EIA study and obtaining Environmental Clearance as per EIA Notification, 2006 and its subsequent amendments.

As per EIA Notification 2006, our project requires Public Hearing, for this purpose we are submitting the following documents with demand draft of INR 1,50,000 vide DD No. 509643 dated 16.01.2024.

- 1) 1 Hard copy of Draft EIA/EMP Report.
- 2) 1 Hard copies of executive summary in Hindi and English.
- 3) 1 Soft copies of above documents in CD.
- 4) Demand Draft (DD No. 509643) in name of Member Secretary, Haryana State Pollution Control Board, payable at Panchkula.

In view of the above, it Is requested to please acknowledge the mentioned documents and process the project for Public Hearing on an early date.

Thanking You,

Authorized Signatory  
Minerio Mining Pvt. Ltd.

U/S

M/s Minerio Mining Pvt. Ltd.  
Authorized Signatory

Encl. As above

Regards



**ICICI Bank** (5561) PANCHSIKHRA Branch SECTOR 10  
 DD No. 509643  
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 DATE 15/01/2024  
 D D M M Y Y Y Y  
 \*\*\*\*\*MEMBER SECRETARY HARYANA STATE POLLUTI  
 ON DEMAND PAY CONTROL BOARD \*\*\*\*\*  
 ONE LAKH FIFTY THOUSAND Only OR ORDER  
 RUPEES  
 ₹ 1,50,000.00  
 Purchaser Name: MINERIO MINING PRIVATE LIMITED FOR VALUE RECEIVED  
 TL/1/5 - Not Above 1,50,000.00  
 1650DDCENPAY  
 NEW DELHI - BHOGAL  
 Issuing Branch  
 Priya  
 052224  
 Authorised Signatory  
 Authorised Signatory  
 Please sign above

⑈ 509643 ⑈ 0002290001 ⑈ 001650 ⑈ 16

# **DRAFT ENVIRONMENT IMPACT ASSESSMENT (EIA) REPORT**

**Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit)  
Production Capacity - 37,80,000 MT/ year  
Area - 99.384 ha**

**Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.**



PROPONENT	:	<b>M/S MINERIO MINING PRIVATE LIMITED</b>
ENVIRONMENT CONSULTANT	:	<b>PARIVESH ENVIRONMENTAL ENGINEERING SERVICES</b> Nabet Certificate No. - NABET /EIA/2124/IA 0092 (Rev.01)
STUDY PERIOD	:	<b>POST-MONSOON (OCTOBER 2023 TO DECEMBER 2023)</b>
VERSION	:	<b>PEES/EIA/23-24/35</b>

**JANUARY 2024**

3



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

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PROPOSANT: M/S MINERIO MINING PRIVATE LIMITED

CONSULTANT: PARIVESH ENVIRONMENTAL ENGINEERING SERVICES (NABET /EA/2124/IA 0092(Rev.01))

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Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

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# **CHAPTER – 01**

# **INTRODUCTION**





Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## 1. Introduction

Environmental Impact Assessment (EIA) is a procedure used to examine the environmental consequences or impacts, both beneficial and adverse, of a proposed development and to ensure that these effects are considered in project design stage and suggest mitigation measures are proposed to minimize the adverse impacts caused to the project activity.

M/s Minerio Mining Pvt. Ltd., through Sh. Sachin Sharma, MCD No.01, First Floor, Saman Bazar Road, Bhogal, Delhi, South Delhi-110014 was the highest bidder (13.18 Crores) for the Sand quarries of Thantri Unit for which auction held on 13.06.2023.

The applicant is involved in the Mining business for last many years. The applicant can invest necessary funds for the scientific and systematic development of mines including land rejuvenation and progressive reclamation programme and other measures necessary to protect the quality of the environment and human health etc.

### 1.1. Project Brief

This is the sand mine project on riverbed of Yamuna River. Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

Based on the details published vide Haryana Government Gazette notification for auction dated 10-05-2023 & corrigendum no 3272 dated 07-06-2023 & LOI dated 21-07-2023 issued by DMG, Haryana and the Khasra map submitted by the applicant, survey of the area was carried out along the course of the river Yamuna in the revenue villages of Thantri and Rajupur Khadar as detailed above which flow from North to South side. Workings will be restricted within the lease area/khasra's allotted. Mining activities will be carried out in a manner so that there is no obstruction to the movement of water flow, if any, during rainy season. The total length of the lease area is about 3.0 kms.

**Table 1-1: Approvals / Permissions from Concerned Authorities**

<b>NOCs</b>	<b>Approval / Permission Details</b>	<b>Annex.</b>
Lease Grant	Letter of Intent (LOI) has been issued by the Director Mines & Geology Haryana vide letter no. DMG/ HY/ Thantri Unit/ Palwal/ 2023/ 4199 dated 21-07-2023 for Mining of Sand (Minor Mineral) in Thanthri Unit, comprising Thantri & Rajupur Khadar villages over an area of 248.46 acres (99.384 hectares) in district Palwal, Haryana for a period of 10 years.	Annex 1.1
Cluster NOC	The information was asked about other mines coming within 500m radius from the lease from Department of Mines and Geology, Faridabad. The clarification from department vide letter MO/FBD/2449 dated 01.08.2023 confirms there is no other mining activity within 500m from project lease boundary to form mining cluster. So, it is individual project in the area.	Annex 1.2
Mining Plan	As per rule 70 of Haryana Minor Mineral Concession, Stocking, Transportation of Minerals & Presentation of Illegal Mining Rule, 2012, the mining plan was submitted to department and mining plan	Annex 1.3

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

NOCs	Approval / Permission Details	Annex.
	was approved vide reference no. DMG/HY/MP/THANTHRI SAND UNIT/ 2023/ 6111 DATED 26.10.2023.	
Forest NOC	Forest NOC has been issued by the Office of Divisional Forest Officer, Palwal Forest Division, Palwal vide reference no. 1783 dated 24.08.2023 which confirms project site is not part of any reserve forest or protected forest.	Annex 1.4
Approved DSR	Approved District Survey Report of Faridabad District has been obtained.	Annex 1.5

**Table 1-2: Salient Features of Mine**

S. No.	Parameters	Description
1.	Name of the project	Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) by M/s Minerio Mining Private Limited.
2.	Nature & category of Mine	Non-Coal Mining Category 'B' of Activity 1(B)
3.	Project Proponent	M/s Minerio Mining Private Limited
4.	Khasra No.	<p><b>For Mining</b></p> <p>3// 11 min, 20/1, 20/2 min, 21 min, 4// 7, 8 min, 13/1 min, 13/2, 14, 15/1, 15/2, 16/1 min, 16/2 min, 17/1, 17/2, 18/1 min, 23 min, 24/1, 24/2, 25/1, 25/2, 10// 3 min, 4/1, 4/2, 5, 6/1, 6/2, 7/1, 7/2, 8/1, 8/2 min, 13/1 min, 13/2, 13/3, 14, 15/1, 15/2, 15/3, 15/4, 16/1, 16/2, 17, 18/1, 18/2 min, 23 min, 24, 25, 11// 1 min, 10 min, 11 min, 20 min, 21/1, 21/2, 22 min, 15// 1, 2 min, 9 min, 10/1, 10/2, 11, 12/1 min, 12/2 min, 19 min, 20/1, 20/2, 21, 22 min, 16// 3/2, 4, 5, 6, 7, 8/1, 13/1 min, 13/2 min, 14, 15, 16/1, 16/2, 17, 18/1 min, 23/2 min, 24, 25, 23// 3/2 min, 4/1, 4/2, 5/1, 5/2, 7, 8/1 min, 13/3 min, 14/1, 14/2, 15, 16/1, 16/2, 17/1, 17/2, 18/1 min, 23 min, 24, 25/1, 25/2, 24// 1, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20, 21, 22 min, 28//, 1, 2 min, 9/1 min, 9/2 min, 10, 11, 12 min, 19 min, 20, 21/1, 21/2, 29//, 3 min, 4, 5/1, 5/2, 6/1, 6/2, 7/1, 7/2, 8 min, 13/2 min, 14/1, 14/2, 15/1, 15/2, 15/3, 16, 17/1, 17/2, 18/1 min, 23/2 min, 24/1, 24/2, 25, 38//, 3/2 min, 4/1, 4/2, 5/1, 5/2, 6, 7/1, 7/2, 8/1 min, 13/2 min, 14/1, 14/2, 15, 16, 17 min, 18/1 min, 24 min, 25, 39//, 1, 2 min, 3 min, 8 min, 9, 10, 11/1, 11/2, 12, 13/1 min, 13/2 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min, 41//, 1, 2, 3 min, 9, 10, 11, 42//, 4 min, 5, 6/1, 6/2, 6/3, 7 min, 14 min, 15, 17 min.</p> <p><b>For Ancillary area</b></p> <p>24// 4, 5/1, 5/2, 6, 7, 14, 15, 25// 1/ 1, 1/2, 10, 11.</p> <p><b>For Mining</b></p>

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Parameters	Description																																	
		7//, 3/1, 3/2, 8/1 min, 8/2, 9, 11/2, 11/1, 12, 13 min, 14 min, 17 min, 18, 19, 20, 21, 22, 23, 24 min, 8// 16 min, 25/1 min, 25/2, 10// 5/1 min, 5/2, 6/1, 6/2, 7 min, 14 min, 15/1, 15/2, 16, 17 min, 24/2 min, 25, 11// 1, 2, 3, 4 min, 7 min, 8/1, 8/2, 9, 10/1, 10/2, 11, 12, 13/1, 13/2, 14 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min, 24// 1, 2/1, 2/2, 3/1, 3/2, 7 min, 8 min, 9, 10, 11, 12, 13, 14 min, 17/1 min, 17/2 min, 18, 19, 20, 21, 22/1, 22/2, 23, 24/1,2,3 min, 25// 4/2 min, 5, 6, 7 min, 15 min, 16 min, 25 min, 29//, 5 min, 6/1 min, 6/2 min, 15 min, 30// 1, 2/1, 2/2, 3/1, 3/2, 4 min, 7 min, 8, 9/1, 9/2, 10, 11, 12, 13, 14, 15 min, 16 min, 17, 30// 18, 19, 20 min, 21/1,2 min, 22/1, 22/2, 23, 24, 25 min, 44//, 10/2 min, 11/1 min, 20/1 min, 20/2 min, 21 min, 45// 1 min, 2, 3, 4, 5 min, 6 min, 7, 8, 9/1 min, 9/2 min, 10 min, 11 min, 12 min, 13, 14, 15, 16, 17, 18, 19 min, 22 min, 23, 24, 25/1, 25/2, 52// 2 min, 3, 4, 5, 6/1, 6/2, 7, 8 min, 13 min, 14, 15, 16, 17 min, 18 min, 23 min, 24, 25, 53// 1/1, 1/2 min, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20/1, 20/2, 21, 22, 23 min, 61// 1, 2/1, 2/2, 3/1, 8 min, 9, 10, 11, 62// 3 min, 4 min, 5, 6. <b>For Ancillary area</b> 31// 6, 7, 8, 13, 14, 15, 16, 17, 18, 23, 24, 25/1																																	
5.	Total Lease area	99.384 Ha (248.46 Acre) - Riverbed of Yamuna River																																	
6.	Location of the project	Village- Thanthri & Rajupur Khadar, Tehsil & District- Palwal, Haryana																																	
7.	Toposheet No.	H43X7 - Project Site & H43X7, H43X8, H43X11 & H43X12 - Study Area.																																	
8.	Maximum Production Capacity	37,80,000 Metric Tonne / Year																																	
9.	Geological Mineral Reserve	49,21,776 Metric Tonne																																	
10.	Blocked Mineral Reserve	11,34,000 Metric Tonne																																	
11.	Mineable Reserve	37,87,776 Metric Tonne																																	
12.	Geographical co-ordinates	<table border="1"> <thead> <tr> <th>Point</th> <th>Longitude</th> <th>Latitude</th> </tr> </thead> <tbody> <tr> <td colspan="3" style="text-align: center;"><b>THANTRI</b></td> </tr> <tr> <td>J</td> <td>28°11'11.62"N</td> <td>77°28'28.66"E</td> </tr> <tr> <td>K</td> <td>28°10'50.58"N</td> <td>77°28'30.54"E</td> </tr> <tr> <td>L</td> <td>28°10'35.01"N</td> <td>77°28'32.27"E</td> </tr> <tr> <td>M</td> <td>28°10'25.35"N</td> <td>77°28'34.66"E</td> </tr> <tr> <td>N</td> <td>28°10'20.42"N</td> <td>77°28'24.11"E</td> </tr> <tr> <td>O</td> <td>28°10'28.93"N</td> <td>77°28'20.77"E</td> </tr> <tr> <td>P</td> <td>28°10'36.97"N</td> <td>77°28'19.87"E</td> </tr> <tr> <td>Q</td> <td>28°10'48.08"N</td> <td>77°28'20.60"E</td> </tr> <tr> <td>R</td> <td>28°10'52.30"N</td> <td>77°28'19.59"E</td> </tr> </tbody> </table>	Point	Longitude	Latitude	<b>THANTRI</b>			J	28°11'11.62"N	77°28'28.66"E	K	28°10'50.58"N	77°28'30.54"E	L	28°10'35.01"N	77°28'32.27"E	M	28°10'25.35"N	77°28'34.66"E	N	28°10'20.42"N	77°28'24.11"E	O	28°10'28.93"N	77°28'20.77"E	P	28°10'36.97"N	77°28'19.87"E	Q	28°10'48.08"N	77°28'20.60"E	R	28°10'52.30"N	77°28'19.59"E
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Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Parameters	Description
		S 28°10'55.35"N 77°28'19.11"E
		T 28°11'0.91"N 77°28'19.65"E
		U 28°11'8.03"N 77°28'19.79"E
		<b>RAJUPUR KHADAR</b>
		M 28°10'25.35"N 77°28'34.66"E
		M1 28°10'21.22"N 77°28'35.74"E
		N 28°10'20.42"N 77°28'24.11"E
		O 28°10'14.55"N 77°28'23.46"E
		O1 28°10'14.95"N 77°28'35.86"E
		P 28°10'10.57"N 77°28'23.13"E
		P1 28°10'10.80"N 77°28'35.24"E
		Q 28°10'1.74"N 77°28'24.64"E
		Q1 28°10'5.40"N 77°28'36.00"E
		R 28° 9'51.05"N 77°28'28.86"E
		R1 28° 9'58.90"N 77°28'38.00"E
		S 28° 9'45.29"N 77°28'30.54"E
		S1 28° 9'52.20"N 77°28'40.50"E
		T 28° 9'42.44"N 77°28'33.19"E
		T1 28° 9'46.60"N 77°28'43.00"E
		U 28° 9'40.08"N 77°28'34.35"E
		U1 28° 9'34.56"N 77°28'49.01"E
		V 28° 9'29.87"N 77°28'36.25"E
13.	Topography of ML area	Highest elevation in riverbed at extreme north end is 132.9 mRL and bank top level is 135.3 mRL whereas the levels at the extreme south end in riverbed is 129.5 mRL and Riverbank top is 133.0 mRL. The Yamuna River flows from N to S direction in Thanthri & Rajupur khadar revenue village.
14.	Mining Method & Technology	Opencast manual method will be adopted. No specific method of exploration is required as the river borne sediments are deposited all along the riverbed and are very well exposed on the surface. Moreover, these sediments are accumulated/ replenished every year during rainy season by flood waters to almost the same level depending on the intensity of rains on the upstream side. Adequate quantity of sand reserves is available for meeting consumer demand.
15.	Ultimate depth of Mining	3 m from the riverbed of Yamuna River
16.	Ground water level	05 - 10 m from the surface level
17.	GWT intersection	Mining will be done only up to 3m from surface. So, ground water table will not be intersected.
18.	Drainage pattern/ water courses	Mining will be done in dry riverbed; stream will not be touched and will be done only during non-monsoon period.

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Parameters	Description		
19.	Water requirement & source	The source of water is private water tankers. The break-up of water requirement is as follows:		
		<b>S. No.</b>	<b>Description</b>	<b>Demand</b>
		1	Dust Suppression	31.0 KLD
		2	Greenbelt Development	13.0 KLD
		3	Domestic Requirement	6.5 KLD
<b>Total</b>		<b>50.5 KLD</b>		
20.	Cost of project	The capital cost for the project will be Rs. 19 Crores including proposed lease area and machinery will be hired on contract bases.		

Source: Approved Mining Plan

## 1.2. Nature of the Project

The Ministry of Environment, Forest, and Climate Change (MoEF&CC), Govt. of India through its notification of 14<sup>th</sup> September 2006 and its subsequent amendment under the Environment (Protection) Act, 1986 classifies the projects under Cat. B1. This is a project of minor mineral.

### 1.2.1. Need for the Project and Its importance to the Country and or Region

The demand for sand, gravel and boulders is increasing day by day construction activities & infrastructure development. With the rapid pace of development and industrialization, the demand of building material has enhanced manifold in the last 10-15 years and the demand of minor mineral has risen mainly in infrastructure activities like roads, highways, buildings & townships. Mining of minor minerals not only narrows the gap between the demand and supply of building material but also enhances employment opportunities and economic growth of the region. Besides, the production will also benefit the State in the form of revenue generation. Also, the mine management will conduct medical camps at regular intervals.

### 1.2.2. Demand-Supply Gap

As already mentioned, there is a large demand of sand, gravel, and boulder (minor mineral) for construction activities which will be bridged to some extent by this project by various end users in the open market.

### 1.2.3. Imports vs. Indigenous Production

The minerals excavated from the proposed mine will be transported from the site towards NCR, Haryana, UP, Punjab, Himachal Pradesh etc. where it will be sold in the local market. The proposed mining project aims to cater only the need of domestic market.

### 1.2.4. Export Possibility

Not applicable as the production will be consumed within local area.

## 1.3. Location of the Project

The mine lease area is located at village Thanthri & Rajupur Khadar, Tehsil & District Palwal of State Haryana. Lease area is well connected to nearest villages via village road.

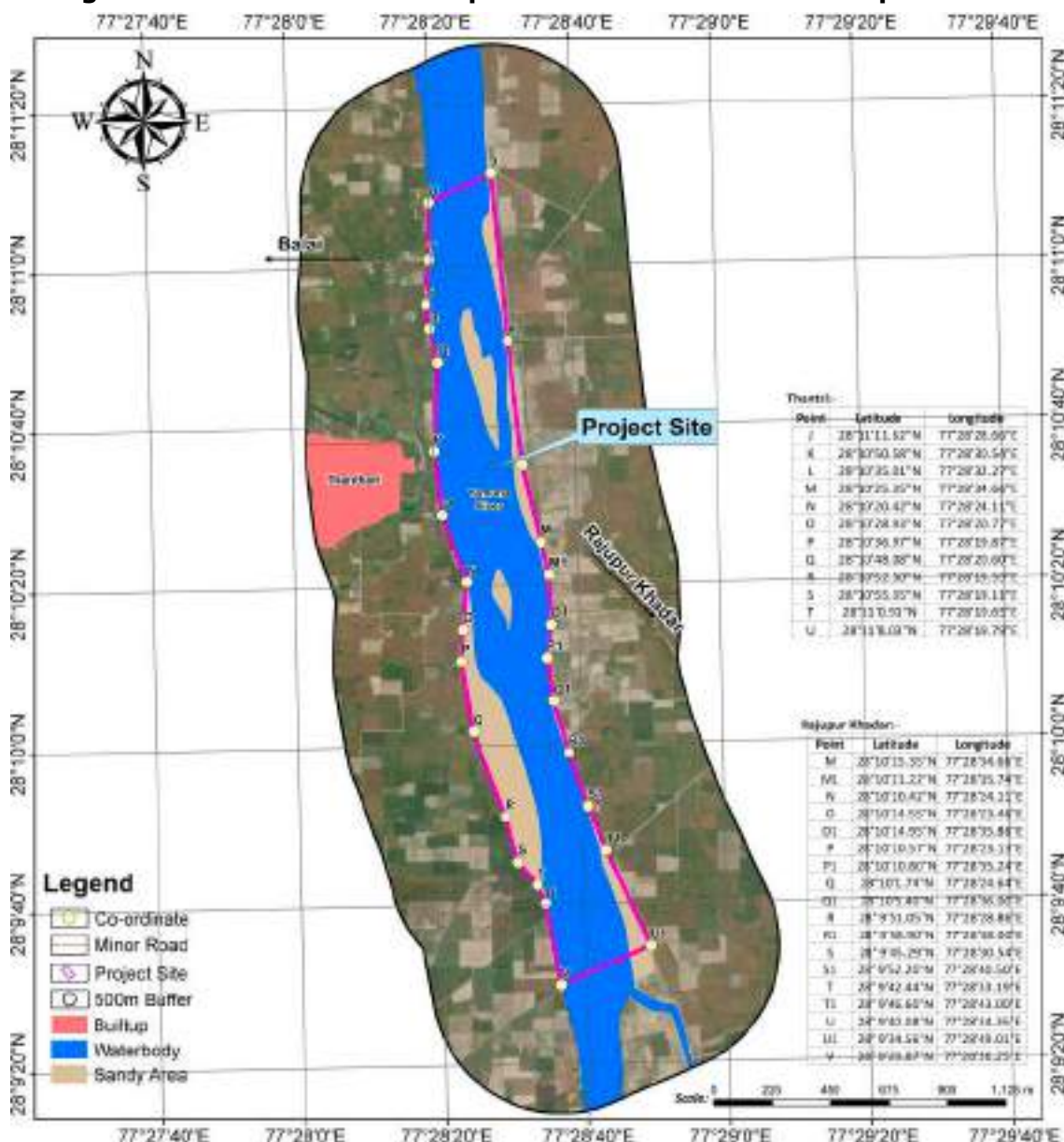


Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Figure 1.1: Location Map of Proposed Project**

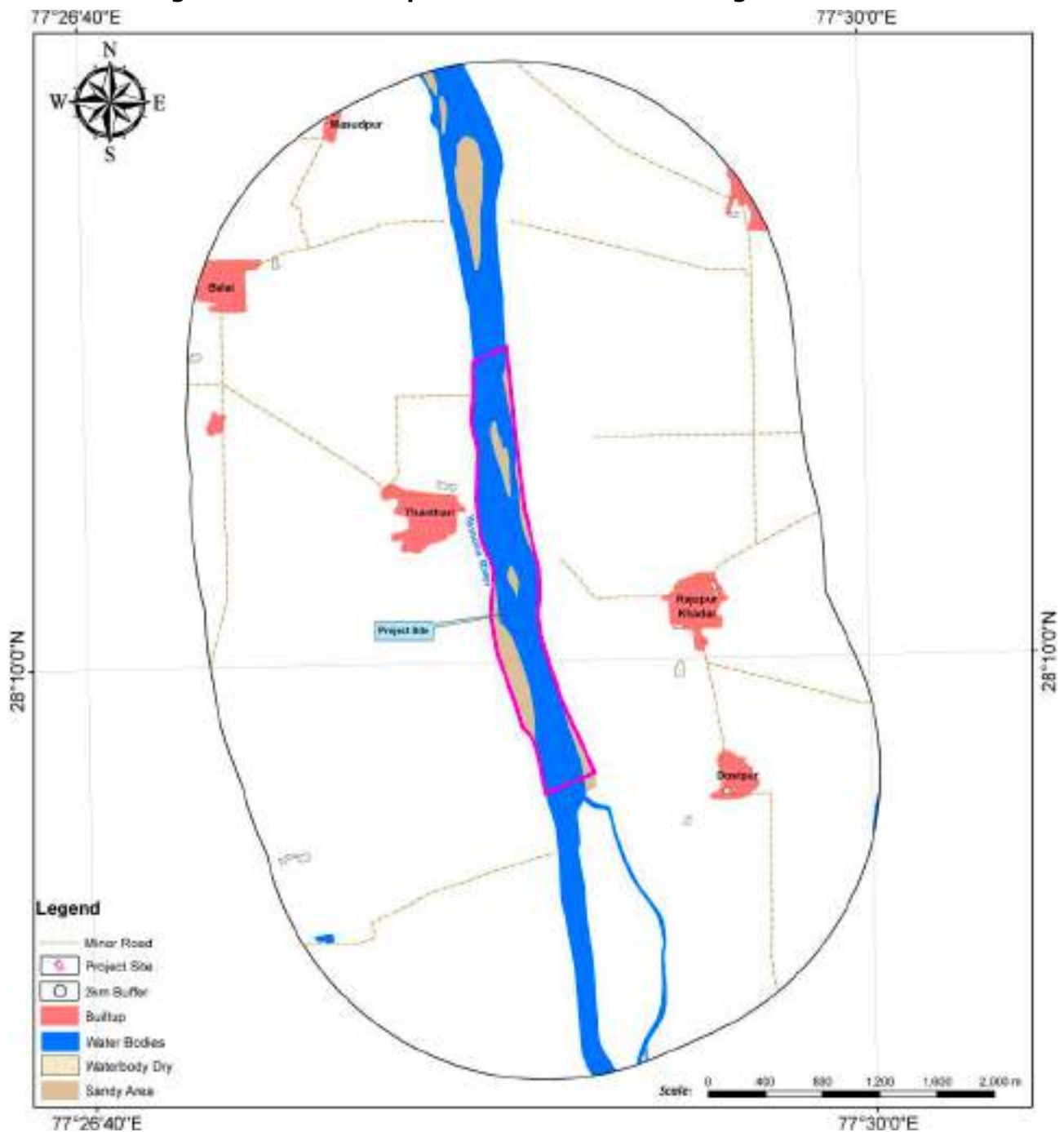


**Figure 1.2: Co-Ordinates Map with 500 m Buffer from Proposed Site**



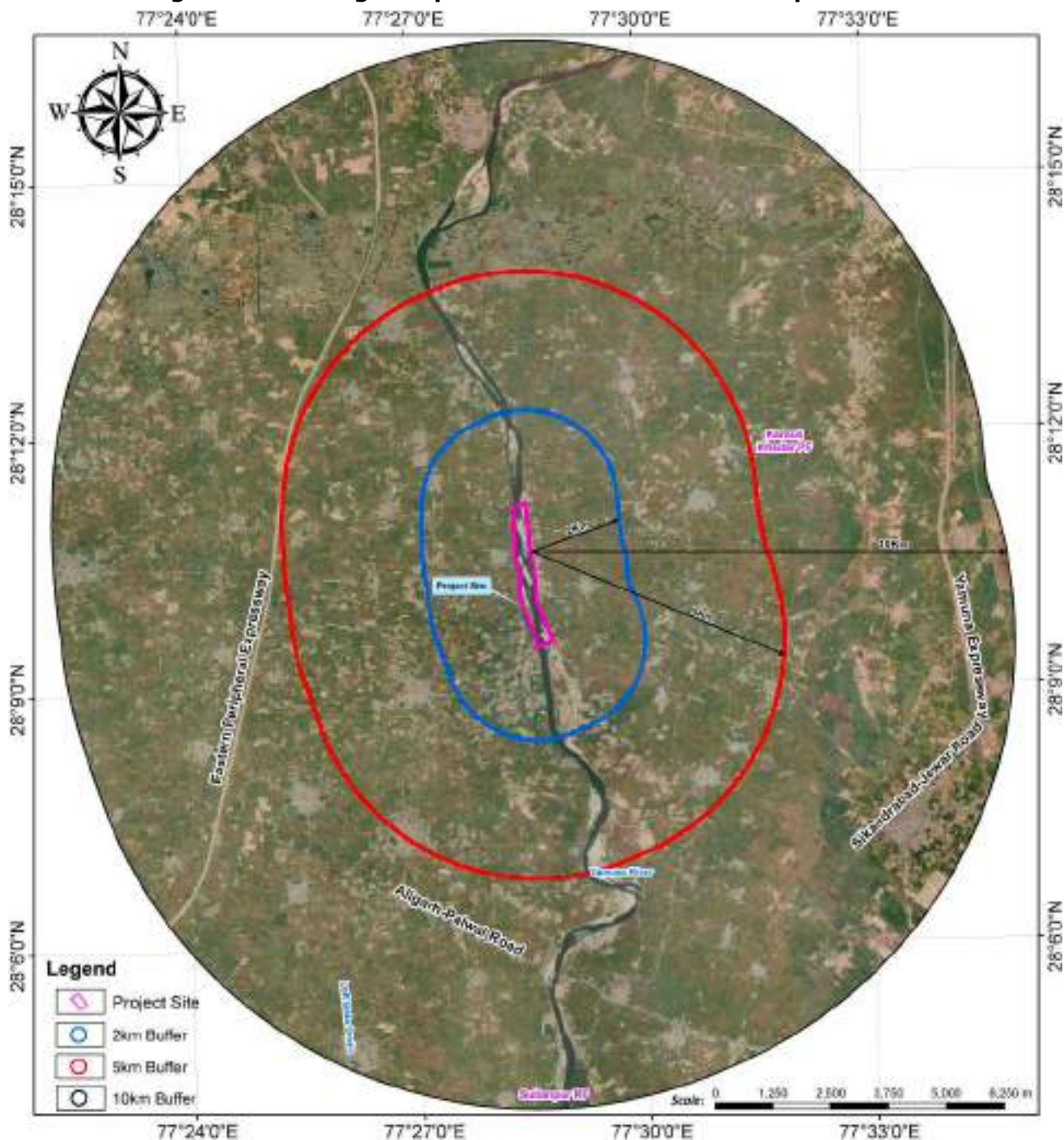
Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Figure 1.3: Base Map with 2 km Buffer Showing Site Features**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Figure 1.4: Google Map with 10 km Buffer from Proposed Site**



### 1.4. Purpose of the Report

The purpose of the assessment is to ensure that decision makers consider the environmental impacts when deciding whether or not to proceed with a project. The International Association for Impact Assessment (IAIA) defines an environmental impact assessment as "the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made". EIA are unique in that they do not require adherence to a predetermined environmental outcome, but rather they require decision makers to account for environmental values in their decisions and to



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

justify those decisions considering detailed environmental studies and public comments on the potential environmental impacts.

The Environmental Impact Assessment has been prepared to assess the current environmental scenario of the area and then based on the activities of the mining proposed, to carry out Environment Management Plan (EMP). This plan will identify and address the impacts, where these are adverse in nature, and thereafter design mitigative measures to manage such impacts in a manner as to conserve environment and ecology of the area. The EMP has been prepared with a view to ultimately ensure that the adverse impacts are minimized if these cannot be prevented altogether.

### 1.5. The Study

This is the individual project as clarified in cluster mining certificate. In this context, Form-I and LOI along with approved Mining Plan has been submitted to Haryana State Environmental Impact Assessment Authority (Haryana SEIAA) on date 15.11.2023 (online) vide proposal no. SIA/HR/MIN/450653/2023 to obtain "Terms of Reference" (ToR). The standard ToR was issued by State Level Environment Impact Assessment Authority, Haryana vide File No. **SEIAA/HR/2023/2439 on dated 23.11.2023** which is enclosed as **Annex 1.6**. We have collected data for one season (post-monsoon) i.e., from October 2023 to December 2023. The point-wise compliance of the standard ToR with additional points is given in Table 1.3.

**Table 1-3: Pointwise Compliance of Terms of Reference**

<b>Terms of Reference Issued by SEIAA, Haryana</b>	<b>Compliance</b>
1) Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.	Not applicable as this is the fresh lease.
2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.	Letter of Intent (LOI) has been issued by the Director Mines & Geology Haryana vide letter no. DMG/HY/Thantri Unit/Palwal/2023/4199 dated 21-07-2023 for Mining of Sand (Minor Mineral) in Thanthri Unit, comprising Thantri & Rajupur Khadar villages over an area of 248.46 acres (99.384 hectares) in district Palwal, Haryana for a period of 10 years. Enclosed as <b>Annex 1.1</b> .
3) All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.	All documents including approved mine plan, EIA are compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the M/s Minerio Mining Private Limited. This is the

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	draft EIA, being submitted to conduct the public hearing. Final EIA will have the minutes if public hearing.
4) All corner coordinates of the mine lease area, superimposed on a High-Resolution Imagery/toposheet, topographic sheet, geomorphology, and geology of the area should be provided. Such an Imagery of the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).	All the maps are superimposed on toposheet no.- H43X8 of SOI for project site and SOIL toposheet no.- H43X7 for Project Site & H43X7, H43X8, H43X11 & H43X12 for study area of 10km. Co-ordinates of lease area are given in Table 1.2 and marked in figure 1.2. Other maps as land use were also prepared and given in report.
5) Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of landforms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.	All the maps are prepared in SOI toposheet in 1:50,000 scale indicating the feature of site and surrounding. Study area map is enclosed as figure 3.1 and digitized land-use of study area is given in figure 3.3 with land-use classification in Table 3.2 of chapter 3.
6) Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.	This is the sand mine project on riverbed of Yamuna River over an area of 99.384 ha located at Village Sultanpur, Tehsil & District Palwal and State Haryana. No diversion is proposed.
7) It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/ violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.	<p>The Safety, Health and Environmental (SHE) policy has been developed which will be accessible to all at site and to other stakeholders. The following key principles will be demonstrated:</p> <ul style="list-style-type: none"> <li>✓ Integrate sound environmental management practices in all our activities by forming an Environmental Management Cell.</li> <li>✓ Progressively adopt cleaner and energy efficient technologies.</li> <li>✓ Conduct our operations in an environmentally responsible manner to comply with applicable legal and other requirements related to its environmental aspects and strive to go beyond.</li> <li>✓ Biodiversity in and around our working areas and mines will be</li> </ul>

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	<p>repeated and progressively enhanced for benefit of nature.</p> <ul style="list-style-type: none"> <li>✓ Strive for continual improvement in our environmental performance by setting challenging targets, measuring progress, taking corrective action, and communicating environmental information to all concerned.</li> <li>✓ Enhance environmental awareness amongst employees working for and on behalf of us and the general populace around working areas and mines.</li> <li>✓ Encourage our business associates to adopt similar approach for environmental protection.</li> </ul> <p>Apart from this, EMC has been framed in hierarchical system to ensuring the implementation and adaptations of norms and EC conditions.</p>
<p>8) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.</p>	<p>This is the opencast mine from riverbed of river Yamuna. The maximum depth will be 3 m from the surface level and no activity will be involved in monsoon period. No blasting is involved. Mining operations are associated with several potential hazards that affect adversely the human health and environment as given below.</p> <ul style="list-style-type: none"> <li>✓ Inundation due to flood.</li> <li>✓ Accidents by heavy machinery.</li> <li>✓ Slope failures at the mine faces etc.</li> </ul> <p>The detailed study has been done and incorporated in chapter 7 of report.</p>
<p>9) The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.</p>	<p>The study area will comprise of 10 km zone around the mine lease from lease periphery. The maps have been given in chapter 1 &amp; 3 marking study area and features. No waste will be generated from process except municipal waste.</p>
<p>10) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and</p>	<p>FCC imagery (Digital data) was used for interpretation for the relevant land use classes. On screen visual interpretation coupled with supervised image</p>



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<p>other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.</p>	<p>classification techniques are used to prepare the land use classification.</p> <ul style="list-style-type: none"> <li>✓ Digitization of the study area (10 km radius from the plant site) from the Survey of India Toposheet maps.</li> <li>✓ In the present study the Landsat satellite image with Toposheet no. H43X7, H43X8, H43X11 &amp; H43X12 have been procured and interpreted using the ERDAS imaging software adopting the necessary interpretation techniques.</li> <li>✓ Satellite data interpretation and vectorization of the resulting units.</li> <li>✓ Field checking and ground truth validation.</li> <li>✓ Composition of final LU/LC map.</li> </ul> <p>Study area is mainly covering agricultural land (86.0%) by following built-up area (5.6%) &amp; Wasteland (5.2%) of the total study area. For study area land-use details, refer section 3.3.2 of report and project site land-use at different stage is given in section 2.6.1 of report.</p>
<p>11)Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&amp;R issues, if any, should be given.</p>	<p>No overburden or dump will be on project site. Storage, loading, unloading all the activities will be done in ancillary area.</p>
<p>12)A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.</p>	<p>Forest NOC has been issued by the Office of Divisional Forest Officer, Palwal Forest Division, Palwal vide reference no. 1783 dated 24.08.2023 which confirms project site is not part of any reserve forest or protected forest. NOC are enclosed as Annex 1.4.</p>
<p>13)Status of forestry clearance for the broken-up area and virgin forestland involved in the</p>	<p>Not applicable as no forest land involved. NOCs enclosed as Annex 1.4.</p>

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Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.	
14)Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.	Not applicable.
15)The vegetation in the RF / PF areas in the study area, with necessary details, should be given.	No applicable as no forest land involved, or no national park, sanctuary or biosphere reserve is coming within 10km study area.
16)A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications, and submitted.	Ecology assessment was carried in and around the lease area to study the wildlife of the area. As per the faunal survey data, a total of six species were found within the Schedule-I of Indian Wildlife (Protection) Act, 1972 which includes Pavo cristatus (Indian Peafowl), Naja naja (Indian Cobra), Ptyas mucosa (Rat Snake), Varanus benghalensis (Common Indian Monitor lizard), Herpestes edwardsii (Common Mongoose) and Felis chaus (Jungle Cat). Conservation plan have been prepared for schedule I species and submitted to the concert authority for approval with the budget of 25,000,000 for wildlife animals' conservation.
17)Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/ (existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.	Forest NOC has been issued by the Office of Divisional Forest Officer, Palwal Forest Division, Palwal vide reference no. 1783 dated 24.08.2023 which confirms project site is not part of any reserve forest or protected forest. NOC are enclosed as Annex 1.4.
18)A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered,	The present study on the floral & faunal assessment for the project activity is based on the field survey of the area. By the following forest inventory

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CONSULTANT: PARIVESH ENVIRONMENTAL ENGINEERING SERVICES (NABET /EIA/2124/IA 0092(Rev.01))

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<p>endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled- I fauna found in the study area, the necessary plan along with budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.</p>	<p>methodology, the survey of biological parameters has been conducted within the core zone and buffer zone (10 km radial distance) from project site at village- Thanthri &amp; Rajupur Khadar, Tehsil &amp; District- Palwal, Haryana, in accordance with the guidelines issued by the ministry of Environment, Forest and Climate Change, CPCB and SPCB during the study period. A preliminary survey of the study area has been performed to get a general picture of the landscapes in vegetation. The detailed study has been incorporated in report in section 3.8 of chapter 3.</p>
<p>19) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.</p>	<p>Not applicable as project is not part of any declared critically polluted area.</p>
<p>20) Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).</p>	<p>Not applicable.</p>
<p>21) R&amp;R Plan/ compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&amp;R Plan, the relevant State/National Rehabilitation &amp; Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need-based sample survey, familywise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may</p>	<p>The project site is free from any habitat, the lease issued in name of proponent and the site is part of river Yamuna, So, there is no Project Affected Person (PAP) by the proposed mining activities. Hence, there is no need of R&amp;R Plan.</p>

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<p>be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&amp;R and socio-economic aspects should be discussed in the Report.</p>	
<p>22) One season (non-monsoon) [i.e., March-May (Summer Season); October-December (post monsoon season); December-February (winter season)] primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.</p>	<p>Baseline data as collected in core as well as buffer zone of 10 km from the project boundary during post-monsoon season (October 2023 to December 2023) in accordance with the guidelines for preparation of EIA.</p> <ul style="list-style-type: none"> <li>✓ A meteorological station was collected hourly for wind speed, wind direction, dry and wet bulb temperature, relative humidity, and general weather conditions were recorded throughout the study period in an automated data logger.</li> <li>✓ To assess the Ambient Air Quality (AAQ), 6 samples of ambient air were collected by installation of Respirable Dust Sampler and Fine Particulate Sampler at different locations from the study area during study period and analysed for primary air pollutants to work out the existing status of air quality.</li> <li>✓ 5 Groundwater samples were collected during the study period from the existing hand-pumps and bore wells, while 4 surface water was collected from nearest pond, rivers, and lakes. The samples were analysed for parameters necessary to determine water quality (based on IS: 10500: 2012, IS 3025 and APHA 23<sup>rd</sup> Edition, 2017 for ground water, water quality criteria classified by CPCB for surface water) and those which are relevant from the point of view of environmental impact of the proposed site.</li> <li>✓ 6 Soil samples were collected and analysed for relevant physical and chemical characteristics to assess</li> </ul>

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	<p>the impact of the proposed plant on soil.</p> <ul style="list-style-type: none"> <li>✓ The noise level measurements were also made at 6 locations in different intervals of time with the help of sound level meter to establish the baseline noise levels in the impact zone.</li> </ul>
<p>23) Air quality modelling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used, and input parameters used for modelling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing predominant wind direction may also be indicated on the map.</p>	<p>Air quality modelling was done to for the cumulative impact identification. It is observed that the ground level concentration (GLC) decreases from 55.71 <math>\mu\text{g}/\text{m}^3</math> at 50 m from the centre line of the road to 7.28 <math>\mu\text{g}/\text{m}^3</math> at 500 m for proposed mining lease in un-controlled way and 13.93 <math>\mu\text{g}/\text{m}^3</math> at 500 m to 1.82 <math>\mu\text{g}/\text{m}^3</math> at 50 m from the centre line of the road with controlled way respectively. These values have been predicted for a dry unpaved road. To mitigate the source emission, following mitigation measure will be adopted.</p> <ul style="list-style-type: none"> <li>✓ Water sprinkling will be done on the roads regularly. This will reduce dust emission further by 70-80%.</li> <li>✓ Care will be taken to prevent spillage by covering the carrying vehicles with tarpaulin and sprinkling of water, if dry.</li> <li>✓ Fortnightly scraping of road to keep the roads almost levelled. This will ensure smooth flow of vehicles and prevent spillage.</li> <li>✓ Overloading will be kept under check by giving prior awareness.</li> <li>✓ Proper Tuning of vehicles to keep the gas emissions under check.</li> <li>✓ Plantation of trees along roads sides to help reduce the impact of dust in the nearby villages.</li> </ul>
<p>24) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.</p>	<p>The total water demand will be 50.5 KLD for the mining operation (dust suppression – 31.0 KLD), domestic use (6.5 KLD), and plantation purpose (13.0 KLD) which will be fulfilled by private</p>

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	water tankers. About 1.3 KLD municipal wastewater will also be generated which will be treated in septic tank & further may be utilized for water sprinkling. No discharge into the river will be ensured. Details of water demand, use and water balance have been given in section 4.8 of chapter 4.
25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.	Water demand will be sourced from private water tankers.
26) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.	Ground water level will not be intersected during mining. An amount of INR 2 lakh capital with 20 thousand annual recurring amounts has been secured for rainwater which will be constructed on nearby school or panchayat office. Budget details are given in table 10.10 of chapter 10.
27) Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.	There is no major impact on water environment. Assessment of the adverse impact and indicate the proposed mitigation. For details, refer to section 4.8 & 4.10 of chapter 4.
28) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken, and Report furnished. The Report inter-alia shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.	The mining in the lease area will not intersect to the ground water level as this is sandmining project from riverbed. The maximum depth of sand mine will be 3m as ultimate depth is limited up to 3.0 m as the water table is 5-10 m BGL and only mining will be done in dry seasons except monsoon and water stream will not be touched during mining. So, the chances of water pollution are very minimal. The domestic wastewater disposed from the mining activity may cause contamination of surface water. Ground water will not withdraw so permission is not required from CGWA.
29) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.	No stream modification or diversion is proposed for the mining operation and mining will be done only in dry area; water stream will not be touched.
30) Information on site elevation, working depth, groundwater table etc. Should be provided	The maximum depth of sand mine will be limited up to 3.0 m as the water table is



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both in AMSL and bgl. A schematic diagram may also be provided for the same.	5-10 m BGL. For details refer section 4.10 of chapter 4.
31) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.	A suitable combination of trees (total 13,000) that can grow fast and have good leaf cover to contain dust pollution shall be adopted to develop greenbelt. Greenbelt development will be done wherever possible. Plantation will be done within first 2 years and in later years maintenance will be ensured. The gap plants also will be ensured to complete the numbers of total plants. Neem, Peepal, Mango, Shisham, Sirish, Babool, Gulmohar and other local fruity plants will be planted along the haul roads, along the riverbanks, schools, public building, and other social forestry programme. For details, refer to section 10.7 of chapter 10.
32) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.	During proposed mining, there will be an increase in traffic flow as two locations were identified for traffic survey location as one was in NH-334D which connect to Palwal crossing Eastern Peripheral Expressway & other was on Amarpur-Palwal Road near Amarpur village which connect to Eastern Peripheral Exp.). Total 1680 PCU/ day will increase in the existing traffic due to this mining activity. After commencement of the project, the projected traffic represents conditions of free flow (LOS Category "A") and represents a zone of stable flow conditions in 2024 which is convenience at all locations. For details, refer section 4.6 of chapter 4.
33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.	Because it is riverbed mining project so there is not any provision of adequate infrastructure and other facilities will be provided to mine worker within mine lease area. Office and rest shelter will be installed in ancillary area.
34) Conceptual post mining land use and Reclamation and Restoration of mined out	The mining activity in the mine site will be converted into the pit which will be replenished during monsoon season each



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<p>areas (with plans and with adequate number of sections) should be given in the EIA report.</p>	<p>year. No pit will remain on site. Detailed replenishment plan will be prepared, and approval will be obtained from concerned department.</p>
<p>35)Occupational Health impacts of the Project should be anticipated, and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.</p>	<p>Open cast method involves dust generation by excavation, loading and transportation of mineral. At site, during excavation and loading activity, dust is main pollutant which affects the health of workers whereas environmental and climatic conditions also generate the health problems. Occupational health hazard has been identified and risk matrix was developed. For details, refer to section 7.3.7 of chapter 7.</p>
<p>36)Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.</p>	<p>Following health related hazards were identified in open cast mining operations to the workers:</p> <ul style="list-style-type: none"> <li>a. Light: The workers may be exposed to the risk of poor illumination or excessive brightness. The effects are eye strain, headache, eye pain and lachrymation, congestion around the cornea and eye fatigue. In present case, the mining activity is done during daytime only.</li> <li>b. Heat and Humidity: The most common physical hazard is heat. The direct effects of heat exposure are burns, heat exhaustion, heat stroke and heat cramps; the indirect effects are decreased efficiency, increased fatigue, and enhanced accident rates. Heat and humidity are encountered in hot and humid condition when temperatures and air temperatures increase in summer up to 46.1°C or above in the riverbed mining area.</li> <li>c. Eye Irritation: - During the high windy days in summer the dust could be the problems for eyes like itching and watering of eyes.</li> <li>d. Respiratory Problems: Large amounts of dust in the air can be a</li> </ul>

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	<p>health hazard, exacerbating respiratory disorders such as asthma and irritating the lungs and bronchial passages.</p> <p>e. Noise Induced Hearing Loss: Machinery is the main source of noise pollution at the mine site. Occupational health hazard has been identified and risk matrix was developed. For details, refer to section 7.3.7 of chapter 7.</p>
<p>37) Measures of socio-economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.</p>	<p>The broad activities proposed under ESR initiative along with financial implications and year wise allocation of funds is shown in Table 9.8 of chapter 9. The salient features of the programme are as follows:</p> <ul style="list-style-type: none"> <li>✓ Social welfare program like provision of medical facilities educational facilities, water supply for the employees as well as for nearby villagers will be taken.</li> <li>✓ A well laid plan for employment of the local people has been prepared by giving priority to local people.</li> <li>✓ Supplementing Govt. efforts in health monitoring camps, social welfare, and various awareness programs among the rural population.</li> <li>✓ Assisting social plantation program.</li> <li>✓ Adoption of villages for general development.</li> <li>✓ Supply of water to village nearby villages.</li> <li>✓ Development of facilities within villages like roads, etc.</li> </ul>
<p>38) Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.</p>	<p>The environmental management must be integrated into the process of mine planning so that ecological balance of the area is maintained, and adverse effects are minimized. An Environmental Management Plan (EMP) is a site-specific plan developed to ensure that the project is implemented in an environmentally</p>

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

Terms of Reference Issued by SEIAA, Haryana	Compliance
	sustainable manner. An effective EMP ensures the application of best practice environment management to a project. For details, refer to chapter 9 of report.
39)Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.	The public hearing was conducted on dated 18.03.2023 & incorporated in EIA report in section 7.2 and minutes are enclosed as Annex 7.1.
40)Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	No litigation identified.
41)The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The total project cost is INR 19.0 Crores (Refer Annex 10.1). For environmental management, a budget of INR 46,00,000 has been proposed which is consisting of INR 17,000 as capital amount and INR 5,80,000 as annual recurring amount for the plan period. For details, refer to section 10.10 of report. Also, a budget for ESR initiatives and Occupation Health & safety of amount INR 11,00,000 has been proposed. Refer Section 10.8.3 of EIA report.
42)A Disaster management Plan shall be prepared and included in the EIA/EMP Report.	The DMP has been prepared based on the Risk Assessment and related findings covered in the report. The objectives of DMP are to describe the company's emergency preparedness, organization, the resource availability, and response actions applicable to deal with various types of situations that can occur at mines in the shortest possible time. For details, refer to section 9.4 of report.
43)Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.	The execution of the project brings overall improvement in the locality, neighbourhood, and the State by bringing up to industry, roads, infrastructure sectors and employment generation at local level. Hence it will be helpful for the economic growth and support to enhance

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Terms of Reference Issued by SEIAA, Haryana	Compliance
	quality of life through employment. For details, refer to section 8.2 of report.
44) Besides the above, the below mentioned general points are also to be followed:	-
a) All documents to be properly referenced with index and continuous page numbering.	Complied.
b) Where data are presented in the Report especially in Tables, the period in which the data were collected, and the sources should be indicated.	Complied.
c) Project Proponent shall enclose all the analysis/ testing reports of water, air, soil, noise etc. using the MoEF&CC/ NABL accredited laboratories. All the original analysis/ testing reports should be available during appraisal of the Project.	Complied. Annexure 3.2.
d) Where the documents provided are in a language other than English, an English translation should be provided.	Noted, complied.
e) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.	Noted
f) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA. II(I) dated 4th August 2009, which are available on the website of this Ministry, should be followed.	Noted.
g) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.	Noted, no change has been done.
h) As per the circular no. J-11011/618/2010-IA. II(I) dated 30.5.2012, certified report	This is fresh lease, not applicable.

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Terms of Reference Issued by SEIAA, Haryana	Compliance
of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest, and Climate Change, as may be applicable.	
i) The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage, and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.	Enclosed in chapter 2. (Surface Geological Map – Figure 2.6, Working Production Plan – Figure 2.7, Reclamation Plan - 2.10 & Environment Plan - 2.12).

Source: Terms of Reference issued by SEIAA, Haryana

### 1.5.1. Scope of the Study

The Scope and objective of the study includes following issues:

- Understanding the basic project activities and make a detailed review of policy and regulations.
- To study and analysis, the anticipated impacts of the proposed project on overall baseline environmental and socioeconomic conditions in its surrounding study area.
- To identify environmental sensitive features within the study area and places of architectural and cultural importance, if any, and its safeguarding.
- To recommend project specific appropriate preventive and mitigative measures to minimize pollution, environmental and social disturbances during entire life-cycle period of the project.
- To adopt suitable environmental action plans and management systems, to implement and monitor the appropriate mitigative measures.

Field studies for the project were conducted for the post-monsoon season (October 2023 to December 2023) to determine the existing conditions of various environmental attributes as outlined in **Table 1.4**.

**Table 1-4: Environmental Attributes and Frequency of Monitoring**

Attributes	Parameters	Frequency
Ambient Air Quality	PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>x</sub> & CO	Twice a week for one season as per CPCB guidelines at 6 locations.
Meteorology	Wind speed and direction, temperature, relative humidity & rainfall.	Near to project site at one location for one season continue hourly recording as per norms.
Water quality	Physical, Chemical and Bacteriological parameters	Once in a season (Surface Water at 4 & Ground Water 5 Locations)

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Attributes	Parameters	Frequency
Ecology	Existing terrestrial and aquatic flora and fauna within 10km radius circle.	Primary Inventorization and Secondary data was collected from the forest department.
Noise levels	Noise levels in dB(A)	Once in a season (24 hours) at 6 locations.
Soil Characteristics	Physico-chemical soil quality	Once during study period at 06 locations.
Land use	Land use classification for different categories	Based on Toposheets (SOI) and Satellite imagery.
Socio-economic Pattern	Demographic and Working Status	Based on Census of India, 2011 and primary consultation.
Hydrology	Drainage Pattern and nature of streams	Based on data collected from secondary sources like Survey of India Maps, Hydrology Atlas of India, CGWB etc.
Risk assessment and Disaster Management	Identification of areas where disaster can occur by fires and release of toxic substances	Site specific Hazard Identification and Risk assessment was done initially (As and when there is change in stored quantity of hazardous materials or process at site).

Source: Guidelines of Central Pollution Control Board, New Delhi

### 1.5.2. Methodology of the Study

The Environment Impact Assessment study was carried out as given in TOR which includes Identification, assessment, Quantitative Evaluation and Prediction of possible impacts. To minimize impact due to the proposed project on various environmental components, an impact identification matrix has been prepared, while the assessment of impacts has been based on mathematical models and/or scientific knowledge and judgment.

- Existing environmental status of the environment components was assessed. Identification and quantification of significant impacts of the proposed project on these environment components was carried out. The work carried is briefly reported below and has been elaborated in subsequent chapters.
- Predominant wind direction expected during the period of baseline monitoring in the study area as recorded by India Meteorological Department.
- Topography and location of surface water bodies like ponds, canals, and rivers.
- Location of villages/towns/sensitive areas.
- Identified pollution pocket, if any, within the study area.
- Accessibility, power availability and security of monitoring equipment.
- Areas which represent baseline conditions; and
- Collection, collation, and analysis of baseline data for various environmental attributes.

### 1.6. Environment Clearance Process

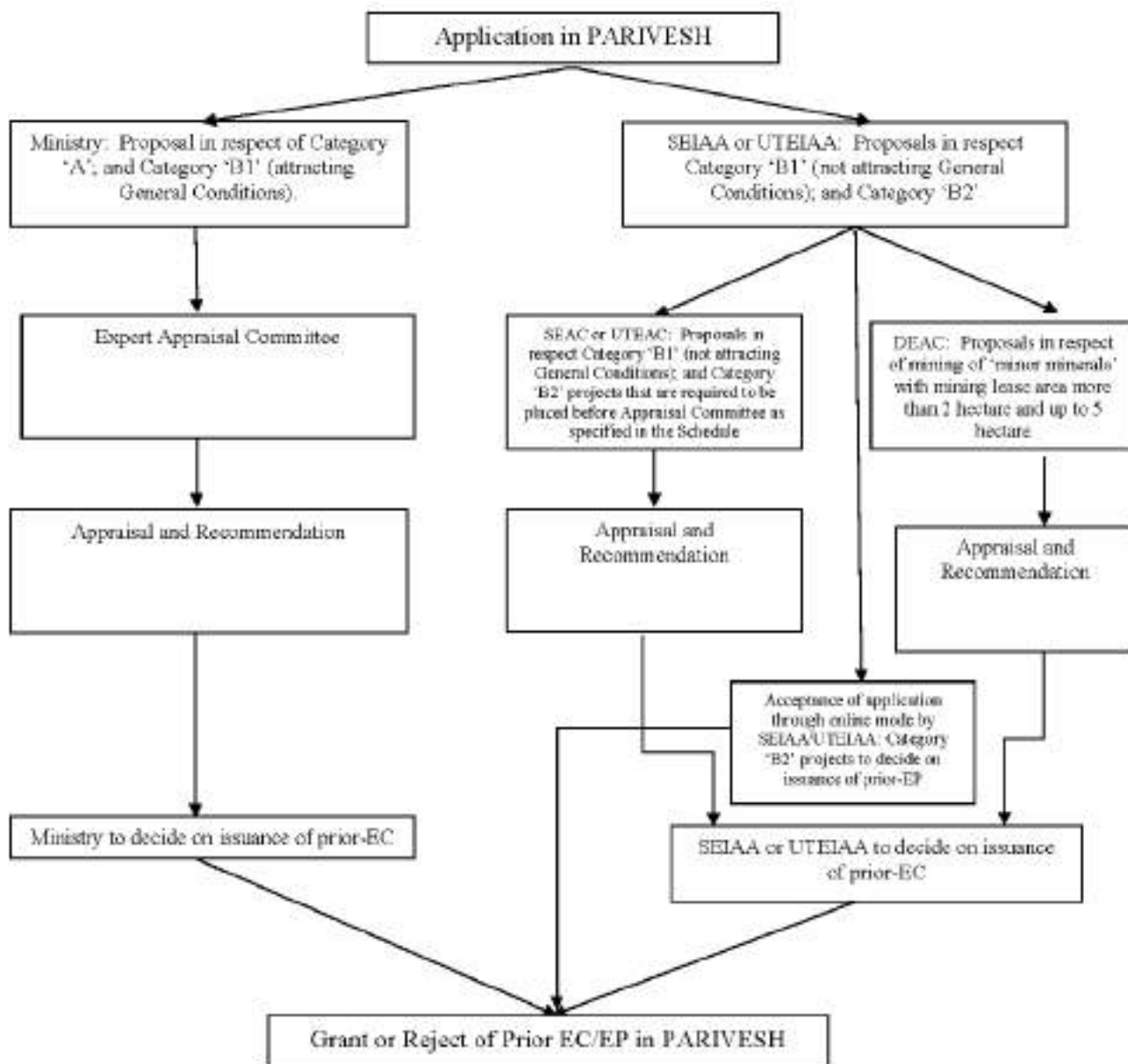
Environmental clearance of any new project or expansion of existing projects is now done as per the notification of the Ministry of Environment and Forest & Climate Change (MoEF&CC), Govt. of India dated 14<sup>th</sup> September 2006 and subsequently amended. This notification requires prior environmental clearance of all projects from competent central govt. or state govt. authorities,



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as may be the case. The projects are further classified into Category 'A' or Category 'B' projects based on spatial extent of potential impacts on human health, natural and man-made resources. Category 'A' projects require prior clearance by the MoEF&CC, Govt. of India while the Category 'B' projects must get clearance from the State Level Environment Impact Assessment Authority (SEIAA), constituted by the Central Government for this purpose. The environment clearance procedure for new projects requires maximum of four stages all of which may not be applicable to all the projects. The process of environmental clearance for the proposed project is shown in the schematic diagram below given as Figure 1.5.

**Figure 1.5: Schematic Diagram for Environmental Clearances Process**



These four stages are as follows:

**Stage 1- Screening:** It refers to the definite assignment of environmental category to projects or activities. In case of Category 'B' projects scrutiny of application at State level to categorize project in 'B1' or 'B2' is done. The 'B2' projects do not require EIA Reports.



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**Stage 2 - Scoping:** It refers to the process where EAC or SEAC determines detailed and comprehensive ToR for the EIA report and can also include site visits by the committee if required. But this process excludes construction projects such as township/ commercial complex / housing complex, etc.

**Stage 3- Public Consultation:** It refers to the process by which the concerns and views of local people and other stakeholders are ascertained and taken into consideration regarding the project. The Public Consultation takes part in two steps: Public Hearing and written responses.

**Stage 4- Appraisal:** This refers to detailed scrutiny of the application and EIA report to make categorical recommendations to the regulatory authority.

### 1.7. Legislative & Regulatory Framework

The environmental regulations, legislation as and policy guidelines and control that may impact the project are the responsibility of a variety of Government agencies. The principal environmental regulatory agency in India is the Ministry of Environment and Forest & Climate Change (MoEF&CC), Delhi. MoEF&CC formulates environmental policies and accords environmental clearance for different projects. The relevant standards, which are of significance to the proposed project, are discussed in the section below.

**Table 1-5: Key Environmental Legislation**

Rules / Act	Scope and Objectives	Applicable Agencies
Water (Prevention and Control of Pollution) Act 1974 and Amendment Act, 2014.	To provide for prevention & control of water pollution and enhancing water quality	Central and State Pollution Control Boards
The Air (Prevention and Control of Pollution) Act, 1981	To provide for the prevention and control of air pollution.	CPCB & SPCB
Forest Conservation Act 1980 & Forest (Conservation) Rules, 2003	To halt rapid deforestation & resulting environment degradation.	GoI.
Environment Protection Act 1986, Amendments 1993.	To provide for the protection and improvement of environment.	GoI, MoEF&CC.
Noise Pollution (Regulation and control) (Amendment) Rules, 2010	To control & take measures for abatement of noise and ensure that level does not cross standard.	GoI, Nodal Agencies of MoEF&CC & State Govt.
Hazardous and Other Wastes (Management and Transboundary Movement) Amendment Rules, 2023	To the adequate handling of hazardous materials or wastes.	Central Government, Nodal Agencies MoEF&CC, CPCB
Solid Waste Management Rules 2016 & Plastic Waste Management (Amendment) Rules, 2022	To regulate the management and handling of the municipal or domestic solid wastes	CPCB, SPCB, State Govt. and Municipal Authority

Source: (i) MoEF&CC and CPCB

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## 1.8. Report Structure

The overall contents of the EIA report have been prepared as per the generic structure (Appendix III) of EIA Notification issued by Ministry of Environment & Forests and Climate Change (MoEF&CC), Govt. of India on 14<sup>th</sup> September 2006 and subsequent amendments. The report consists of eleven chapters. The content of the chapters is briefly described in this section.

**Chapter-1 Introduction:** This chapter contains the general information on the mining of minerals, major sources of environmental impacts in respect of mining projects and details of environmental clearance process.

**Chapter-2 Project Description:** In this chapter the proponent should also furnish detailed description of the proposed project, such as the type of the project, need for the project, project location, layout, project activities during construction and operational phases, capacity of the project, project operation i.e., land availability, utilities (power and water supply) and infrastructure facilities such as roads, railways, housing, and other requirements.

**Chapter-3 Description of the Environment:** This chapter should cover baseline data in the project area and study area.

**Chapter-4 Anticipated Environmental Impacts Assessment & Mitigation Measures:** This chapter describes the anticipated impacts on the environment and mitigation measures. The method of assessment of impacts including studies carried out, modelling techniques adopted to assess the impacts where pertinent should be elaborated in this chapter. It should give the details of the impacts on the baseline parameters, both during the construction and operational phases and suggests the mitigation measures to be implemented by the proponent.

**Chapter-5 Analysis of Alternatives (Technology & Site):** This chapter gives details of various alternatives both in respect of location of site and technologies to be deployed in case the initial scoping exercise considers such a need.

**Chapter-6 Environment Monitoring Program:** This chapter should cover the planned environmental monitoring program. It should also include the technical aspects of monitoring the effectiveness of mitigation measures.

**Chapter-7 Additional Studies:** This chapter should cover the details of the additional studies required in addition to those specified in the ToR and which are necessary to cater to more specific issues applicable to the project.

**Chapter-8 Project Benefits:** This chapter should cover the benefits accruing to the locality, neighbourhood, region, and nation. It should bring out details of benefits by way of improvements in the physical infrastructure, social infrastructure, employment potential and other tangible benefits.

**Chapter-9 Environmental Cost Benefit Analysis:** This chapter should cover on Environmental Cost Benefit Analysis of the project.

**Chapter-10 Environmental Management Plan:** This chapter should comprehensively present the Environmental Management Plan (EMP), which includes the administrative and technical setup, summary matrix of EMP, the cost involved to implement the EMP, both during the construction and operational phase and provisions made towards the same in the cost estimates of project construction and operation. This chapter should also describe the proposed post-monitoring scheme as well as inter-organizational arrangements for effective implementation of the mitigation measures.

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**Chapter-11 Summary & Conclusion:** This chapter gives the summary of the full EIA report condensed to ten A-4 size pages at the maximum. It should provide the overall justification for implementation of the project and should explain how the adverse effects have been mitigated.

**Chapter-12 Disclosure of the Consultant:** This chapter should include the names of the consultants engaged with their brief resume and nature of consultancy rendered.

**CHAPTER – 02**  
**PROJECT**  
**DESCRIPTION**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## 2. Project Description

### 2.1. General

The most important life nourishing systems of nature are a freshwater ecosystem, in which rivers are important and play a major role in the terrestrial and aquatic ecosystem. It transfers the water and minerals from the terrestrial environment to ocean. In India, there are many perennial, annual and seasonal or non-perennial rivers which provide many natural resources like Sand, Gravel, and Boulder. These materials are beneficial for the development of a country in way of urbanization and industries. Riverbed mining is the process of removal of sand, gravel, and boulders from the river. The name of this raw material is based upon their size like if the size of material >256 mm then it is categorized as boulders and size varies between 64-256 mm Cobbles, Gravel/ Pebbles size varies between (2-64 mm) are divided into 5 types because of their Different Sizes, if size varies between 32-64 mm very coarse gravel, 16-32 mm coarse gravel, 8-16 mm medium gravel, 4-8 mm fine gravel, 2-4 mm very fine gravel. Sand is a movable, non-cohesive granular material whose size varies between 0.063 mm and 2 mm. Sand also divided into 4 types because of the different size, very coarse sand (1-2 mm), coarse sand (0.5-1 mm), medium sand (0.25-0.5 mm), fine sand (125- 250 µm), and very fine sand (62.5-125 µm) respectively. Also, as per the Indian Standard Soil Classification System (ISSCS) Boulder - > 300 mm in diameter, Gravel - 300 - 2 mm in diameter, Sand < 2mm in diameter. The term sand is used to cover almost any rock or mineral, but technically it is limited to quartz sand with a minor impurity of mica, iron oxides and feldspar. Sand and gravel occur as sedimentary beds, lenses and pockets lying on or close to the surface or inter-bedded with other sedimentary formations. They take place in the river channel and floodplain deposits, fluvial glacial deposits, seashore deposits, windblown deposits along and near water bodies, marine and freshwater sedimentary beds, and desert sand dune. The sand acts as a buffer against strong tidal waves and storm surges by reducing their impact as they reach the shore and it also a habitat for crustacean species and other related marine organisms. The riverbed mining activity is done in whole the world to construct the buildings, roads and supports urbanization.

### 2.2. Location of Project

M/s Minerio Mining Private Limited proposed a mining project for mineral sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 Metric Tonne/ year production over an area of 99.384 ha located at Villages Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana. This is a fresh lease.

### 2.3. Mine Details

#### 2.3.1. Topography & Drainage

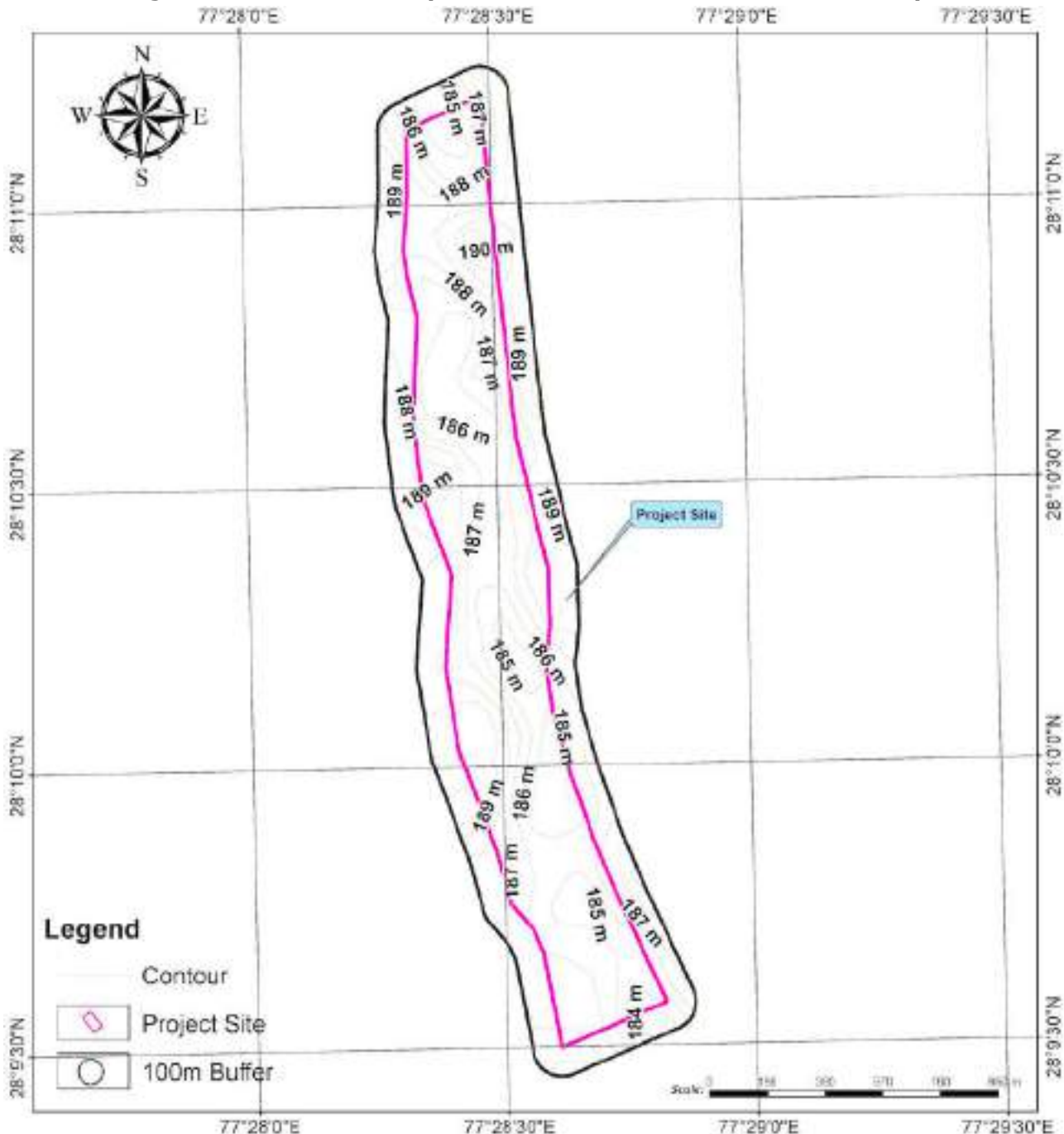
Highest elevation in riverbed at extreme north end is 132.9 mRL and bank top level is 135.3 mRL whereas the levels at the extreme south end in riverbed is 129.5 mRL and Riverbank top is 133.0 mRL. The Yamuna River flows from N to S direction in Thanthri & Rajupur khadar revenue village. Difference between highest and lowest elevation of both pits is approx. 2-3 m.

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

### 2.3.2. Drainage Pattern / Mine Drainage

The river Yamuna flows from N to S which originates from the Himalayas provides the major drainage in the lease area. The general slope of the land surface is From N to S. The levels of the riverbed and bank area of the proposed mining area are as under. Contour map with 100m buffer from site & Elevation Map / Slope Map of Study area are given as Figure 2.2 & Figure 2.3.

**Figure 2.1: Contour Map with 100m Buffer Site Elevation / Slope**



**Table 2-1: Levels of Riverbed and Riverbank**

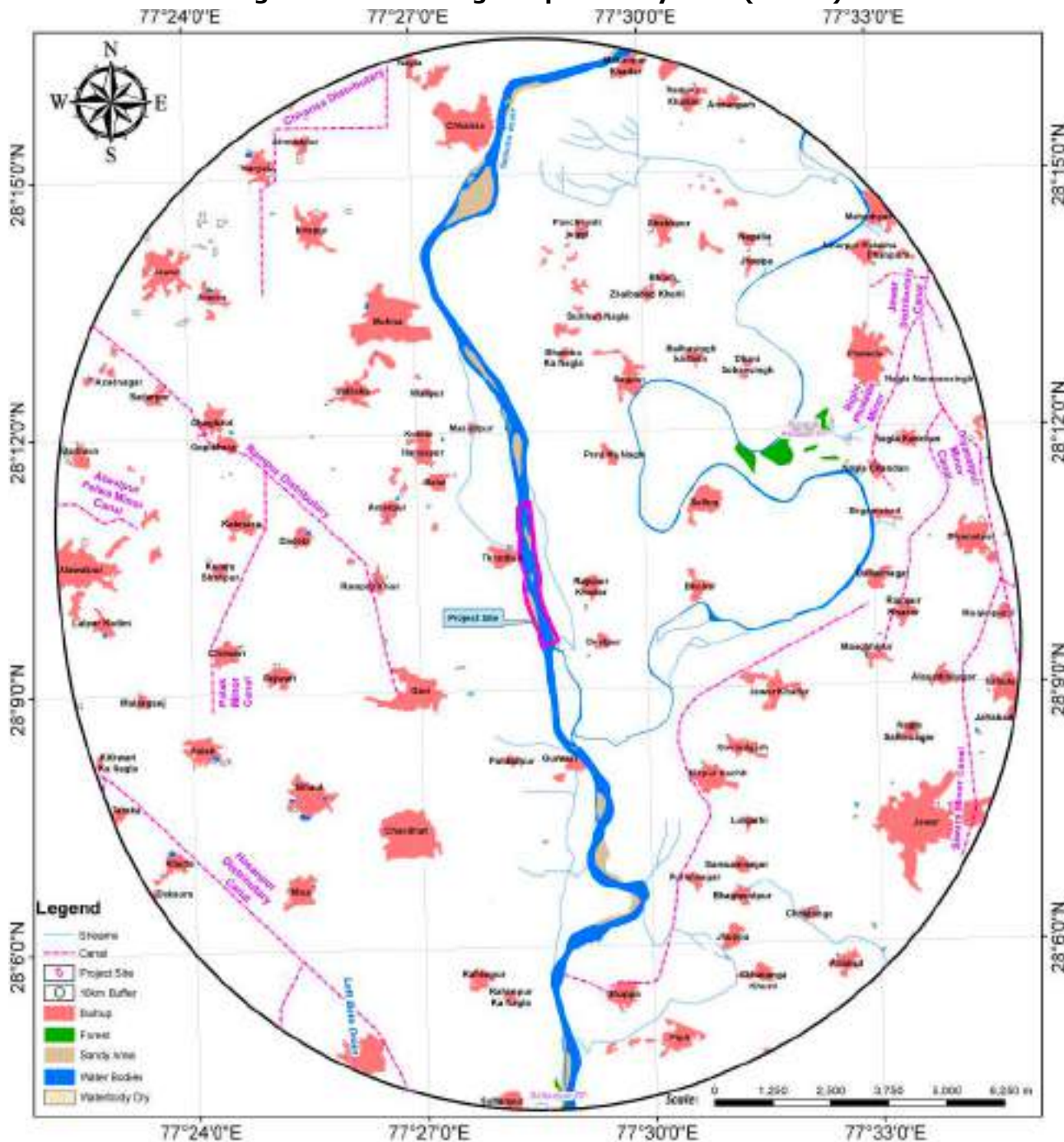
Location	Riverbed levels (mRL)	Riverbank top levels(mRL)
(South end)	129.5	133



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

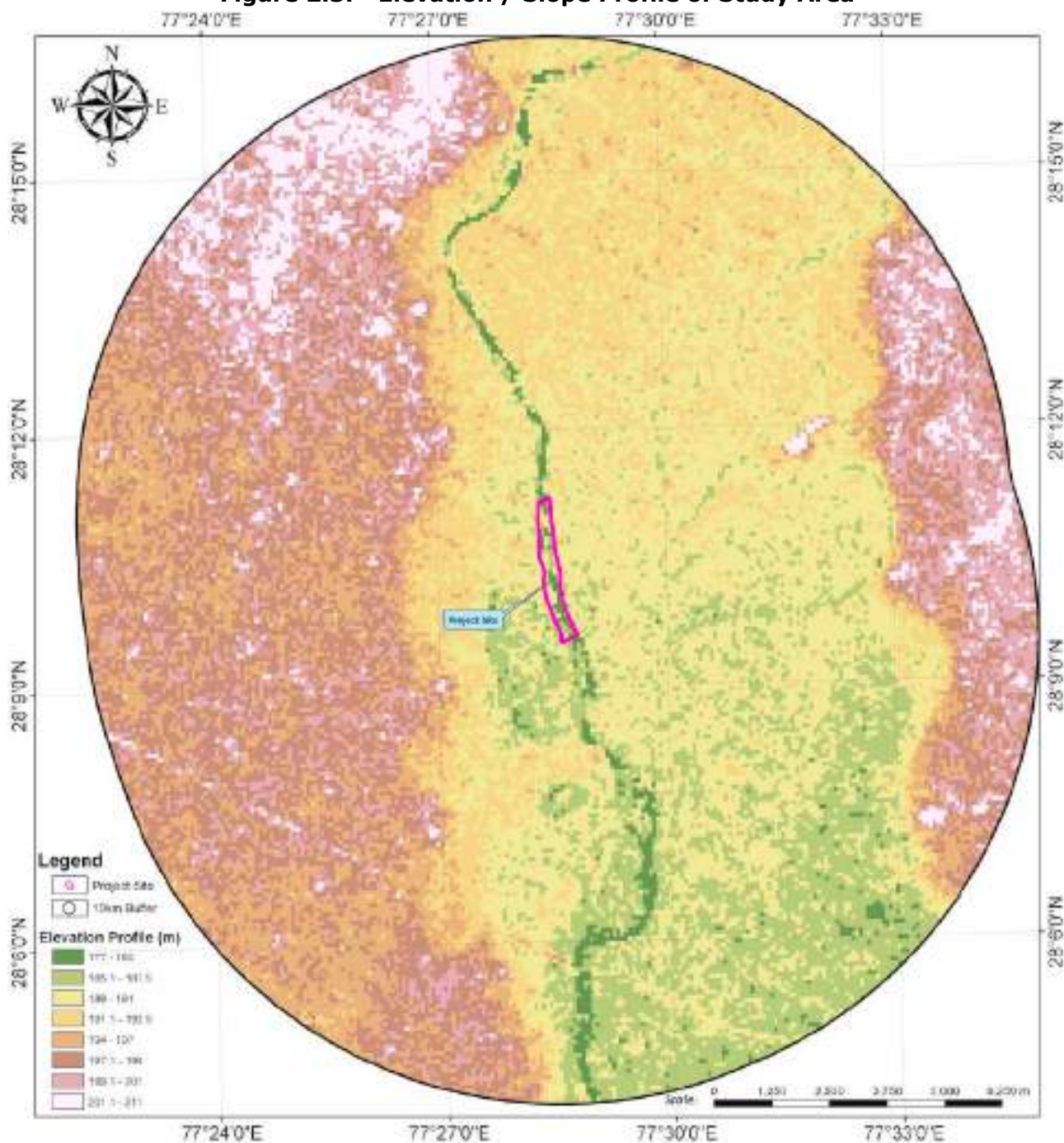
Location	Riverbed levels (mRL)	Riverbank top levels(mRL)
400	129.66	132
800	129.87	133
1200	130.32	133.57
1600	130.87	133.9
2000	131.37	134.4
2400	131.6	135.2
2800 (North end)	132.85	135.3

**Figure 2.2: Drainage Map of Study Area (10 km)**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Figure 2.3: Elevation / Slope Profile of Study Area**



## 2.4. Geology and Exploration

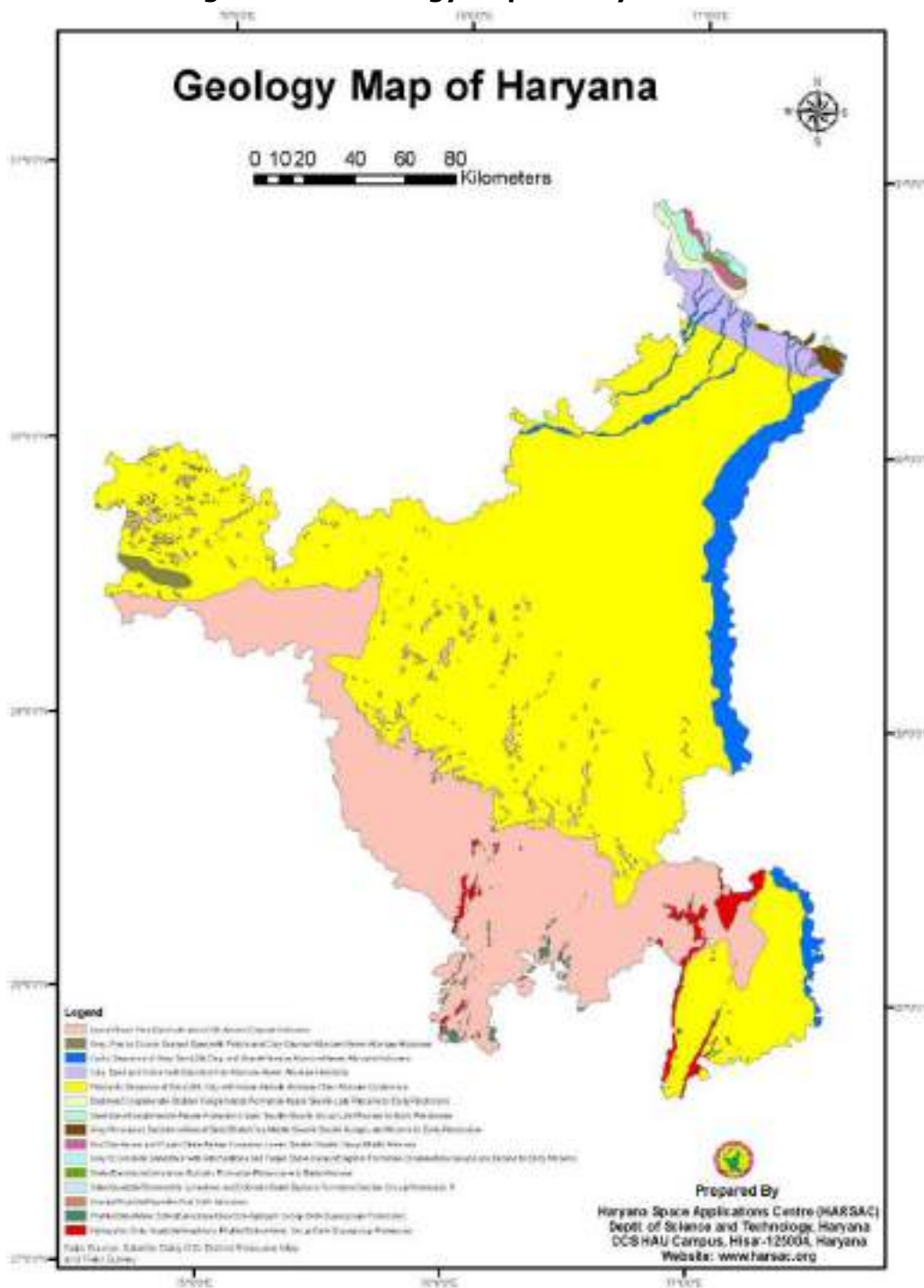
### 2.4.1. Regional Geological Setup

The regional geology of Distt. Faridabad & Palwal (Haryana) is represented by varieties of formations belonging to Delhi Super Group. Stratigraphically the rock formations of Delhi super group are composed of arenaceous, argillaceous & calcareous sediments. These sediments have been placed by Heron (1923) in the Alwar & Ajabgarh series of Delhi system & intruded by basic granitic rocks. The general succession of Delhi system can be represented as follows: (Das, Gupta S.P. 1968).



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Figure 2.4: Geology Map of Haryana State**



**Table 2-2: Regional Geology of Palwal District**

Series	Rock Types
Recent intrusive	Alluvium, dune sand, soil, ankerite, chert, quartz veins, younger basic dykes. Granites, Pegmatites, Quartz veins Older basic rocks.
Ajabgarh series	Carbonaceous phyllites & schists etc. (Local).
	Massive Quartzites.
	Phyllites, Mica-schists (Local).
	Marble, calc-gneiss, amphibolite etc.

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

Series	Rock Types
	Schist with or without garnet. Staurolite, Kyanite, Sillimanite, Andalusite, phyllites, sandy phyllites.
Alwar series	Amphibole quartzite, marble, Amphibolite's.
	Arko sic quartzites, quartzites & Interrelated phyllite & schists. Magnetite & Hematite quartzites etc.
	Phyllite & schists.

### 2.4.2. Local Geology

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

**GEOLOGY OF THE AREA:** The sediments of the riverbed are of recent nature. These sediments have been brought by river water and deposited in the bed of Yamuna River. The following sequence of formations has been observed in the area:

- Soil/Alluvium
- Sand

#### Description of Formation:

Description of formations found in the area are as under:

**Soil/ alluvium:** The finer sediments have been deposited in the flood plains of the Yamuna River.

**Sand:** Sediments of less than 1-3 mm size are predominantly deposited in the riverbed by flood waters during rainy season. There is no perfect classification between Sand and Silt. They have been deposited in a mixed state. As usual the larger size sediments are deposited at the bottom and the smaller sizes are deposited at the top, on the edges/flanks of the riverbed.

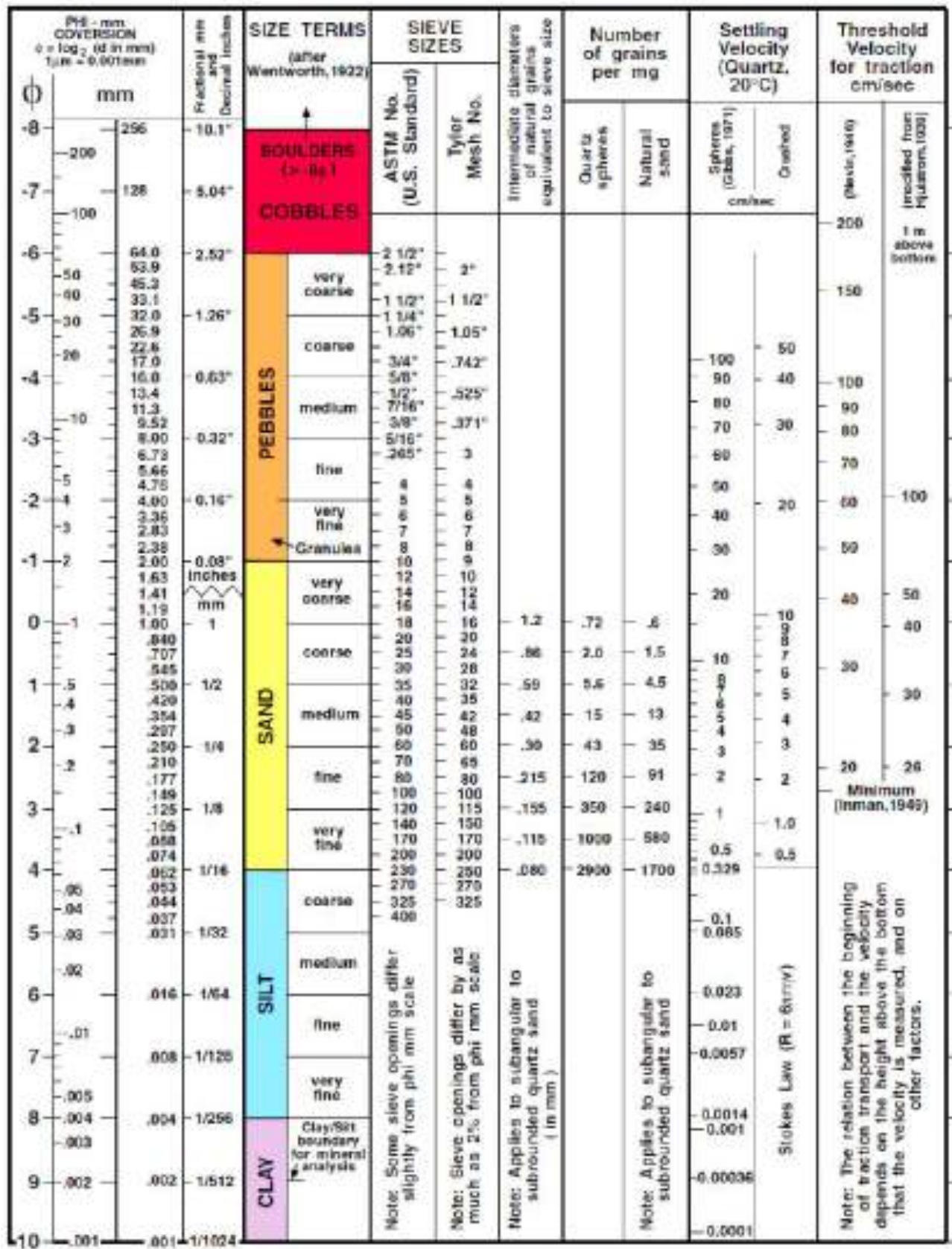
However, during shifting of the river course towards East about five hundred years back, silt was deposited on top in thicker layers up to 3 meters in some cases underlain by about 6-15 meters of sand.

Sediments of various sizes and in mixed form are predominantly deposited in the riverbed and there is no perfect classification between sediments. These may be called as coarse sand, medium sand, and fine sand.

The term sand is used to denote an aggregate of mineral or rock grains greater than 1/16mm and less than 2 mm in diameter.

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Figure 2.5: Size Distribution of Mineral**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**PHYSICAL CHARACTERISTIC OF MINERAL:** Technically, sand is merely a size category. Sand is particulate matter that's larger than silt and smaller than gravel. Different specialists set different limits for sand:

- Engineers call sand anything between 0.074 and 2 millimetres, or between a U.S. standard #200 sieve and a #10 sieve.
- Soil scientists classify grains between 0.05 and 2 mm as sand, or between sieves #270 and #10.
- Sedimentologists put sand between 0.062 mm (1/16 mm) and 2 mm on the Wentworth scale, or 4 to -1 unit on the phi scale, or between sieves #230 and #10. In some other nations a metric definition is used instead, between 0.1 and 1 mm.
- From a geological viewpoint, sand is anything small enough to be carried by the wind but big enough that it doesn't stay in the air, roughly 0.06 to 1.5 millimetres. It indicates a vigorous environment.

**SAND COMPOSITION AND SHAPE:** Most sand is made of quartz or its microcrystalline cousin chalcedony because that common mineral is resistant to weathering. The farther from its source rock sand is, the closer it is to impure quartz. But Yamuna sands contain quartz grains, tiny bits of rock (lithics), or dark minerals like limestone and ferruginous concretions.

The size of the sediments is variable. The grains whether small or large are rounded in shape. Sand is grey, brown in colour, coarse to fine grained. The present deposits are of good quality and can be used for building industries. There is no other use of this material.

### 2.4.3. Replenishment Plan

**ORIGIN & CONTROL OF MINERALISATION (ANNUAL REPLENISHMENT OF MINERAL IN RIVERBED AREA vis-à-vis SEDIMENTATION):** Sedimentation, in the geological sciences, is a process of deposition of a solid material from a state of suspension or solution in a fluid (usually air or water). Broadly defined it also includes deposits from glacial ice and those materials collected under the impetus of gravity alone, as in talus deposits, or accumulations of rock debris at the base of cliffs. The term is commonly used as a synonym for sedimentary petrology and sedimentology.

Sedimentation is generally considered by geologists in terms of the textures, structures, and fossil content of the deposits lay down in different geographic and geomorphic environments.

The factors which affect the "Computation of Sediment":

Geomorphology & Drainage Pattern: The following geomorphic units plays important role:

- ✓ Structural Plain.
  - ✓ Structural Hill.
  - ✓ Structural Ridge.
  - ✓ Denudation Ridge & Valley.
  - ✓ Plain & Plateau of Gangetic plain.
  - ✓ Highly Dissected pediment.
  - ✓ Un dissected pediment.
- a) Distribution of Basin Area River wise (Area in Sq. Km or Sq. Miles).
  - b) Drainage System/Pattern of the area (Drainage Density = ..... Km/Sq. Km of Yamuna River.
  - c) Rainfall & Climate: Year wise Rainfall data for previous 8 years of Yamuna Basin/River.



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d) As per Dandy & Bolton study "Sediment Yield" can be related to Catchment Area and Mean Annual Run-off.

Sand is an essential minor mineral used extensively across the country as a useful construction constituent and variety of other uses in sports, agriculture, glass making (a form of sand with high silica content) etc. It is common knowledge that minerals are non-renewable, but this form of mineral naturally gets replenished from time to time in each river system and is very much interrelated to the hydrological cycle in a river basin.

The rivers originating from the Himalayas bring with them lots of aggregate materials whereas as they move downstream, only finer elements / minerals like sand are found in abundance. River Yamuna near Dak Patthar barrage leaves Uttarakhand and enters Himachal Pradesh.

The Yamuna River is the biggest tributary of the river Ganga in North India. Its source in the Yamunotri glacier at an elevation of 6387 m on Southwestern sides of Bander pooch crests in the lower Himalayan ranges. The overall span of the Yamuna River is 1376 Kms (855 miles) with catchment area of 366223 square km (141,399 square mile). This encompasses 40.2 % of the whole Ganga valley, prior to joining Ganga at Triveni Sangam in Allahabad (UP)

**ITINERARY OF YAMUNA RIVER AND ITS TRIBUTARIES:** The river passes through many states such as Uttarakhand, UP, Haryana, going across to HP and then Delhi. With yearly discharge of around 10,000 cubic billion meters (cbm) and consumption of 4400 cbm (of which irrigation comprises 96%), the river represents above 70% of water provision of Delhi. Yamuna water are fairly good quality for its entire span from Yamunotri in Himalayan ranges to Wazirabad in Delhi, the length of which is around 375 Kms.

**ITINERARY OF DRAINAGE AREA OF YAMUNA:** The origin of Yamuna is situated in the Yamunotri glacier at an elevation of 6387 m on SE sides of Bander pooch crests, which are in the Mussoorie range of lower Himalayan range in Uttarkashi district of Uttarakhand, to the North of Haridwar. From this place Yamuna runs to South around 200 Kms across the Shivalik mountain ranges and lower Himalayan ranges. A significant portion of its beginning of Drainage basin (with total area of 217.00 square km) is situated in HP and a major tributary sapping the upper drainage basin in the Tons, which is also biggest and most extensive tributary of the Yamuna. Other tributaries in the area are the Rishi Ganga, Giri, Hanuman Ganga, Kunta & Bata, which sap the upper drainage basin of the huge Yamuna River. Subsequently, the river moves down the terrains of Doon basin at Dak Patthar close to Dehradun, in this place water is redirected into a channel for the purpose of electricity generation. Once it goes across the Sikh religious place of Ponta Sahib, the river arrives at Tajewala in the YAMUNANAGAR district of Haryana where a dam was constructed in 1873. This dam is the origin of the two major channels or water courses – Eastern Yamuna Canal and Western Yamuna Canal and both drain in UP & Haryana. The Western Yamuna Canal (WYC) traverses Karnal, Yamuna Nagar and Panipat prior to arriving at the Haider pur water treatment plant, which provides a portion of municipal water provisions of Delhi. The Yamuna also forms natural boundary between the states of Uttarakhand & HP and amid the states of UP and Haryana. Together with the Ganga to which it flows almost parallel once it meets the Indo-Gangetic plateau, the biggest Alluvial productive area in the World, it forms the Ganges-Yamuna Doab are stretched across 69,000 square Km which is 33% of the whole area.

Table of Drainage Basin area of River Yamuna (square KM/square mile) with % of Drainage Basin.

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**Table 2-3: Basin Area of Yamuna River**

S. No.	State	Drainage Basin Area
1)	HP	5799/2240 (1.6 %)
2)	UP & Uttarakhand	74208/142 (21.50 %)
3)	Rajasthan	102883/39739 (29.80%)
4)	Haryana	21265/8214(6.5%)
5)	Delhi	1485/574(0.4%)
6)	MP	14023/5416 (40.6%)

**DANDY & BOLTON FORMULA FOR CALCULATION OF SEDIMENT YIELD:** Dandy & Bolton formula is often used to check whether the sedimentation yield exceeds the replenishment rate but the whole question is whether there is adequate monitoring of the river basin, the answer is no as hydrological stations are sparsely spread. The formula uses catchment area and mean annual runoff as key determinants to give a yield value. It does not differentiate in basin wide smaller streams and their characteristics. CWC distinguishes river basins as classified and non-classified, as per the latest hydrological data for unclassified River basins; there are 122 GDSW (Gauge, Discharge, Sediment & Water Quality) sites in 12 such basins, the number was 147 in 2005. This brings in context the whole issue of scientific mining, thereby indicating that the monitoring of sediment yield in rivers / streams within the river basins is essential to arrive at extraction rates and express and conduct environmental studies based on these basin wide characteristics which should become part of the 'Terms of Reference'.

**SEDIMENT YIELD VERSUS DRAINAGE AREA:** Dandy and Bolton studied sedimentation data from about 1500 reservoirs, ponds, and sediment detention basins. In developing their formulas, they used data from about 800 of these reservoirs with drainage areas greater than or equal to 1 mi<sup>2</sup>. The smaller watersheds-those of drainage area less than 1 mi<sup>2</sup>-were excluded because of their large variability of sediments yield, reflecting the diverse effects of soils, local terrain, vegetation, land use, and agricultural practices.

For drainage areas between 1 and 30,000 mi<sup>2</sup>, Dandy and Bolton found that the annual sediment yield per unit area was inversely related to the 0.16 power of the drainage area:

In which S= sediment yield in tons per square mile per year; SR = Reference sediment yield Corresponding to a 1-mi<sup>2</sup> drainage area, equal to 1645 tons per year; A = drainage area in square miles; and AR = reference drainage area (1 mi<sup>2</sup>)

**SEDIMENTS YIELD VERSUS MEAN ANNUAL RUNOFF:** Dandy and Bolton studied sedimentation data from 505 reservoirs having mean annual runoff data. Annual sediment yield per unit area was shown to increase sharply as mean annual runoff Q in- creased from 0 to 2 in. Thereafter, for mean annual runoff from 2 to 50 in. annual sediment yield per unit area decreased exponentially.

This led to the following equations.

For Q <2 in.:

For Q >2 in.:

In which QR = reference mean annual runoff QR = 2 in.

Dandy and Bolton combined Equation 15-10 and 15-11 into a set of equations to express sediment yield in terms of drainage area and mean annual runoff.

For Q <2 in.:

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For  $Q > 2$  in.:

Sec: 15.2 Sediment Productions.

For  $SR = 1645$  tons/mi<sup>2</sup>/y,  $QR = 2$  in., and  $AR = 1$  mi<sup>2</sup>, Eq. 15-12 reduces to the followings:

For  $Q < 2$  in.:  $S = 1280 Q^{0.46} (1.43 - 0.26 \log A)$

For  $Q > 2$  in.:  $S = 1965 e^{-0.055Q} (1.43 - 0.26 \log A)$

Equations 5-12 and 5-13 are based on average values of grouped data; therefore, they should be used with caution. In Certain cases, local factors such as soils, geology, topography, land use, and vegetation may have greater influence on sediment yield than either mean annual runoff or drainage area. Nevertheless, these equations provide a first approximation to be of sediment yield for watershed planning purposes.

**Calculation of Sediment Yield for Sand Mine of Thanthri Block**

Total Targeted Production is 37.80 Lakh MT/year.

- ✓ Area under riverbed: 227.86 Acre.
- ✓ Drainage basin area of river Yamuna and its tributaries in Haryana: 8214 square miles.
- ✓ Normal Annual Rainfall of Yamuna catchment is district (1978 to 2005) :1076mm or 42.36 inch.

With above inputs, the calculation of the sediment yield by the Dandy and Bolton formula is illustrated below:

Sample Set	S.No.	Q (in inches)	A (in square mile)	S
	1	3.5	150	1400.823
	2	27.4	8214	179.4756

$S = 1965 e^{-0.055Q} [1.43 - 0.26 \log(A)]$

Dandy & Boltan formula also says that actual sediments yield from individual drainage basins may vary 10-fold or even 100-fold from computed yields. Since itinerary of river Yamuna indicates that its basis comprises of sediment rocks with good average rainfall therefore there are fair chances of yield of sediments to be 50-fold of computed results hence Actual Sediment Yield will be about 40-42 Lakh Tones / Annum

The equations express the general relationships between sediment yield runoff and drainage area. They may provide a quick rough approximation of mean sediment yields on a regional basis for preliminary watershed planning. Because Dandy & Bolton have derived the equation from average values computed sediment yields normally would be low for highly erosive area and high for well stabilized drainage basins with high plant density. Factors which have direct bearing on sediments yield & limitations of Dandy & Bolton equation.

Sediment yield of a sediment basin has direct impact of local terrain, climate, vegetation, soils, agricultural practices & land use pattern of catchment area of the sediment basin aforesaid factors varies from basin to basin therefore, Dandy & Bolton has category stated that use of the equation to predict sediment yield for a specific location would be unwise because of the wide variability caused by local factors not considered in the equation development. Actual sediment yield from individual drainage basins may vary 10-fold or even 100-fold from computed yields.

**GRADE USE OF SAND:** The minor mineral sand is made of quartz or quartzite/its microcrystalline cousin chalcedony because that common mineral is resistant to weathering. Sands contain quartz, feldspar grains, tiny bits of rock (lithics), or dark minerals like ilmenite and magnetite.

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The size of the sediments is variable. The grains whether small or large are rounded in shape. Sand is mainly grey, brown in colour, coarse to fine grained. The present deposits are of good quality and can be used for building industries. There is no other use of this material.

#### **2.4.4. Exploration of Area**

No specific method of exploration is required as the river borne sediments are deposited all along the riverbed and are very well exposed on the surface. Moreover, these sediments are accumulated/ replenished every year during rainy season by flood waters to almost the same level depending on the intensity of rains on the upstream side. Adequate quantity of sand reserves is available for meeting consumer demand.

#### **2.4.5. RESERVE**

**METHOD OF ESTIMATION OF RESERVE:** Volumetric method is adopted for calculating reserves of sand. Reserves are estimated based on established width, thickness, and strike length based on influence of the mineralized formation in the riverbed. Where good inferences are available only such area are considered for reserve estimation. The depth is considered up to 3.0 m as working is permitted up to 3.0m depth in the riverbed.

##### **GEOLOGICAL & MINEABLE RESERVES**

**PROVED RESERVES:** Following special conditions which are applicable for excavation of minor mineral(s) from riverbeds to ensure safety of riverbeds, structures and the adjoining areas are considered while calculating the reserves of this area:

- a. No mining would be permissible in a riverbed up to five times of the span of a bridge on up-stream side and ten times the span of such bridge on down-stream side, subject to a minimum of 250 meters on the up-stream side and 500 meters on the down-stream side.
- b. There shall be maintained an un-mined block of 50 meters width after every block of 1000 meters over which mining is undertaken or at such distance as may be directed by the Director or any officer authorized by him.
- c. The maximum depth of mining in the riverbed shall not exceed three meters from the un-mined bed level at any point in time with proper bench formation.
- d. Mining shall be restricted within the central 3/4th width of the river/ rivulet.
- e. A barrier of 7.5 m width will be left from the lease boundary, if falling in the riverbed.
- f. The river does not have any water flow during the post monsoon period and sand bed remains dry.

Mineral reserves are calculated up to 3 m depth from riverbed surface RL.

- a. Mineral Reserves falling in the riverbed area have been calculated to take the maximum permissible depth of 3 m from the riverbed surface RL.
- b. The bulk density of Sand is considered 1.80.
- c. Volumetric method is adopted for calculating reserves of Sand.
- d. The mineable reserves are calculated by deducting "Blocked Geological Reserves on account of riverbanks, lease boundary, railway line, highways, bridges, (wherever applicable) from total proved Geological Reserves".
- e. It is considered that riverbed Sand shall be replenished every year as evident from preceding paragraph (3.2.6) on "Annual Replenishment of Mineral in Riverbed Area vis-à-vis Sedimentation".

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**UNFC classification – Codes of UNFC are followed for reserve calculation.**

- a. UNFC is a three-digit code-based system, the economic viability axis representing the first digit, the feasibility axis the second digit and the geological axis the third digit. Each digit is provided.
- b. Codes 1, 2 and 3 in decreasing order. The highest category of resources under UNFC system has code (111) and for lowest category the code is (334).
- c. Code (111): This code is provided for the economically mineable part of the measured mineral resources (proved category reserves).
- d. Code (121): This code is provided for the economically mineable part of the indicated mineral resources (probable category reserves).
- e. Code (211): The part of the measured mineral resources (proved category), which as per feasibility study has not found economically mineable. The reserves blocked in 7.5 meters buffer zone and 50 meters from permanent structure.
- f. Code (222): The part of the indicated mineral resources (probable category), which as per feasibility study has not found economically mineable. The reserves blocked in 7.5 meters buffer zone and 50 meters from permanent structure.
- g. Code (480): Tonnage, Grade and mineral contents can be estimated with low level of confidence and resources are also inferred from geological.

The reserves of Sand calculated by volumetric method. All reserves are proved reserves. Details are given as below.

- 1) The entire reserves of Sand up to the depth of 3.0 m are calculated.
- 2) The bulk density of sand is considered 1.80 MT/CUM.
- 3) The reserves of Sand calculated by volumetric method and are summarized here below:  
Reserves in MT= Area in acres x 4000 x depth 3.0m x Bulk Density 1.80

**Table 2-4: Geological Reserve Estimation**

Mining area in acres	Ancillary area in acres	Blocked area in acres	Geological Reserves MT	Blocked reserves MT	Mineable reserves MT	Targeted Production
248.46	20.60	52.50	49,21,776	11,34,000	37,87,776	37,80,000

**A. PROVED RESERVES AS PER UNFC CODE (111)**

Total Mineable Area = 227.86 Acres

Total Geological reserves: 227.86 x 4000 x 3.0 x 1.80 = 49,21,776 MT

**B. BLOCKED RESERVES AS PER UNFC CODE (211 & 222)**

Blocked area = 52.50 Acres

Total Blocked reserves= 52.50 x 4000 x 3 x 1.80 = 11,34,00 MT

**C. MINEABLE RESERVES**

Mineable Reserves (A-B) = 37,87,776 MT

**D. TARGETED PRODUCTION**

37,80,000 MT per Year up to the lease period (or say 3.780 million MT/year)

**E. BALANCE RESERVES & LIFE OF MINE**

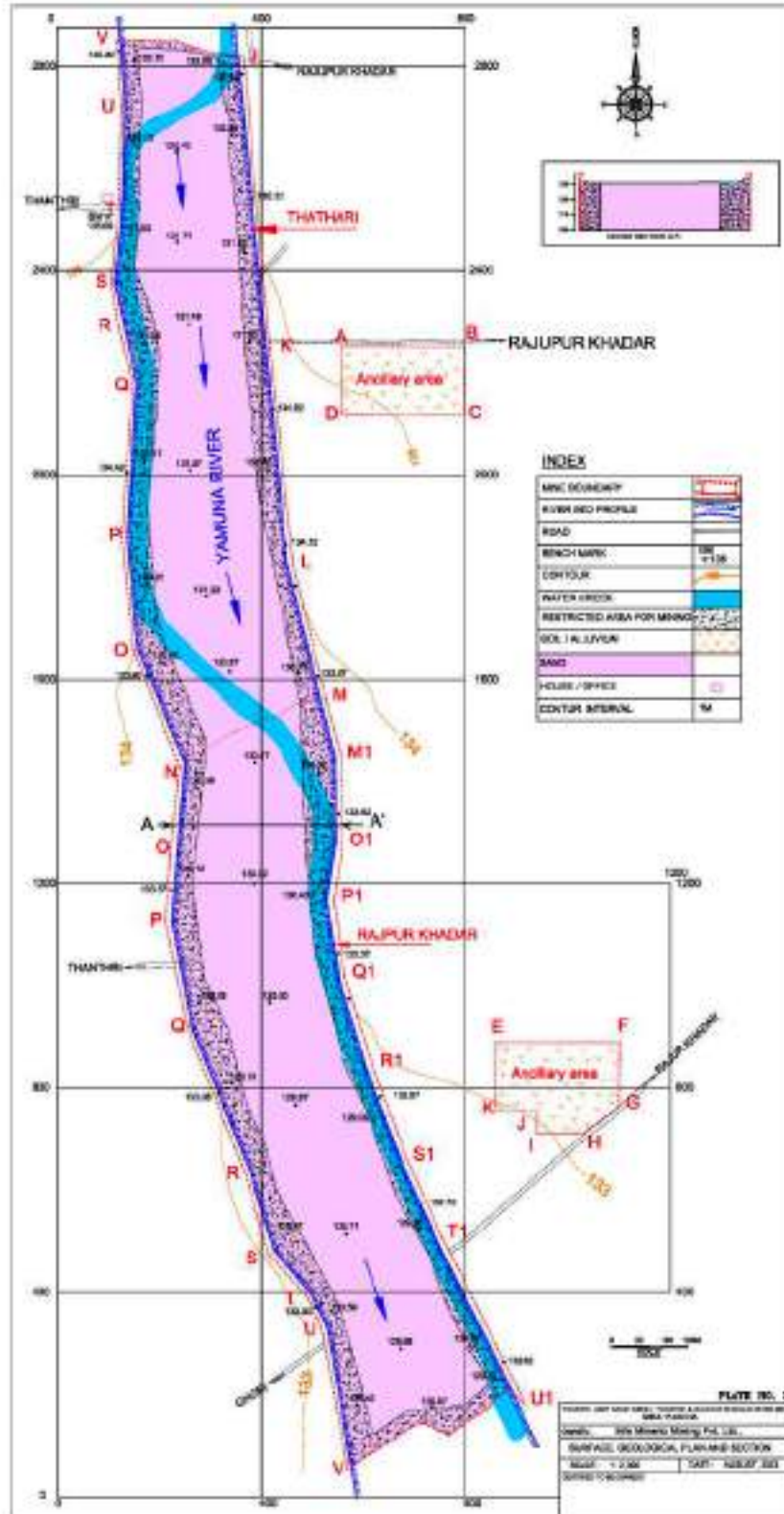
For Balance reserves it is presumed that the mineral will be replenished every year during the rainy season. New mineral will be added every year in the riverbed.



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

Period of Anticipated life of mine cannot be estimated accurately in the riverbed since the quantum of sand replenished every year depend on the intensity of flood waters from upstream side and proposed rate of production.

**Figure 2.6: Surface Geological Map of Lease**





Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## 2.5. Mining methodology

Mining work will be carried out by opencast manual method by forming one bench of 3 m high in riverbed. There are no existing pits at present as the mining activities are closed for the last few years. The sand will be excavated by backhoe type excavators directly loading into dumpers/trucks for dispatch to consumers situated in and around Delhi/NCR. Loading of mineral shall be mechanical, while transport of mineral out by the riverbed shall be done through private truck owners.

Riverbed mining is for extracting sand from Yamuna Riverbed. Total length of the area as per the description report stretches in the length of 3.0 km. Mining activity will be carried out in allocated areas only.

Activities will be carried out as per the production schedule given earlier. The mining quarry will be working as self-sustained units with all facilities like site office, rest shelter, first aid and drinking water etc. All these mines will be connected suitably with communication system.

Light weight excavators/JCB will be deployed for extraction. Mineral will be removed in 3.0 m layer only forming one bench. This is as per the digging depth of the equipment. Mineral will be loaded in trucks of 25 tons capacity. Trucks and equipment will be on hire basis. There will be no OB or waste generation as the sand is exposed in the riverbed.

Bench will advance parallel to the banks of the river. Height of bench will be 3.0 m. Width of the bench will be around 20.0 m. Workings will be restricted within the lease area as per the description report given by Mining Department. Mining activities will be carried out in a manner so that there is no obstruction to the movement of water flow, if any, during rainy season. The bench will be in the form of slices/ strips parallel to the banks of the river. Roads in the lease area for the movement of loaded trippers/ trucks will not have slopes more than 1 in 20. However, movement of trucks after mineral loading will be towards both sides through approach roads connecting to tar roads. Every block will have its own approach roads, well connected to main highways. No processing of mineral will be done.

### Salient Points of Proposed Scientific Mining are:

- a) First requirement is to ascertain the maximum depth to which mineral is available and safe depth of working which has been fixed as 3.0 m in riverbed in virgin areas.
- b) All proposed pits have been proposed for further deepening and widening up to the above proposed depths.
- c) The depth of pit below the surface shall not exceed 3.0m in virgin areas where mining operations to some depths have not been carried out provided mining operations are carried out by formation of benches in accordance with the provisions of MMR 1961.
- d) The contractor shall comply with all other conditions and stipulations as given in the LOI and Auction document.
- e) No mining operation may be carried out from 01-07 to 15-09 every year (rainy season).
- f) Mining will be carried out about in about 270 days in a year.

### 2.5.1. Proposed Method of Mining

Mining activity will be carried out by open cast manual method.

- ✓ Light weight excavators will be used for digging & loading of mineral in tippers.
- ✓ No OB/ waste material will be produced.

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- ✓ No drilling/ blasting is required as the material is loose in nature.
- ✓ Proper benching of 3.0 m height will be maintained.
- ✓ Roads will be properly made and sprayed by water for suppression of dust.
- ✓ Roads in the lease area for the movement of loaded trippers/ trucks will not have slopes more than 1 in 20.
- ✓ Total extent of lease is 3.0 km.
- ✓ Extraction activities will start in the blocks from the upstream side to downstream side. This will not obstruct the movement of water, if any, during monsoon period in the river course.
- ✓ Approach roads from the various blocks as already described earlier will be merging with permanent tar roads on both sides of the river for transportation of the mineral to final destinations. In case during any period, the replenishment was found less than 3 m or depth of excavation, the mining during said period would restrict to depth which would not be more than 3 m of the original level of the riverbed.

**As per MMR 1961, following precautions shall be undertaken during operations of HEMM.**

**Shovel/ excavator: -**

- ✓ Excavators will be provided with efficient warning devices, front & rear lights, and efficient brakes.
- ✓ Excavator will be under the charge of a competent person authorized in writing by the manager designated as operator.
- ✓ No person other than the operator or his helper if any will ride on the excavator or even enter the excavator's cabin.
- ✓ No person will be permitted to ride in the bucket of a Shovel/ excavator.
- ✓ No inflammable material will be stored in the excavator housing or cab.
- ✓ Shovel/ excavator dippers will be lowered to the ground during greasing operation.
- ✓ When a Shovel/ excavator is to be moved from one point to another its boom shall be kept in strict alignment with direction of travel while the bucket/ dipper shall be held m above the ground.
- ✓ No Shovel/ excavator will be operated in the position where any part of the machines, suspended loads or lines are brought closer than 3 m to the exposed high voltage line.
- ✓ Every movement of a Shovel/ excavator shall be preceded by warning signals.
- ✓ When not in use, the Shovel/ excavator will be moved to and stood on stable ground, the bucket shall be kept resting on stable ground and will never be left hanging.
- ✓ The Shovel/ excavator will be so spaced that there will be no danger of accident from flying & falling objects.
- ✓ Safety appliances, booms will be examined thoroughly once in a year.
- ✓ Emergency switches, safety limit switches will be examined and tested once in four months.
- ✓ All brakes will be tested for their operation worthiness once in a week.
- ✓ The following signboards will be carried in and around the machine: -
  - "Warning— Do Not Enter the Working Range of the Machine".
  - "Lubricating Prohibited While the Machine in Running Condition".

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**Duties of Shovel/ excavator operator: -**

At the commencement of every shift the operator will personally inspect and test the machine, paying special attention to the following details: -

- i. The brakes and every warning device are in working order.
- ii. Lights are in working order.
- iii. The operator will neither take out the machine for work nor will he work the machine unless he is satisfied that it is mechanically shown and in efficient working order.
- iv. The operator will maintain a record of every inspection made in a bond paged book, kept for the purpose, and shall sign every entry made their in.
- v. The operator will keep the cab window clean to ensure clear vision at all times.
- vi. The operator will not operate the machine when persons are in such proximity as to be endangered.
- vii. Before leaving the machine, the operator will lower the bucket to the ground.
- viii. The operator will not leave his machine during the shift. Whenever, he finishes his work, he will hand over the machine to his relief or lock the excavator's cab.
- ix. The operator will not allow any unauthorized person to ride on the machine.

**Dumper: -**

- i. Every dumper will be provided with efficient brakes.
- ii. Efficient audible warning devices will be provided with the dumpers.
- iii. The dumper, if required to work after daylight hours, efficient headlights and taillights will be used.
- iv. Every dumper will be under the charge of a competent person, authorized in writing by the manager.
- v. No person, other than the driver or his helper, if any, will ride on a dumper.
- vi. No person will be permitted to ride in the running board of a dumper.
- vii. The loaded dumpers will not be reversed on gradients.
- viii. Sufficient stop blocks will be provided at every tipping point, and these will be used on every occasion when material is dumped.
- ix. Standard traffic rules shall be adopted and followed during movement of all dumpers. They shall be prominently displayed at relevant places in the opencast workings and haulm roads.
- x. When not in use, every dumper will be moved to and stood on proper parking places.
- xi. No person will be permitted to work on a chassis of a dumper, with the body in rest position, until after the dumper body has been securely blocked-in position.
- xii. The mechanical wised mechanism will not be depended upon to whole the body of a dumper in a rest position.
- xiii. No unauthorized person will be permitted to enter or remain in any turning points.
- xiv. While inflating tyres, suitable protective cages shall be used.
- xv. Tyres will never be inflated by sitting either in the front or on the top of the same.
- xvi. While the vehicle is being loaded / unloaded on gradient, the same will be secured stationary by the parking brake, and other means suitably designed stopper block, which could be placed below the tyres.

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- xvii. At least once in every two weeks the brakes of every dumper will be tested as below: -
- (a) Service Brake test: The brake will be tested on a specified gradient and speed when the vehicle is fully loaded. The vehicle should stop within the specified distance when the brake is applied.
  - (b) Parking brake test: The parking brake shall be capable to hold the vehicle when it is fully loaded and placed at the maximum gradient. Maximum gradient of the roadway which is permitted only for a period of at least 10 minutes.
  - (c) A record of such test will be maintained in a bound paged book and will be signed by the competent person carrying out the test. These records will be counter signed by the engineer and manager.
  - (d) All vehicles shall be tested and examined once at least in every 6 months.
  - (e) A notice shall be displayed outside every vehicle that **“No Unauthorized Travelling allowed”**.

#### **Duties of dumper operators:**

At the commencement of every shift, the operator shall personally inspect and test the machine, paying special attention to the following details: -

- i. Tyre pressure, brakes, horn, and the Lights are in working order.
- ii. The driver will neither take out the machine for work nor will he work the machine unless he is satisfied that it is mechanically shown and in efficient working order.
- iii. The driver will maintain a record of every inspection made in a bound paged book, kept for the purpose, and shall sign every entry made their in.
- iv. The driver will keep the cab window clean so to ensure clear vision at all times.
- v. Driver will ensure that the gear is in neutral position before stopping the engine. He will park the vehicle: -
  - (a) In reverse gear, on level roads and down gradients.
  - (b) In low gear, on up gradients.
- vi. The driver will negotiate downhill gradients in low gear, so that minimum of braking is required.
- vii. The driver will not drive too fast, avoid distractions, and drive defensively.
- viii. Before crossing a road / railway line he will reduce his speed looking both directions along the road or railway line and will proceed across the road or line only if it is safe to do so.
- ix. The driver will not operate the dumper in reverse unless he has a clear view of the area behind the vehicle.
- x. The driver will see that the vehicle is not overloaded.
- xi. The material is not loaded in a dumper to project horizontally beyond the sides of its body.
- xii. The driver will not allow any unauthorized person to ride on the vehicle.
- xiii. When there is a poor visibility, the speed of a vehicle will be restricted in a manner that the braking distance is maintained shorter the distance of visibility.
- xiv. The driver will not leave his machine during the shift. When he finishes his work, he will hand over the machine to his reliever or lock the excavator's cab.

#### **2.5.2. Details of Production & Dispatches of Five Years**

This is a new lease area allotted to the applicant. As it is a new mine. Preproduction activities are required. Roads from lease boundary to entry to the mining area, from mining faces to the

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

proposed exit area, from ground level to the mining area, to the mine’s office complex, plantation area, and to the garage / workshop & Access roads / haul roads are proposed to be developed. The Future production programme has been planned as per the details given below:

**RIVER SAND MINING WITH SIMULTANEOUS RECLAMATION**

Fully manual mining with simultaneous reclamation and pollution free mining method shall be adopted. River sand used for construction industry is available all along the river Yamuna in the plains of Haryana. Yamuna River flows along some major towns of Haryana from North to South like Yamuna Nagar, Karnal, Panipat, Sonipat, Faridabad and Palwal. The sand is a minor mineral and falls under the preview of the Mines and Geology Department, State of Haryana.

The sand mines of Thanthri Unit District Palwal are approachable from Aligarh Palwal Road which is 7.6 km in SW. The villages of Thanthri & Rajupur Khadar are well connected with mettle road network. The same will be used to take the mineral transported to various destinations.

**MINE ROADS**

All villages in the proposed lease area of Thanthri Unit are connected by metal roads. The mine roads branching off the village roads, are well consolidated to prevent sinking of heavy truck wheels, the mine roads are at least 10 m wide to permit easy manoeuvrability of trucks, provide crossover’s and changing points. To keep pollution off the mine, dust is proposed to be suppressed by spraying roads with water at intervals of 3 hrs by using tractor/truck mounted water sprinklers. The water for this purpose is obtained from tube wells located nearby.

**Table 2-5: Mining Area Details**

S. No.	Name of Quarries	Area free from restrictions (Ha*)	Per day production (MT**)	Year wise production (MT**)
1	Thanthri Unit	70.144	14,000	37,80,000

\*HA- Hectare, \*\*MT- Metric Ton

Daily production proposed = 14,000 tons.

Production programme is 560 trips/ day @ 25 ton per trip.

Working days have been taken as 270 days per annum.

Projected Production per Year = 270 x 14,000 = 37,80,000 Tons.

**Table 2-6: Five Years Proposed Production Details (MT/A)**

Year	Trips/ day	MMTPA
I	560	3.780
II	560	3.780
III	560	3.780
IV	560	3.780
V	560	3.780

\*MMTPA – Million Metric Ton Per Annum

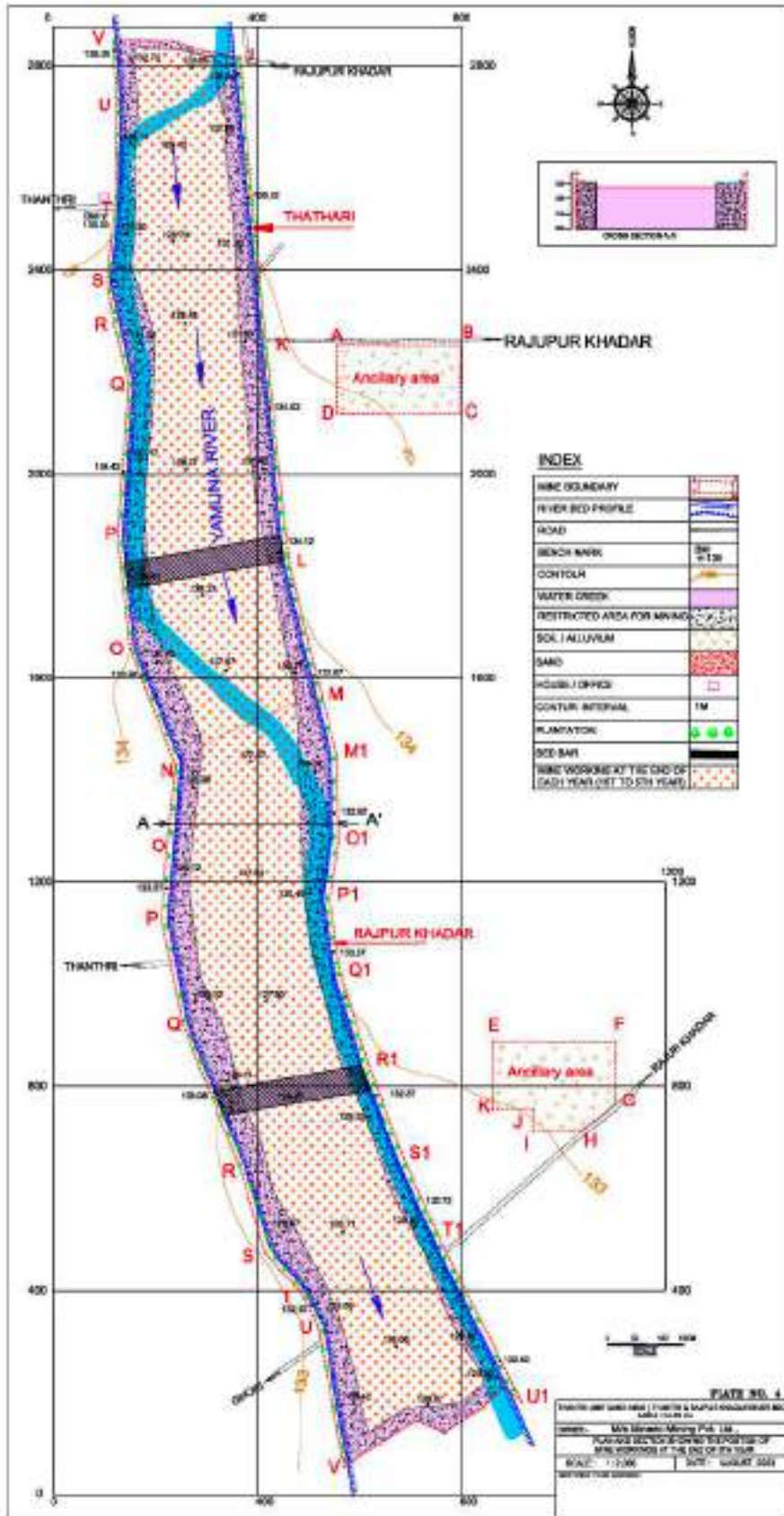
**PHYSICAL & GEOGRAPHICAL CHARACTERISTIC OF THE DEPOSIT:**

Deposit is moderate to good quality Sand. It is widely used in construction, buildings, bridges, and other infrastructure. It is free from clay and non-sticky in nature.



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Figure 2.7: Working / Production Plan**





Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

### 2.5.3. Extent of Mechanization

Following equipment are proposed to be deployed for the desired production.

**Table 2-7: List of Machinery**

S. No.	Name of machinery	Capacity	Nos.	Engagement
1	Excavator cum loader	2.0 m <sup>3</sup>	8	Hire Basis
2	Tippers/ Trucks	25 tons	112	Hire Basis
3	Water Tanker	10,000 liters	2	Hire Basis
4	Light vehicles	--	1	-

**Fuel Consumption:** The diesel requirement for the mining operation will be 13080 Litre / day in peak production stage. The break-up of diesel consumption is given below.

**Table 2-8: Fuel Consumption / Day**

S. No.	Machine	Details of Diesel requirements	Consumption
1.	Dumper	(Considering diesel consumption by the dumper is 3 km / ltr.) Total Diesel consumption for 36 Dumper = 112 x 100 = 11,200 Liter	11,200 liter
2.	JCB	Diesel consumption 10 ltr / hr working of 20 hrs diesel consumption = 10 x 20 x 8 = 1600 ltr	1600 liter
3.	Water Tankers	Diesel consumption 10 ltr/Hour x 10 x 2 = 200	200 liter
4.	Light Vehicles	Diesel consumption 8 ltr/Hour x 10 x 1 = 80 ltr	80 liter
<b>Total diesel requirements per day</b>			<b>13,080 liter</b>

### 2.5.4. Water Demand

The requirement of water for the project will be sourced from private water tankers. The total water demand will be 50.5 KLD which will conclude dust suppression (31.0 KLD), green belt development (13.0 KLD) & domestic requirement (6.5 KLD). Details are given in Table 1.2.

### 2.5.5. Electricity Requirement

Electrical supply is available in all nearby villages.

### 2.5.6. Mode of Transportation

Mineral Sand will be transported by hired trucks. Loaded trucks will travel on Kuccha Road made for plying of trucks. Temporary roads will provide access to the riverbed and the movement of loaded trucks. As the lease area stretches in a length of around 3.0 km, working will be carried out in both villages' riverbed. Each village has its outlet meeting the tar road on the nearby villages and from where the mineral is sent to various destinations. Similarly, mineral will be transported on the other side through approach roads which finally merge with tar roads for final destinations.

### 2.5.7. Manpower Requirement

Statutory personnel as detailed below are proposed to be deployed by project proponent as per requirement of Mines Act-1952 and latest DGMS circulars. Total requirement of employee (skilled & unskilled) will be required 145 which may be sourced from nearest villages as per their skills.

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Table 2-9: Manpower Requirement**

S. No.	Category	Numbers
1	Manager – 1 <sup>st</sup> Class	1
2	Assistant managers	2
3	Foreman/Mates	2
4	Supervisory staff	2
5	Skilled personnel	16
6	Semi-skilled personnel	112
7	Un-skilled personnel	10
<b>Total</b>		<b>145</b>

### 2.5.8. Drilling & Blasting

Sand extraction will not require any drilling, blasting activities. It will be directly loaded into trucks.

### 2.5.9. Mine Drainage

The river Yamuna flows from N to S which originates from the Himalayas provides the major drainage in the lease area. The general slope of the land surface is From N to S. Refer to Table 2.1.

There is no flow of water in the riverbed in post monsoon period. Area is having 542 mm rainfall in a year. During rainy season, catchment water flows in the river. During dry period the Sand is excavated which gets replenished during rainy period. No mining activities will be carried out during rainy season when there is water flowing in the working area.

There will be no intersection of water table as working will be carried out up to 3.0 m depth only from surface of riverbed while the water level is 5 -10 m below the surface of riverbed.

## 2.6. Conceptual Development Plan

Mine lease area will be worked in blocks for ease of operation. However, as the digging depth will be restricted to 3.0 m only, material will still be available below. This will be further replenished during rainy season. Blocks will be worked systematically as the width is limited while length is much more.

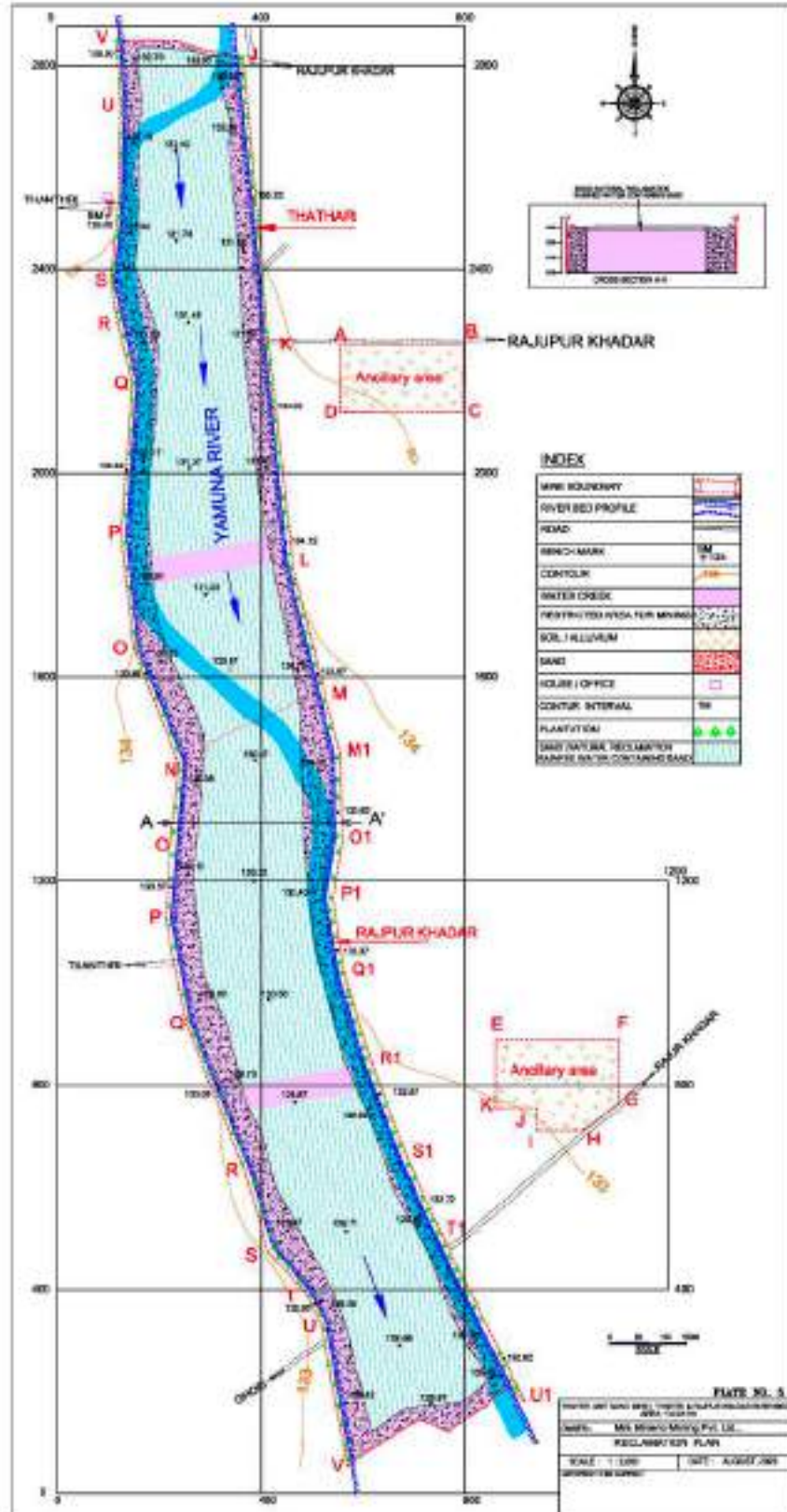
- **Final Slope Angle to be Adopted:** Thickness of the bench is limited to 3.0 m only and width will be more than the height of the bench. Riverbank side will be protected by working in 3/4 part of middle of the river. Bank side natural slope will not be disturbed. This will prevent collapse of bank and erosion. However, the height of the bank with respect to riverbed is varying from 2-3 m only.
- **Working:** During plan period workings will be carried out in both villages at a time in the lease area simultaneously. Scattered workings will ensure safety, remove congestion of vehicles, and will have better control and management.
- **Ultimate Capacity of Dumps:** There will be no OB removal and waste generation during the plan period. No dumping area is needed. No outside material will be filled up in the extracted zone.

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### 2.6.1. Land-Use Pattern

Presently there is no pit available in the riverbed. Land use pattern will be as follows:

**Table 2-10: Reclamation Plan**



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**Table 2-11: Land-Use Breakup at Present and Conceptual Stage**

Particulars	Present	End of 5 Years
Pit Area	0.0	0.0
Dump Area	0.0	0.0
Restricted Area	21.0	21.0
Area for Ancillary* Activities as Office, Rest Shelter & Mineral Storage	8.24	8.24
Plantation (In safety zone* and ancillary area)	0.00	4.00*
Naturally Reclaimed Area	70.144	70.144
<b>Total</b>	<b>99.384</b>	<b>99.384</b>

*\*Plantation in 4.0 Ha land will be done under social forestry and plantation & infrastructure will be restricted to the ancillary area only.*

## 2.6.2. Environment Management Plan

### General Measures:

- Envisaged mining operation will be carried out in the Riverbed. This will be dry bed mining. There will be no mining activities when there is flow of water in the working zones. During rainy season, the activities will be stopped, if there is flow in the river.
- Besides resource extraction, following activities will be kept in view:
  - a. Protection and restoration of ecological system.
  - b. Prevent damages to the river regime.
  - c. Protect riverine configuration such as bank erosion, change of water course gradient, flow regime etc.
  - d. Prevent contamination of ground water.

### Safeguard Measures:

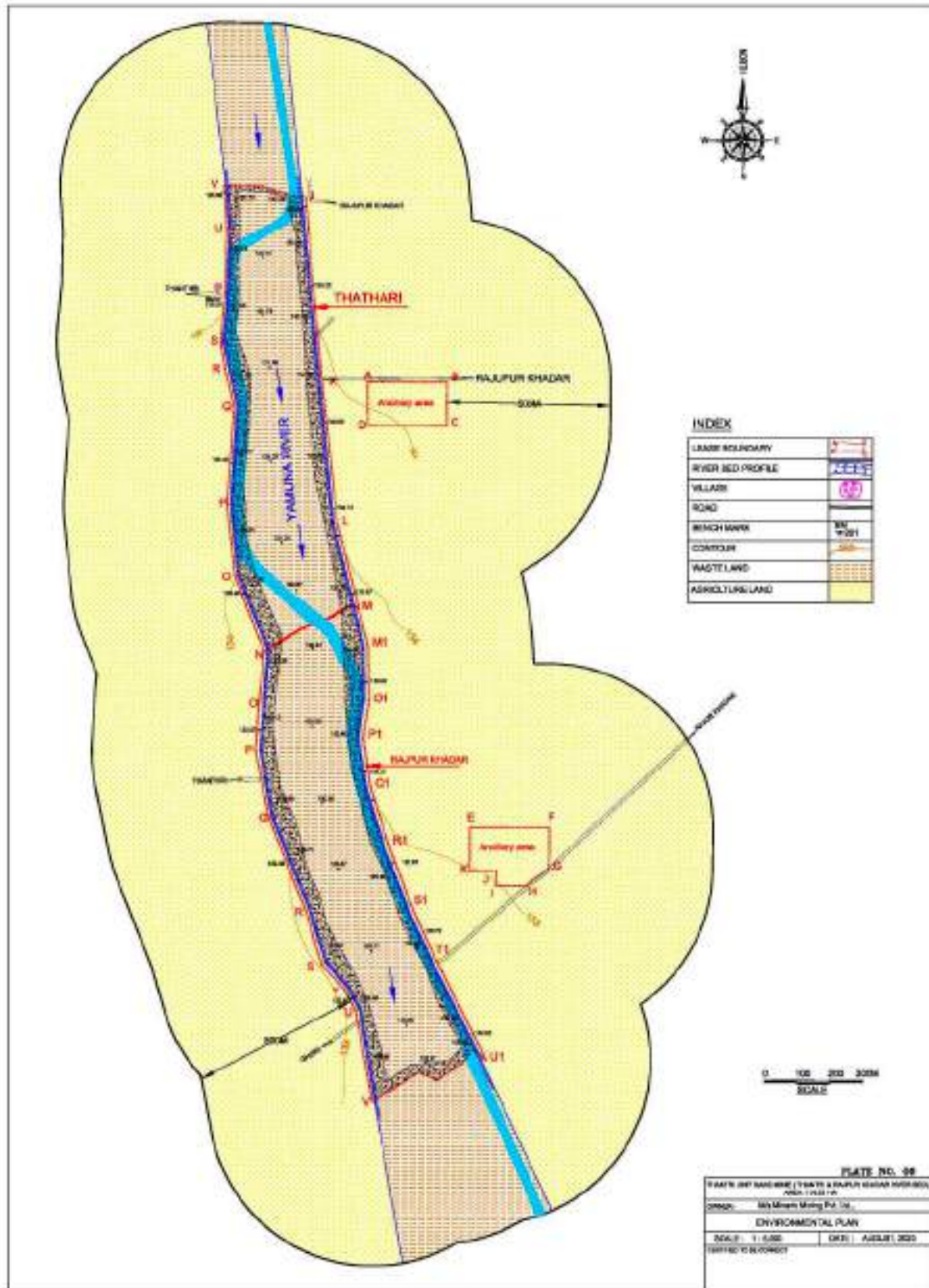
While carrying out mining activity following measures will be taken.

- Mining activities will be carried out only in dry bed. No in stream mining will be practiced.
- Identification of river stretches for mining will be completed.
- There will be no mining near the banks. This is to protect the bank erosion and river migration.
- Mineral Sand from river will be restricted to a maximum depth of 3.0 m from the existing bed level. This is for safety and sustainability.
- As the lease area is quite large and long in length, systematic extraction will be carried out to prevent seasonal scouring and enhanced erosion.
- Extraction will be carried out in a manner that there is no obstruction to flow of water, if any, during rainy season.
- Mining on the concave side of the river channel should be avoided to prevent bank erosion. Similarly meandering segment of river will be selected to prevent natural eroding banks and to promote mining on natural building (aggrading) meanders component.
- There is no generation of OB/ waste material. No backfilling has been proposed in the excavated zone. Riverbed will be replenished by sediments during rainy season.



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Table 2-12: Environmental Plan**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Greenbelt:** To restore the environment and ecological balance in the area affected by mining, a forestation is an effective measure. plantation is a major thrust area in pollution control of mining. plantation is suitable for detecting, recognizing, and reducing air pollution effects. Tree functions as sinks of air pollutants, besides their bio-aesthetical values, owing to its large surface area. The green belt supplements Oxygen to the atmosphere and combat air pollution effectively and aesthetic beauty and landscape of the area improves. It also checks soil erosion and make eco-system and climate more conducive.

Following factors will be considered while selecting species for plantation: -

- Fast growing plant species shall be preferred.
- The plant will be of deep rooting system.
- The plant will be perennially green to improve aesthetic beauty of the area.
- The plant species will be adoptable to the local climatic conditions.
- Native plant species will be planted.

## **2.7. Progressive Mine Closure Plan**

### **2.7.1. Mined-Out Land**

Land use at various stages is given in table 2.10. About 20.02 Ha area will be mined out.

### **2.7.2. Water quality management**

Mining is being proposed in the riverbed in the river Yamuna. The general water table in the area is 5-10 m. There are no surface or ground water bodies within the lease area except the running water in river Yamuna the quantum of which varies throughout the year depending on rains and release of water from dams upstream.

There is a little flow of water in the riverbed in post monsoon period. Area is having 542 mm rainfall in a year. During rainy season, catchment water flows in the river. During dry period the Sand is excavated which gets replenished to some extent during this period. No mining activities will be carried out during rainy season when there is flooding in the working area.

There will be no intersection of water table as working will be carried out up to 3.0 m depth only from surface of riverbed while the water level is 5-10 m below the surface of riverbed.

### **2.7.3. Air Quality Management**

The proposed mining method is not likely to produce much of dust and fugitive emissions to cause damage to ambient air quality of the area. Workers will be provided with personnel protective equipment like face mask, ear plug/ muffs.

For air pollution management at the progressive mine closure of mine, green belt will be developed to prevent and control air pollution.

### **2.7.4. Waste Management**

As stated in mining method, there will be no OB/ waste generation and there will not be any OB/ waste dumps.

### **2.7.5. Topsoil Management**

There is no topsoil.



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### **2.7.6. Tailing dam management**

There is no proposal of beneficiation of mineral. No tailing dam is envisaged.

### **2.7.7. Infrastructure**

The infrastructure facilities like site office, first -aid station, rest shelter/ store, drinking water etc. will be established.

### **2.7.8. Disposal of mining machinery**

Machinery is proposed on hire basis. Hence no decommissioning of mining machinery is proposed.

### **2.7.9. Safety & Security**

Safety measures will be implemented to prevent access to excavation area by un-authorized persons as per Mine Act 1952, MMR 1961.

- a) Safety measures will be implemented as per Mine Act 1952, MMR 1961, Mines Rules 1955.
- b) Provisions of MMR1961 shall be followed strictly and all roads shall be 10 m wide and have a gradient of not more than 1 in 20.
- c) Excavation will not be more than 3 m depth.
- d) Width of bench will be kept around 20.0 m for ease of operations and provide sufficient room for the movement of equipment.
- e) Protective equipment like dust masks, ear plugs/ muffs and other equipment shall be provided for use by the work persons.
- f) Notices giving warning to prevent inadvertent entry of persons shall be displayed at all conspicuous places and near mining entries.
- g) Danger signs shall be displayed near the excavations.
- h) Security guards will be posted.
- i) In the event of temporary closer, approaches will be fenced off and notice displayed.

### **2.7.10. Disaster Management and Risk Assessment**

This should deal with action plan for high-risk accidents like landslides, subsidence, flood, inundation in underground mines, fire, seismic activities, tailing dam failures etc. and emergency plan proposed for quick evacuation, ameliorative measures to be taken etc. The capability of lessee to meet such eventualities and the assistance to be required from the local authorities should be described.

- The shallow depth of activities in riverbed mining will not involve any high-risk accident due to side falls/collapse.
- The complete mining operation will be carried out under the Management and control of experienced and qualified Mines Manager having Certificate of Competency to manage the mines granted by DGMS.
- All the provisions of Mines Act 1952, MMR 1961, and Mines Rules 1955, RMMCR 1986 and other laws applicable to mine will strictly be complied with.
- During heavy rainfall the mining activities will be closed.
- All persons in supervisory capacity will be provided with proper communication facilities.
- Competent persons will be provided FIRST AID kits which they will always carry.

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

### **2.7.11. Care and Maintenance during Temporary Discontinuance**

In case of any temporary discontinuance due to court order or due to statutory requirement or any other unforeseen circumstance following measures shall be taken for care, maintenance, and monitoring of conditions.

- Notice of temporary discontinuance of work in mine shall be given to the DGMS as per the MMR 1961.
- All the mining machinery shall be shifted to a safe place.
- Entrance to the mine or part of the mine, to be discontinued shall be fenced off. Fencing shall be as per the circular 11/1959 from DGMS.
- Security Guards shall be posted for the safety and to prevent any unauthorized entry to the area.
- Carry out regular maintenance of the facilities/area detailed below in such a way as would have been done as if the mines were operation:
  - Mine roads and approach roads,
  - Fencing on approach roads,
  - Checking and maintenance of machines and equipment,
  - Drinking water arrangements,
  - Mine office, first aid stations etc.
- Competent persons shall inspect the area regularly.
- Air, water, and other environmental monitoring shall be carried out as per CPCB and IBM Guideline.
- Care and upkeep of plantation shall be carried out on regular basis.
- Status of the working and status monitoring for re-opening of the mines shall be discussed daily.
- In case of discontinuance due to any natural calamities/abnormal conditions, mining operation will be restarted as early as possible after completing rescue work, restoring safety and security, repairs of roads etc.

### **2.8. Summary**

The total proposed production is 37,80,000 MTPA of mineral sand from riverbed of Yamuna over in area of 70.114 ha minable area excluding the 21.0 Ha restricted area. This mining project will provide employment to 145 people which will include skilled and unskilled labours and indirect employment will also be created due to this project. A suitable combination of trees that can grow fast and have good leaf cover to contain dust pollution shall be adopted to develop greenbelt. Greenbelt development will be done wherever possible. Plantation (Total 13,000 Saplings) will be done within first 2 years and in later years maintenance will be ensured. The project proponent will also play an important role in the development and improvement of the infrastructure of that region which will help in improving the standard of living of that region.

**CHAPTER – 03**

**DESCRIPTION OF ENVIRONMENT**



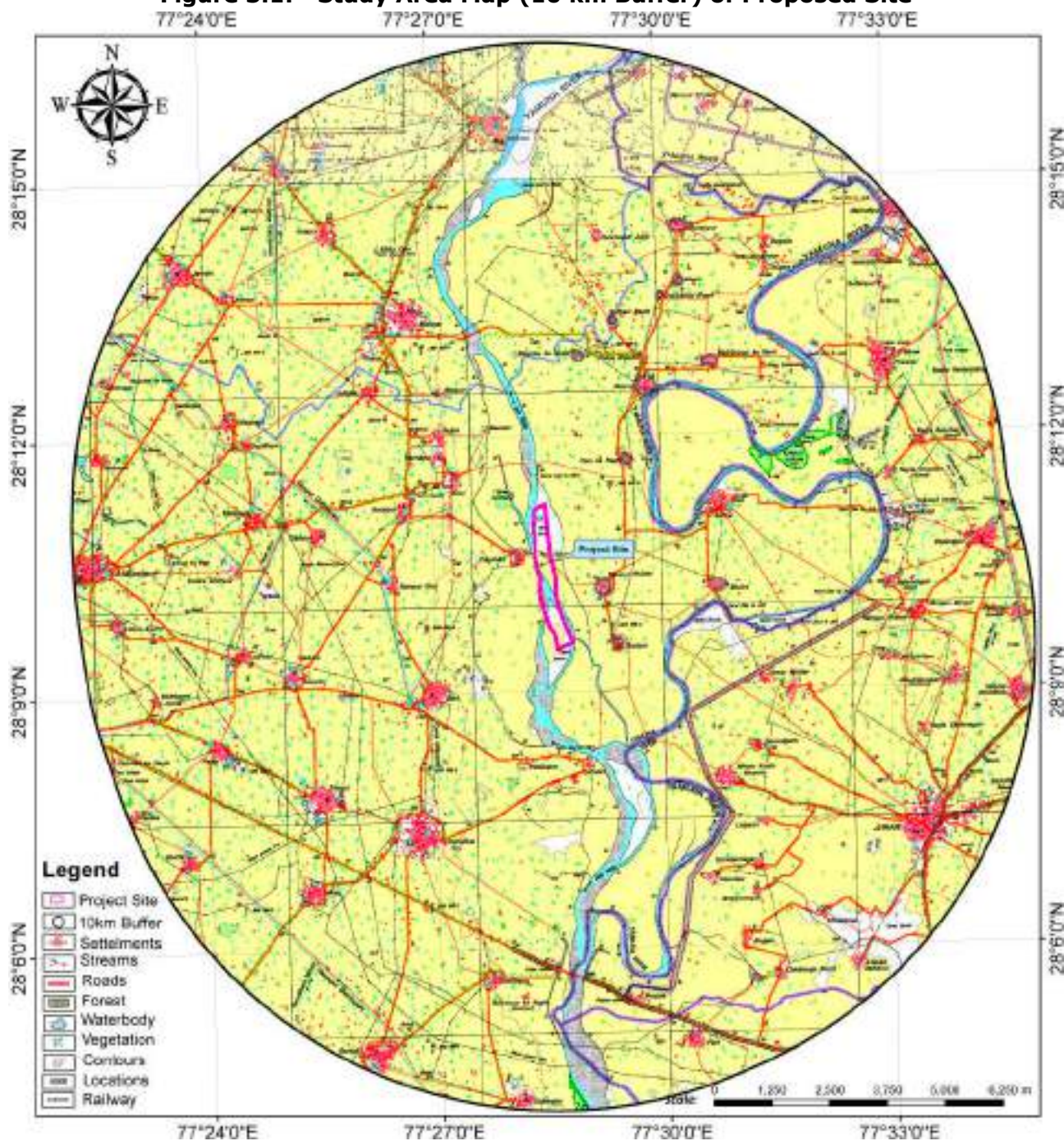
Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

### 3. Description of Environment

#### 3.1. Introduction

Baseline environmental status in and around enhanced project depicts the existing environmental conditions of air, noise, water, soil, biological and socio-economic environment. A radial distance of 10 km is considered as "study area" for baseline data collection and environmental monitoring. Baseline data was collected for various environmental attributes to compute the impacts that are likely to arise due to proposed development activity.

**Figure 3.1: Study Area Map (10 km Buffer) of Proposed Site**





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## 3.2. Study Area & Period

According to Appendix III of EIA Notification, 2006 and its amendment till date, study area was selected from 10.0 km radius from the project boundary. The area was selected to do the studies and collect the baseline data as ambient air, water, soil, noise, meteorology, hydrogeology, hydrology, land-use, ecological and socio-economic data etc. The relevant information and data (both primary and secondary) were collected in core as well as buffer zone of 10 km from the project boundary during post-monsoon season (October 2023 to December 2023) in accordance with the guidelines for preparation of EIA.

### 3.2.1. Methodologies Adopted

The baseline data for environmental parameters were collected as per standard Terms of Reference for the relevant category of the project. The data was also authenticated or validated from the secondary data collected from regarding departments of agencies. The detailed methodology is as given below.

### 3.2.2. Primary Data Collection Methodologies

A detailed field monitoring study of the project study area was carried out for baseline environment assessment of the project area. Baseline data was generated for various environmental parameters including air, water (surface and groundwater), land and soil, ecology, and socio-economic status to determine quality of the prevailing environmental settings. Sampling of soil and water, monitoring of air quality and noise level and other field data collection were carried out by the team operating from this field station. The field team consisted of technical personnel viz. environmental scientists and social experts along with the field staff.

The noteworthy activities completed during the field visit were as follows:

- ✓ A meteorological station was setup on the roof top a house in nearby village from proposed mining lease. Wind speed, wind direction, dry and wet bulb temperature, relative humidity, and general weather conditions were recorded throughout the study period in an automated data logger.
- ✓ To assess the Ambient Air Quality (AAQ), samples of ambient air were collected by installation of Respirable Dust Sampler and Fine Particulate Sampler at different locations from the study area during study period and analysed for primary air pollutants to work out the existing status of air quality.
- ✓ Groundwater samples were collected during the study period from the existing hand-pumps and bore wells, while surface water was collected from nearest pond, rivers, and lakes. The samples were analysed for parameters necessary to determine water quality (based on IS: 10500: 2012, IS 3025 and APHA 23<sup>rd</sup> Edition, 2017 for ground water, water quality criteria classified by CPCB for surface water) and those which are relevant from the point of view of environmental impact of the proposed site.
- ✓ Soil samples were collected and analysed for relevant physical and chemical characteristics to assess the impact of the proposed plant on soil.
- ✓ The noise level measurements were also made at two locations in different intervals of time with the help of sound level meter to establish the baseline noise levels in the impact zone.

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- ✓ Ecological data was procured from both primary and secondary sources. A primary data was collected through survey and walkover by ecological experts.
- ✓ Socio-economic data was collected from field studies and secondary sources like Census of India 2011 etc.

### 3.2.3. Secondary Data Collection

Secondary data are those collected over the years that can be used to understand the existing environmental scenario of the study area. The secondary data is required to authenticate the primary data as the primary data was collected over the short period which should be comparing to know the trend of baseline data to compete the understanding of baseline scenario.

**Table 3-1: Detailed of Secondary Data Collection**

S. No.	Area	Description	Source
1.	Meteorology	Temperature, humidity, rainfall, wind speed, Wind Direction	IMD Station Gurugram (1981-2010).
2.	Ambient Air	Air Pollutants	CPCB.
3.	Water Quality	Water (Surface & Ground) Characteristics	
4.	Soil Quality	Soil characteristics	
5.	Nature of terrain	Land-use	Survey of India (Toposheet), National Remote Sensing Centre (Satellite image).
6.	Hydrogeology	Geological formation, hydro-geological analysis	District Ground Water Information Booklet, Palwal District, Haryana.
7.	Seismic Data	Seismic zone	Seismicity Map.
8.	Biological Environment	Inventory of flora & fauna	Divisional Forest Department.
9.	Socio-economic status	Demographic profile, household, occupation status.	Census data (2001 & 2011).

Source: Studies done by **PARIVESH ENVIRONMENTAL ENGINEERING SERVICES**

## 3.3. Physical Environment

### 3.3.1. Seismic Status of Study Area

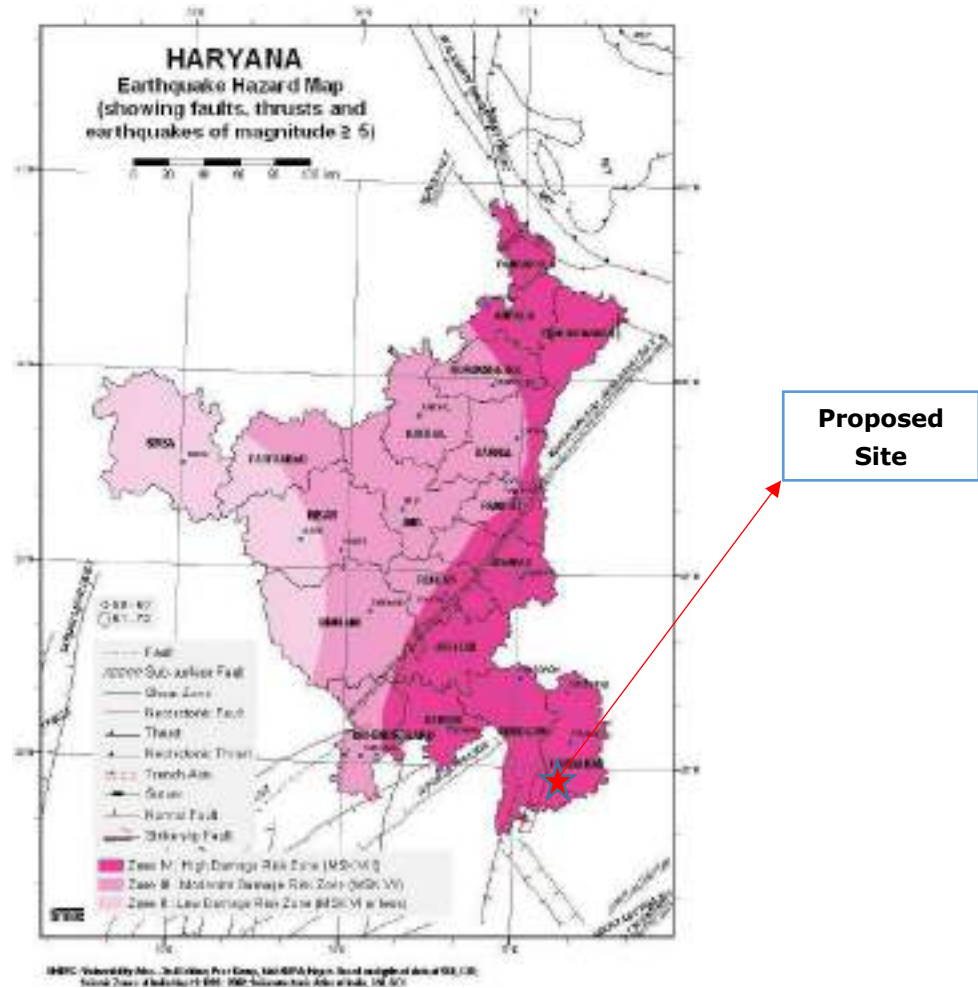
The area which has struck by the present event has been described as a region of Seismic Zone-IV which is defined as high damage risk zone (MSK intensity < VIII) in the Seismic Map of Haryana. Adequate measures need to be adopted during operation phase of the project-by-project proponent.

**Seismic Hazard of Haryana:** The seismic zoning map of Haryana is shown in Figure 4.2. Ambala, Sonapat, Rohtak, Karnal, Gurgaon, Faridabad, Panipat, Rewari and Yamuna Nagar districts lie in Zone IV. The districts of Kurukshetra, Jind, Hissar, Bhiwani, Mahendragarh and Kaithal lie in Zone III while only Sirsa district lies in Zone II. The entire state of Delhi lies in Zone IV and so does the Union Territory of Chandigarh. Since the earthquake database in India is still incomplete, especially with regards to earthquakes prior to the historical period (before 1800

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A.D.), these zones offer a rough guide of the earthquake hazard in any region and need to be regularly updated.

**Figure 3.2: Earthquake Hazard Map of Haryana**



**Earthquake History of Haryana State**

Eastern parts of Haryana along with Delhi lie in the Gangetic Plain. This is a fore-deep, a downward of the Himalayan foreland, of variable depth, converted into flat plains by long-vigorous sedimentation. This is known as a geosyncline and the Gangetic Plain is the Indo-Gangetic Geosyncline. This has shown considerable amounts of flexure and dislocation at the northern end and is bounded on the north by the Himalayan Frontal Thrust. The floor of the Gangetic trough (if see without all the sediments) is not an even plain but shows corrugated inequalities and buried ridges (shelf faults). The region sits atop the Delhi-Haridwar ridge, which is a sub-surface ridge, trending NE-SW. There are numerous faults in this region, like the Moradabad, Panipat and Sohna faults. Delhi, Chandigarh, and many parts of Haryana lie in Zone IV and thus they are extremely vulnerable to earthquakes. Most earthquakes in this region are shallow though a few earthquakes of intermediate depth have been recorded in Haryana. The alluvial cover of the Indo-Gangetic plain makes even distant earthquake felt here quite strongly. This region often feels deep-seated earthquakes that are centred on the Pakistan-Afghanistan Border and in the Hindukush mountains in Afghanistan. However, it must be stated that proximity to faults does not necessarily translate into a higher hazard as compared to areas located further away, as damage from earthquakes

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depends on numerous factors such as subsurface geology as well as adherence to the building codes.

### 3.3.2. Land-Use Details

The objective of assessing the land use details of the area is to know the existing land use pattern of the area and to know about the land that can be used for the proposed development activities in the study area. It also enables to envisage the scenario emerging due to the increase in demand for land with increase in population and the impacts arising due to the interface with various project activities.

**Methodology:** The land use / land cover map is prepared by adopting the interpretation techniques of the satellite image in combination with collateral data such as Survey of India topographical maps and census records. Image classification has been done by using visual interpretation techniques and digital classification using the image processing software's. The various activities for preparation of Land-use (LU)/ Land cover (LC) include pre-processing, rectification, enhancements and classifying the satellite data for assessing the change in LU/LC due to proposed developmental activities. The imagery is interpreted, and ground verification was done for corrections. The final map is prepared after ground truthing of the study area. The different land use/land cover categories in the study area have been carried out based on the NRSC land use / land cover classification system.

**Interpretation Technique:** Standard on-screen visual interpretation procedure was followed. The various Land use / Land cover classes interpreted along with the Survey of India topographical maps during the initial rapid reconnaissance of the study area. The physiognomic expressions conceived by image elements of Colour, tone, texture, size, shape, pattern, shadow, location, and associated features are used to interpret the FCC imagery. Image interpretation keys were developed for each of the LU/LC classes in terms of image elements.

FCC imagery (Digital data) was used for interpretation for the relevant land use classes. On screen visual interpretation coupled with supervised image classification techniques are used to prepare the land use classification.

- ✓ Digitization of the study area (10 km radius from the plant site) from the Survey of India Toposheet maps.
- ✓ Satellite Data Selection: In the present study the Landsat satellite image with Toposheet no. H43X7, H43X8, H43X11 & H43X12 have been procured and interpreted using the ERDAS imaging software adopting the necessary interpretation techniques.
- ✓ Satellite data interpretation and vectorization of the resulting units.
- ✓ Field checking and ground truth validation.
- ✓ Composition of final LU/LC map.

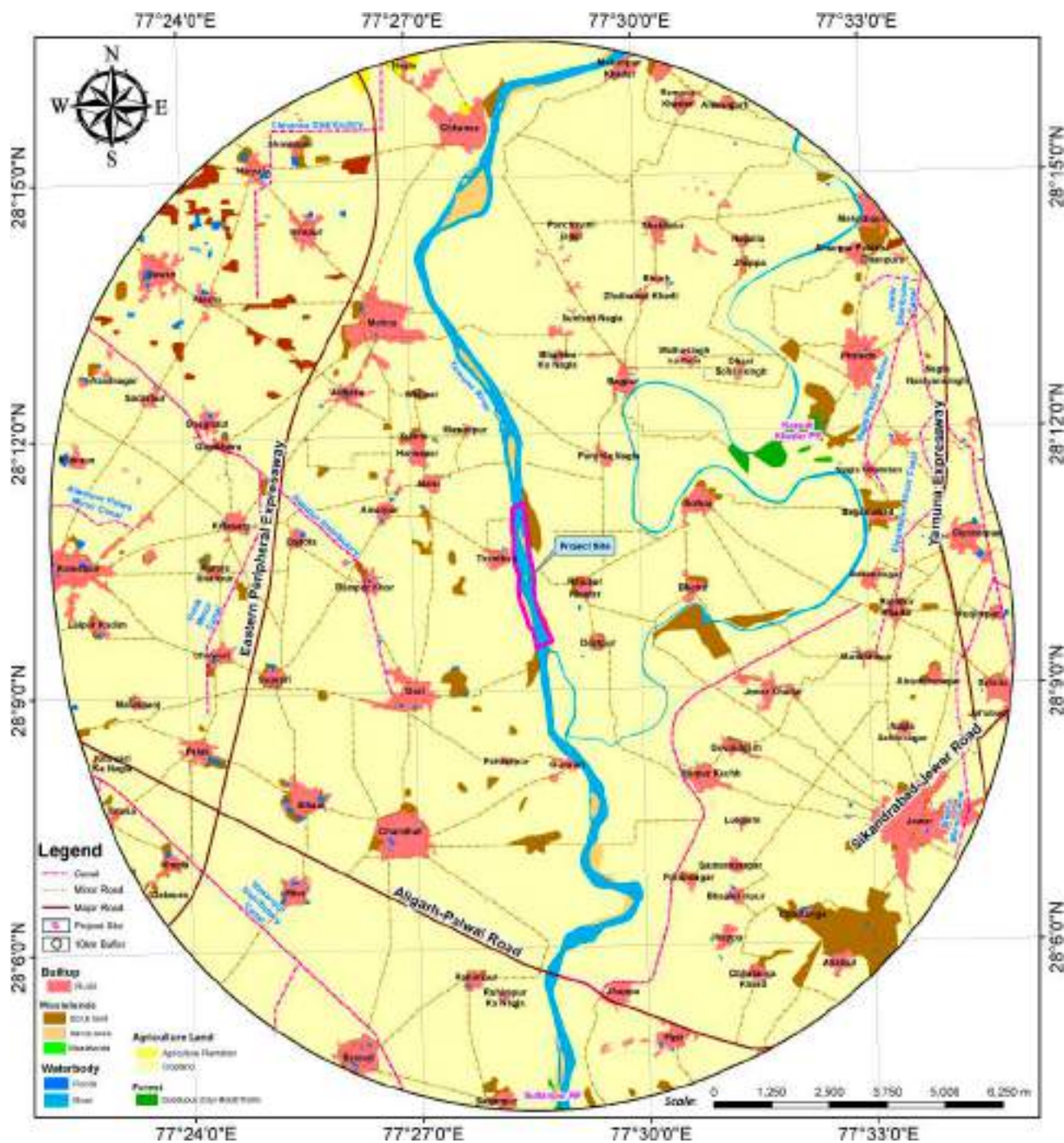
#### 3.3.2.1. Land-use of the Study Area

Study area is mainly covering agricultural land (86.0%) by following built-up area (5.6%) & Wasteland (5.2%) of the total study area.



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Figure 3.3: Land-Use Map of Study Area (10 km Buffer)**



**Table 3-2: Land-use Classification of the Study Area**

Classification (Level 1)	Category (Level 2)	Subcategory (Level 3)	Area in Hectare	Area in %
Built-up	Rural	Rural	2150.6	5.6
Agriculture Land	Agriculture Plantation		27.3	0.1
	Cropland		32921.5	86.0
Waterbody	Ponds	Permanent	29.3	0.1
		Seasonal	71.7	0.2
	River	Non Perennial	691.4	1.8

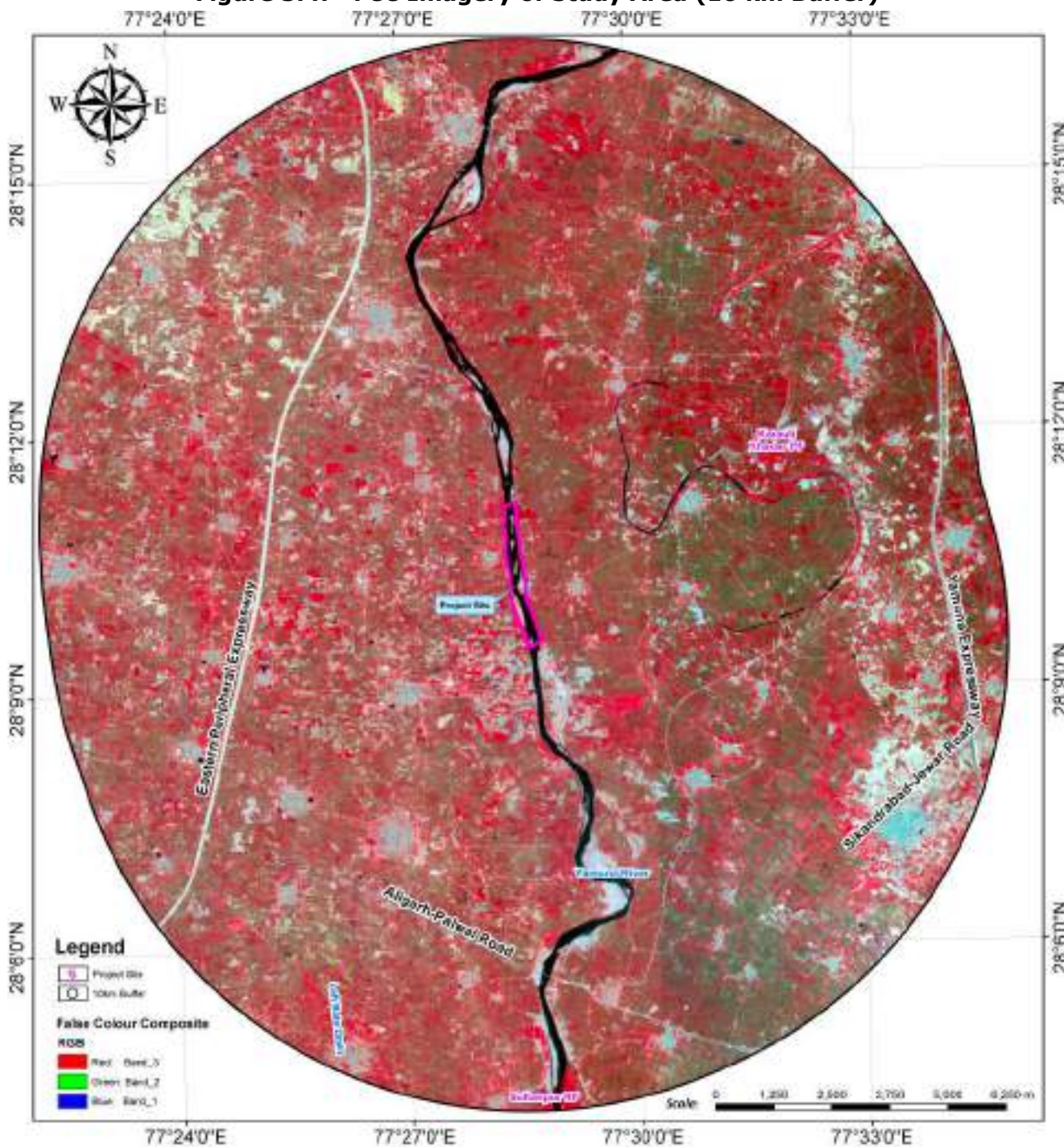


Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

Classification (Level 1)	Category (Level 2)	Subcategory (Level 3)	Area in Hectare	Area in %
Wastelands	Scrub land	Open Scrub	1997.0	5.2
	Sandy Area		182.0	0.5
	Wastelands		153.8	0.4
Forest	Deciduous (Dry / Moist / Thorn)		71.7	0.2
<b>Total</b>			38296.1	100.0

Source: SOI Toposheet No. H43X7, H43X8, H43X11 & H43X12.

**Figure 3.4: FCC Imagery of Study Area (10 km Buffer)**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

### 3.3.2.2. Land-use of the Project Area

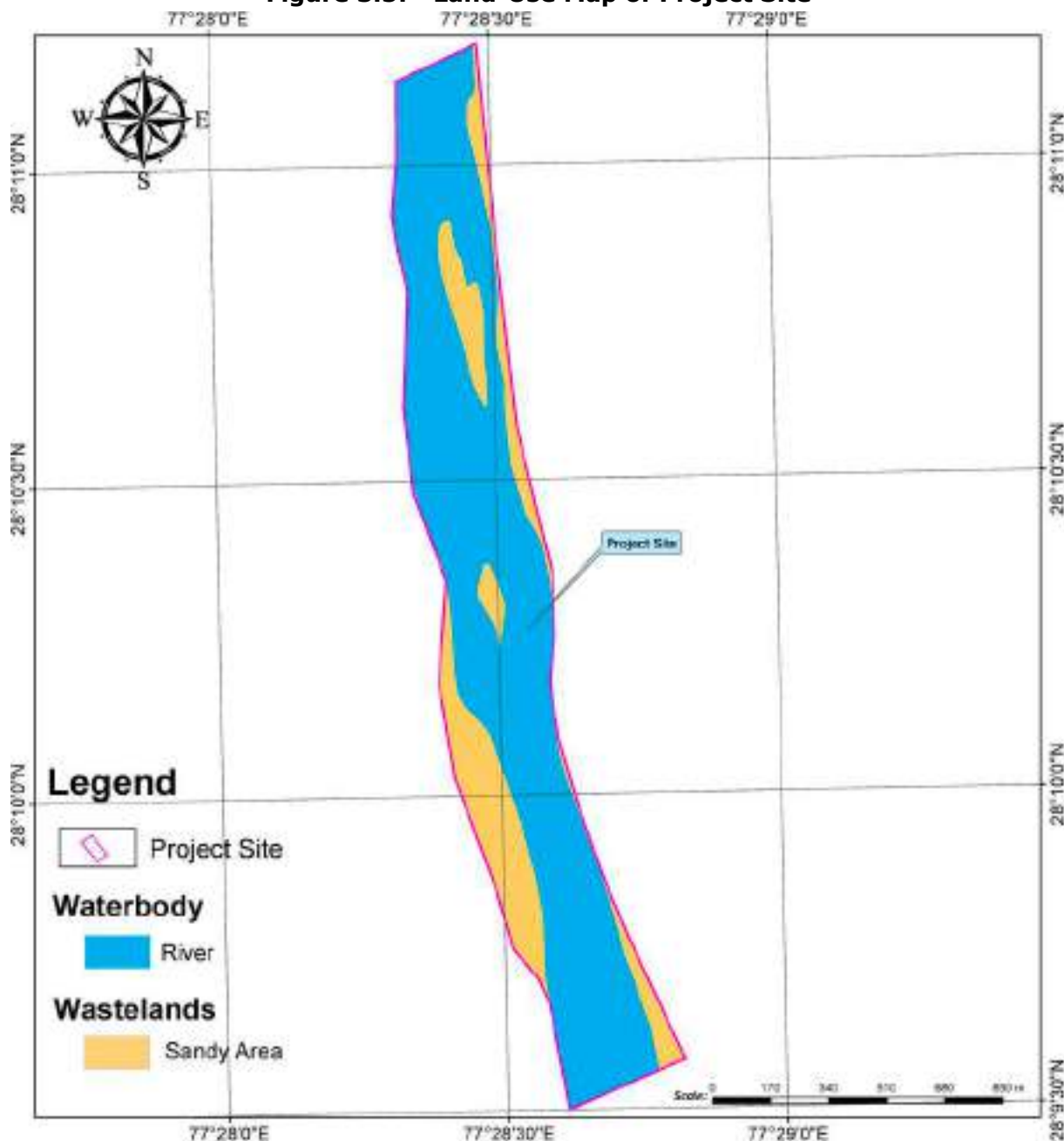
The proposed project site area is in river Yamuna as this is sand mining project from riverbed. Area land-use is detailed below.

**Table 3-3: Land-use Classification of the Project Site**

Classification (Level 1)	Category (Level 2)	Subcategory (Level 3)	Area in Hectare	Area in %
Wastelands	Sandy Area		25.74	25.90
Waterbody	River	Non Perennial	73.64	74.10
<b>Total</b>			<b>99.38</b>	<b>100.00</b>

Source: SOI Toposheet No. H43X7.

**Figure 3.5: Land-Use Map of Project Site**



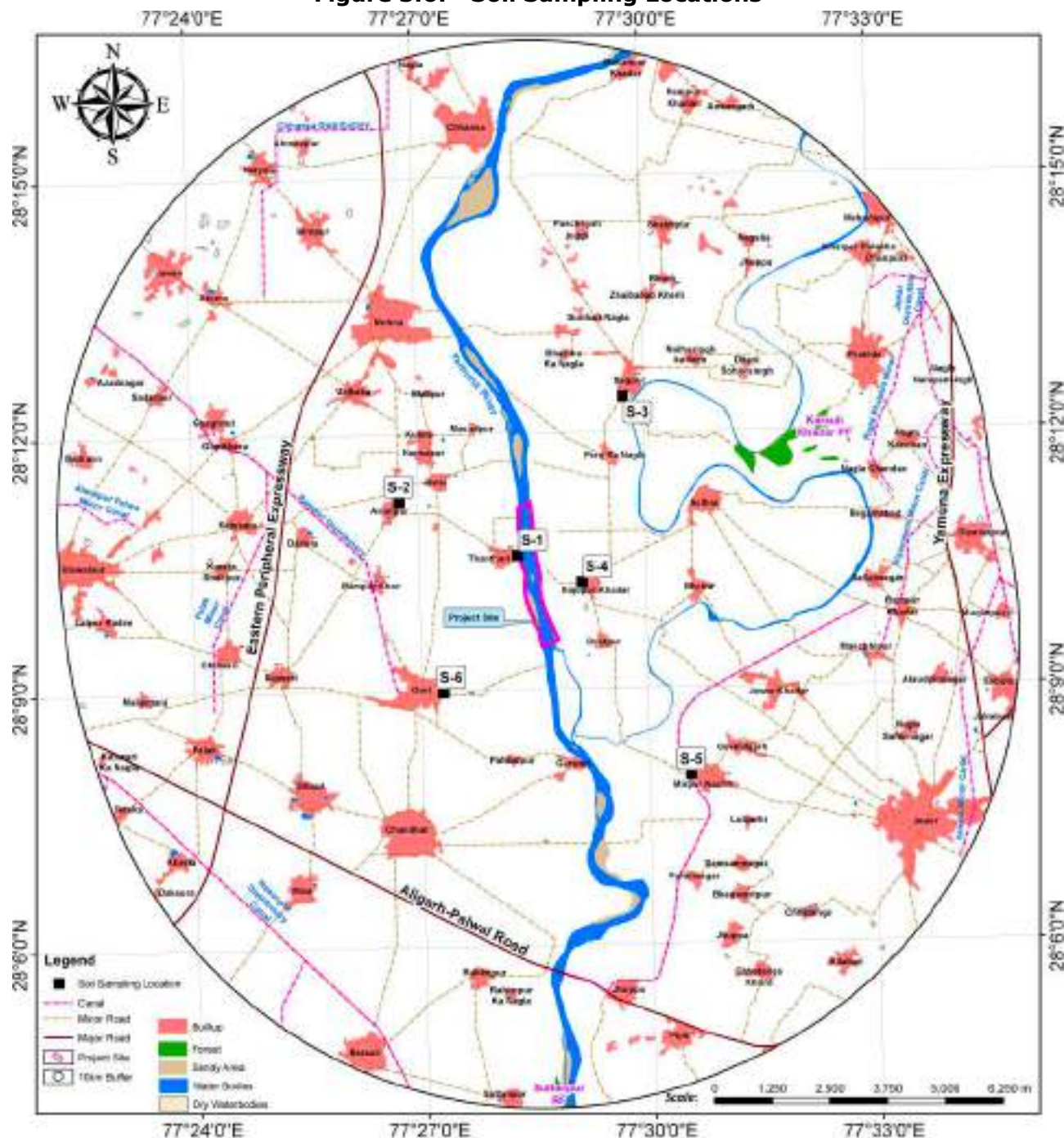


Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

### 3.3.3. Soil Environment

To assess the baseline status of soil quality in the study area for tree plantation, filtration/percolation of water, ground water scenario etc. total 6 soil samples were collected. The samples were collected by ramming an augur into the soil up to 30-cm depth. The sealed samples were sent to laboratory for analysis. Soil samples were analysed as per the standard methods prescribed in "Soil Chemical Analysis" (M.L. Jackson, 1967). The soil quality as analysed from the collected samples is given in Table 3.4 and the locations are shown in Figure 3.6.

**Figure 3.6: Soil Sampling Locations**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**Table 3-4: Soil Sampling Locations**

S. No.	Location Name	Location Code	Distance (km)	Direction	Co-ordinates	
					Latitude	Longitude
1	Thanthri	S-1	0.4	NNW	28°10'34.19"N	77°28'18.09"E
2	Amarpur	S-2	3.2	NW	28°11'13.20"N	77°26'44.68"E
3	Bagpur	S-3	3.1	NE	28°12'25.20"N	77°29'43.70"E
4	Solhra	S-4	3.4	ENE	28°10'54.56"N	77°30'36.07"E
5	Mirpur Kachh	S-5	5.5	SE	28° 7'58.44"N	77°30'32.34"E
6	Gori	S-6	3.1	SSW	28° 8'58.70"N	77°27'17.36"E

The samples were analysed as per the standard methods prescribed in Department of Agriculture & Cooperation Ministry of Agriculture; Government of India" & IS 2720. The important properties analysed for soil are bulk density, porosity, infiltration rate, pH, and organic matter, kjehldal Nitrogen, Phosphorous and Potassium. The standard classification of soil and physico-chemical characteristics of the soils is presented below in Table 3.5.

**Table 3-5: Soil Classification Standards as per ICAR**

Soil Test	Classification	
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
Salinity Electrical Conductivity (mmhos/cm) (1 ppm = 640 mmhos/cm)	Upto 1.00 Average 1.01-2.00 harmful to germination	2.01-3.00 harmful to crops (sensitive to salts)
Organic Carbon	Upto 0.2: very less 0.21-0.4: less 0.41-0.5 medium,	0.51-0.8: on an average sufficient 0.81-1.00: sufficient >1.0 more than sufficient
Nitrogen (Kg/ha)	Upto 50 very less 51-100 less 101-150 good	151-300 Better >300 sufficient
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
Potash (Kg/ha)	0 -120 very less 120-180 less 181-240 medium	241-300 average 301-360 better >360 more than sufficient

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

**Table 3-6: Soil Quality Results**

Parameters	Unit	S-1	S-2	S-3	S-4	S-5	S-6
pH	----	7.3	7.5	7.4	7.8	7.6	7.1
Electrical Conductivity	µmhos /cm	339	428	364	387	358	401
Moisture	%	19.1	13.7	14.3	17.6	14	13.7
Soil texture	USDA System	Loam	Sandy Loam	Loam	Loam	Sandy Loam	Loam
Sand	%	47	55	51	43	57	44

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Parameters	Unit	S-1	S-2	S-3	S-4	S-5	S-6
Silt	%	34	30	28	30	29	38
Clay	%	19	15	21	27	14	18
Infiltration Rate	cm/hr	1.41	1.49	1.54	1.62	1.48	1.38
Bulk density	gm/cm <sup>3</sup>	1.55	1.58	1.57	1.54	1.58	1.56
Porosity	%	43.2	44.0	43.6	44.0	44.2	44.4
Iron (DTPA Extractable)	mg/kg	0.51	0.62	0.57	0.71	0.99	0.87
Zinc (DTPA Extractable)	mg/kg	1.62	1.57	1.49	1.52	10.98	1.85
Copper (DTPA Extractable)	mg/kg	0.91	0.87	0.99	1.02	0.88	0.78
Sodium as Na	mg/kg	21.6	23.8	25.1	22.7	22.4	21.7
Calcium as Ca	mg/kg	2065	1971	2164	2213	2067	1998
Magnesium as Mg	mg/kg	146	178	196	157	169	204
SAR Value	USDA System	0.92	1.03	1.03	0.93	0.95	0.92
Nitrogen as N	kg/ha as N	142	151	158	164	149	173
Phosphorus	kg/ha as P	17	22	19	16	18	20
Potassium as K	kg/ha as K	114	121	129	124	118	131
Organic Carbon	%	0.57	0.49	0.39	0.46	0.47	0.53
Organic matter	%	0.98	0.84	0.67	0.79	0.81	0.91

**SQ-Soil Sampling Locations**

**Results Interpretation:** The soil was predominantly Loamy in the study area. The pH was ranges 7.1 to 7.8 which were neutral to slightly alkaline mostly as per ICAR guideline. The conductivity was varying from 339 µmhos/cm to 428 µmhos/cm in the study area which is average as per ICAR guidelines which is good to crops. Organic Carbon was varying from 0.39% to 0.57% which is between less & medium as per ICAR guidelines as mostly locations are near to river. Nitrogen was varying from 142 kg/ha to 173 kg/ha which is between good & sufficient as per ICAR guidelines and good to crops. Phosphorous was varying from 16 kg/ha to 22 kg/ha which is very less as per ICAR guidelines for crops. Potassium was varying from 114 kg/ha to 131 kg/ha which is also between very less to less as per ICAR guidelines. Heavy metals were also analysed. Overall, the soil quality was good having the good bulk density & good moisture content which may be due to the basin of river Yamuna.

**3.4. Water Environment**

**3.4.1. Hydrogeology (Aquifer System)**

The district is occupied by Indo-Gangetic alluvial plain of Quaternary age and falls in Yamuna sub-basin of Ganga basin. The Central Ground Water Board has drilled 21 exploratory boreholes to delineate and determine potential aquifer zones, evaluation of aquifer characteristics Out of 21 exploratory boreholes 13 boreholes were abandoned due to poor quality of ground water. The permeable granular zones comprising fine to medium grained sand and occasionally coarse sand and gravel. Their lateral and as well as vertical extent is limited. The borehole data reveals that clay group of formations dominate over the sand group in the district area. Ground water occurs



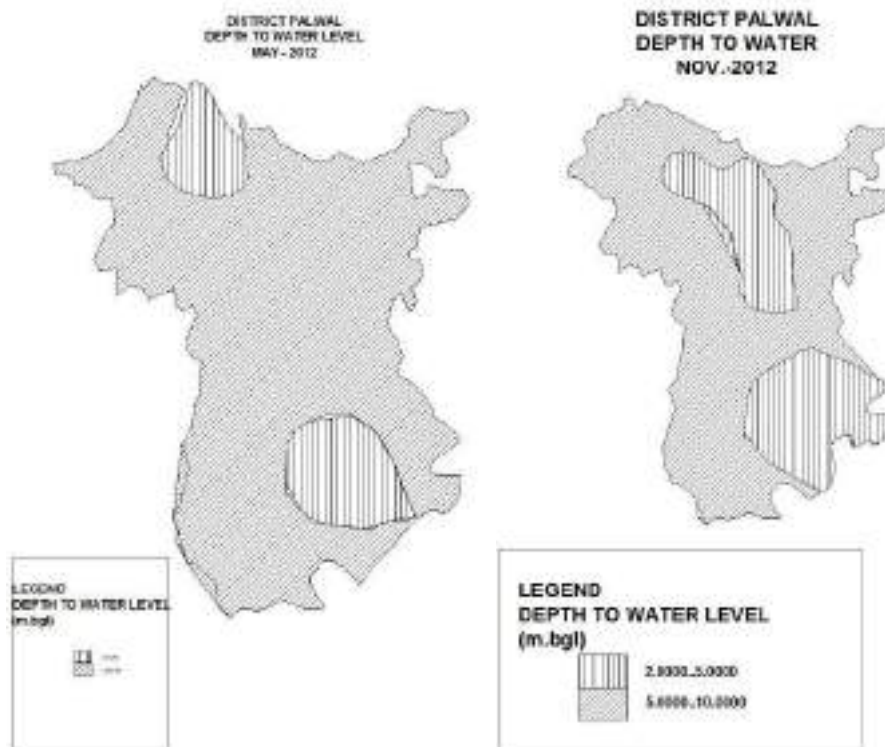
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in alluvium and the underlying weathered/ fractured quartzites. Alluvium comprises sands silt, Kankar and gravel. Which form the principal ground water bearing horizon. In Quartzite formation, occupying the north- western part of the district, ground water occurs in weathered and jointed fractured horizons. Weathering and fracturing have resulted in formation of semi-consolidated sand beds (BADARPUR SANDS) which form potential aquifer zones. This quartzite formation has not been explored for ground water occurrence. In alluvium, granular zones are evenly distributed in entire thickness which is negligible near the quartzite outcrops to over 350 m in the eastern parts near Yamuna River. The discharge of the well's ranges from 750 lpm to 900 lpm at a drawdown of 5.5 to 7.00m. The transmissivity 'T' value ranges between 55 to 200 m<sup>2</sup> /day were determined. Shallow tube wells for irrigation use are generally constructed up to a depth of 40 m. The discharge of these shallow tube wells range 360 - 600 litres per minutes.

### 3.4.2. Trend / Behaviour to Ground Water Level

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

**Figure 3.7: Pre-Monsoon (May 2012) & Post-Monsoon (November 2012) Water Level**



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

### 3.4.3. Status of Ground Water Development

The hydrogeological data generated through exploratory drilling has proved a vital information regarding identification of aquifer system, demarcation of their vertical and lateral extent, and delineation of potential aquifer characteristics. These studies also provide information on well design and drilling techniques. A well assembly of 203 mm dia, using about 20 m to 30 m long housing pipe and MS slot pipe with slots of 1.19 mm to 1.59 mm size would be ideal in the district

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area. "V" wires galvanized Screen having 0.50-1.5 mm slot can also be used as it can provide more open area conventional slotted pipes. Entrance velocity of water in the well must be kept in mind while designing the well assembly. Reverse /Direct circulation rig is suitable for carrying out the drilling in alluvial parts of district whereas percussion or Down the Hole Hammer (DTH) technique with Odex attachment are suitable for drilling in boulder formation.

### 3.4.4. Water Level Fluctuation in Study Area

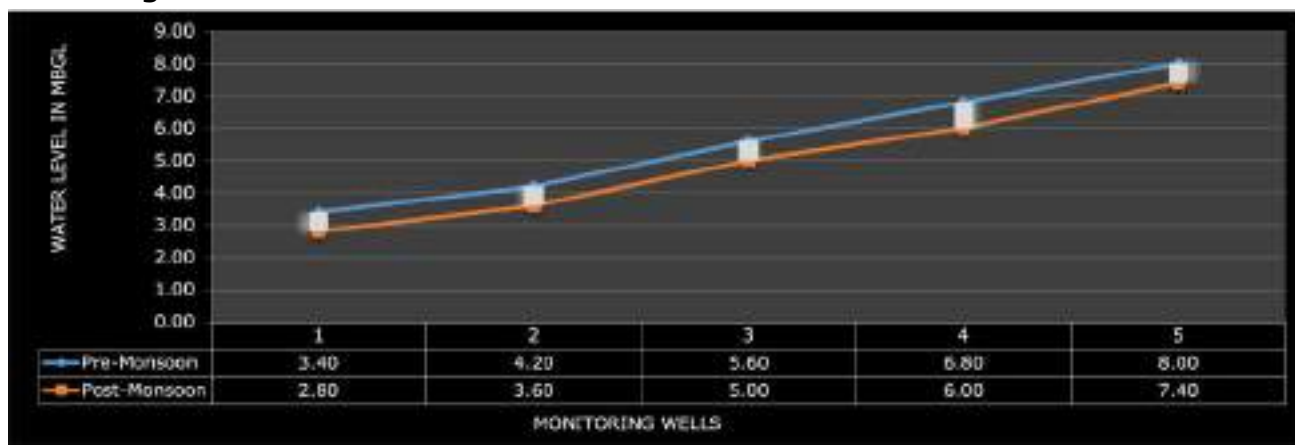
To assess the ground water scenario, 5 samples were collected from dug wells. Sampling locations with co-ordinates are given below in Table 3.7. The water level from dug wells was varying from 3.40 MBGL to 8.0 MBGL in pre-monsoon and 2.80 MBGL to 7.40 MBGL in post-monsoon season. Ground water fluctuation difference was observed from 0.6 MBGL to 0.8 MBGL in the study area.

**Table 3-7: Ground Water Level Fluctuation in Area**

Location	Latitude	Longitude	Pre-Monsoon	Post-Monsoon
WL - 1	28°10'36.12"N	77°28'13.54"E	3.40	2.80
WL - 2	28°11'18.83"N	77°26'40.52"E	4.20	3.60
WL - 3	28°12'22.30"N	77°29'42.37"E	5.60	5.00
WL - 4	28° 7'57.28"N	77°30'36.11"E	6.80	6.00
WL - 5	28° 8'57.26"N	77°27'14.81"E	8.00	7.40

\*WL- Ground Water Level Location

**Figure 3.8: Water Level Fluctuation of Pre-monsoon and Post-monsoon**



### 3.4.5. Rainfall & Climate

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

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

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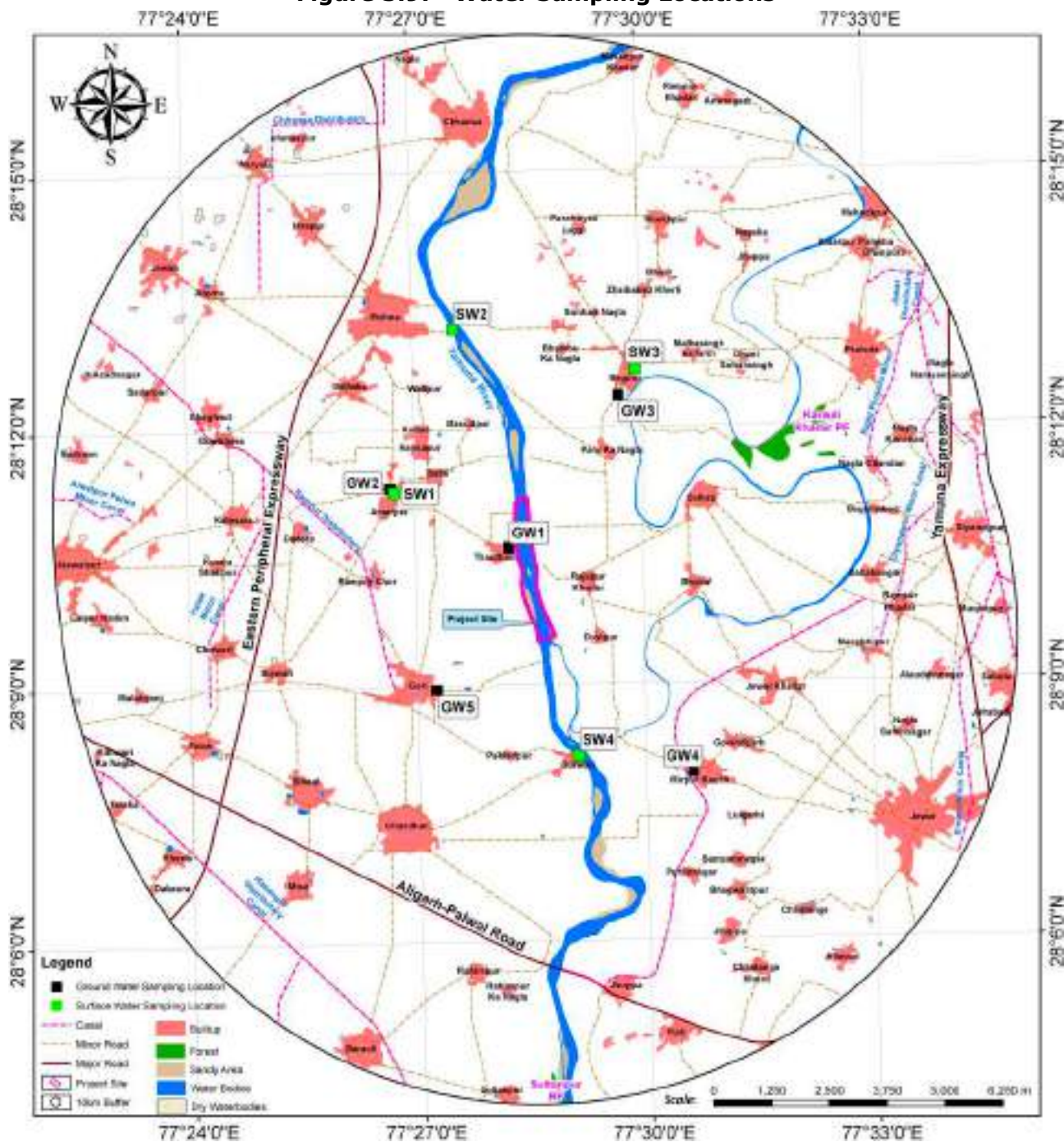
disturbances. Normal Annual Rainfall - 542 mm, Normal Monsoon Rainfall - 460 mm, Temperature - 41° C (May & June).

### 3.4.6. Ground Water Quality

#### 3.4.6.1. Methodology for Sampling & Analysis

Water samples were collected from the available identified water bodies during the post-monsoon season (October 2023 to December 2023). Five ground water samples were examined for Physico-chemical and heavy metals to access the effect of the already ongoing activities on surface and ground water. Water sampling locations are given in Table 3.8 & Figure 3.10.

**Figure 3.9: Water Sampling Locations**





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**Table 3-8: Ground Water Sampling Location**

Location Name	Location Code	Distance (km)	Direction	Co-Ordinates	
				Latitude	Longitude
Thantri	GW1	0.5	NNW	28°10'36.12"N	77°28'13.54"E
Amarpur	GW2	3.3	NW	28°11'18.83"N	77°26'40.52"E
Bagpur	GW3	2.9	NE	28°12'22.30"N	77°29'42.37"E
Mirpur Kachh	GW4	5.6	SE	28° 7'57.28"N	77°30'36.11"E
Gori	GW5	3.2	SW	28° 8'57.26"N	77°27'14.81"E

**HP- Hand Pump**

Analyses of the samples were carried out as per established standard methods and procedures prescribed by CPCB, IS 3025 Codes and APHA 23<sup>rd</sup> edition, 2017. Samples for chemical analysis were collected in glass/plastic sterilized water bottles. Samples collected for metal content were acidified with 1 ml HNO<sub>3</sub>. Parameters like dissolved oxygen (DO) and pH were analysed at the time of sample collection. The analyse details of ground water is given below.

**Table 3-9: Ground Water Results**

S. No.	Parameters	Unit	Handpump / Borewell					IS 10500 :2012	
			GW-1	GW-2	GW-3	GW-4	GW-5	AL*	PL**
1	pH	--	7.6	7.2	7.8	7.5	7.1	6.5-8.5	NR
2	Conductivity	µS/cm	1287	1314	1297	1289	1312	\$	\$
3	Total Dissolve Solids	mg/l	776	791	782	779	792	500	2000
4	Alkalinity as CaCO <sub>3</sub>	mg/l	214.9	226.7	219.6	234.8	254.8	200	600
5	Total Hardness as CaCO <sub>3</sub>	mg/l	286.6	295.5	272.6	266.0	273.2	300	600
6	Calcium as Ca	mg/l	65.9	72.4	62.4	58.6	65.8	75	200
7	Magnesium as Mg	mg/l	29.7	27.9	28.4	29.1	26.5	30	100
8	Sodium	mg/l	124	136	141	129	134	\$	\$
9	Potassium	mg/l	21	14	11	18	17	\$	\$
10	Bicarbonate	mg/l	214.9	226.7	219.6	234.8	254.8	\$	\$
11	Chloride as Cl	mg/l	241.9	249.6	239.5	223.8	219.7	250	1000
12	Sulphate as SO <sub>4</sub>	mg/l	55.2	51.7	57.6	53.7	58.4	200	400
13	Nitrate as NO <sub>3</sub>	mg/l	11.8	12.7	10.8	9.9	8.7	45	NR
14	Total Nitrogen as N	mg/l	<0.5	<0.5	<0.5	<0.5	<0.5	\$	\$
15	Fluoride as F	mg/l	0.58	0.69	0.53	0.72	0.72	1.00	1.50
16	Total Phosphorus as P	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	\$	\$
17	Phenolic compound as C <sub>6</sub> H <sub>5</sub> OH	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.002
18	Cyanide	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	NR
19	Aluminium	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	0.2
20	Cadmium	mg/l	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	NR

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Source			Handpump / Borewell					IS 10500 :2012	
S. No.	Parameters	Unit	GW-1	GW-2	GW-3	GW-4	GW-5	AL*	PL**
21	Chromium as Cr <sup>+6</sup>	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	NR
22	Iron	mg/l	0.26	0.22	0.17	0.26	0.18	0.3	NR
23	Copper	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	1.5
24	Lead	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	NR
25	Manganese	mg/l	<0.03	<0.03	<0.03	<0.03	<0.03	0.1	0.3
26	Mercury	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	NR
27	Zinc	mg/l	1.74	1.998	2.42	2.16	2.42	5	15

\*AL- Acceptable Limit, \*\*PL- Permissible Limits in absence of alternate sources, NR- No Relaxation

### GROUND WATER RESULTS INTERPRETATION

All the parameters were observed mostly exceeding the acceptable limits but well within permissible limits for drinking water standard 10500:2012. pH (7.1 to 7.8), TDS (776 mg/l to 792 mg/l), alkalinity (214.9 mg/l to 254.8 mg/l), Total Hardness (266.0 mg/l to 295.5 mg/l), Calcium as Ca (58.6 mg/l to 72.4 mg/l), Magnesium as Mg (26.5 mg/l to 29.7 mg/l), Chloride (219.5 mg/l to 249.6 mg/l) & Sulphate (51.7 mg/l to 58.4mg/l) parameters were analysed. Water was also analysed for heavy metal and biological parameters and observed good quality of water. Water is not good for direct drinking, should be used after treatment.

### 3.4.7. Surface Water Quality

**Table 3-10: Surface Water Sampling Location**

Location Name	Location Code	Distance (km)	Direction	Co-Ordinates	
				Latitude	Longitude
Amarpur Near Pond	SW2	3.2	NW	28°11'15.99"N	77°26'43.46"E
Yamuna River (Mohna)	SW3	3.9	NNW	28°13'10.08"N	77°27'32.32"E
Bagpur Near Pond	SW4	3.6	NE	28°12'40.58"N	77°29'55.64"E
Yamuna River (Gurwari)	SW5	4.2	SSE	28° 8'10.00"N	77°29'5.74"E

**Table 3-11: CPCB Water Quality Criteria**

Designated Best Use	Class*	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less
		pH between 6.5 and 8.5
		Dissolved Oxygen 6mg/l or more
		Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organized)	B	Total Coliforms Organism MPN/100ml shall be 500 or less
		pH between 6.5 and 8.5
		Dissolved Oxygen 5mg/l or more
		Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less
		pH between 6 to 9
		Dissolved Oxygen 4mg/l or more
		Biochemical Oxygen Demand 5 days 20°C 3mg/l or less
Propagation of Wildlife and Fisheries	D	pH between 6.5 to 8.5
		Dissolved Oxygen 4mg/l or more
		Free Ammonia (as N) 1.2 mg/l or less
	E	pH between 6.0 to 8.5



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Designated Best Use	Class*	Criteria
Irrigation, Industrial Cooling, Controlled Waste disposal		Electrical Conductivity at 25°C micro mhos/cm Max.2250
		Sodium absorption Ratio Max. 26
		Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

\* Class- Water Quality Class Defined by CPCB

The analyze details of surface water is given in Table 3.12.

**Table 3-12: Surface Water Results**

S. No.	Parameters	Unit	SW-1	SW-2	SW-3	SW-4	CPCB Standards*	
							IS 2296	Class
1	Turbidity	NTU	31.9	21.4	21.4	18.7	\$	\$
2	pH	--	7.3	7.5	7.2	7.0	6.5 – 8.5	Class A
3	Temperature	°C	25.9	26.1	26.4	26.6	\$	\$
4	Total Suspended Solids	mg/l	63	59	63.7	66.2	\$	\$
5	Conductivity	µS/cm	1941	1989	2024.3	2062.8	\$	\$
6	Total Dissolve Solids	mg/l	1168	1197	1220.7	1245.7	\$	\$
7	Alkalinity as CaCO <sub>3</sub>	mg/l	451.8	463.7	457.1	447.3	\$	\$
8	Total Hardness as CaCO <sub>3</sub>	mg/l	679.2	677.4	718.8	664.3	\$	\$
9	Calcium as Ca	mg/l	193.7	189.7	199.8	188.4	\$	\$
10	Magnesium as Mg	mg/l	47.6	49.6	53.5	47.2	\$	\$
11	Sodium	mg/l	74.8	82.5	77.4	81.7	\$	\$
12	Potassium	mg/l	5	6	6	4	\$	\$
13	Bicarbonate	mg/l	451.8	463.7	457.1	447.3	\$	\$
14	Chloride as Cl	mg/l	223.9	231.7	244.0	228.4	\$	\$
15	Sulphate as SO <sub>4</sub>	mg/l	139.6	131.8	138.0	135.4	\$	\$
16	Nitrate as NO <sub>3</sub>	mg/l	23.8	29.6	30.5	26.5	\$	\$
17	Total Carbon	mg/l	<1	<1	<1	<1	\$	\$
18	Fluoride as F	mg/l	0.69	0.82	0.84	0.89	1.5	\$
19	Phenolic compound as C <sub>6</sub> H <sub>5</sub> OH	mg/l	<0.001	<0.001	<0.001	<0.001	0.005	\$
20	Nickel	mg/l	<0.03	<0.03	<0.03	<0.03	\$	\$
21	Cadmium	mg/l	<0.01	<0.01	<0.01	<0.01	\$	\$
22	Chromium as Cr <sup>+6</sup>	mg/l	<0.05	<0.05	<0.05	<0.05	\$	\$
23	Iron	mg/l	0.79	0.64	0.6	0.5	\$	\$
24	Lead	mg/l	<0.1	<0.1	<0.1	<0.1	\$	\$
25	Zinc	mg/l	3.8	4.5	4.0	3.9	\$	\$
26	Dissolve Oxygen	mg/l	6.7	6.1	6.2	6.9	5	Class A
27	COD	mg/l	125	139	139.7	143.7	\$	\$
28	BOD, 27°C 3 days	mg/l	44.7	37.8	37.4	35.3	3	Below E**
29	Total Coliforms	MPN / 100ml	300	1500	250	1400	500	Class B & C

\*IS 2296-class B designated for inland surface water & class as per CPCB Water Quality Criteria, \*\* Not meeting to any class defined by CPCB.

**OBSERVATIONS & INTERPRETATIONS**

The parameters were analysed as per Indian Standard 2296 & APHA methodology and compared to the defined water quality of CPCB as the categorization has been given in above table. The pH

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was varying between 7.0 to 7.5. Dissolved Oxygen of the sources was varying between 6.1 mg/l to 6.9 mg/l. BOD was observed 4.9 mg/l to 37.8 mg/l. Total Coliform were observed varying between 300 MPN/100ml to 1500 MPN/100ml. Water was not usable due to bad quality.

### 3.5. Meteorological Condition

Meteorology is the key to understand the air quality. The essential relationship between meteorological condition and atmospheric dispersion involves the wind in the broadest sense. Wind fluctuations over a very wide range of time, accomplish dispersion and strongly influence other processes associated with them.

#### 3.5.1. Meteorological Data as per IMD Gurugram (Haryana)

The meteorological data is collected from the IMD station at Gurugram, which is the nearest IMD station (Approx 60 km) to the project site. The data collected from IMD includes wind speed, wind direction (recorded in sixteen directions), temperature, relative humidity, atmospheric pressure; rainfall and cloud cover over a period of 30 years from the year 1981 to 2010. All these parameters were recorded twice a day viz at 08.30 and 17.30 hours. The monthly maximum, minimum and average values are collected for all the parameters like rainfall, temperature, humidity & wind speed are presented in Table 3.13.

**Table 3-13: Meteorological Table as per IMD, Gurugram (1981-2010)**

Season / Month		Rainfall (mm)	Temperature (°C)		Humidity (%)		Wind	
			Max	Min	08.30 hrs.	17:30 hrs.	Speed (kmph)	Direction
Winter	December	9.9	27.0	2.8	80.0	55.0	2.0	NW, W
	January	15.0	24.9	2.4	82.0	54.0	2.8	NW, W
	February	21.4	28.7	4.2	73.0	45.0	3.4	NW, SE
	<b>Total / Mean</b>	<b>46.3</b>	<b>26.9</b>	<b>3.1</b>	<b>78.3</b>	<b>51.3</b>	<b>2.7</b>	-
Summer	March	12.3	35.7	8.0	65.0	37.0	4.1	NW, SE
	April	18.2	42.1	13.3	49.0	28.0	4.3	NW, W
	May	34.3	44.5	18.3	48.0	31.0	4.6	NW, SE
	<b>Total / Mean</b>	<b>64.8</b>	<b>40.8</b>	<b>13.2</b>	<b>54.0</b>	<b>32.0</b>	<b>4.3</b>	-
Monsoon	June	67.3	44.9	24.6	57.0	40.0	5.5	NW, SE
	July	171.3	40.2	23.1	76.0	63.0	4.1	SE, NW
	August	190.7	37.8	23.2	81.0	69.0	2.1	SE, NW
	September	93.8	37.6	20.5	74.0	59.0	2.6	NW, SE
	<b>Total / Mean</b>	<b>523.1</b>	<b>40.1</b>	<b>22.9</b>	<b>72.0</b>	<b>57.8</b>	<b>3.6</b>	-
Post-Monsoon	October	12.0	36.2	12.4	66.0	45.0	1.9	NW, SE
	November	10.7	32.7	7.2	66.0	47.0	1.6	NW, W
	December	9.9	27.0	2.8	80.0	55.0	2.0	NW, W
	<b>Total / Mean</b>	<b>32.6</b>	<b>32.0</b>	<b>7.5</b>	<b>70.7</b>	<b>49.0</b>	<b>1.8</b>	-
<b>Total Annual average Rainfall is 657 (mm)</b>								

Source: <https://imd pune.gov.in/library/publication.html>;

#### 3.5.2. Onsite Micro-Meteorology (Hourly)

The data on meteorological parameters in the study area were monitored continuously for post-monsoon season (October 2023 to December 2023). A meteorological station was setup on the roof top a house in nearby habitat to proposed lease. Wind speed, wind direction, dry and wet

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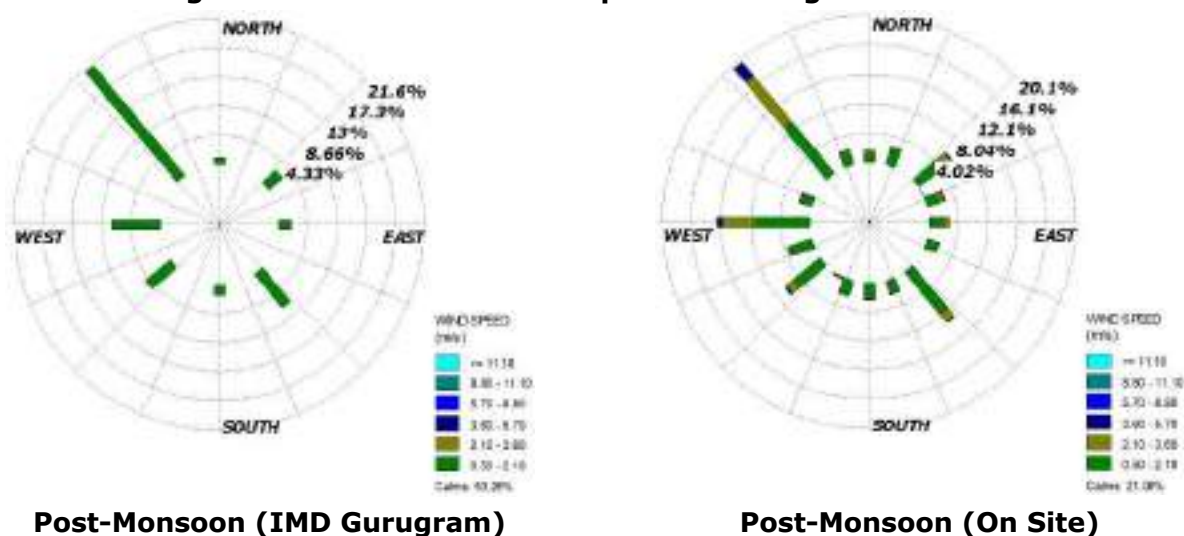
bulb temperature, relative humidity, and general weather conditions were recorded throughout the study period in an automated data logger.

**Table 3-14: On-site Micro Meteorological Data**

Months	Temperature (°C)			Relative Humidity (%)			Average Wind Speed		Rainfall
	Max.	Min.	Average	Max.	Min.	Average	m/s	kmph	mm
October	35.7	14.7	25.6	76.5	51.3	61.4	1.4	5.1	0.0
November	31.2	10.9	22.0	71.7	43.6	55.0	1.2	4.4	0.0
December	26.8	8.2	19.2	75.0	42.6	54.5	1.2	4.3	0.0
<b>Average</b>	<b>31.2</b>	<b>11.3</b>	<b>22.3</b>	<b>74.4</b>	<b>45.8</b>	<b>57.0</b>	<b>1.3</b>	<b>4.6</b>	<b>0.0</b>

The maximum temperature recorded during the study period was 35.7°C in the month of October and the minimum temperature was 8.2°C in the month of December. The highest RH found in the study area was 76.5% in the month of October, while minimum monthly average RH found 42.6% in the month of December. The average wind speed recorded was 1.3 m/sec. Predominant wind direction during the study period was mainly South-West to North-East followed by North-East to South-West. Hourly onsite micro-meteorological data is enclosed as **Annex 4.1**.

**Figure 3.10: Wind Pattern as per IMD Gurugram & Onsite**



### 3.6. Air Environment

The baseline studies on air environment include identification of specific air pollution parameters and their existing levels in ambient air. The ambient air quality with respect to the core and buffer zone of 10 km radius around the proposed project site forms the baseline information. The sources of air pollution in the region are mostly due to vehicular traffic, dust arising from unpaved village road and domestic fuel/ biomass burning. The quantification of impacts of the proposed project on the ambient air quality requires to evaluate the existing ambient air quality of the area.

#### 3.6.1. Monitoring Methodology, Parameters & Locations

Monitoring has been carried out as per the latest CPCB and MoEF&CC guidelines and notifications. This is to allow a comparison with the present revised standards mentioned in the latest Gazette

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Notification of the Central Pollution Control Board (November 2009). The sampling locations for ambient air quality were established based on the following considerations: Meteorological conditions including wind direction, Topography of the study area; and Representativeness of regional background air quality for obtaining baseline status.

The monitoring has been carried out at a frequency of two samples per week at each of 8 locations, adopting a continuous 24-hour continuous schedule for Particulate Matter, Sulphur Dioxide and Nitrogen Dioxide except CO for one hour. It was ensured that the equipment was placed at a height of at least 1 m to 1.5 m above the ground level at each monitoring station, for negating the effects of windblown ground dust. Also, distance of the sampler to any air flow obstacle i.e., buildings, must be more than two times the height of the obstacle above the sampler has been ensured. The equipment was placed at open space free from trees and vegetation which otherwise act as a sink of pollutants resulting in lower levels in monitoring results.

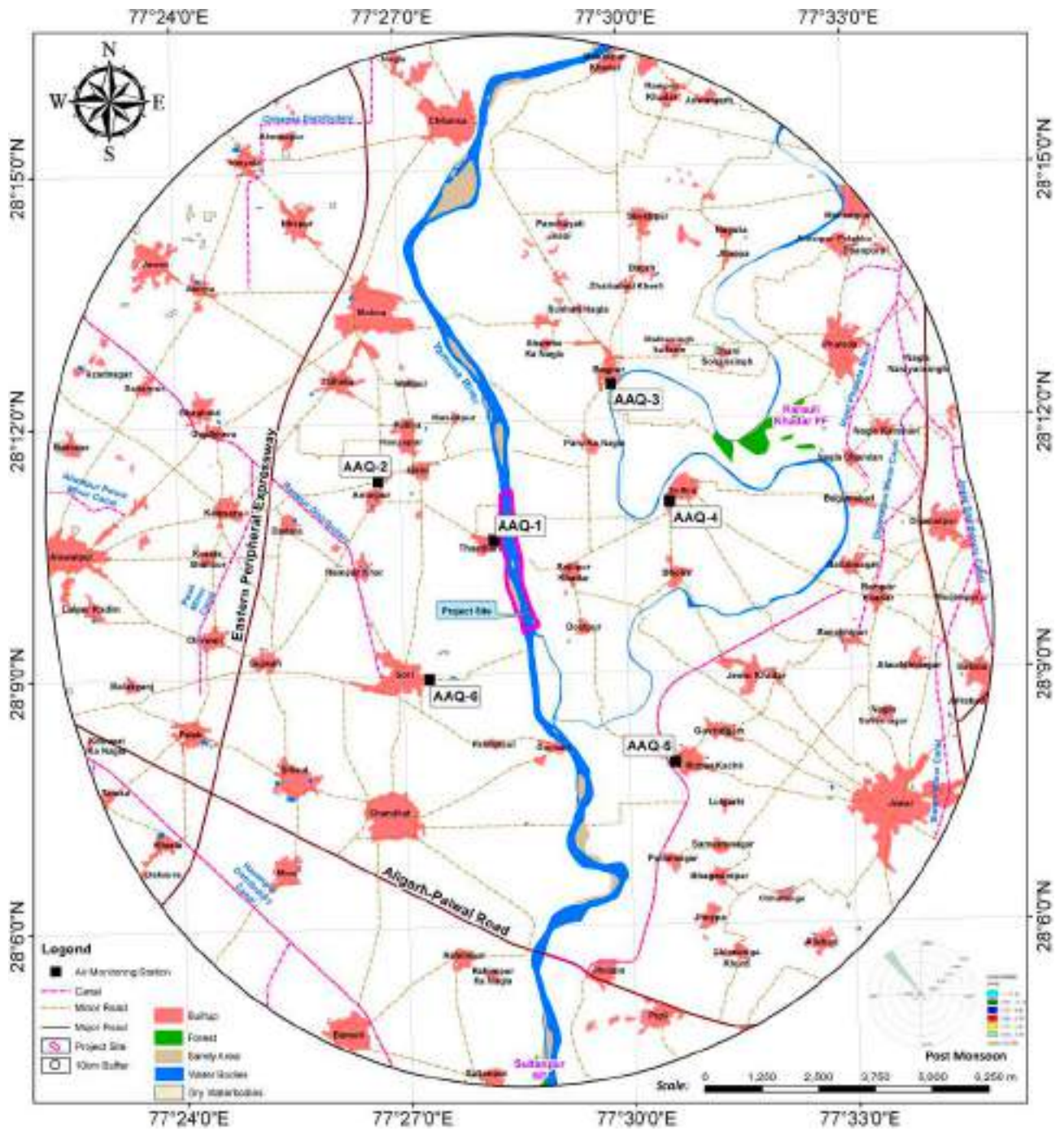
**Table 3-15: Ambient Air Monitoring Locations**

S. No.	Location Name	Code	Zone	Distance (km)	Direction	Latitude	Longitude
1	Thantri	AAQ-1	Core	0.5	NW	28°10'35.43"N	77°28'14.05"E
2	Amarpur	AAQ-2	Buffer	3.3	NW	28°11'19.34"N	77°26'41.48"E
3	Bagpur	AAQ-3	Buffer	3.2	NE	28°12'26.23"N	77°29'50.61"E
4	Solhra	AAQ-4	Core	3.5	ENE	28°11'01.48"N	77°30'36.24"E
5	Mirpur Kachh	AAQ-5	Buffer	5.6	SSE	28°07'55.93"N	77°30'36.62"E
6	Gori	AAQ-6	Buffer	3.1	SW	28°08'57.21"N	77°27'19.90"E



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**Figure 3.11: Ambient Air Monitoring Locations**





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### 3.6.2. Air Quality of Study Area

Consolidated values of ambient air quality are given in Table 3.16. The test report and monitoring photographs are enclosed as **Annex 3.2**.

**Table 3-16: Ambient Air Quality Results**

Parameters				PM <sub>10</sub>			PM <sub>2.5</sub>			SO <sub>2</sub>			NO <sub>x</sub>			CO		
Name of monitoring equipment used				RDS			Fine Particle Sampler			RDS with Gas Attachments			RDS with Gas Attachments			CO Analyzer (NDIR)		
Equipment sensitivity				5 µg/m <sup>3</sup>									0.1 mg/m <sup>3</sup>					
AAQ standard (CPCB) for Industrial, Residential & other Areas				100 µg/m <sup>3</sup>			60 µg/m <sup>3</sup>			80 µg/m <sup>3</sup>			80 µg/m <sup>3</sup>			4 mg/m <sup>3</sup>		
AAQ standard (CPCB) for Sensitive Areas				100 µg/m <sup>3</sup>			60 µg/m <sup>3</sup>			80 µg/m <sup>3</sup>			80 µg/m <sup>3</sup>			4 mg/m <sup>3</sup>		
Code	Location Name	Samples	Category (R, I, S)	Min.	Max	98% tile	Min.	Max.	98% tile	Min.	Max.	98% tile	Min.	Max.	98% tile	Min.	Max.	98% tile
AAQ-1	Thantri	24	R	43	71	71	20	33	33	6.4	9.3	9.2	10.1	14.0	13.9	0.58	1.04	1.02
AAQ-2	Amarpur	24	R	47	75	75	22	35	35	6.4	9.9	9.9	10.1	14.6	14.5	0.58	0.95	0.94
AAQ-3	Bagpur	24	R	46	79	79	22	38	38	6.2	10.1	10.1	10.0	14.3	14.3	0.52	1.01	1.01
AAQ-4	Solhra	24	R	49	73	73	23	34	34	6.8	9.9	9.8	10.1	14.7	14.4	0.58	1.02	1.02
AAQ-5	Mirpur Kachh	24	R	44	70	70	20	32	32	6.4	10.1	9.6	10.1	13.9	13.7	0.61	1.07	1.05
AAQ-6	Gori	24	R	45	77	76	21	36	36	6.8	10.7	10.2	10.1	15.5	14.8	0.51	1.09	1.07

\* 24 hourly or 8 hourly or 1 hourly monitored value, as applicable shall be complied with 98% of the time in a year, \*\* Annual Arithmetic Means of minimum 104 measurements in a year at a site taken twice a week 24 hourly at uniform intervals, \*\*\* Category defined as Residential, Industrial & Sensitive. 5% of the time they may exceed the limits but not on two consecutive days of monitoring, For CO 1 hourly standard is being considered.

**Table 3-17: Mineralogical Composition of PM10**

Location Name	Date	PM 10 (µg/m <sup>3</sup> )	Free Silica (%)	Ca (µg/m <sup>3</sup> )	Mg (µg/m <sup>3</sup> )	Ni (µg/m <sup>3</sup> )	Pb (µg/m <sup>3</sup> )
Thantri	08/10/2023	62	2.3	1.42	0.61	<0.5	0.18
Amarpur	09/10/2023	74	1.7	1.33	0.44	<0.5	0.15
Bagpur	23/10/2023	62	1.3	1.16	0.31	<0.5	0.09
Solhra	24/11/2023	58	1.9	1.66	0.58	<0.5	0.11
Mirpur Kachh	11/11/2023	59	2.1	1.14	0.49	<0.5	0.18
Gori	04/12/2023	54	1.5	1.49	0.55	<0.5	0.18

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**INTERPRETATION**

- ✓ **Particulate Matter:** PM<sub>10</sub> varying from 43 µg/m<sup>3</sup> to 79 µg/m<sup>3</sup>. PM<sub>2.5</sub> was observed 20 µg/m<sup>3</sup> to 38 µg/m<sup>3</sup>.
- ✓ **Gaseous Pollutants:** SO<sub>2</sub> was varying from 6.2 µg/m<sup>3</sup> to 10.7 µg/m<sup>3</sup>. NO<sub>x</sub> was observed 10.0 µg/m<sup>3</sup> to 15.5 µg/m<sup>3</sup> in study area. CO was observed from 0.51 mg/m<sup>3</sup> to 1.09 mg/m<sup>3</sup> in study area.
- ✓ The mineralogical composition of free silica in PM<sub>10</sub> was also analysed and is presented in the Table 4.17, which follows the standard ToR requirement.

As per the results observed of ambient air quality of the project site and the surrounding areas, the ambient air quality is well below the NAAQS limits, however after commissioning of the project the prevailing baseline status of area will be changed so to maintain the ambient air quality of the area. To control the air pollution, proper measurements along with suitable EMP will be adopted, which will be elaborated in environment management plan and impact chapter of report.

**3.7. Noise Environment**

**3.7.1. Ambient Noise Level Monitoring Stations**

In the present study, sound pressure levels (SPL) were measured by a sound level meter (Model: Envirotech Make SLM 100). Since loudness of sound is important for its effects on people, the dependence of loudness upon frequency must be considered in noise impact assessment. This has been achieved using A-weighting filters in the noise measuring instrument which gives a direct reading of approximate loudness. A-weighted equivalent continuous sound pressure level (Leq) values have been computed from the values of A-weighted sound pressure level measured with the help of noise meter.

**3.7.2. Frequency & Parameters of Sampling**

Noise levels were recorded continuous for 24 hours at an interval of 60 minutes during the day and night times to compute the day equivalent, night equivalent and day-night equivalent level. The noise level was monitored once during the study period at each monitoring location. The noise level is recorded in dB(A). The important parameters measured are Leq, Lday, and Lnight.

**3.7.3. Ambient Noise Level Monitoring Locations**

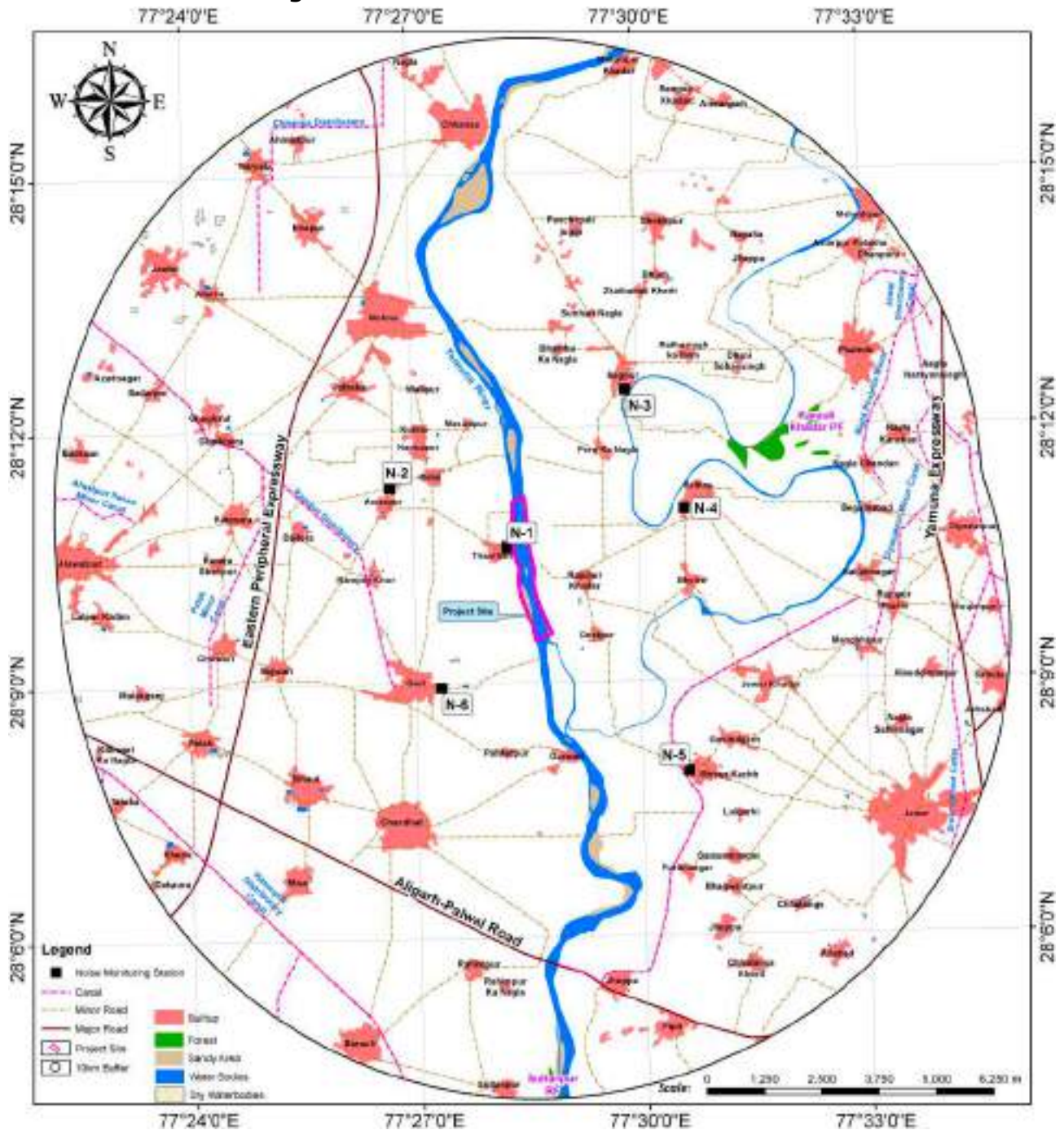
Assessment of ambient noise levels is an important parameter in preparation of impact assessment report. The environmental impact of noise can have several effects varying from annoyance to hearing loss depending on loudness of noise levels. The monitoring for noise levels were done in Six locations keeping considering the population and traffic of the area.

**Table 3-18: Ambient Noise Monitoring Locations**

S. No.	Location Name	Location Code	Distance (km)	Direction	Latitude	Longitude
1	Thantri	N-1	0.5	NW	28°10'35.43"N	77°28'14.05"E
2	Amarpur	N-2	3.3	NW	28°11'19.34"N	77°26'41.48"E
3	Bagpur	N-3	3.2	NE	28°12'26.23"N	77°29'50.61"E
4	Solhra	N-4	3.5	ENE	28°11'1.48"N	77°30'36.24"E
5	Mirpur Kachh	N-5	5.6	SSE	28° 7'55.93"N	77°30'36.62"E
6	Gori	N-6	3.1	SW	28° 8'57.21"N	77°27'19.90"E

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**Figure 3.12: Ambient Noise Level Locations**



### 3.7.4. Method of Monitoring

At each location, noise monitoring has been carried out once during study period over a period of 24 hours to obtain Leq values at uniform time intervals of 1 hour. In each hourly time interval Leq values have been computed from SPL readings taken at uniform time intervals of 10 minutes. For each location, day and night-time Leq values have then been computed from the hourly Leq values such that comparison could be made with the national ambient noise standards. Day time Leq was computed from the hourly Leq values between 6.00AM - 10.00PM and night-time Leq from the hourly Leq values between 10.00PM- 6.00AM.

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For noise levels measured over a given period interval, it is possible to describe important features of noise using statistical quantities. This is calculated using the percent of the time certain noise levels exceeds the time interval.

The notation for the statistical quantities of noise levels is described below:

- ✓ Hourly Leq values have been computed by integrating sound level meter.
- ✓ **Lday**: As per the CPCB guidelines the day-time limit is between 06:00 hours to 22.00 hours as outlined in Ministry of Environment and Forest Notification S.O. 123 (E) dated 14/02/2000.
- ✓ **Lnight**: As per the CPCB guidelines the night-time limit is between 22:00 hours to 06.00 hours as outlined in Ministry of Environment and Forest Notification S.O. 123 (E) dated 14/02/2000.
- ✓ **Ldn**: A rating developed by Environmental Protection Agency, (US-EPA) for specification of community noise from all the sources is the Day Night Sound Level, (Ldn). It is like a 24-hr equivalent sound level except that during night period (10 PM to 06 AM) a 10 dB (A) weighting penalty is added to the instantaneous sound level before computing the 24-hr average.

**Table 3-19: Ambient Noise Level (CPCB Standards)**

Area Code	Type of Area	Limits in dB(A) Leq*	
		Day (06:00hrs to 20:00hrs)	Night (20:00hrs to 06:00hrs)
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

\* Silence zone is defined as an area up to 100 meters around such premises as hospitals, educational institutions, and courts. The silence zones are to be declared by the competent authority.

### 3.7.5. Ambient Noise Level in Study Area

An analysis of the different Leq data obtained during the study period has been made. Variation was noted during the day - time as well as night - time. The results are presented in Table 3.20.

**Table 3-20: Ambient Noise Quality Result**

Noise Location	Zone	Code	Day				Night			
			Std.	L Max	L Min	L eq	Std.	L Max	L Min	L eq
Thantri	Residential	AN-1	55	54.2	40.9	50.4	45	40.2	30.4	35.6
Amarpur		AN-2	55	51.1	39.3	47.9	45	37.5	30.8	34.9
Bagpur		AN-3	55	53.9	42.6	49.8	45	39.5	29.4	34.9
Solhra		AN-4	55	52.7	40.5	49.0	45	37.8	29.1	34.7
Mirpur Kachh		AN-5	55	54.9	42.9	50.5	45	39.9	30.4	35.8
Gori		AN-6	55	53.6	39.7	49.0	45	38.9	28.5	34.8

The Sound Pressure Level recorded during the daytime on all locations varies from 39.3 dB(A) to 54.9 dB(A) & in time it varies between 28.5 dB(A) to 40.2 dB(A). The noise level was found well within prescribed standards due to absence of any major noise generating activities in the area.



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### 3.8. 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 geographical area. Ecological systems show complex interrelationship 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.

Generally, biological communities are the good indicators of climatic and edaphic factors. Studies on biological aspects of ecosystems are important in Environmental Impact Assessment for safety of natural flora and fauna. Information on the impact of environmental stress on the community structure serves as an inexpensive and efficient early warning system to check the damage to a particular ecosystem. The biological environment includes mainly terrestrial and aquatic ecosystems.

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. Plants and animals are more susceptible to environmental stress. The sensitivity of animal and plant species to the changes occurring in their existing ecosystem can, therefore, be used for monitoring Environmental Impact Assessment studies of any project.

#### 3.8.1. Objective of Biological Study

The main objectives of biological study were:

- ✓ To collect the baseline data for the study along with a description of the existing terrestrial, wetland, and aquatic biodiversity.
- ✓ To assess the scheduled species in the proposed site (rare, endangered, critically endangered, endemic, and vulnerable).
- ✓ To identify the locations and features of ecological significance.
- ✓ To identify the Impacts of proposed project before, after and during development phase.

**Table 3-21: Mode of Data Collection and Parameters**

Sr. No.	Aspect	Mode of Data collection	Parameters monitored	Remarks
1.	Terrestrial Biodiversity	By field survey	Floral and Faunal diversity	<b>For Floral Diversity:</b> Random survey, sapling survey/forest inventory, walking transects, collection and identification with the help of relevant literature. <b>For Faunal Diversity:</b> direct and indirect sampling, walking transects, point sampling and nest sampling etc.
2.		From authentic sources like Forests department of Haryana and available published	Floral and Faunal diversity and study of vegetation, forest type, importance etc.	Data collected from the working plan of the region, forest types from the authentic literature of Champion & Seth.



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Sr. No.	Aspect	Mode of Data collection	Parameters monitored	Remarks
		literatures from ZSI, BSI etc.		
3.	Aquatic Biodiversity	By field survey	Floral and Faunal diversity	<b>For Plankton Study-</b> Lackey's drops method and light microscope <b>For other aquatic-</b> Random survey, opportunistic observations
4.		From authentic sources like Forests department of Haryana.	Floral and Faunal diversity and study of vegetation, forest type, importance etc.	Desktop literature review to identify the representative spectrum of threatened species, population and ecological communities.

### 3.8.2. Environmental Sensitivity of the Study Area

There is no wildlife sanctuary, elephant corridor, tiger reserve or any sensitive receptor within study area (10 km) from lease area. Forest NOC has been issued by the Office of Divisional Forest Officer, Palwal Forest Division, Palwal vide reference no. 1783 dated 24.08.2023 which confirms project site is not part of any reserve forest or protected forest.

**Table 3-22: Environmental Settling of Study Area (15km Buffer)**

S. No.	Accessibility	Description	Distance	Direction
1	Roads/ Highways	Yamuna Expressway	9.1 (km)	ESE
		Aligarh Palwal Road	7.6 (km)	SW
2	Railway Stations	Palwal Railway Station	13.1 (km)	WSW
3	Religious	Lord Shiva Temple	3.9 (km)	NW
		Shiv Temple	5.7 (km)	NNE
4	Airport	Jewar Airport	11.9 (km)	E
5	Hospitals	Primary Health Centre	5.1 (km)	NNW
6	Institutional Buildings	Govt Sr Sec School Amarpur	3.3 (km)	NW
		Govt School	0.8 (km)	NW
7	Post Office	Post Office Chandhat	6.2 (km)	SW
8	Nearby Settlement	Thantri	0.5 (km)	NW
9	Interstate Boundary	Haryana - Uttar Pradesh	2.4 (km)	NE
10	Waterbody	Yamuna River	Project Site	
		Canal	8.6 (km)	NNW
		Chhansa Distributary	7.6 (km)	NW
		Rampur Distributary	11.3 (km)	W
		Alawalpur Polwa Minor	8.5 (km)	WNW
		Palak Minor	6.1 (km)	W
		Rampur Distributary	3.4 (km)	W
		Raunija Drain	11.3 (km)	WSW
		Kithwari Drain	11.1 (km)	WSW
		Palwal Drain	12.9 (km)	WSW
		Hoshangabad Minor	12.2 (km)	SW

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S. No.	Accessibility	Description	Distance	Direction
		Rasulpur Minor	10.9 (km)	SW
		Hasanpur Distributary	9.4 (km)	SW
		Nandabara Minor	11.1 (km)	SW
		Left Bata Drain	12.5 (km)	SSW
		Amrauli Minor	11.9 (km)	SSW
		Bata Escape	14.6 (km)	SSW
		Kharis Nala	13.1 (km)	SE
		Gopalgarh Minor	12.2 (km)	SE
		Waina Minor	13.7 (km)	SE
		Siwara Minor	9.3 (km)	ESE
		Kishorpur Minor	13.1 (km)	ESE
		Karoli Minor	10.9 (km)	E
		Dinayatpur Minor	7.9 (km)	ENE
		Jewar Distributary	9.3 (km)	NE
		Right Phaleda Minor	7.5 (km)	ENE
		Ranehra Minor	11.4 (km)	ENE
		Birampur Minor	11.9 (km)	ENE
		Tirthili Drain	12.7 (km)	NE
		Rabupura Minor	12.1 (km)	NE
		Kund Nala	10.5 (km)	NNE
11	Forest	Sultanpur RF	14.7 (km)	S
		Karauli Khadar PF	4.9 (km)	NE

Source: SOI Toposheet (H43X8, H43X12, G43F5 & G43F9) & Google References.

### 3.8.3. Forest Cover in Palwal District

The forest type found in the study area is Dry Deciduous Type Forest as per Champion and Seth Classification (1968). The recorded forest cover of the state is 1559 sq. km, which is 3.53% of its geographical area. The reserved, protected, and unclassified forests are 249 sq. km, 1158 sq. km and 152 sq. km respectively of the recorded forest area. (India State of Forest Report, 2021).

**Table 3-23: Forest cover of State and Project Affected District**

District / State	Geographical Area (km <sup>2</sup> )	Forest (km <sup>2</sup> )			Total (km <sup>2</sup> )	% of GA
		Very Dense	Mod. Dense	Open		
Palwal	1,359	0.00	1.94	11.62	13.56	1.00
<b>Haryana</b>	<b>44212</b>	<b>28</b>	<b>445.38</b>	<b>1130</b>	<b>1603.48</b>	<b>3.63</b>

Source: ISFR, 2021

The proposed mine area is not falling under any reserve forest. However, some forest areas are in buffer area of proposed mine lease area. The details of such forests area as follows:

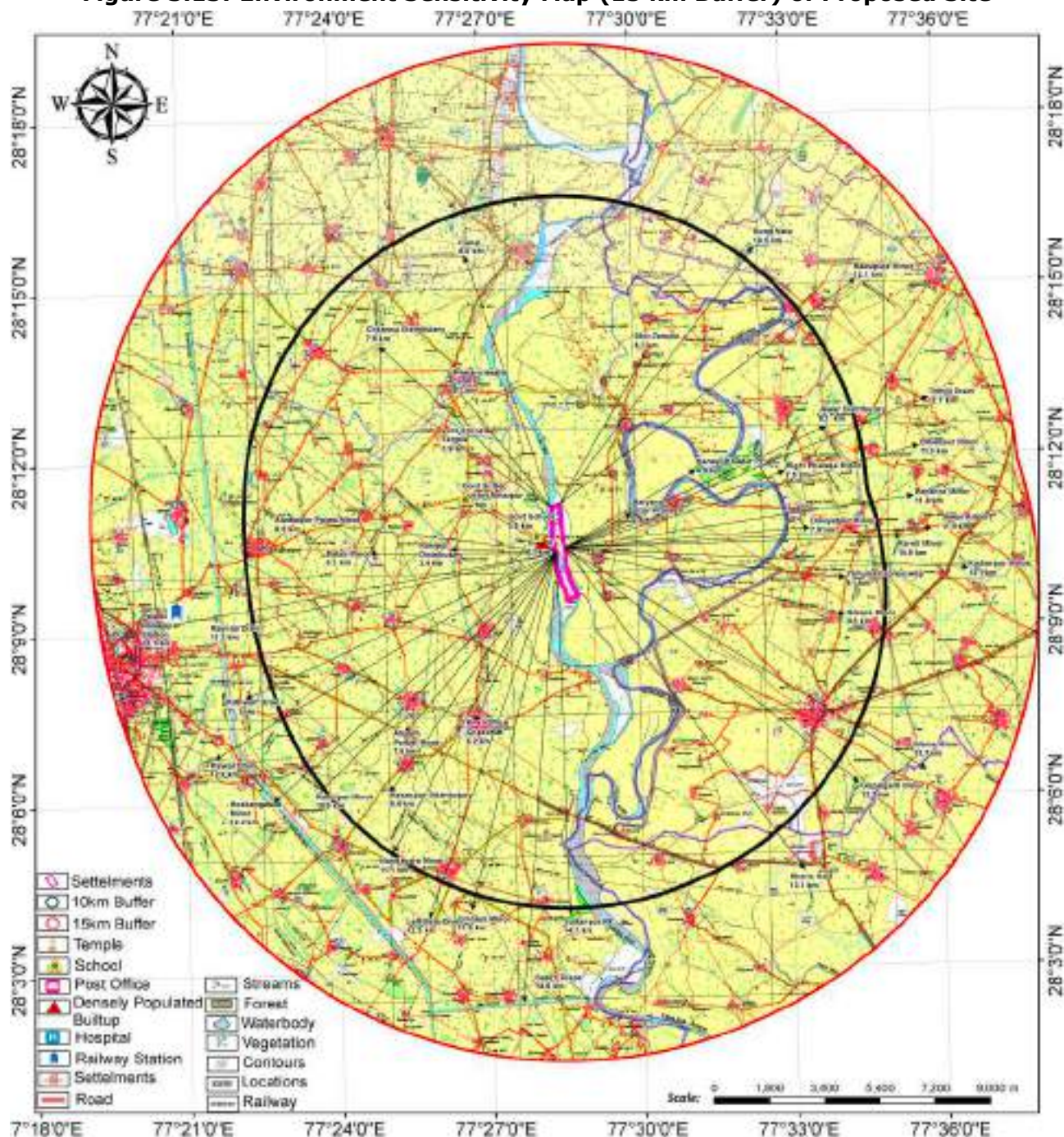
**Table 3-24: Reserve Forest Area details around the proposed Mine Site**

S. No.	Name of Forest	Distance from mine area	Direction from Mine Area
1	Sultanpur RF	14.7 km	South
2	Karauli Khadar PF	4.9 km	North-East

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The proposed mine area is neither part nor falling within 10 km radius of any National Park / Wildlife Sanctuary / other protected area under Wildlife (Protection) Act, 1972.

**Figure 3.13: Environment Sensitivity Map (15 km Buffer) of Proposed Site**



### 3.8.4. Ecology of the 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



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community are studied in the pattern of distribution, abundance, and diversity. The study area is divided into two parts i.e.:

**Core Zone:** Project Site i.e., Thanthri unit river sand mine, District- Palwal, Haryana.

**Buffer Zone:** Area within 10 Km radius from the project site.

**Methodology:** The present study on the floral assessment for the project activity is based on the field survey of the area. By the following forest inventory methodology, the survey of biological parameters has been conducted within the core zone and buffer zone (10 km radial distance) from project site at village- Thanthri & Rajupur Khadar, Tehsil & District- Palwal, Haryana, in accordance with the guidelines issued by the ministry of Environment, Forest and Climate Change, CPCB and SPCB during the study period.

A preliminary survey of the study area has been performed to get a general picture of the landscapes in vegetation. Traverses have been taken within different zone of the study area to note major vegetation patterns and plant communities including their growth form and dominant species. A **forest inventory** is **“an attempt to describe the quantity and quality of forest trees and many of the characteristics of the land area upon which the trees are grown.”**

The objective for this floral inventory of the study area is to provide complete checklist of floristic structure within the core zone and buffer zone (10 km radial distance) from project site for formulating effective management and conservation measures.

Biological environment is a good bio-indicator of changing environmental quality. Reconnaissance survey was undertaken around the proposed project site. In the present survey 10 km radius area around the project site was considered as study area. Both terrestrial and aquatic ecological analysis was carried out in the field and in the laboratory. Assessment of flora and fauna was undertaken in the study area. The field study was undertaken during November-2023.

In addition to the field study, literature review /desk research was carried out to determine the existing conditions within the study area and to identify habitats and species of potential importance that may be affected by the Project.

The following parameters were primarily considered in the study.

- Assessment of present state of vegetation, flora and fauna in the study area.
- Collection of data from literature about the flora and fauna accounts
- Identification of rare, endangered plants and animal species (if any).
- Identification of important plants/animals' species having diverse economic values.

The study area falls under the category of **Tropical Desert Thorn** and comprise predominantly of xerophytes. The area is sparsely populated and is almost plain. The study area contains plantations around villages. There is no wildlife and bird sanctuary within the study area. The biotic environment can be described under following heads:

- ✓ Core Zone: Project Site
- ✓ Buffer Zone: (Area within 10 km radius): The Buffer Zone can further be described as per the types of the land use.
  - i. Terrestrial Ecology
  - ii. Aquatic Ecology

### **3.8.5. Floral Ecology**

As the core zone of study area is riverbed, hence large trees were not found. Shrubs, herbs, and grasses were observed at shores of river. The buffer zone of the study area mainly comprises

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agricultural field. The large trees were found within agriculture fields, near habitation and in the forest area falling within the buffer zone of study area. Shrubs, herbs, grasses and climbers were also observed in the buffer zone of study area.

During the survey, no rare, endangered or threatened species of flora was observed in the study area. The floral inventory is presented in table below:

**Table 3-25: Floral Checklist of Buffer Zone**

S. No.	Scientific Name	Local Name	Family
<b>Trees</b>			
1	<i>Acacia nilotica</i>	Kikar	Fabaceae
2	<i>Acacia catechu</i>	Khair	Fabaceae
3	<i>Aegle marmelos</i>	Bel	Rutaceae
4	<i>Albizia lebbek</i>	Kala siris	Fabaceae
5	<i>Alstonia scholaris</i>	Saptarni	Apocyanaceae
6	<i>Ailanthus excelsa</i>	Arusa	Simaroubaceae
7	<i>Anthocephalus cadamba</i>	Kadamb	Rubiaceae
8	<i>Azadiracta indica</i>	Neem	Meliaceae
9	<i>Bauhinia purpurea</i>	Kachnar	Caesalpiniaceae
10	<i>Bombax ceiba</i>	Semal	Malvaceae
11	<i>Cassia fistula</i>	Amaltas	Fabaceae
12	<i>Callistemon viminalis</i>	Bottle Brush	Myrtaceae
13	<i>Dalbergia sissoo</i>	Shisham	Fabaceae
14	<i>Delonix regia</i>	Gulmohar	Fabaceae
15	<i>Eucalyptus spp</i>	Safeda	Myrtaceae
16	<i>Ficus benghalensis</i>	Bargad	Moraceae
17	<i>Ficus religiosa</i>	Pipal	Moraceae
18	<i>Ficus glomerata</i>	Gular	Moraceae
19	<i>Mangifera indica</i>	Aam	Anacardiaceae
20	<i>Melia azedarach</i>	Bakain	Meliaceae
21	<i>Morus alba</i>	Toot	Moraceae
22	<i>Pongamia pinnata</i>	Karanj	Fabaceae
23	<i>Prosopis juliflora</i>	Khejri	Fabaceae
24	<i>Polyalthia longifolia</i>	False Ashok	Annonaceae
25	<i>Syzygium cumini</i>	Jamun	Myrtaceae
26	<i>Tamarindus indica</i>	Imli	Caesalpiniaceae
27	<i>Terminalia arjuna</i>	Arjun	Combretaceae
28	<i>Ziziphus mauritiana</i>	Ber	Rhamnaceae
<b>Shrubs and Herbs</b>			
1	<i>Abutilon indicum</i>	Kanghi	Malvaceae
2	<i>Achyranthes aspera</i>	Chirchita	Amaranthaceae
3	<i>Aerva tomentosa</i>	Bui	Amaranthaceae
4	<i>Agave americana</i>	Gwarpatha	Amariyidaceae
5	<i>Bougainvillea glabra</i>	Bougainvella	Nyctaginaceae
6	<i>Calotropis procera</i>	Aak	Asclepiadaceae
7	<i>Cassia tora</i>	Panwar	Caesalpiniaceae
8	<i>Cleome viscosa</i>	Bagra	Capparaceae
9	<i>Datura metel</i>	Dhatura	Solanaceae
10	<i>Euphobia hirta</i>	Dudhi	Euphorbiaceae
11	<i>Lantana camara</i>	Panchpuli	Verbenaceae



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S. No.	Scientific Name	Local Name	Family
12	<i>Opuntia dillenii</i>	Nagphani	Cactaceae
13	<i>Parthenium hysterophorus</i>	Gajar Ghass	Asteraceae
14	<i>Ricinus communis</i>	Arandi	Euphorbiaceae
15	<i>Nerium oleander</i>	Kaner	Apocynaceae
16	<i>Solanum nigrum</i>	Makoi	Solanaceae
17	<i>Xanthium strumarium</i>	Chota gokhru	Asteraceae
<b>Grasses, Hedges and Climbers</b>			
1	<i>Apluda mutica</i>	Tachula	Poaceae
2	<i>Brachiaria ramosa</i>	Makra	Poaceae
3	<i>Cuscuta reflexa</i>	Amarbel	Cuscutaceae
4	<i>Cenchrus ciliaris</i>	Anjan grass	Poaceae
5	<i>Cyperus rotundus</i>	Dilla	Cyperaceae
6	<i>Cynodon dactylon</i>	Doob	Poaceae
7	<i>Digitaria ciliaris</i>	Wild Crab grass	Poaceae
8	<i>Erianthus munja</i>	Kana	Poaceae
9	<i>Heteropogon contortus</i>	Black Spear Grass	Poaceae
10	<i>Saccharum munja</i>	Moonj	Poaceae
11	<i>Tinospora cordifolia</i>	Giloy	Menispermaceae
12	<i>Vetiveria zizanoides</i>	Khas	Poaceae

Source: Study done by **PARIVESH ENVIRONMENTAL ENGINEERING SERVICES**

**Plants of Economic Importance:** Several plants found in the study area possess importance as medicine & other allied uses. The details of such plants are as follows.

**Table 3-26: Plants of Medicinal Importance & Other Allied Uses**

S. No.	Botanical Name	Common Name	Family Name	Part used	Medicinal use
1	<i>Abutilon indicum</i>	Kanghi	Malvaceae	Roots	Roots decoction is taken with milk or honey orally for long life span with strength
				Seeds	Seeds powder is taken orally as a Constipation remedy
				Leaves	Leaves Powder is taken orally with cow milk to cure diabetes
2	<i>Ailanthus excelsa</i>	Ardu	Simaroubaceae	Stem	Stem Juice mixed with sugar or honey is given orally to birth control
				Bark	Stem bark Decoction is given orally mixed with honey to treat Dysentery
3	<i>Albizia lebbek</i>	Safed Siris	Leguminosaceae	Leaf	Leaf extract are helpful in Bites and stings from venomous animals, ear pain and coughing
				Bark	Bark extract is helpful in Blood purification.

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S. No.	Botanical Name	Common Name	Family Name	Part used	Medicinal use
				Seeds	Seeds extract are used in Diarrhoea and Dysentery
4	<i>Azadirachta indica</i>	Neem	Meliaceae	Leaf	Leaf extract cures Leprosy, intestinal helminthiasis, respiratory disorders, constipation, rheumatism, chronic syphilitic sores and ulcer
				Flower	Flowers extracts are useful in Bile suppression, elimination of intestinal worms and phlegm
				Fruit	Fruit is taken for curing Piles, intestinal worms, urinary disorder, phlegm, eye problem, diabetes, wounds and leprosy
				Bark	Analgesic and antipyretic
5	<i>Cassia fistula</i>	Amaltas	Caesalpiaceae	Seeds	Mild laxative
				Leaf	Insect bites, swelling, rheumatism and facial paralysis
				Roots	Tonic, an astringent, febrifuge and strong purgative, migraine and dysentery
6	<i>Cynodon dactylon</i>	Doob	Poaceae	Whole plant	fodder
7	<i>Cassia tora</i>	Chakor	Caesalpiaceae	leaves	used as vegetables
8	<i>Datura metel</i>	Dhatura	Solanaceae	Seeds	Its 2-3 seeds should be taken daily to cure headache
				Leaves	Crushed leaves of Datura are used in treatment of bones diseases and scrotum swelling Pulp of its leaves is used for a scorpion sting
				Seeds	Its seeds crushed with water and used to treat for skin diseases
9	<i>Dalbergia sissoo</i>	Shisham	Leguminosae	Leaf	Gonorrhoea
				Roots	Astringent
				Wood	Leprosy and to allay vomiting

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S. No.	Botanical Name	Common Name	Family Name	Part used	Medicinal use
10	<i>Ficus benghalensis</i>	Bargad	Moraceae	Bark	Dysentery, diarrhoea, leucorrhoea, nervous disorders and reduces blood sugar in diabetes
				Leaf	Leaf extract is applied externally to abscesses and wounds to promote suppuration.
				Aerial Roots	Pimples, leucorrhoea and osteomalacia
				Twigs	Strengthen gums and teeth
				Latex	Rheumatism, haemorrhoids, gonorrhoea, cracks of the sole and skin diseases
11	<i>Ficus glomerata</i>	Gular	Moraceae	Bark	Diabetes, bronchitis, dry cough, dysentery, diarrhoea etc.
				Leaf	Diarrhoea, dyspepsia, haemorrhages and obesity
				Fruit	Leprosy, blood diseases, fatigue, leucoderma etc.
12	<i>Mangifera indica</i>	Aam	Anacardiaceae	Roots and Bark	Anti-syphilitic, anti-inflammatory, leucorrhoea, wounds, ulcers and vomiting.
				Leaf	Cough, hiccup, burning sensation, hemorrhages, diarrhoea and dysentery
				Flower	Anorexia, dyspepsia, diarrhoea and anaemia etc
				Ripe Fruit	Anorexia, dyspepsia, cardiopathy, haemorrhages from uterus, lungs and intestine and anaemia.
				Unripe Fruit	Dysentery ophthalmia, and urethrorrhagia
13	<i>Melia azedarach</i>	Bakayan	Meliaceae	Leaves	5 ml juice of its leaves is used to remove barriers of menstruation
				Seeds	Its seeds crushed with mustard seed are applied on joints to relief arthritis
14	<i>Ricinus communis</i>	Arandi	Euphorbiaceae	Seeds	used for oil extraction

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S. No.	Botanical Name	Common Name	Family Name	Part used	Medicinal use
15	<i>Saccharum munja</i>	Munj	Poaceae	Whole plant	for making rope
16	<i>Tamarindus indica</i>	Imli	Leguminosae	Fruit	used as food
17	<i>Terminalia arjuna</i>	Arjun	Combretaceae	Leaf, Stem Bark	Medicinal use

Source: Primary Survey and Secondary Data

**Agriculture:** As the study area mainly comprises agriculture land, various crops are grown in the area. The major crops are paddy, jowar, bajra and makai in kharif seasons, while that of Rabi seasons crops are wheat, barley, mustard, toor, mung, chana, pea and barseem. The cultivation in this area is highly mechanized and there are profound facilities for irrigation through canals and deep tube wells. The farmers also use both chemical and bio-fertilizer in adequate quantity.

**Table 3-27: Plants of Medicinal Importance & Other Allied Uses**

S. No	Scientific Name	Common Name	Family	Season
1	<i>Brassica nigra</i>	Mustard	Brassicaceae	Rabi
2	<i>Cajanus cajan</i>	Toor	Fabaceae	Rabi
3	<i>Cicer arietinum</i>	Chana	Fabaceae	Rabi
4	<i>Hordeum vulgare</i>	Barley	Poaceae	Rabi
5	<i>Pisum sativum</i>	Pea	Fabaceae	Rabi
6	<i>Trifolium alexandrinum</i>	Berseem	Fabaceae	Rabi
7	<i>Triticum aestivum</i>	Wheat	Poaceae	Rabi
8	<i>Vigna spp.</i>	Mung	Fabaceae	Rabi
9	<i>Oryza sativa</i>	Rice / Paddy	Poaceae	Kharif
10	<i>Pennisetum glaucum</i>	Bajra/Pearlmillet	Poaceae	Kharif
11	<i>Sorghum bicolor</i>	Jowar	Poaceae	Kharif
12	<i>Zea mays</i>	Maize/Makai	Poaceae	Kharif

Source: Primary Survey and Secondary Data

### 3.8.6. Faunal Diversity

To prepare a detailed report on the status of wildlife biodiversity within 10 km radial area to assess the impacts due to the project activity and evolve suitable mitigation measures to protect and conserve wildlife biodiversity following components were studied:

- a. Wildlife Survey (Diversity)
- b. Habitat Study (Feeding, Breeding and Roosting areas)
- c. Distribution/Status of Birds
- d. Rare & Endangered species of Fauna
- e. Specific local characteristics of biodiversity in the study area.

**Methodology for Faunal Diversity:** The presence of mammals, avifauna and herpetofauna were observed by using conventional methods like transect walks during the daytime. Amphibians were observed in the river and other water bodies. Butterflies were also observed in the study area. As the study area consists of agricultural lands, built-up areas, river, roads, canals and drains etc. many species of fauna was seen. Domesticated animals were seen near inhabited areas while some wild animals were reported from agricultural fields, near river area and RF area. The presence of fauna species was also confirmed from the local inhabitants.

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**Table 3-28: Faunal Checklist of Buffer Zone**

S. No.	Common Name	Scientific Name	Status/Schedule as per WPA, 1972
<b>Mammals</b>			
1.	Black Rat	<i>Rattus rattus</i>	Schedule-V
2.	<b>Common Mongoose</b>	<b><i>Herpestes edwardsii</i></b>	<b>Schedule-I</b>
3.	Five Striped Palm Squirrel	<i>Funambulus pennanti</i>	Schedule-IV
4.	Little Indian field mouse	<i>Mus booduga</i>	Schedule-V
5.	Bandar	<i>Macaca mulatta</i>	Schedule-II
6.	Bat	<i>Rousettus leschenaultia</i>	Schedule-V
7.	Common Langur	<i>Presbytis entellus</i>	Schedule-II
8.	<b>Jungle Cat</b>	<b><i>Felis chaus</i></b>	<b>Schedule-I</b>
9.	Asian House Shrew	<i>Suncus murinus</i>	Least Concern
10.	Common House Mouse	<i>Mus musculus</i>	Schedule-V
<b>Amphibians</b>			
11.	Indian pond frog	<i>Rana hexadactyla</i>	Schedule-IV
12.	Common Indian Toad	<i>Duttaphrynus melanostictus</i>	Not Listed
13.	Indian Bull Frog	<i>Hoplobatrachus tigerinus</i>	Schedule-IV
14.	Indian Skipper Frog	<i>Euphlyctis cyanophlyctis</i>	Schedule-IV
15.	Toad	<i>Bufo bufo</i>	Not Listed
16.	Indian Cricket Frog	<i>Rana limnocharis</i>	Schedule-IV
17.	Common Frog	<i>Rana tigrina</i>	Schedule-IV
<b>Reptiles</b>			
18.	House gecko	<i>Hemidactylus flaviviridis</i>	Common
19.	Brahminy skink	<i>Mabuya carinata</i>	Common
20.	<b>Indian Cobra</b>	<b><i>Naja naja</i></b>	<b>Schedule-I</b>
21.	<b>Rat Snake</b>	<b><i>Ptyas mucosa</i></b>	<b>Schedule-I</b>
22.	Garden Lizard	<i>Calotes versicolor</i>	Not Listed
23.	Common Indian Krait	<i>Bungarus caeruleus</i>	Schedule-IV
24.	Snake-eyed Lacerta	<i>Ophisops jerdonii</i>	Schedule-IV
25.	<b>Common Indian Monitor</b>	<b><i>Varanus benghalensis</i></b>	<b>Schedule-I</b>
<b>Butterflies</b>			
26.	White orange tip	<i>Ixias marianne</i>	Common
27.	Lime butterfly	<i>Papilio demoleus</i>	Common
28.	Common crow	<i>Euploea core</i>	Common
29.	Common map	<i>Cyrestis thyodamas</i>	Common
30.	Common mormon	<i>Papilio polytes</i>	Common
31.	Common Grass Yellow	<i>Eurema hecabe</i>	Fairly Common
32.	Stripped Tiger	<i>Danaus genutia</i>	Common
33.	Danaid Egg Fly	<i>Hypolimnans misippus</i>	Common
34.	Common Bush Brown	<i>Mycalesis perseus</i>	Common
<b>Aves</b>			
35.	House Crow	<i>Corvus splendens</i>	Schedule-V
36.	Rock Pigeon	<i>Columba livia</i>	Common
37.	Jungle babbler	<i>Turdoides striatus</i>	Schedule-IV
38.	Common Myna	<i>Acridotheres tristis</i>	Schedule-IV
39.	Green bee-eater	<i>Merops orientalis</i>	Least Concern
40.	Indian roller	<i>Coracias benghalensis</i>	Schedule-IV
41.	Black Drongo	<i>Dicrurus macrocercus</i>	Schedule-IV
42.	Common swift	<i>Apus apus</i>	Schedule-IV



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S. No.	Common Name	Scientific Name	Status/Schedule as per WPA, 1972
43.	Cattle Egret	<i>Bubulcus ibis</i>	Schedule-IV
44.	Little Egret	<i>Egretta garzetta</i>	Schedule-IV
45.	Pond heron	<i>Ardeola grayii</i>	Schedule-IV
46.	Red wattled lapwing	<i>Vanellus indicus</i>	Schedule-IV
47.	Spotted Dove	<i>Streptopelia chinensis</i>	Schedule-IV
48.	White Breasted Kingfisher	<i>Halcyon smyrnensis</i>	Schedule-IV
49.	Asian Koel	<i>Eudynamis scolopacea</i>	Schedule-IV
50.	Small Sun Bird	<i>Nectarinia minima</i>	Schedule-IV
51.	House Sparrow	<i>Passer domesticus</i>	Schedule-IV
52.	Red Vented Bulbul	<i>Pycnonotus cafer</i>	Schedule-IV
53.	Bank Myna	<i>Acridotheres ginginianus</i>	Schedule-IV
54.	Common Babbler	<i>Turdoides caudatus</i>	Schedule-IV
55.	Rose Ringed Parakeet	<i>Psittacula krameri</i>	Schedule-IV
56.	Baya	<i>Ploceus philippinus</i>	Schedule-IV
57.	<b>Peafowl</b>	<b><i>Pavo cristatus</i></b>	<b>Schedule-I</b>
58.	Red-wattled lapwing	<i>Vanellus indicus</i>	Schedule-IV
59.	Hoopoe	<i>Upupa epops</i>	Schedule-IV

Source: Primary Survey and Secondary Data

**Endangered Species:** As per the faunal survey data, a total of six species were found within the Schedule-I of Indian Wildlife (Protection) Act, 1972 which includes *Pavo cristatus* (Indian Peafowl), *Naja naja* (Indian Cobra), *Ptyas mucosa* (Rat Snake), *Varanus benghalensis* (Common Indian Monitor lizard), *Herpestes edwardsii* (Common Mongoose) and *Felis chaus* (Jungle Cat). Certain steps have been taken to conserve this critical wildlife:

- a) Programs for the conservation of wildlife will be formulated and implemented outside the protected areas by educating the local communities with help of local public agencies, and other stakeholders including the environment division officers of our company, to reduce the scope of man-animal conflict.
- b) It will be ensured that human activities on the fringe of the protected areas do not degrade the habitat.

Overall, the status of wildlife in a region is an accurate index of the state of ecological resources, and thus, of the natural resources base of human well-being. This indicates the interdependent nature of ecological entities (the web of life), in which wildlife is a vital link and a base of eco-tourism. Thus, the importance of conserving and protecting wildlife will be spread among the local people.

### 3.8.7. Aquatic Ecology

The core zone of study area comprises the riverbed of Yamuna River. Besides, buffer zone of study area includes other tributaries, ponds, canals and drains. Aquatic biotic communities like Phytoplankton and Zooplanktons, Macrophytes and Fishes were studied.

**Methodology for Aquatic Diversity:** The samples for analysis of planktons were collected from the sub surface layer at knee depth of the water bodies. Water samples were filtered through plankton net of 20µ mesh size (APHA, 1971). The filtered samples were concentrated by using the centrifuge in laboratory. By using Lackey's drops method and light microscope (Lackey, 1938), the analysis was carried out for phytoplankton and zooplankton.

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**Macrophyte:** The presence of macrophytes were studied in rivers, marsh areas, ponds, canal and drains within the study area of the proposed site. An inventory of macrophytes is given in the Table below. The commonly observed macrophytes were Water hyacinth, Behaya, Duckweed and Hogla.

**Table 3-29: Macrophytes in Aquatic Habitats**

S. No.	Common Name	Scientific Name	Growth Form
1.	Water hyacinth	<i>Eichhornea crassipes</i>	Floating
2.	Duck weed	<i>Lemna minor</i>	Floating
3.	Patera	<i>Typha domingensis</i>	Emergent
4.	Behaya	<i>Ipomoea aquatica</i>	Floating
5.	Garundi	<i>Alternanthera sessilis</i>	Floating
6.	Sedges	<i>Cyperus difformis</i>	Emergent
7.	Oriental Pepper	<i>Polygonum orientale</i>	Amphibious
8.	Barnyard Grass	<i>Echinochloa glabrescens</i>	Amphibious
9.	Jal kumbhi	<i>Pistia stratiotes</i>	Floating
10.	Lotus	<i>Nymphaea nancheli</i>	Emergent
11.	Harinkhuri	<i>Convolvulus arvensis</i>	Amphibious
12.	Patera	<i>Typha angustifolia</i>	Amphibious
13.	Mosquito fern	<i>Azolla pinnata</i>	Floating
14.	Jhangi	<i>Hydrilla verticillata</i>	Emergent

Source: Primary Survey and Secondary Data

**Phytoplankton:** The samples collected from the water bodies were analyzed for identification of phytoplankton and zooplankton. The details of phytoplankton and zooplankton are as follows.

**Table 3-30: List of Phytoplankton from Study Area**

Cyanophyceae	Bacillariophyceae	Chlorophyceae	Euglenophyceae
<i>Anabaena flosaque</i>	<i>Fragillaria sp.</i>	<i>Spirogyra sp.</i>	<i>Euglena sp.</i>
<i>Nostoc sp.</i>	<i>Synedra ulns</i>	<i>Chlorella vulgaris</i>	<i>Phacus sp.</i>
<i>Oscillatoria formosa</i>	<i>Navicula sp.</i>	<i>Microspora sp.</i>	<i>Trachelomonas sp.</i>
<i>Phormidium sp.</i>	<i>Cylindrotheca sp.</i>	<i>Ulothrix zonata</i>	
<i>Anacystis sp.</i>	<i>Cyclotella sp.</i>	<i>Gonium sp.</i>	
<i>Spirulina sp.</i>	<i>Achnanthes sp.</i>	<i>Zygnema sp.</i>	
<i>Microcystis sp.</i>	<i>Cymbella affinis</i>	<i>Oocystis crassa</i>	
<i>Gloeocapsa sp.</i>	<i>Nitzschia palea</i>	<i>Ankistrodesmus sp.</i>	

Source: Primary Survey and Secondary Data

**Table 3-31: List of Zooplanktons from Study Area**

Rotifers	Protozoa	Cladocera	Copepoda	Ostracoda
<i>Ascomorpha saltans</i>	<i>Amoeba proteus</i>	<i>Alona sp.</i>	<i>Cyclops sp.</i>	<i>Cyprinotus sp.</i>
<i>Anuraeopsis sp.</i>	<i>Arcella sp.</i>	<i>Bosmina longirostris</i>	<i>Diaptomus sp.</i>	<i>Cypris sp.</i>
<i>Brachionus bidentata</i>	<i>Centropyxis spp.</i>	<i>Ceriodaphnia sp.</i>	<i>Eucyclops agilis</i>	<i>Stenocypris sp.</i>
<i>Cephalodella forficula</i>	<i>Chlamydomonas minor</i>	<i>Chydorus Sphaericus</i>	<i>Mesocyclops sp.</i>	
<i>Colurella obtusa</i>	<i>Diffugia lebes</i>	<i>Daphnia laevis</i>	<i>Nauplius larvae</i>	
<i>Keratella sp.</i>		<i>Leydgia sp.</i>	<i>Thermocyclops sp.</i>	
<i>Polyarthra sp.</i>		<i>Moina brachiata</i>		

Source: Primary Survey and Secondary Data

**Fishes:** The fishes were observed in the rivers, canals and ponds. The pisciculture activities were observed very less and restricted only in the rivers and ponds of some villages. The fishes found

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were major carps like Rohu (*Labeo rohita*), Catla (*Catla catla*), Mrigal (*Cirrhinus mrigala*) and Kalbasu (*Labeo calbasu*). Other species found were *Puntius sophore*, *Wallago attu*, *Channa punctatus* etc. An inventory of fishes are as follows.

**Table 3-32: List of Fishes from Study Area**

S. No.	Scientific Name	Common Name	Family
<b>Major Carps</b>			
1	<i>Catla catla</i>	Katla	Cyprinidae
2	<i>Labeo rohita</i>	Rohu	Cyprinidae
3	<i>Cirrhinus mrigala</i>	Mrigal	Cyprinidae
4	<i>Labeo calbasu</i>	Kalbasu	Cyprinidae
<b>Minor Carps</b>			
5	<i>Puntius sophore</i>	Putti	Cyprinidae
6	<i>Labeo bata</i>	Bata	Cyprinidae
<b>Cat Fishes</b>			
7	<i>Wallago attu</i>	Lanchi	Siluridae
8	<i>Mystus seenghala</i>	Singhara	Bagridae
9	<i>Heteropneustes fossilis</i>	Singhi	Heteropneustidae
10	<i>Channa punctatus</i>	Girai	Channidae
11	<i>Clarias batrachus</i>	Mangur	Clariidae

Source: Primary Survey and Secondary Data

### 3.9. Socioeconomic Environment

Socio-economic environment is an essential part of environmental study which incorporates various facts related to socio-economic conditions in the area and deals with the total environment. Socio-economic study includes demographic structure of the area, provision of basic amenities viz. housing education, health and medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as feature of aesthetic significance such as temples, historical monuments etc. at the baseline level. This would help in visualizing and predicting the possible impact depending upon the nature and magnitude of the project.

Socio-economic study of an area provides a good opportunity to assess the socioeconomic conditions of an area. This study will possibly estimate the change in living and social standards of the area benefitted due to the project. The gross economic production of the area will be increased substantially due to the existence of this project. It can undoubtedly be said that this plant will provide direct and indirect employment and improve the infrastructural facilities and living standards of the area.

#### 3.9.1. Census & Demographic Status of Palwal District

An official Census 2011 detail of Palwal, a district of Haryana has been released by Directorate of Census Operations in Haryana. Enumeration of key persons was also done by census officials in Palwal District of Haryana.

In 2011, Palwal had population of 1,042,708 of which male and female were 554,497 and 488,211 respectively. In 2001 census, Palwal had a population of 829,121 of which males were 445,390 and remaining 383,731 were females. Palwal District population constituted 4.11 percent of total Maharashtra population. In 2001 census, this figure for Palwal District was at 3.92 percent of Maharashtra population.

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There was change of 25.76 percent in the population compared to population as per 2001. In the previous census of India 2001, Palwal District recorded increase of 34.21 percent to its population compared to 1991.

**Table 3-33: Palwal District Population**

Description	2011	2001
Population	10.43 Lakhs	8.29 Lakhs
Actual Population	10,42,708	8,29,121
Male	5,54,497	4,45,390
Female	4,88,211	3,83,731
Population Growth	25.76%	34.21%
Area Sq. Km	1,359	1,367
Density/km2	767	607
Proportion to Haryana Population	4.11%	3.92%
Sex Ratio (Per 1000)	880	862
Child Sex Ratio (0-6 Age)	866	853
Average Literacy	69.32	59.2
Male Literacy	82.66	75.1
Female Literacy	54.23	40.8
Total Child Population (0-6 Age)	1,77,494	2,06,778
Child Proportion (0-6 Age)	17.02%	24.94%

**Palwal Literacy Rate:** Average literacy rate of Palwal in 2011 were 69.32 compared to 69.32 of 2001. If things are looked out at gender wise, male, and female literacy were 82.66 and 54.23 respectively. For 2001 census, same figures stood at 75.10 and 40.80 in Palwal District. Total literate in Palwal District were 599,796 of which male and female were 379,696 and 220,100 respectively. In 2001, Palwal District had 250,361 in its district.

**Palwal Sex Ratio:** With regards to Sex Ratio in Palwal, it stood at 880 per 1000 male compared to 2001 census figure of 862. The average national sex ratio in India is 940 as per latest reports of Census 2011 Directorate. In 2011 census, child sex ratio is 866 girls per 1000 boys compared to figure of 853 girls per 1000 boys of 2001 census data.

**Palwal Child Population:** In census enumeration, data regarding child under 0-6 age were also collected for all districts including Palwal. There was total 177,494 children under-age of 0-6 against 206,778 of 2001 census. Of total 177,494 male and female were 95,132 and 82,362 respectively. Child Sex Ratio as per census 2011 was 866 compared to 853 of census 2001. In 2011, Children under 0-6 formed 17.02 percent of Palwal District compared to 24.94 percent of 2001. There was net change of -7.92 percent in this compared to previous census of India.

**Palwal Houseless Data:** In 2011, total 306 families live on footpath or without any roof cover in Palwal district of Haryana. Total Population of all who lived without roof at the time of Census 2011 numbers to 1,481. This approx. 0.14% of total population of Palwal district.

**Palwal District Density:** The initial provisional data released by census India 2011, shows that density of Palwal district for 2011 is 767 people per sq. km. In 2001, Palwal district density was at 607 people per sq. km. Palwal district administers 1,359 square kilometres of areas.

**Palwal District Urban/Rural 2011:** Out of the total Palwal population for 2011 census, 22.69 percent lives in urban regions of district. In total 236,544 people lives in urban areas of which

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males are 125,590 and females are 110,954. Sex Ratio in urban region of Palwal district is 883 as per 2011 census data. Similarly, child sex ratio in Palwal district was 830 in 2011 census. Child population (0-6) in urban region was 33,728 of which males and females were 18,427 and 15,301. This child population figure of Palwal district is 14.67 % of total urban population. Average literacy rate in Palwal district as per census 2011 is 77.81 % of which males and females are 86.16 % and 68.45 % literates respectively. In actual number 157,811 people are literate in urban region of which males and females are 92,336 and 65,475 respectively.

As per 2011 census, 77.31 % population of Palwal districts lives in rural areas of villages. The total Palwal district population living in rural areas is 806,164 of which males and females are 428,907 and 377,257 respectively. In rural areas of Palwal district, sex ratio is 880 females per 1000 males. If child sex ratio data of Palwal district is considered, figure is 874 girls per 1000 boys. Child population in the age 0-6 is 143,766 in rural areas of which males were 76,705 and females were 67,061. The child population comprises 17.88 % of total rural population of Palwal district. Literacy rate in rural areas of Palwal district is 66.72 % as per census data 2011. Gender wise, male, and female literacy stood at 81.59 and 49.85 percent respectively. In total, 441,985 people were literate of which males and females were 287,360 and 154,625 respectively.

All details regarding Palwal District have been processed by us after receiving from Govt. of India. We are not responsible for errors to population census details of Palwal District.

**Table 3-34: Palwal District Demography**

Description	Rural	Urban
Population (%)	77.31%	22.69%
Total Population	8,06,164	2,36,544
Male Population	4,28,907	1,25,590
Female Population	3,77,257	1,10,954
Sex Ratio	880	883
Child Sex Ratio (0-6)	874	830
Child Population (0-6)	1,43,766	33,728
Male Child (0-6)	76,705	18,427
Female Child (0-6)	67,061	15,301
Child Percentage (0-6)	17.83%	14.26%
Male Child Percentage	17.88%	14.67%
Female Child Percentage	17.78%	13.79%
Literates	4,41,985	1,57,811
Male Literates	2,87,360	92,336
Female Literates	1,54,625	65,475
Average Literacy	66.72%	77.81%
Male Literacy	81.59%	86.16%
Female Literacy	49.85%	68.45%

### 3.9.2. Demography of Study Area

Study area is following 2 states namely, Uttar Pradesh and Haryana. Two districts & Four blocks are coming in study area namely Palwal, Hodal of Palwal District & Jewar of Gautam Budhha Nagar & Khair of Aligarh District. Demography of the study area is given in table below.



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**Table 3-35: Demographic Structure of the Study Area**

S. No.	State	Name of District	Name of the Block	Household	Total Population	Male	Female	Population 0-6 Years	HH Size	Gender Ratio
1	Uttar Pradesh	Aligarh	Khair	1344	9028	4873	4155	1607	6.7	853
2		Gautam Buddha Nagar	Jewar	16215	99442	53166	46276	16276	6.1	870
3	Haryana	Faridabad	Ballabgarh	8675	49872	26437	23435	7829	5.7	886
4		Palwal	Palwal	20923	124202	66299	57903	20081	5.9	873
<b>Total</b>				<b>47157</b>	<b>282544</b>	<b>150775</b>	<b>131769</b>	<b>45793</b>	<b>6.1</b>	<b>871</b>

**Figure 3.14: Population & Gender Ration of Study Area**



**Table 3-36: Population Distribution of the Study Area**

S. No.	State	Name of District	Name of the Block	Household	Total Population	SC Total	SC Male	SC Female	ST Total	ST Male	ST Female
1	Uttar Pradesh	Aligarh	Khair	1344	9028	1780	986	794	0	0	0
2		Gautam Buddha Nagar	Jewar	16215	99442	25694	13742	11952	0	0	0
3	Haryana	Faridabad	Ballabgarh	8675	49872	11068	5787	5281	0	0	0
4		Palwal	Palwal	20923	124202	28475	15116	13359	0	0	0
<b>Total</b>				<b>47157</b>	<b>282544</b>	<b>67017</b>	<b>35631</b>	<b>31386</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table 3-37: Literacy Rate of the Study Area**

S. No.	State	Name of District	Name of the Block	Total Population	Total Literates	Literacy Rate				
						Male	%	Female	%	Overall
1	Uttar Pradesh	Aligarh	Khair	9028	4830	3100	64.18	1730	35.82	53.50

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S. No.	State	Name of District	Name of the Block	Total Population	Total Literates	Literacy Rate				
						Male	%	Female	%	Overall
2	Haryana	Gautam Buddha Nagar	Jewar	99442	57798	35909	62.13	21889	37.87	58.12
3		Faridabad	Ballabgarh	49872	30663	18865	61.52	11798	38.48	61.48
4		Palwal	Palwal	124202	73915	46750	63.25	27165	36.75	59.51
<b>Total</b>				<b>282544</b>	<b>167206</b>	<b>104624</b>	<b>62.77</b>	<b>62582</b>	<b>37.23</b>	<b>58.15</b>

**Figure 3.15: Literacy Rate & Worker Status of Study Area**



**Table 3-38: Occupational Structure of the Study Area**

S. No.	State	Name of District	Name of the Block	Total Population	Total Main Workers	Main Workers				Marginal Workers	Non-workers
						Cultivators	Agricultural labours	Household labours	Other Workers		
1	Uttar Pradesh	Aligarh	Khair	9028	2038	1239	392	23	384	938	6052
2	Pradesh	Gautam Buddha Nagar	Jewar	99442	21869	7780	3891	1418	8780	9948	67625
3	Haryana	Faridabad	Ballabgarh	49872	10827	3296	1551	530	5450	3803	35242
4		Palwal	Palwal	124202	26863	11707	4901	638	9617	14346	82993
<b>Total</b>				<b>282544</b>	<b>61597</b>	<b>24022</b>	<b>10735</b>	<b>2609</b>	<b>24231</b>	<b>29035</b>	<b>191912</b>

**Table 3-39: Education and Medical Facilities of the Study Area**

S. No.	State	Name of District	Block	Govt. School				Health Center			
				Primary	Middle	Secondary	Senior Secondary	CHC	PHC	PHSC	MCWC
1	Uttar Pradesh	Aligarh	Khair	1	1	0	0	0	1	0	1
2		Gautam Buddha Nagar	Jewar	35	19	3	1	1	3	6	4
3	Haryana	Faridabad	Ballabgarh	12	8	8	5	0	3	5	3

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S. No.	State	Name of District	Block	Govt. School				Health Center			
				Primary	Middle	Secondary	Senior Secondary	CHC	PHC	PHSC	MCWC
4		Palwal	Palwal	53	29	12	7	0	5	15	0
<b>Total</b>				<b>101</b>	<b>57</b>	<b>23</b>	<b>13</b>	<b>1</b>	<b>12</b>	<b>26</b>	<b>8</b>

CHC- Community Health Center, PHC- Primary Health Center, PHSC-Primary Health Sub-center, MCWC-Maternity Child Welfare Centre

**Table 3-40: Drinking Water Facilities in the Study Area**

S. No.	State	Name of District	Name of the Block	Tap Water	Untreated Tap Water	Covered Well Water (CW)	Hand Pump (HP)	Tube-well (TW)
1	Uttar Pradesh	Aligarh	Khair	0	0	0	1	0
2		Gautam Buddha Nagar	Jewar	23	13	0	36	22
3	Haryana	Faridabad	Ballabgarh	14	0	0	14	8
4		Palwal	Palwal	51	39	8	45	50
<b>Total</b>				<b>88</b>	<b>52</b>	<b>8</b>	<b>96</b>	<b>80</b>

Source Census Data, 2011

**Table 3-41: Land Use Classification in the Study Area**

State	Uttar Pradesh				Haryana		Total
	Name of District	Aligarh	Gautam Buddha Nagar	Faridabad	Palwal	Total	
	Name of the Block	Khair	Jewar	Ballabgarh	Palwal		
Forest Area (in Hectares)		0	67.28	0	0	67.28	
Area under Non-Agricultural Uses (in Hectares)		294.75	814.64	954	2942	5005.39	
Barren & Un-cultivable Land Area (in Hectares)		0	93.65	0	0	93.65	
Permanent Pastures and Other Grazing Land Area (in Hectares)		0	0.33	11	0	11.33	
Land Under Miscellaneous Tree Crops etc. Area (in Hectares)		253.78	178.66	0	0	432.44	
Culturable Waste Land Area (in Hectares)		0	110.39	6	347	463.39	
Fallow Land other than Current Fallows Area (in Hectares)		0	447.56	0	0	447.56	
Current Fallows Area (in Hectares)		0	251.67	0	0	251.67	
Net Area Sown (in Hectares)		1825.47	12391.184	6972	20777	41965.654	
Total Unirrigated Land Area (in Hectares)		0	61	72	0	133	
Area Irrigated by Source (in Hectares)		1825.47	12330.184	6900	20777	41832.654	
Canals Area (in Hectares)		0	2840.5	160	3238	6238.5	
Wells/Tube Wells Area (in Hectares)		0	7645.44	6740	17283	31668.44	

PROPOSER: M/S MINERIO MINING PRIVATE LIMITED

CONSULTANT: PARIVESH ENVIRONMENTAL ENGINEERING SERVICES (NABET /EIA/2124/IA 0092(Rev.01))

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State	Uttar Pradesh		Haryana		Total
Name of District	Aligarh	Gautam Buddha Nagar	Faridabad	Palwal	
Name of the Block	Khair	Jewar	Ballabgarh	Palwal	
Tanks/Lakes Area (in Hectares)	0	351.51	0	156	507.51
Waterfall Area (in Hectares)	0	5.09	0	0	5.09
Other Source (specify) Area (in Hectares)	1825.47	1487.644	0	100	3413.1

**3.10. Conclusion**

This is the sand mining case and the adverse impacts as no drilling, blasting is proposed. The baseline status of the project site is good as maximum area is agricultural land. No other source of emission identified in the region.





**CHAPTER – 04**

**ANTICIPATED  
ENVIRONMENTAL  
IMPACTS  
ASSESSMENT &  
MITIGATION  
MEASURES**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## 4. Anticipated Environmental Impacts & Mitigation Measures

### 4.1. General

The environmental parameters likely to be affected by mining are related to many factors, i.e., physical, social, economic, agriculture and aesthetic. Opencast mining involves loading / unloading and transportation of mineral. The excavated stone will be transported via trucks/dumpers to outsiders. The operations may disturb environment of the area in various ways, such as removal of mass, change of landscape, flora and fauna of the area, surface drainage, and change in air, water, and soil quality. While for the purpose of development and economic upliftment of people, there is need for establishment of mining industries, but these should be environment friendly. Therefore, it is essential to assess the impacts of mining on different environmental parameters, before starting the mining operations, so that abatement measures could be planned for eco-friendly mining in the area.

“Environmental Impact” can be defined as any alternation of base line environmental conditions or creation of a new set of environmental conditions, adverse or beneficial, caused or induced by the action or set of proposed actions under consideration. Opencast mining activities cause adverse impacts on the surrounding environment unless proper environmental management plan is adopted. Selecting suitable sites for mining and adopting all the guidelines prescribed by the Ministry of Environment and Forests & Climate Change (MoEF&CC) and Indian Bureau of Mines (IBM) can minimize the major possible impacts.

### 4.2. Impact Assessment

It summarizes the pollution potential of the proposed open cast mine, its possible impact on the surrounding environment and the necessary management actions proposed for control and abatement of pollution. The environmental components that are likely to be influenced are illustrated below in Table 4.1.

**Table 4-1: Types of Impact due to Mining Activity**

S. No.	Activities	Description of impacts
1	Vegetation	Moderate damage: uprooted plants, damaged to plant parts such as branches, loss of tree species, disturbances to survival, habitat loss
2	Animals	Moderate damage: loss of aquatic habitats (specially for fish and phytoplankton), decreased species diversity due to loss of sensitive species, loss of spawning grounds for aquatic species and riverbank dwelling species, disturbances to food webs, habitat loss for bank dwelling species such as aquatic birds, reptiles, amphibians.
3	Ecosystem stability	Moderate damage: soil erosion, loss of fertile soil, bank instability and collapse, loss of protective structures provided by trees, changes to topography due to temporary foot paths and transportation network, obstacles to water flow
4	Water quality	Pollution by sedimentation, silt loads, vehicular discharge, solid waste dumping by humans, visible impairment of water quality, decreased dissolved oxygen concentration

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### 4.3. Identification of Impacts

During the working life of mine, air, water, noise, and land use are likely to be affected due to minerals and associated activities. Positive impacts on socio-economic environment are expected due to creation of employment opportunities and development of infrastructure such as roads, schools, hospitals etc. The identification matrix indicates interrelationship between activities causing impact (columns) and aspects getting impacted (rows). The significant impacts are marked as (✓) for beneficial impacts and as (•) for adverse impacts. Any detailed assessment shall be done only for the significant impacts. The matrix will assist in identifying significant impacts as Table 4.2.

**Table 4-2: Impact Identification Matrix**

Aspects Impacted Attributes	Site		Ancillary / Activity Area					Post Operation	
	Site Clearance	Operation (Opencast)	Transportation	Mineral Storage	Water Discharge	Greenbelt Development	Employment	Urbanization (Buffer)	Transportation
Ambient Air		•	•	•		✓			
Water Resource		•							
Water Quality		•		•	•				
Ambient Noise		•	•			✓			
Vibration			•						
Flora and Fauna		•				✓			
Soil / Land-use	•	•		•		✓			
Infrastructure		•	✓					✓	✓
Traffic			•						
Health & Safety		•		•					
Socio-economic		•					✓	✓	✓

• **Adverse Impact** ✓ **Beneficial Impacts**

### 4.4. Impacts on Land-use and Mitigation Measures

This is the sandmining project from riverbed of river Yamuna. The project area does not consist of any forest land. It does not consist of any human habitations. Land-use plan of the mining lease area during pre-operation, operation and post-operational is incorporated in the Chapter 2 (Table 2-10).

#### 4.4.1. Identified Impact on Land-Use

The mining activity in the mine site will be converted into the pit which will be replenished during monsoon season each year. No pit will remain on site. Detailed replenishment plan will be prepared, and approval will be obtained from concerned department.

#### 4.4.2. Mitigation Measures for Impacts on Land-Use

There will be no change in land-use as the mined-out area will be replenished by river in monsoon period. Fencing will be done around the lease area and ancillary area. Total mining area is 99.384 ha, out of total lease area, 70.114 ha will be mined-out and remaining 21.0 ha area will be

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restricted zone for mining. A suitable combination of trees (total 13,000) that can grow fast and have good leaf cover to contain dust pollution shall be adopted to develop greenbelt. Greenbelt development will be done wherever possible as riverbanks, bunds, and transportation route. Plantation will be done within first 2 years and in later years maintenance will be ensured. The gap plants also will be ensured to complete the numbers of total plants.

#### 4.4.3. Conclusion

There will be no change in land-use in mining lease area. The mined-out area will be replenished each year during monsoon period so no pit will be available on site. For the safety reasons, bunds will be developed in 21.0 area which is safety / restricted zone. Plantation will be done on riverbanks both side and haul road / transportation road in first two years and will be ensured the growth of each sapling 100% in 3<sup>rd</sup> year. In later year plantation will be maintained.

### 4.5. Impact on Ambient Air Quality

#### 4.5.1. Identified Anticipated Impact on Ambient Air Quality

The quarry lease area is presently free from pollution. No drilling or blasting will be required as this is sand mining project. Due to small scale quarry operation, it will not affect the immediate vicinity of the mine lease area. The mining method will be opencast manual and small in nature, and there is no proposal for deployment of machinery, which create dust, noise, or air pollution. The approach road of the lease area will be prepared by sand & boulders and tar road are very near to the site, so no question arises of pollution due to surface transportation. Per day trips of trucks are 160 trips in a day. Therefore, no significant impact on the quality of air in the surrounding area.

In sand mining the different process of handling, transportation, and storage of line in the mining activities are prone to generation of high levels of fugitive dust that may increase the levels of PM10 and SPM to high extent. The probable sources of pollution due to mining activities are shown in Table 4.3.

**Table 4-3: Predominant Source of Air Pollution**

S. No.	Source	Type of Pollutant
1	Mining activity (loading/unloading)	PM <sub>10</sub> , PM
2	Transport of overburden or soil for dumping/ backfill and mining mineral to sorting/sizing	PM <sub>10</sub> , PM
3	Dumping of waste	PM <sub>10</sub> , PM
4	Sorting of mining mineral and loading	PM <sub>10</sub> , PM
5	Transportation of sorted mining mineral	PM <sub>10</sub> , SPM, SO <sub>2</sub> , NO <sub>x</sub> , CO

The effects of air pollutants upon receptors are influenced by concentrations of pollutants and their dispersion in the atmosphere. Air quality modelling is an important tool for prediction, planning and evaluation of air pollution control activities besides identifying the requirements for emission control to meet the regulatory standards. The efficient management of air quality requires the use of modelling techniques to analyse the patterns of pollutant concentrations from many individual sources of air pollutants operating simultaneously. The main impacts of air pollutants on the health of human and others are given Table 4.4.



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**Table 4-4: Identified Impacts of Air Pollutions on Human, Animals and Plants**

S. No.	Pollutant	Impact on human health, habitats, and species
1	Particulate matter	PM <sub>10</sub> can penetrate deep into the lung and cause more damage, while larger particles are typically filtered out through the airways' natural mechanisms. Particulates can damage surfaces and materials.
2	Sulphur dioxide (SO <sub>2</sub> )	SO <sub>2</sub> can cause coughing, make people more prone to respiratory infections, and aggravate asthma and chronic bronchitis. SO <sub>2</sub> can attach itself to particles and, if these particles are inhaled, they can cause more serious health effects. Acid rain acidifies soils and water. This can affect aquatic life, cause deforestation, and alter the species composition of plant and animal communities. Acid rain can corrode building materials and paints.
3	Oxides of Nitrogen (NO <sub>x</sub> )	NO <sub>x</sub> can increase a person's susceptibility to, and the severity of, respiratory infections and asthma. Long-term exposure to high levels of NO <sub>x</sub> can cause chronic lung disease. High NO <sub>x</sub> levels damage foliage, decrease plant growth, and reduce crop yield. Deposition of nitrogen compounds can lead to soil and water acidification. NO <sub>x</sub> can cause eutrophication of soils and water, which alters the species composition of plant communities and can eliminate sensitive species. NO <sub>x</sub> is a component of photochemical smog.
4	Carbon monoxide (CO)	When inhaled by people and animals, CO bonds to the haemoglobin in the blood, and reduces the oxygen carrying capacity of the red blood cells. The resulting lack of oxygen in the body causes cells to die.

#### 4.5.2. Impact Assessment on Air Quality due to Operation

Information on air quality was studied and various modelling techniques predicted that the mining activity is not likely to affect the air quality in a significant manner. However, loading of sand, its transportation and unloading operations may cause some deterioration in air quality in terms of fugitive dust from unpaved roads and vehicular emission. In the present case, only wet materials will be handled, thus eliminating problems of fugitive dust due to handling of the materials. Also, the collection and lifting of minerals will be done by open cast manual method without any blasting. Therefore, the dust generated is likely to be insignificant as the processes involving loading/unloading and transportation etc.

#### 4.5.3. Air Dispersion Modelling

In case of riverbed sand mining, as there is no blasting and drilling activities, wet sand handling will limit the impacts only to fugitive dust by transportation on unpaved road and vehicular emission. The distance of unpaved road for project is limited up to the connectivity of nearest major road. The major road will not produce fugitive dust. Therefore, in case of pucca road modelling was carried out for emission likely due to vehicular transportation. The impact due vehicular transportation was assessed by two modelling practices namely fugitive dust modelling and Caline 4 for fugitive dust and vehicular emission respectively.

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### 4.5.3.1. Fugitive Dust- Modelling

The model has been run for assessment of fugitive dust emission likely from transportation at kutchra road. Air quality modelling was done using line source model as published by USEPA "Workbook of Dispersion Modelling" by Turner, for transportation through roads and the empirical emission factor equations from USEPA. Emission factors to be used in Line source Dispersion equation is adopted from formula as given below and block wise emission rate are given in as Table:

$$E = k * (1.7) * (s/12) * (S/48) * (W/2.7)^{0.7} * (w/4)^{0.5} * (365-p/365) \text{ kg/VKT} \text{----- (1)}$$

where,

- E = Emission Rate (kg/VKT)
- k = Particle size multiplier
- s = Silt Content of the Road surface material
- S = Mean Vehicle Speed (km/hr)
- W = Mean Vehicle Weight (tons)
- w = Mean number of wheels
- P = Number of days with at least 0.254 mm of precipitation per year
- f = frequency of Vehicle movement in no per hour

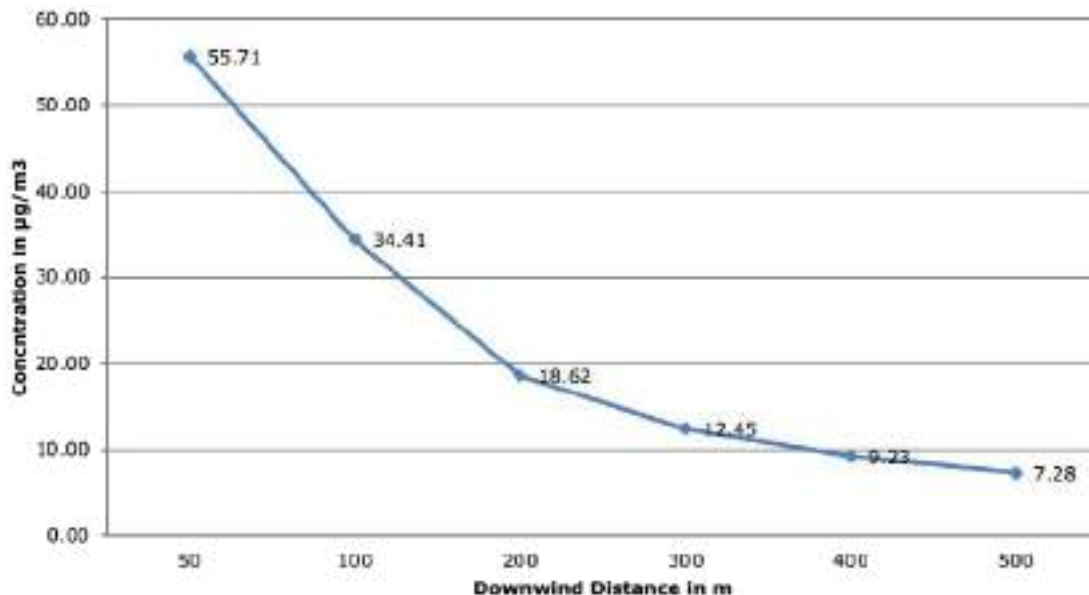
Thus, using equation (1):

**Table 4-5: Emission Rate Estimation**

Block Details	Emission Rate in kg/VKT	Emission Rate in g/sec/m
Sultanpur Block	0.77	0.0023

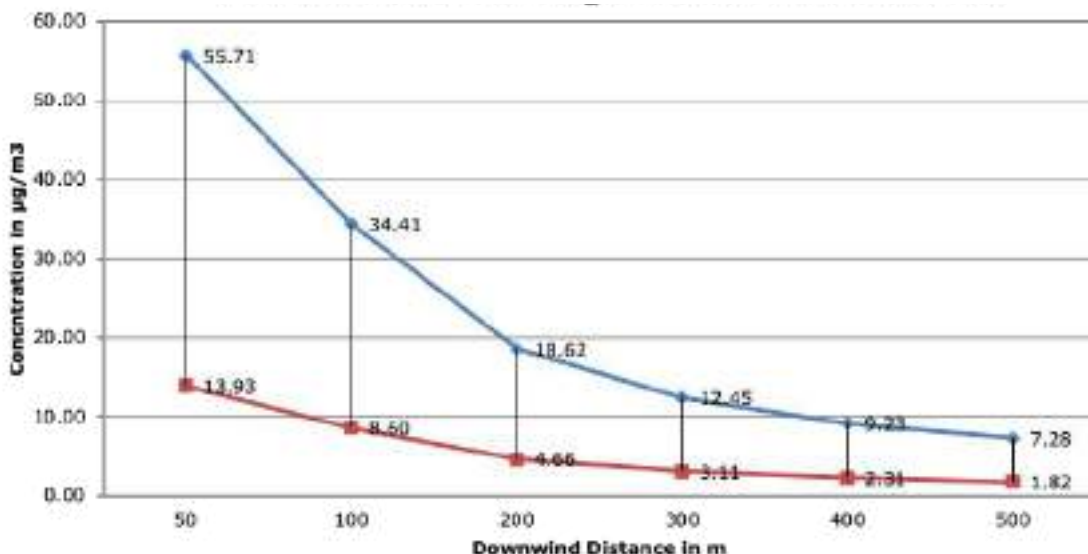
Concentration of the fugitive dust was calculated using the empirical equations for unpaved roads published by USEPA- AP42. For this, wind speed is assumed 1.3 m/s and height of source is 0 m. Modelling was done for an infinite line source assuming unpaved road. For conservative calculation wind was assumed to blow at a velocity of 1 m/s perpendicular to the road. The results for 24 hourly concentration values are given in the below Figure 4.2 & 4.2.

**Figure 4.1: Concentration of Fugitive Dust v/s Distance (Uncontrolled)**



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**Figure 4.2: Concentration of Fugitive Dust v/s Distance (Controlled)**



The details of concentration in respect of distance are given below table.

**Table 4-6: Concentration in respect of distance**

Concentration	Distance x in m	24 hr avg. concentration in respect of distance	
		Un-controlled	Controlled
Concentration; C in µg/m³	50	55.71	13.93
	100	34.41	8.60
	200	18.62	4.66
	300	12.45	3.11
	400	9.23	2.31
	500	7.28	1.82

It is observed that the ground level concentration (GLC) decreases from 55.71 µg/m³ at 50 m from the centre line of the road to 7.28 µg/m³ at 500 m for proposed mining lease in un-controlled way and 13.93 at 500 m to 1.82 µg/m³ at 50 m from the centre line of the road with controlled way respectively. These values have been predicted for a dry unpaved road.

The model prediction has been made for unpaved road. The distance of unpaved road from the proposed block is approx. 500 to 1.0 km. After that Pucca Road (Highway) is available. Hence, no fugitive emission will take place after this point. The distance of nearest settlement is about 1.0 km from the mine lease area. Most of the fugitive dust will get settled at this distance due to specific settling velocity of the particles. Also, the regular water sprinkling will reduce the dust drastically. However, most of the roads in the region are pucca road.

**4.5.3.2. Mitigation measures**

The only air pollution sources are the road transport network of the trucks/dumpers. The dust suppression measures like the following will be resorted:

- ✓ Water sprinkling will be done on the roads regularly. This will reduce dust emission further by 70-80%.
- ✓ Care will be taken to prevent spillage by covering the carrying vehicles with tarpaulin and sprinkling of water, if dry.

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- ✓ Fortnightly scraping of road to keep the roads almost levelled. This will ensure smooth flow of vehicles and prevent spillage.
- ✓ Overloading will be kept under check by giving prior awareness.
- ✓ Proper Tuning of vehicles to keep the gas emissions under check.
- ✓ Plantation of trees along roads sides to help reduce the impact of dust in the nearby villages.

#### 4.5.3.3. Vehicular Load Emission using Caline 4

The Caline 4 Model has been deployed to assess the emission load likely due to transportation of minerals in trucks. Modelling for the project has been done for taking comprehensive approach including the entire vehicular load expected from other mines on the same side. There are only two mining blocks located in the river and likely to use the same highway / road for transportation of mined out minerals to sell.

**Emission Rate:** The details of emission rate considered for the project are as follows.

**Table 4-7: Vehicle Emission Statement**

Mine	Category of Vehicles	Expected No. of Vehicles/hr	Emission Rate (g/km)	
			NO <sub>x</sub> *	CO*
Thanthri Mines	Truck	56	9.45	3.99

\*- Emission Factor development for Indian Vehicles, ARAI Pune, #- The SO<sub>2</sub> emission has been calculated based on Diesel Consumption

#### 4.5.3.4. Model Assumption

The emission load has been evaluated by Caline 4 for Vehicular Movement. The average meteorological data of post-monsoon season (October to December 2023) was considered as met input for model study. CALINE 4 dispersion model software was run by using data on link geometry, traffic volume and environmental receptors given in the table above. The output results at various distances from the road are presented in Table below.

**Table 4-8: Incremental Pollution due to Vehicular Transportation**

Distance from the Road (m)	Incremental GLCs	
	NO <sub>x</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
20	5.08	0.013
50	2.26	0.006
100	1.69	0.003
150	1.32	0.002
200	0.94	0.001

#### 4.5.4. Mitigation Measures for Air Pollution

Mitigative measures suggested for air pollution controls are based on the baseline ambient air quality of the area. The impact with mitigation measures is given in below.

**Table 4-9: Impacts of Air Pollution and Mitigation Measures**

Attributes	Impact	Mitigation Measure
Human	It is evident from the above table the impact due to vehicular movement shall get almost normalized at approx. 100 on either side of transporting road.	<ul style="list-style-type: none"> <li>❖ Only PUC Certified vehicles shall be deployed for the project.</li> <li>❖ Regular maintenance check will be conducted for the vehicles.</li> </ul>

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Attributes	Impact	Mitigation Measure
	Approx. 1.82 ( $\mu\text{g}/\text{m}^3$ ) will be add on to existing baseline conditions.	❖ Traffic management plan will help in avoiding any traffic jams. ❖ Plantation of trees along roads sides (proposed road for transportation) as part of social forestry to help reduce the impact of fugitive dust in the nearby villages.
Animal	No Impact as it is part of riverbed.	
Plant	Stomatal index may be minimized due to dust deposit on leaf.	
Crops	Crop yield will be affected.	
Infrastructu re	There is no major impact on infrastructure due this sandmining operation.	

#### 4.5.5. Biological Method for Dust Control

Trees can act as efficient filters. The systematic and planned greenbelt development not only reduces the fugitive dust but also checks soil erosion and improves the aesthetic beauty of an area. It is essential that planning for greenbelt development should be done at the inception. It is a proven technology for waste dump stabilization and restoration of mined out areas. But at the end of conceptual stage no dump will be available as waste generation is only 5% of total production which will be utilized for road maintenance and bench preparation. So, the plantation will be done along with haul road, safety zone & nearby panchayat govt. land with consultation of local administration and concerned authorities.

Green belt of adequate width should be raised by planting native species around the mine lease area on both sides of haul road, near material handling plant, on external overburden dumps and backfilled quarry along undisturbed area.

#### 4.5.6. Conclusion

In this mining project, the only source of emission of air pollution is excavation, transportation, loading, hauling operation of minor mineral stone etc. The proposed mining operations are not anticipated to raise the concentration of the pollutions beyond prescribed limits. However, the measures are suggested to mitigate any harmful impacts of pollutants like plantation of trees along haul roads, especially near settlements, to help to reduce the impact of dust on the nearby villages, planning transportation routes of mined material to reach the nearest paved roads by shortest route (minimize transportation over unpaved road); regular water sprinkling on unpaved roads to avoid dust generation during transportation etc.

### 4.6. Impact on Road due to Traffic Movement

#### 4.6.1. Traffic Projection after Implementation of Mining Project

The extent of these impacts, at any given time, depends upon (i) the rate of vehicular emission within a given stretch of the road and (ii) the prevailing meteorological conditions. The impacts have strong temporal dependence as both factors vary with time. The temporal dependence would have diurnal, seasonal as well as long term components.

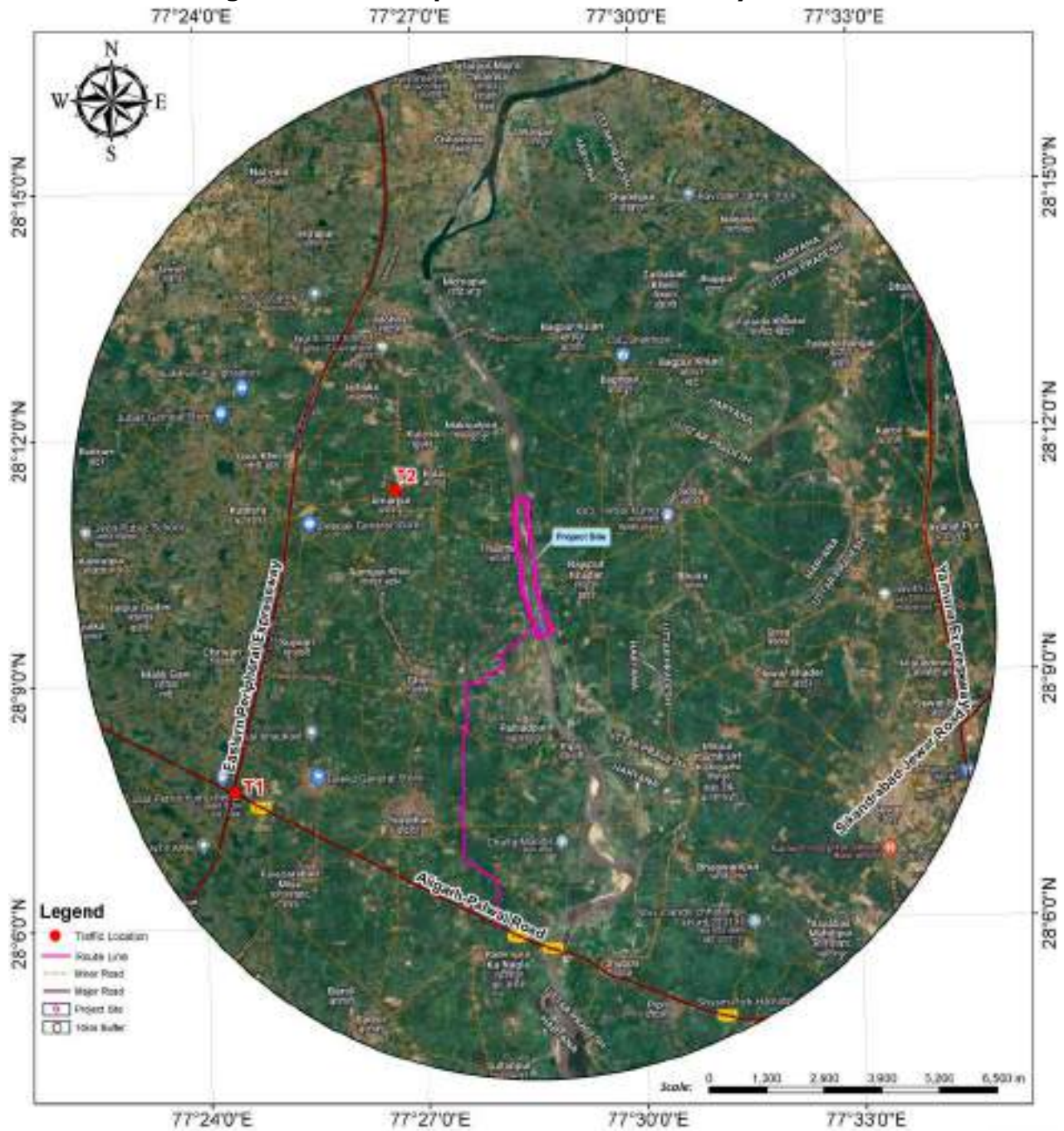
During proposed mining, there will be an increase in traffic flow as two locations were identified for traffic survey location as one was in NH-334D which connect to Palwal crossing Eastern



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Peripheral Expressway & other was on Amarpur-Palwal Road near Amarpur village. The traffic density in near to proposed site is minimal. Traffic survey location is marked in Figure 4.3.

**Figure 4.3: Transportation Route & Survey Location**



During the study period, traffic survey was done for one day i.e., 12 hours (8.0 AM to 8.0 PM) with 15-minute intervals at one location which is near to the project site which is connected to the project. The Average Annual Daily Traffic (AADT) and PCUs at sampling location is given in Table 4.10.

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**Table 4-10: Details of Average Annual Daily Traffic (AADT) and PCUs**

Location	Distance (km)	Direction	Bus/ Trucks		Passenger cars		3 wheelers		2 wheelers		LCV		Truck-Trailer/ Tractor		Total PCU/day
			No./ day	PCU/ day	No./ day	PCU/ day	No./ day	PCU/ day	No./ day	PCU/ day	No./ day	PCU/ day	No./ day	PCU/ day	
T1	7.7	SW	113	339	342	342	143	143	421	211	151	227	46	207	1469
T2	3.1	NW	32	96	197	197	86	86	197	99	49	74	5	23	575

Source: (PCU Factor: Buses-3, Trucks-3, Car-1, Two-Wheeler-0.5)

The vehicle classification system adopted for conducting the traffic volume counts along with respective Passenger Car Unit (PCU) factors, as recommended by India Road Congress in "Guidelines for Capacity of Rural Roads in Plan Areas" (IR:106-1990) are given in Table 4.11.

**Table 4-11: Detail of PCUs Factor as per IRC**

Category	Vehicle Class	Equivalent PCUs Factors
<b>Fast Vehicles</b>	Motorcycle or scooter etc.	0.50
	Passenger car, pick-up van, or Auto-rickshaw	1.00
	Agricultural Tractor, Light Commercial Vehicle	1.50
	Truck or Bus	3.00
	Truck-trailer, Agricultural Tractor-Trailer	4.50
<b>Slow Vehicles</b>	Cycle	0.50
	Cycle rickshaw	2.00
	Hand cart	3.00
	Horse-drawn Vehicle	4.00
	Bullock Cart*	8.00

Source- Guidelines for Capacity of Rural Roads in Plan Areas" (IR:106-1990)

The details V/C ratio and level of service as per IRC Guidelines is given in Table 4.12.

**Table 4-12: V/C Ratio and Level of Service (LOS) as per IRC**

V/C Ratio	LOS	Performance
0.0-0.2	A	Represents a condition of free flow
0.2-0.4	B	Represents a zone of stable flow
0.4-0.6	C	Represents zone of stable flow but with declining comfort and convenience
0.6-0.8	D	Represents the limit of stable flow
0.8-1.0	E	Represents operating conditions when traffic volumes are at or close to the capacity level
1.0-1.2	F	Represents zone of forced or breakdown flow

Source- Guidelines for Capacity of Rural Roads in Plan Areas" (IR:106-1990)

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The existing traffic scenario and level of service is given in Table 4.13.

**Table 4-13: Existing Traffic Scenario & Level of Service (LOS)**

Location	Existing PCU per day							C = Capacity of PCU per day for roads (Intermediate Lane Roads)	Existing V/C Ratio	LOS as per IRC
	2-wheelers	3-wheelers	Passenger Car	Heavy vehicle	LCV	Truck-Trailer/Tractor	Total PCU			
T1	211	143	342	339	227	207	1469	15,000	0.10	A
T2	99	86	197	96	74	23	575	6,000	0.10	A

Source- Guidelines for Capacity of Rural Roads in Plan Areas" (IR:106-1990)

As per IRC guidelines, the Level of Service (LOS) of existing road represents a condition of free flow (LOS Category "A") at all sampling locations. The impact on traffic is described in Table 4.14.

**Table 4-14: Traffic Scenario with Operation of Mine & Level of Service (LOS)**

Year	Traffic Volume (PCU/day)	V/C Ratio	LOS as per IRC	Traffic Volume (PCU/day)	V/C Ratio	LOS as per IRC
	T1	T1	T1	T2	T2	T2
Addition due to project (112 dumpers/trucks)	1176			504		
<b>Total PCU 2023</b>	<b>1469</b>	<b>0.10</b>	<b>A</b>	<b>1079</b>	<b>0.18</b>	<b>A</b>
2024	2748	0.18	A	1119	0.19	A
2025	2858	0.19	A	1162	0.19	A
2026	2976	0.20	A	1208	0.20	A
2027	3102	0.21	B	1257	0.21	B
2028	3237	0.22	B	1310	0.22	B
2029	3381	0.23	B	1366	0.23	B
2030	3535	0.24	B	1426	0.24	B

Source- Field Survey conducted during monitoring season.

After commencement of the project, the projected traffic represents conditions of free flow (LOS Category "A") and represents a zone of stable flow conditions in 2024 also which is convenience at all locations. From the above table, it can be concluded that the incremental load on the carrying capacity of the concerned road is not likely to have any adverse effect or impact.

#### 4.6.2. Traffic Management and Mitigation Measures

- ✓ Prohibiting on-street parking of vehicles, and simultaneously developing off-street parking facilities.
- ✓ It is proposed 13,000 no plantation on riverbank bunds, ancillary area & connected haul road with consultation of local administration and Forest department along the haul roads to prevent the impact of dust in the nearby village.
- ✓ To avoid accidents the speed of vehicles will be low near habitation areas.

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- ✓ All trucks are to be used for transportation will be covered with tarpaulin, maintained, optimally loaded, and have Pollution test certificates.
- ✓ In peak hours, the transportation of dumpers will be suspended. Dumpers will be transported during day only.
- ✓ All vehicles and their exhausts would be well maintained and regularly tested for emission concentration.
- ✓ Transportation will be through covered trucks and wagons.
- ✓ Truck/tippers shall be parked in designated parking area only.
- ✓ From the above statements, it can be concluded that proposed mining project will have insignificant effect on the traffic and proper management plan will further reduce the negative impacts.

## 4.7. Impact on Noise & Vibration

**Table 4-15: Impact on Noise, Vibration & Mitigation Measures**

Attributes	Impact	Mitigation Measure
Human Animals	Noise from the machinery can cause hypertension, high stress level, hearing loss, sleep disturbance etc. due to prolonged exposure. Total 1680 PCU/ day will increase in the existing traffic due to this mining activity hence vehicle collision may occur unwanted sound and can also cause impact on human health of villagers near to transportation route like effect on breathing and respiratory issues. Accidents may occur due to fast movement of vehicles.	The machinery will be maintained in good running condition so that noise will be reduced to minimum possible level. Vehicles with PUC certificate will be hired. Regular maintenance of vehicles will be done to ensure smooth running of vehicle. Awareness will be imparted to the workers about the permissible noise level and effect of maximum exposure to those levels. Personal protective equipment will provide to prevent the noise exposure. Personal Protective Equipment will be provided during mining activity. In addition, truck drivers will be instructed to make minimum use of horns in the village area and sensitive zones. It is proposed to plant 13,000 nos. of plants in plan period.
Crops	There is no major impact on plants and crops due to this operation.	The truck movement will be from suggested transportation route only. Regular Health check-up camps will be organized.

## 4.8. Impact on Water

There is no major impact on water environment. Assessment of the adverse impact and indicate the proposed mitigation. The total water demand will be 50.5 KLD for the mining operation, domestic use, and plantation purpose. 1.3 KLD municipal wastewater also will be generated which will be treated in septic tank & further may be utilized for water sprinkling. No discharge into the river will be ensured.



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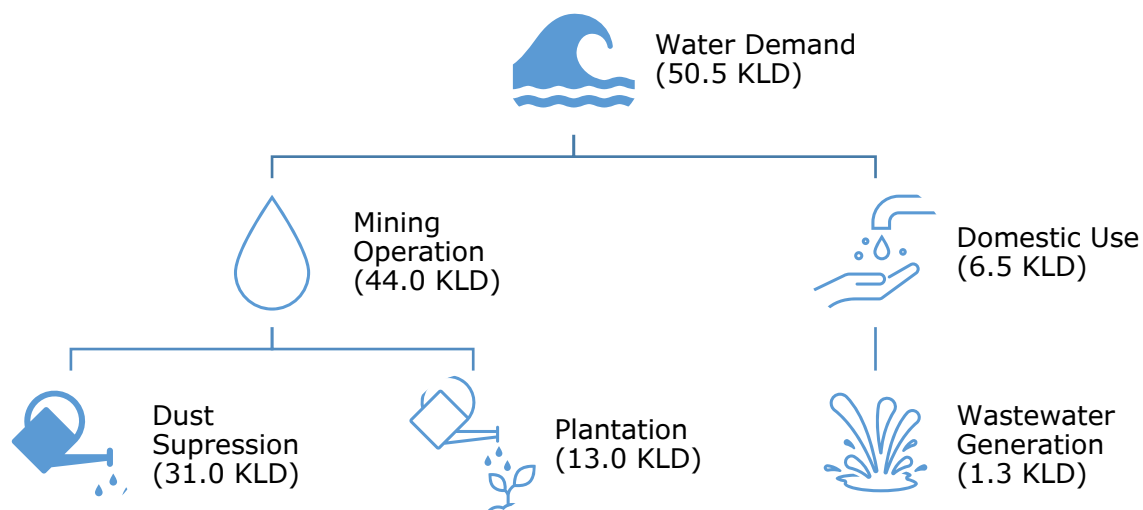
**Table 4-16: Impact on Water Regime and Its Mitigation Measures**

Attributes	Impact	Mitigation Measure
Human Animals	The mining in the riverbed area may cause ground water contamination due to intersection of the water table. The municipal wastewater disposed from the mining activity may cause contamination of surface water.	The mining in the lease area will not intersect to the ground water level as this is sandmining project from riverbed. The maximum depth of sand mine will be 3m and only mining will be done in dry seasons except monsoon and water stream will not be touched during mining. So, the chances of water pollution are very minimal. The domestic wastewater disposed from the mining activity may cause contamination of surface water.
Crops Plants	Wastewater discharges through mining operation directly affect the crops and plants	

**Table 4-17: Water Demand Estimation & Budget**

Mitigation Measures	Break-up	Demand
Drinking & Domestic @45 lpcd/ worker	(145 workers x 45 lpcd = 6525 l/ day)	6.5 KLD
Plantation (Mine Lease 5,000 / Year & Haul Road 1,500)	(5,000 Trees x 2 l/ day + 1,500 Trees x 2 l/ day = 13,000 l/day)	13.0 KLD
Dust Suppression@0.5 L/Sq.m (Twice in a day)	Area for Dust Suppression = (4,500 m haul road + 1,700 m within the mine lease) x 5 m Width = 31,000 m <sup>2</sup> ) x 0.5 l/sqm x 2 = 31,000 L/day	31.0 KLD
<b>Total in KLD</b>		<b>50.5 KLD</b>

**Figure 4.4: Water Balance Diagram**



### 4.9. Impact on Soil Environment and mitigation measures

Below table is showing the impact on soil environment and its mitigation measures.

**Table 4-18: Impact on Soil Environment and Its Mitigation Measures**

Attributes	Impact	Mitigation Measure
LU/LC	Mining activity in the riverbed may change complete land-	The mining is planned in non-monsoon seasons only so that the excavated area will be



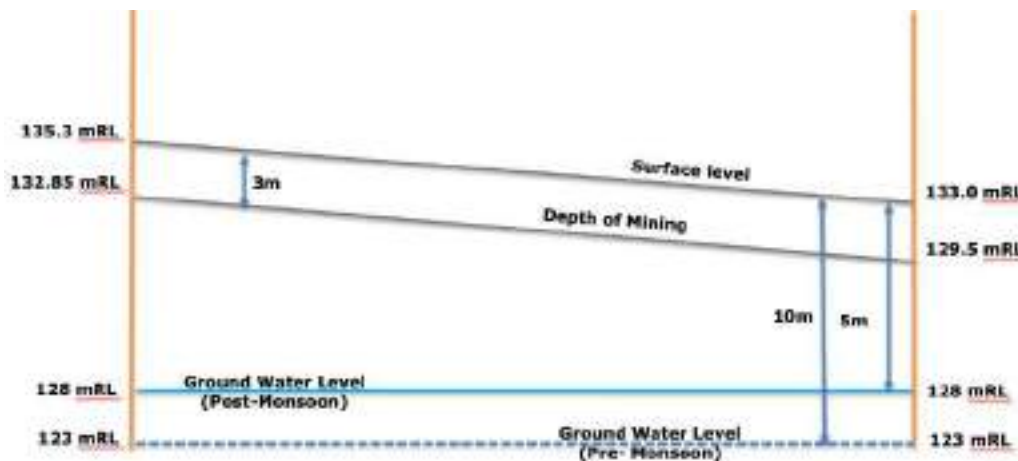
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Attributes	Impact	Mitigation Measure
	use pattern including channel geometry, bed elevation, sediment transportation capacity which can reduce flow of the river and downstream erosion.	replenished naturally during the subsequent rainy season for the riverbed mining block. Mining activity will be done only 70.114 ha only out of 99.384 ha as 21.0 ha area will be left as safety zone. Pre- and post-monsoon survey for sedimentation in the riverbed will be done regularly.
Crops & Plantation	Mining activity may increase the soil erosion and soil degradation which have adverse impact on soil fertility.	Mine lease area has been proposed leaving a safety distance of 1/3 <sup>rd</sup> of the width of the river from the bank inwards which will protect the banks so channel geometry will not be disturbed. Mining activity may increase the soil erosion and soil degradation which have adverse impact on soil fertility in surrounding agricultural land. It is proposed to do plantation comprising of local species in plan period with consultation of Forest department with some fruit bearing and medicinal trees, along the haul roads, outer periphery within the mining area which enhances the binding property of the soil to check the erosion.

#### 4.10. Impact on Hydrology and Mitigation measures

Below table is showing the impact on hydrology and its mitigation measures.

**Figure 4.5: Impact of Mining on Ground Water**



**Table 4-19: Impact on Hydrology and Its Mitigation Measures**

Impact	Mitigation Measure
The mining in the mine site area may cause the ground water contamination due to intersection of the water table.	The water table will not be intersected during the entire period of mining in the riverbed as ultimate depth is limited up to 3.0 m as the water table is 5-10 m BGL. Proper analysis/Monitoring will be done to check the ground and surface water quality.

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Impact	Mitigation Measure
Change the topography will divert the water flow.	There is no proposal of any stream modification/diversion due to this mining activity hence there will be not any impact on flow of water.

#### 4.11. Biological Environment

Impact on Terrestrial Flora: Dust deposition on leaf lamina observed on nearby local plant species which may results in decline the rate of photosynthesis and retards the plant growth.

**Table 4-20: Impact on Ecology due to Mining Activity and Its Mitigation Measures**

Impact	Mitigation Measure
Mining on the riverbed, braided flow or subsurface flow may hinder the movement of fishes between pools. Transportation of mineral in the trucks/Trippers will disturb the movement of wild animals and reptiles.	Transportation of mineral will be minimized in the morning and evening and cannot be done in night. Plantation will be carried out along the approach roads and nearby community land and govt. lands & both riverbanks. Neem, Peepal, Mango, Shisham, Sirish, Babool, Gulmohar and other local fruity plants are proposed for reduce the emission generated by transportation & mining operation.
Fugitive emission from vehicle movement will form a layer in leaves thus reducing the gaseous exchange process. This ultimately affects the growth of plants.	Haul roads will be sprinkled with water which would reduce the dust emission, thus avoiding damage to the crops. Annual monitoring of roadside plants exposed to vehicular pollution will be done to check the dust load and Air Pollution Tolerance Index (APTI).
Chances of vehicle collisions with wildlife attempting to crossroads are possible.	Transportation of mineral will be minimized in the morning and evening and cannot be done in night. Speed of trucks/dumpers will not exceed the speed limit i.e., 20 km/hr in the dust prone area, village area and wildlife sensitive areas.
Any human settlement in the mining area will disturb the vegetation cover and reptiles.	No human settlement will be permitted in the lease mining or nearby area.
In discriminate mining from active channels of rivers causes many adverse effects on the benthic fauna, which inhabits the bottom sandy substratum.	Scientific mining will be done as per the approved mining plan.
Excessive mineral extraction from rivers affects the eco-biology of many terrestrial insects whose initial life history begins in aquatic environments.	No mining will be carried out during the rainy season to minimize impact on aquatic life.
The Indian peafowl movement is very common in the area; the noise	Green belt and community forestry program will be proposed to encourage the green cover which is able to

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Impact	Mitigation Measure
from sand mining will hinder the same.	reduce the noise level. If wildlife is noticed crossing the area, they will not be disturbed at all.
Mining may drive away the wildlife from their habitat, and significantly affect wildlife and nearby residents.	Shelter and fodder providing tree species will be proposed in the plantation program which cater the wildlife and may be reduce the destructive impacts of mining on wildlife. Awareness program about wildlife and its importance will be conducted for workers and nearby residents so that they will not disturb the wildlife at all. Sign boards will be displayed as mentioned in conservation plan (enclosed as annex).

### 4.12. Impact on Socio-Economic Environment

To assess the impacts on socioeconomic profile, the related information has been obtained through primary sources as well as secondary sources. Report has been prepared using a combination of methods, including Focus Groups Discussion (FGD) tools and techniques, site visit, community observations, and informal and formal surveys. Direct observation-based methods were implemented to help identifying current socioeconomic environmental Scenario and potential impacts of mining activities as experienced by the local people in the study area, and to rank socioeconomic activities based upon their contribution to household livelihood. This observation/ study reflected various socioeconomic variables and direct-indirect impacts between mining and non-mining communities.

The potential impact of proposed mining activities as experienced by the locals in the villages of the area under study was identified through survey to rank socioeconomic contribution ensuring development. In facts, People perceive that the project will bring handful gains by way of creating significant job opportunities along with development of social infrastructure. The impacts on the different components viz employment, housing, educational, and medical and transport facilities, fuel availability, economics, status, health agriculture is not significant because size of project is small. Some of these impacts reported by local people & observed during the visit would be beneficial.

#### 4.12.1. Positive Impact

**Increase in Job Opportunities:** Critically analysing the existing environmental status of the socio-economic profile and visualizing the scenario with the project, the impacts of the project would be varied and may generate both positive and negative impacts of the proposed project in the region that are stated. Manpower required for the proposed project is about 67 personnel which may include skilled and unskilled workers which will be sourced from local population. As such the project will have positive impact in the area.

**No Rehabilitation:** Hence, Resettlement & Rehabilitation is not required as there is no land acquisition or displacement of any houses, habitation, or livestock.

**Minimal burden in the existing infrastructure facilities:** Local work force will be given first preference in the activity due to which influx of the outsiders is not envisaged or it will be very minimal. Thus, there will not be the necessity of provision of housing facility for the local workers

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and not stressing on the existing civic amenities of the area. If enough local workers will not be available, then workers from outside will be engaged. For the outside workers if any, housing arrangement and the facilities will be provided at the project site.

**Improvement in infrastructure:** The activity will benefit the local people due to provision of more infrastructural facilities such as developments of approach routes within the village area, streetlight, health facilities etc.

**Impact on road development:** Movement of trucks and other vehicles to and from the quarry is expected to increase substantially when mining will start. The existing roads connecting the quarry with the national and state highways are mostly narrow mud roads. There will be mud slide and traffic bottle neck if these roads are not widened, and their conditions are not improved by making them paved roads. Hence, there is ample scope for road development in and around the mining areas.

#### 4.12.2. Negative Impact

The negative impact will be limited to some sporadic health problems, which may occur due to increase in fugitive emission near the mines. However, as the incremental dust due to mining activities will be maximum 1.4 µg/m<sup>3</sup> from 50m distance from approach road in controlled manner. So, there will be negligible impact on human health.

**Table 4-21: Impact on Socio-economic and Its Mitigation Measures**

Impact	Mitigation Measure
Due to mining and transportation of sand will generate the opportunity of indirect employments like small shops, Dhaba, garage and restaurant, vegetable shops etc.	Positive Impact
Mining activity will be committed to generate direct employment by recruiting 145 people which will be employed locally, and preference will be given to local people.	Positive Impact
Productivity of crops will be deteriorated affecting the agriculture-based livelihood due to the pollution arising out of the mines, if proper mitigation measures are not implemented	50.5 KLD water will be proposed for dust suppression at mine site and approach road by sprinklers to avoid dust generation during mining activity and transportation. It is proposed to plant 13,000 nos. of local tree species for three years with consultation of local administration and forest department which help to reduce in the pollution level.
Extraction from riverbanks and beds and the resultant generation of fugitive dust cause workers of the mine to suffer from occupational hazards like skin allergies, eye, and respiratory problems etc. Further, the deep pits created in the channel also can contribute to an increase in accidents in the working environment.	Mine lease area has been proposed leaving a safety distance of 1/3 <sup>rd</sup> of the width of the river from the bank inwards which will protect the banks. Dust mask will be provided to the workers engaged at dust generation points like excavation and loading points. Regular water sprinkling on unpaved roads to avoid dust generation.

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Impact	Mitigation Measure
This creates serious threat to residents in the area who depend on river water for their domestic purposes.	The mined-out area in riverbed block will be reclaimed naturally every year. The mining is planned in non-monsoon seasons only so that the excavated area will be replenished naturally during the subsequent rainy season for the riverbed mining block.
The major source of socio-health impacts of transportation will generate from truck, dust etc. Increase in accidents because of rash driving of dumpers carrying mineral through the roads may be possible.	The plantation is proposed to be done in first 2 years and will be ensured 100% survival in third year. In later fourth & fifth year, plants will be maintained. Local species will be preferred for plantation.

#### 4.13. Impacts on Solid Waste/ Over Burden & Mitigations

The small quantity of domestic solid waste will be generated which will be disposed through the gram panchayat. Only 16 kg/day will be generated. No topsoil is available on project site. Dustbins will be provided for the domestic waste generated from lease.

#### 4.14. Impacts on Occupational Health & Safety

Details of the principal environmental and occupational risks that are likely to be created are given in below table.

**Table 4-22: Impact on Occupational Health & Safety and Mitigation**

Impact	Mitigation Measure
The mining of sand (minor mineral) from the riverbed can cause the lung disease and respiratory disorder due to dust exposure.	Dust masks will be provided as additional personal protection equipment (helmet and safety shoes) to the workers working in the dust prone area. Regular water sprinkling will be done, and dust masks will be provided to the workers.
Due to noise exposure, hearing disorder may be resulted.	Earmuffs will be provided to the workers and good maintenance of vehicles will be provided.
The accident at the site due to mining operation may be anticipated.	Workers are informed, kept aware and trained about possible accidents during the mining operation and persona protective equipment will be provided viz. gloves, safety shoes, dust mask, safety jackets, helmet etc. In addition to, the awareness about the occupational health hazards due to mining activities to avoid any incident will be provided to the workers. Pre-placement health check-up will be made mandatory and periodic health check-up will be done quarterly.

#### 4.15. Mine Closure Plan

Detailed in [Section 2.7](#) of Chapter 2.



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#### **4.16. Conclusion**

The proposed mining operations are not anticipated to raise the concentration of the pollutants beyond prescribed limits. However, the measures are suggested to mitigate any harmful impacts of pollutants like a plantation of trees along haul roads, especially near settlements, to help to reduce the impact of dust on the nearby villages; planning, transportation routes of mined material to reach the nearest paved roads by the shortest route; regular water sprinkling on unpaved roads to avoid dust generation during transportation etc. Some of impacts may be due to increase in traffic. Transportation of mineral should be minimized in the morning and evening and cannot be done in night.

The impact on the present noise levels due to mining operations will be restricted to the work zone areas only. The impact on the ambient noise levels will not be felt at the settlement areas due to masking effect with the existing noise levels. The mining activities will be done in a systematic manner by maintaining the road infrastructure and vehicle transport, which will be a protective measure for preserving the topography and drainage in the area.

The local people have been provided with either direct employments or indirect employment such as business, contract works and development work like roads, etc. and other welfare amenities. Except dust generation, there is no source which can show a probability for health-related diseases. Regular water sprinkling will be done with sprinkles mounted tankers and dust masks will be provided to the workers. All workers will be subjected to a medical examination as per Mines Rule 1955 both at the time of appointment and at least once in a year. Medical camps will be organized for this activity. Insurance for all employees as per the rules will also be carried out.



**CHAPTER – 05**

**ANALYSIS OF**

**ALTERNATIVES**

**(TECHNOLOGY &**

**SITE)**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## 5. Analysis of Alternatives (Technology & Site)

### 5.1. Introduction

During the scoping process, alternatives to a proposal can be considered or refined, either directly or by reference to the key issues identified. A comparison of alternatives helps to determine the best method of achieving the project objectives with minimum environmental impacts or indicates the most environmentally friendly and cost-effective options.

### 5.2. Alternative of Mines

The Ministry of Environment, Forest, and Climate Change (MoEF&CC), Govt. of India through its notification of 14<sup>th</sup> September 2006 and its subsequent amendment under the Environment (Protection) Act, 1986 classifies the projects under Cat. B1. This is a project of minor mineral.

Sand (Minor Mineral) deposits are site specific. It is present in Yamuna riverbed. The mining of the material will be done by opencast manual method in riverbed. The mining will be done as per procedures laid down by Haryana Minor Mineral Concession Rules.

During monsoon season, when rivers reach high stage, Yamuna River also bears significant catchment area, and it transports riverbed material (sand) which gets accumulated at such stretch which widens the river width and concave banks. Thus, it is evident that the proposed site will be mined for the purpose of preventing land cutting during heavy rainfall and floods.

The mined-out area in riverbed block will get replenished annually after monsoon. Therefore, no alternate site is suggested as existing land use of mine lease classified as "River Body" and will continue to be so even after the current mining period is over.

It is case of fresh quarry lease. The mineral is site specific, so no alternative site was identified. Lease approval from concerned authority has been obtained and enclosed in report.

### 5.3. Alternative for Technology and Other Parameters

The alternative studies done for the project are given below:

**Table 5-1: Alternative Technology & Other Parameters**

S. No.	Particular	Alternative Option 1	Alternative Option 2	Remarks
1	Technology	Open-cast manual mining.	Open-cast semi mechanized mining	Open cast manual is preferred due to benefits listed below: ✓ Less time consuming ✓ No electric power requirement ✓ Minimal noise will be generated. ✓ Minimal air pollution will be generated. ✓ Overburden will not be generated.
2	Employment	Local employment	Outsource employment	Local employment is preferred which will benefit to the region as given below: ✓ Provides employment to local people along with financial benefits. ✓ No residential building/housing is required



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S. No.	Particular	Alternative Option 1	Alternative Option 2	Remarks
3	Labourer transportation	Public transport	Private transport	Local labours will be preferred which will not generate additional load on public transport. So, the cost of transportation of for labour will be negligible.
4	Material transportation	Truck transport	Rail transport	Material will be transported through Dumpers on the contract basis from locals which will indirectly benefit to region.
6	Water requirement	Tanker supplier	Ground water/ surface water supply.	Private water tankers will be preferred for water supply which will ensure to no change in ground or surface water level/ quality.
7	Road	Haul road	Metalled road.	Existing road will be upgraded or widened for the mineral transportation purpose. Two-sided plantation will be ensured on haul road with two-time water sprinkling on haul road.

#### 5.4. Environmental Attributes Management and Mitigation

Adequate environmental management measures will be incorporated during the entire planning, pre- construction, construction, and operational stages of the project to minimize any adverse environmental impact and assure sustainable development of the area.

The mitigation measures which have been suggested for the construction and operational stages of the proposed development will include the following elements:

- ✓ Water sprinkling shall be done on haul roads where dust generation is anticipated.
- ✓ Mineral & OB storage and handling yard will be enclosed from all sides.
- ✓ To minimize the occupational health hazard, proper personal protective equipment's shall be provided to the workers working in the dust prone areas.
- ✓ Air Pollution Control and Management will be done.
- ✓ Noise Control and Management will be done.
- ✓ Water treatment and management will be done.
- ✓ Hazardous and Solid Waste Management will be done.
- ✓ Plantation and Landscaping development will be ensured.
- ✓ Sewage Treatment, Recycle and reuse Energy Conservation

**CHAPTER – 06**

**ENVIRONMENT**

**MONITORING**

**PROGRAM**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## 6. Environment Monitoring Plan

### 6.1. Introduction

Environmental monitoring program is an essential tool for sustainable development. An environmental monitoring program 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 projects works. An environmental monitoring program is important as it provides useful information and helps to:

**Table 6-1: Environmental Management Plan, Activities & Implementation**

Environmental Management Plan Activities	Implementation Process
<ul style="list-style-type: none"> <li>✓ Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures.</li> <li>✓ Monitoring &amp; tracking the effectiveness of Environmental Management Plan &amp; implementation of mitigation measures planned.</li> <li>✓ Define the responsibilities of the project proponents, contractors and environmental monitors and provides means of effectively communicating environmental issues among them.</li> <li>✓ Define monitoring mechanism and identify monitoring parameters.</li> <li>✓ Evaluate the performance and effectiveness of mitigation measures proposed in the Environment Management Plan (EMP) and suggest improvements in management plan, if required.</li> <li>✓ Identify training requirement at various levels.</li> <li>✓ Identification of any significant adverse transformation in environmental condition to Plan additional mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>✓ Environmental surveillance</li> <li>✓ Analysis and interpretation of data</li> <li>✓ Preparation of reports to support environmental management system and</li> <li>✓ Organizational set up responsible for the implementation of the programme.</li> </ul>

### 6.2. Environmental Management Cell

Environmental Monitoring will be taken up for various environmental components as per conditions stipulated in Environmental Clearance Letter issued by MoEF&CC and Consent to Operate issued by the State Pollution Control Board. Compliance of same will be submitted to respective authorities on regular basis.

To maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary which will have complied as per conditions. Proponent has been formulated an Environment Policy of the mine and constitute an Environmental Management Cell and committed to operate the proposed mine with the objectives

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mentioned in approved Environment Policy. The system of reporting of Non-conformances / violation of any Environmental Law/ Policy will be as per quality management system. The internal audit will be conducted on periodic basis and any Non-conformances/violation to Environmental Law/ Policy will be closed and discussed during Management Review Meetings of board of directors/ partners.

### **6.2.1. Hierarchy**

A Manager will be appointed to supervise to subordinates for all activities like mining, transportation, environmental pollution controls, workers safety and greenbelt development activity. An Assistant Manager (EHS) will be responsible for the environment, health and safety related issues and supervise to the subordinates like supervisor (who is working in mine site), environmental executive (responsible for regular environmental compliances and coordinate with local administrative body to regarding environmental issues) and horticulturist (responsible for plantation and green area development).

### **6.2.2. Responsibilities for Environmental Management Cell**

The responsibilities of the EMC include the following:

- ✓ Environmental Monitoring of the surrounding area.
- ✓ Developing the green belt/Plantation.
- ✓ Ensuring minimal use of water.
- ✓ Proper implementation of pollution control measures.
- ✓ Access the risk area.
- ✓ Implementation of QMS.
- ✓ Conducting Internal Audits.
- ✓ Closing of NCs and conduction Management Review Meetings.

### **6.3. Environmental Monitoring and Reporting Procedure**

Environmental Monitoring plan shall be decided considering the environmental impact likely to occur due to operation of the project as the main scope of monitoring program is to track timely and regular change in the environmental condition and to take timely action to protect the environment. This may take the form of direct measurement and recording of quantitative information, such as amounts and concentrations of discharges and wastes, for measurement against corporate or statutory standards, consent limits or targets. It may also require measurement of ambient environmental quality.

The key aims of environmental monitoring program are:

- ✓ To ensure that results/ conditions are as forecast during the planning stage, and where they are not, to pinpoint the cause and implement action to remedy the situation.
- ✓ To verify the evaluations made during the planning process, with risk and impact assessments and standards and target setting and to measure operational and process efficiency.
- ✓ Monitoring will also be required to meet compliance with statutory and corporate requirements.
- ✓ Finally, monitoring results provide the basis for auditing, i.e., to identify unexpected changes.



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Regular Monitoring of all the environmental parameters viz., air, water, noise, and soil as per the formulated program based on CPCB and MoEF&CC guidelines will be carried out every year to detect any changes from the baseline status.

**Table 6-2: Monitoring Methodologies and Parameters**

Attributes	Frequency & Location	Measurement Method	Pursuing Agency	Responsibility
<b>A. Air Environment</b>				
PM <sub>10</sub> , PM <sub>2.5</sub> , SO <sub>2</sub> , NO <sub>x</sub> & CO	Six Monthly (Within lease area, nearby habitat & as per wind pattern & Transportation)	National Ambient Air Quality Standards (NAAQS) 2009 & IS 5182	SPCB / MoEF&CC	Environment Monitoring Cell
<b>B. Water Environment</b>				
Drinking Water (Ground Water) & Surface Water	Six Monthly (Nearby water body and habitat)	As per IS 10500-2012	SPCB / MoEF&CC	Environment Monitoring Cell
<b>C. Noise</b>				
Noise levels at Day and night - Leq dB (A)	Six Monthly (Lese Area & nearby Habitat)	As per CPCB norms	SPCB / MoEF&CC	Environment Monitoring Cell
<b>D. Soil</b>				
Physical & Chemical Properties of Soil	Six Monthly (Nearby Region)	As per CPCB norms	SPCB / MoEF&CC	Environment Monitoring Cell
<b>E. Socioeconomic</b>				
Health status, Cultural & aesthetic attributes, and Education	Yearly (Bases on consultation with panchayat)	Primary data collection through questionnaire	SPCB / MoEF&CC	Environment Monitoring Cell (Mining In charge)
<b>F. Ecological Impact</b>				
Green Belt Development & Conservation of Wildlife	Yearly (Nearby sensitive receptor)	Primary data collection.	SPCB / MoEF&CC	Environment Monitoring Cell (Mining In charge)

## 6.4. Reporting Schedule during Operation of Mine

After completion of analysis, copies of all the analysis reports will be sent to MoEF&CC Regional Office and SPCB. Copies of the reports will be maintained in the office and will be made available to the concerned inspecting authorities.

## 6.5. Monitoring Budget

The environmental monitoring & management budget has been proposed approx. INR 17.0 lakh as capital amount with INR 5.80 Lakh recurring amount for proposal period. For details, refer to [section 10.10](#) of chapter 10 of EIA report.

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## **6.6. Conclusion**

To maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary which will have complied as per conditions. An Environmental Management Cell will be prepared who will be committed to implementation of proposed objectives mentioned in approved Environment Policy. Regular Monitoring of all the environmental parameters viz., air, water, noise, and soil as per the formulated program based on CPCB and MoEF&CC guidelines will be monitored through NABL/ MoEF&CC approved laboratory.

**CHAPTER – 07**  
**ADDITIONAL**  
**STUDIES**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## 7. Additional Studies

### 7.1. General

Mining operations are associated with several potential hazards that affect adversely the human health and environment. It would normally require the assistance of emergency services to handle it effectively. The mining operation will be taken up under the supervision and control of qualified staff including Mine Manager (Grade I). Similarly, mines also have impending dangers and risk which need to be addressed for which a disaster management plan has been prepared with an aim of taking precautionary steps to avert disasters and to take such action after the disaster which limits the damage to the minimum. Nevertheless, the following natural/ industrial problems may be encountered during the mining operation.

- ✓ Inundation due to flood.
- ✓ Accidents by heavy machinery.
- ✓ Slope failures at the mine faces etc.

In additional studies, we particularly discussed about the public consultation, risk analysis & risk management and disaster management plan.

### 7.2. Public Hearing & Consultation

As per the conditions of the ToR and the EIA Notification 2006 and its amendment, a Public Hearing was conducted by Haryana State Pollution Control Board at Mine Site as per the provisions of EIA Notification, S.O. 1533 dated 14.09.2006 and its amendment for Environmental Clearance of Mine Lease.

“Public Consultation” refers to the process by which the concerns of local affected persons and others who have plausible stake in the environmental impacts of the project or activity are ascertained with a view to considering all the material concerns in the project or activity design as appropriate. Public consultation process comprises of two parts, viz Public Hearing and written response from stakeholders.

This is the draft EIA report which will be submitted to PCB for the public hearing, Minutes of Public Hearing will be incorporated in final EIA report.

### 7.3. Hazard Identification and Risk Assessment Methodology

Risk assessments will help mine operators to identify high, medium, and low risk levels. This is a requirement of the Occupational Health and Safety Act 2000 with further amendments as The Occupational Safety, Health, and Working Conditions Code, 2020. Risk assessments will help to priorities the risks and provide information on the need to safely control the risks. In this way, mine owners and operators will be able to implement safety improvements. The following natural/ industrial problem may be encountered during the mining operation.

- ✓ Inundation/Flooding
- ✓ Slope failure at the mine faces or stacks
- ✓ Quicksand Condition
- ✓ Accident due to vehicular movement
- ✓ Accident during Sand loading, transporting, and dumping.
- ✓ Occupational Health Hazar.



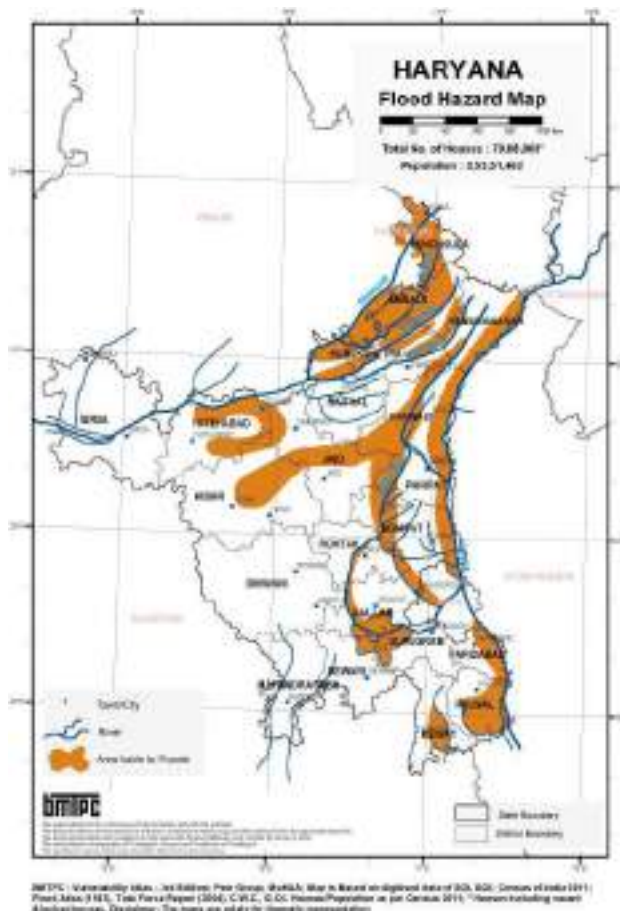
Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

As per proposal made under the mining plan the area will be developed by means of opencast mining method. Extraction of minerals is to be carried out by manual mining means. Water table will not be touched during the mining process. No high-risk accidents like landslides, subsidence flood etc. have been apprehended.

### 7.3.1. Inundation/Flooding

Mining will be done during the non-monsoon periods (October-June); therefore, problem of inundation is not likely to happen.

**Figure 7.1: Floor Hazard Map of Haryana State**



Palwal did not face severe flood situation till now. But still Palwal got affected in 1978, 2010 and now in 2013 due to the floods. The villages situated at the bank of the river got affected in 1978. As these were not severe and flash floods, only agricultural fields were got affected. In 2010, 13924 Acres was the total crop area damaged due the flood. No other damaged had been seen in 2010, 2013 & 2017.

### 7.3.2. Slope Failure at the Mine faces or stacks

To allay dangers due to open cast slope failure for pit, slope stability estimations will be made for the mines. Determining the factor of safety, the slopes should be monitored at regular intervals to check for any possible failure.

### 7.3.3. Quicksand Condition

- This condition occurs when the working crosses the water table at a certain depth and the permeability of the strata is very high.

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- This condition will not occur as the digging will be done up to 3 m depth not touching the water table.

#### **7.3.4. Drowning**

There are possibilities of drowning in the deeper part of the river. However, safety jackets, floating tube will be kept at the site office to prevent any mishap.

#### **7.3.5. Accident due to Vehicular Movement**

Most of the accidents occur during transportation by dumpers, trucks and other vehicles and are often attributable to mechanical failures, in which the factor of human errors cannot be ruled out. Identifying the hazards that come along with the presence of vehicles at the workplace (e.g., reversing operations, loading) can cause harm if not properly handled. Among some of the factors that may make vehicle accidents more likely are:

- Rough access roads
- Time pressure
- Inadequate brakes (Possibly from lack of maintenance)
- Carelessly parked vehicles (e.g., being parked on a slope without being adequately secured)
- Unsafe coupling and uncoupling of trailers, and
- Untrained drivers
- Overturning vehicles

#### **7.3.6. Accident during Sand loading and Transportation**

##### **Sand Loading:**

- The sand is loaded in the trucks using hand shovels and back-hoe. There are possibilities of injury in the hands during loading with shovels and staying under bucket movement.
- There are possibilities that the workers standing on the other side of loading may get injury due to overthrown sands with pebbles.
- There are possibilities of workers getting injured during opening of side covers of the trucks to facilitate sand loading.
- There are possibilities of riverbank collapse due to proximity of sand extraction.
- There are chances of falling of cattle/children into sand pit in riverbed- instances of death due to fall in such pits were reported from other areas to the Department of Mines.

##### **Sand Transport:**

- The sands loaded in 25 Tons trucks are being sent to the market through public roads.
- All possibilities of road accidents are possible.
- Accident may also occur during movement in the mine (sand dunes).
- There are possibilities that due to overloading, some pebbles or big boulder may injure the public.

#### **7.3.7. Occupational Health Hazard**

Open cast method involves dust generation by excavation, loading and transportation of mineral. At site, during excavation and loading activity, dust is main pollutant which affects the health of workers whereas environmental and climatic conditions also generate the health problems. Addressing the occupational health hazard means gaining an understanding of the source (its

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location and magnitude or concentration), identifying an exposure pathway (e.g., a means to get it in contact with someone), and determination of likely a receptor (someone receiving the stuff that is migrating). Occupational hazard due to open cast mining mainly comes under the physical hazards. Possible physical hazards are as below:

**Physical Hazards due to Mining Operations:**

Following health related hazards were identified in open cast mining operations to the workers:

- a. **Light:** - The workers may be exposed to the risk of poor illumination or excessive brightness. The effects are eye strain, headache, eye pain and lachrymation, congestion around the cornea and eye fatigue. In present case, the mining activity is done during daytime only.
- b. **Heat and Humidity:** - The most common physical hazard is heat. The direct effects of heat exposure are burns, heat exhaustion, heat stroke and heat cramps; the indirect effects are decreased efficiency, increased fatigue, and enhanced accident rates. Heat and humidity are encountered in hot and humid condition when temperatures and air temperatures increase in summer up to 46.1<sup>0</sup>C or above in the riverbed mining area.
- c. **Eye Irritation:** - During the high windy days in summer the dust could be the problems for eyes like itching and watering of eyes.
- d. **Respiratory Problems:** - Large amounts of dust in air can be a health hazard, exacerbating respiratory disorders such as asthma and irritating the lungs and bronchial passages.
- e. **Noise Induced Hearing Loss:** - Machinery is the main source of noise pollution at the mine site.

**Risk Level using Risk Matrix:** Risk Matrix is used to identify the level of risk involved in various hazards identified.

**Table 7-1: Risk Level Matrix**

Risk Assessment Matrix		Consequences				
		Insignificant (1) No injuries	Minor (2) First Aid Treatment	Moderate (3) Medical Treatment	Major (4) Hospitalization	Catastrophic (5) Death
Likelihood	<b>Almost Certain (5)</b> Often / Once a week	Moderate (5)	High (10)	High (15)	Catastrophic (20)	Catastrophic (25)
	<b>Likely (4)</b> Could easily happen / once a month	Moderate (4)	Moderate (8)	High (12)	Catastrophic (16)	Catastrophic (20)
	<b>Possible (3)</b> Could happen or known it to happen / Once a year	Low (3)	Moderate (6)	Moderate (9)	High (12)	High (15)
	<b>Unlikely (2)</b> Hasn't happened yet but could / once every 10 years	Low (2)	Moderate (4)	Moderate (6)	Moderate (8)	High (10)
	<b>Rare (1)</b> Conceivable but only on extreme circumstances / Once in every 10 years	Low (1)	Low (2)	Low (3)	Moderate (4)	Moderate (5)

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**Table 7-2: Identification of Likely Risks in Sand Mining from Riverbed**

S. No.	Activities	Risk Probability		
		Occurrence	Consequence	Risk Level
1.	Sand Loading	Possible	Major	High
2.	Sand Transport	Possible	Major	High
3.	Inundation/Flooding	Rare	No injuries	Low
4.	Drowning	Possible	Catastrophic	High
5.	Vehicular Movement	Likely	Catastrophic	Catastrophic
6.	Occupational Health Hazard	High	Moderate	High
7.	Slope Failure	Possible	Moderate	Moderate

## 7.4. Disaster Management Plan & Mitigation Measures

The Disaster Management Plan (DMP) is a guide, giving general considerations, directions, and procedures for handling emergencies likely to arise from planned operations. The DMP has been prepared based on the Risk Assessment and related findings covered in the report.

The objectives of DMP are to describe the company's emergency preparedness, organization, the resource availability, and response actions applicable to deal with various types of situations that can occur at mines in shortest possible time.

Thus, the overall objectives of the emergency plan are summarized as: -

- ✓ Rapid control and containment of Hazardous situation
- ✓ Minimum the risk and impact of event/ accident
- ✓ Effective prevention of damage to property.

To effectively achieve the objectives of emergency planning, the critical elements that form the backbone of Disaster Management Plan (DMP) are:

- ✓ Reliable and early detection of an emergency and immediate careful planning.
- ✓ The command, co-ordination, and response organization structure along with availability of efficient trained personnel.
- ✓ The availability of resources for handling emergencies.
- ✓ Appropriate emergency response action.
- ✓ Effective notification and communication facilities.
- ✓ Regular review and updating DMP.
- ✓ Training of the concerned personnel.
- ✓ Steps taken for minimizing the effects may include rescue operations, first aid, evacuation, rehabilitation and communicating promptly to people living nearby.

### 7.4.1. Mitigation Hazards

Mining and allied activities are associated with several potential hazards to both the employees and the public at large. A worker in a mine will be able to work under conditions, which are adequately safe and healthy. At the same time the environmental conditions also will not impair his working efficiency. This is possible only when there is adequate safety in mines. Hence mine safety is one of the most essential aspects of any working mine. The safety of the mine and the employees is taken care of by the Mines Act 1952, which is well defined with laid down procedure

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to ensure safety and constantly monitored and supervised by Directorate General of Mines Safety and Department of Mines, State Government.

#### **7.4.1.1. Measures to Prevent Accidents during Sand Loading.**

- i. The trucks will be brought to a level so that the sand loading operation suits to the ergonomic condition of the workers and the backhoe.
- ii. The loading will be done from one side of the truck only.
- iii. The workers will be provided with gloves and safety shoes during loading. Opening of the side covers will be done carefully and with warning to prevent injury to the loaders.
- iv. No sand will be collected within 12.0 m safety zone left from all sides, especially from outer bank of the meandering river. Safe clearance will be mainly determined by the height of the riverbank and thickness of sand to be extracted from the close vicinity of that bank.
- v. Ponding in the riverbed shall not be allowed.
- vi. Operations during daylight only.
- vii. No foreign material (garbage) will be allowed to remain/spill in riverbed and catchment area, or no pits/pockets are allowed to be filled with such material.
- viii. Stockpiling of harvested sand on the riverbank will be avoided.
- ix. For operations, approaching riverbed from both the banks will be avoided.
- x. Digging outside riverbank within 500m for pit sand and gravel and taking anything from that zone for construction of access ramps, will be strictly prohibited.

#### **7.4.1.2. Measures to Prevent Accidents during Sand Transportation**

- i. All transportation within the main working will be carried out directly under the supervision and control of the management.
- ii. The Vehicles must be maintained in good repairs and checked thoroughly at least once a week by the competent person authorized for the purpose by the Management.
- iii. Road signs will be provided at each turning point especially for the guidance of the drivers at the evening/night.
- iv. To avoid danger while reversing the trackless vehicles especially at the embankment and tipping points, all workers will be removed from all areas for reversing of lorries, and the vehicle will have audio-visual alarm during reversing.
- v. A statutory provision of the fences, constant education, training etc. will go a long way in reducing the incidents of such accidents.
- vi. Generally, overloading will not be permitted. Big boulders will not be loaded. This is unsafe and may damage equipment and stowing bunker.
- vii. The truck will be covered and maintained to prevent any spillage.
- viii. The maximum permissible speed limit will be ensured.
- ix. The truck drivers will have proper driving license.

#### **7.4.1.3. Safety Features Required in Tippers/Trucks**

- i. Exhaust/ Retard Brake: Required as per DGMS circular 02 of 2004.
- ii. Propeller shaft guard: Propeller shaft guard as per DGMS circular 10 of 1999.
- iii. Tail gate protection: Protection of cabin against collision either by head-to-head or head to tail.



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- iv. Limiting speed device: To ensure speed limits as decided by management. The device may be Electronic or mechanical type speed governors.
- v. Reverse gear for audio-visual alarm: The audio-visual alarm provided for equipment will confirm to DGMS (Tech.) Tests to be carried out on the audio-visual alarm and certificates shall be issued to user industries.
- vi. Provision of two brakes: One of brakes shall be fail safe & for details refer DGMS circular 09 of 1999.
- vii. Body lifting position locking arrangement: A hooter along with an indication may be provided to show the body is lifted.
- viii. Fire suppression System: Semi-automatic fire suppression system. For details refer DGMS circular 10 of 2004. The fire suppression system shall be a factory fitment.
- ix. Blind spot mirror: better view of front blind spot by operator.
- x. Retro reflective reflectors on all sides: For visibility of truck during night
- xi. Seat belt reminder: To alert operator for using the seat belt.
- xii. Proximity warning device: To alert operator.
- xiii. Rear Vision System: For assisting operator to have back view during reversing.
- xiv. Auto dipping System: To reduce glaring of eyes of operator during night.
- xv. Load Indicator and Recorder: Enables management to detect and prevent over loading.
- xvi. Global Positioning system: To prevent illegal transport and selling of sand, restricting short-cut routes other than stipulated routes and computerized monitoring.

#### **7.4.1.4. Measures to Prevent Accidents due to Vehicular Movement**

To avoid instances/accidents, the workers and their representatives should be aware of hazard involved and tell them what to do, to reduce risk. All transportation within the mine lease area should be carried out directly under the supervision and control of management.

The vehicles will be maintained in good working condition and checked thoroughly at least once a month by the competent person authorized for the purpose by the management.

- ✓ Road signs will be provided at each, and every turning point up to the main road (wherever required)
- ✓ To avoid danger while reversing the vehicles especially at working place/loading points, stopper should be posted to properly guide reversing/spotting operating.
- ✓ Only trained drivers will be hired.
- ✓ All transportation within applied mining lease working will be carried out directly under the supervision and control of the management.
- ✓ Regular training will be provided to the operators by the Company or the Contractors.

There will be some emission from combustion of fossil fuel from vehicles to be used for transportation of mineral and mining machinery. All vehicles and machinery (excavators) will be maintained regularly. Proper mitigation measures such as regular water sprinkling on haul roads, etc. will be done to suppress the air borne dust. PPEs will be provided to the workers working nearby dust prone areas. Also, greenbelt/ plantation will be developed around the mining activity area to arrest the air borne dust.

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#### 7.4.1.5. Measures to Prevent Dangerous Incidents during Inundation/ Flooding

- i. Inundation or flooding is expected and beneficial for these sand mines as during this time only the sand reserve gets replenished.
- ii. During monsoon months and heavy rains, the sand mining operations are ceased.
- iii. The Trucks and other vehicle plying over the dunes will be kept on the riverbanks beyond HFL.
- iv. The workers are not allowed to go over the dunes during heavy rains.
- v. There will be mechanism/warning system of heavy rains and discharges from the upstream dams.

#### 7.4.1.6. Measures to Prevent Slope Failure

To allay dangers due to open cast slope failure for pit, slope stability estimations will be made for the mines. Determining the factor of safety, the slopes should be monitored at regular intervals to check for any possible failure.

- i. Flatter slope angles are adopted where occurrences of loose earth are encountered.
- ii. Unmanageable heights are not created.
- iii. Loose rocks are properly dressed.
- iv. Nature and structure of the rocks are properly studied for their slips.
- v. Bench height will be kept with respect to the digging depth of excavating equipment.
- vi. No overhang/ under cutting will be allowed to be created in benches by the excavating equipment.
- vii. Overloading of dumpers/trucks will not be allowed. Large size of material will not be loaded at the top of the dumpers to prevent its falling and causing injury to persons.
- viii. Sand bed will be left in suitable location while harvesting sand from riverbed.

#### 7.4.1.7. Measures to Prevent Drowning

- i. The sand mining will be done under strict supervision.
- ii. The workers are not allowed to go to the deeper areas of the rivers.
- iii. The workers are not allowed to fish in the river during working hours.
- iv. In case it is required to cross the river, it is done under strict supervision and over the shallow area using lifelines.
- v. Few life jackets, inflated tubes will be kept near the mine site.

#### 7.4.1.8. Measures to Prevent Occupational Hazard

**Table 7-3: Details of Prevent Occupational Hazard**

Particulars	Control Measures
Heat & Light	<ul style="list-style-type: none"> <li>• The mine site will have adequate drinking water supply so that workers do not get dehydration.</li> <li>• Lightweight and loose-fitting cloths having light colours will be preferred to wear.</li> <li>• Rigorous exercise and more physical activities will be avoided in hot weather.</li> </ul>

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Particulars	Control Measures
Noise	<ul style="list-style-type: none"> <li>Noise exposure measurements will be taken to determine the need for noise control strategies.</li> <li>The personal protective equipment will be provided for each mine workers.</li> <li>Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment.</li> <li>At noisy working activity, exposure time will be minimized.</li> <li>Machineries will be labelled with noise levels.</li> </ul>
Respiratory	<ul style="list-style-type: none"> <li>PPEs like face mask etc. will be provided during mining activity.</li> <li>Periodic medical examinations will be provided for all workers.</li> <li>Awareness program will be organized for workers.</li> </ul>

#### 7.4.1.9. General Control Measures.

- (i) Regular maintenance and testing all the tools & equipment as per manufacturer's guidelines.
- (ii) Provision of personal protective equipment to the workers working in the mine.
- (iii) Periodical Medical Examination of all workers by medical specialists will be conducted.
- (iv) Awareness program will be organized for workers.

#### 7.4.2. Safety, Health & Environmental (SHE) Policy

The Safety, Health and Environmental (SHE) policy has been proposed by developer. The policy has been framed considering legislative compliance, stakeholder involvement, continual improvement, and management by objectives. Towards this commitment, following key principles will be demonstrated:

- ✓ Integrate sound environmental management practices in all our activities by forming an Environmental Management Cell.
- ✓ Progressively adopt cleaner and energy efficient technologies.
- ✓ Conduct our operations in an environmentally responsible manner to comply with applicable legal and other requirements related to its environmental aspects and strive to go beyond.
- ✓ Biodiversity in and around our working areas and mines will be repeated and progressively enhanced for benefit of nature.
- ✓ Strive for continual improvement in our environmental performance by setting challenging targets, measuring progress, taking corrective action, and communicating environmental information to all concerned.
- ✓ Enhance environmental awareness amongst employees working for and on behalf of us and the general populace around working areas and mines.
- ✓ Encourage our business associates to adopt similar approach for environmental protection.

#### 7.4.3. Planning

Disaster Management Plan to be dealt with action plan for higher risk accident like landslide, subsidence flood, inundation underground mines, fire, seismic activities tailing dam failure etc. and emergency plan proposed for quick evacuation, ameliorative measure to be taken etc. Ye capability of lease to meet such eventualities and the assistance to be required from the local

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authority will be as per Govt. rule. Identification and Prevention of Possible Emergency Situations, Possible emergency situations can broadly be classified into unintended explosions, vehicle collision, and inundation. Additional emergency situations can be developed based on audit or other procedures prior to commencement of operations.

#### **7.4.3.1. Emergency Prevention**

Some of the ways of preventing emergencies are as follows:

- ✓ Preparation of a Preventive Maintenance Schedule Program and covering maintenance schedules for all critical equipment's and instruments as per recommendations of the manufacturer's user manuals,
- ✓ Importantly, it is of great importance to collect and analyse information pertaining to minor incidents and accidents at the site, as well as for recording near-misses or emergencies that were averted. This information gives an indication of how likely or unlikely it is for the site to face actual emergency and what shall be further action to prevent them from occurring.
- ✓ Establishment of an ongoing training and evaluation program, incorporating the development of capabilities amongst employees about potential emergencies and ways and means of identifying and averting the same. Most emergencies do not occur without some incident or an abnormal situation. So, there is always sometime of few seconds to few minutes to arrest an incident of abnormal situation from turning in to an emergency. This is the role of the shift in-charge who is the incident controller (IC) along with his shift team.

#### **7.4.3.2. Emergency Plan Objectives**

Specific objectives of the Emergency Response Plan are to be clearly listed with regards to the responses desired for successful management of the possible emergency situations. Suggested Objectives are given below:

- ✓ To define and assess emergencies, including risk and environmental impact assessment.
- ✓ To control and contain incidents.
- ✓ To safeguard employees.
- ✓ To minimize damage to property or / and the environment.
- ✓ To inform employees, the public and the authority on the hazards / risks assessed.
- ✓ Safeguard provided residual risk if any and the role to be played by them in the event of emergency.
- ✓ To inform authorities like Safety and Fire Dept and Mutual Aid Centres to come up for help.
- ✓ For effective rescue and treatment of casualties and to count the injured.
- ✓ To identify and list fatal accidents if any.
- ✓ To secure the safe rehabilitation of affected areas and to restore normally.
- ✓ To provide authoritative information to the news media.
- ✓ To preserve records, equipment's etc. and to organize investigation into the cause of the emergency and preventive measures to stop its recurrence.
- ✓ To ensure safety of staff and patients and resume work.
- ✓ To work out a plan with all provisions to handle emergencies and to provide for emergency.
- ✓ Preparedness and the periodical rehearsal of the plan.

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- ✓ The objectives are suggested in emergency preparedness plan. Responsibilities, resources, and timeframes require to be allocated for implementing the objectives.

#### **7.4.4. Implementation of Occupational Health & Safety Measures**

Occupational Health & Safety measures result in improving the conditions under which workers are employed and work. It improves not only their physical efficiency, but also provides protection to their life and limb. Management will consider the following safety measures:

- ✓ Safety clauses in contract order.
- ✓ Dedicated Environment Health and Safety system.
- ✓ Inspection and maintenance of equipment's and accessories.
- ✓ Preplacement and periodic health check-up.
- ✓ Removal of unsafe conditions and prevention of unsafe acts.
- ✓ Detailed analysis of each incident.
- ✓ To provide standard PPEs and ensure its uses for mining safety.
- ✓ Periodic inspection by internal and external safety experts.
- ✓ Celebrations of various safety events for awareness.
- ✓ Medical facilities & first aid boxes will be established in the mine premises.
- ✓ Pits, Sumps, openings in floor etc. which may be a source of danger, will be either securely covered or securely fenced. Securely fencing a pit means covering or fencing it in such a way that it ceases to be a source of danger.
- ✓ Health Awareness Programmes and camps will be organized.
- ✓ The mine workers will be provided all necessary PPE, especially dust masks for their safe.
- ✓ guard from dust, Ear Plugs/Earmuffs for noise, boots etc. and measures for other hazards.
- ✓ Under initial vocational training, the workers will be given training related to all safety and health aspects.

#### **7.4.5. Annual Replenishment of Mineral**

Fully operational mining with simultaneous reclamation and pollution free mining method shall be adopted. River sand used for construction industry is available all along the river Yamuna in the plains of Haryana. Yamuna River flows along some major towns of Haryana from North to South like Yamuna Nagar, Karnal, Panipat, Sonipat, Faridabad and Palwal.

The sand is a minor mineral and falls under the preview of the Mines and Geology Department, State of Haryana. Mine lease area will be worked in blocks for ease of operation. However, as the digging depth will be restricted to 3.0 m only, material will still be available below. This will be further replenished during rainy season. Blocks will be worked systematically as the width is limited while length is much more.

#### **7.4.6. Rehabilitation and Resettlement**

There is no displacement of the population within the project area and the adjacent nearby area, and the complete lease area is a Govt. land. However Social development of the village will be considered as per social activities.



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## **7.5. Conclusion & Summary**

Riverbed Mining does not involve hazardous process with no risk related to Fire and Explosion. Risk assessments will help mine operators to identify high, medium, and low risk levels. This is a requirement of the Occupational Health and Safety Act 2000 with amendment on 2020 as The Occupational Safety, Health, and Working Conditions Code, 2020.

Risk assessments will help to priorities the risks and provide information on the need to safely control the risks. In this way, mine owners and operators will be able to implement safety improvements.

There is no displacement of the population within the project area and adjacent nearby area. From the above, it will be observed that during the working of the mine, no problems are likely to crop up that will cause any harm to environment, ecology of the area etc.

This working of mine will offer more employment, chances to some of the nearby population, it is always obvious that the safe mining activity will help to improve socio-economic conditions of the inhabitants.

**CHAPTER – 08**

**PROJECT BENEFITS**

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## 8. Project Benefits

### 8.1. Introduction

The execution of the project brings overall improvement in the locality, neighbourhood, and the State by bringing up to industry, roads, infrastructure sectors and employment generation at local level. Hence it will be helpful for the economic growth and support to enhance quality of life through employment.

### 8.2. Physical Benefits

Following physical infrastructure facilities will be improved in the adjoining areas by the proposed project:

**Table 8-1: Project Benefits in Respect to Different Aspects**

Aspect	Project Benefits
Road Transport	Construction of approach road and maintenance of existing transportation facility will be done for the proposed project. There is separate budget has been mentioned under the EMP head.
Market	By improving the economic status of local habitants through employments will attract market to develop their facilities and services near to the project site it's a part of indirect employment which will be developed due to the proposed project.
Infrastructure	Proposed project will provide the raw material for the infrastructure development like road, building etc.
Plantation or Greenbelt Development	<p>Plantation is a major thrust area in pollution control of mining. Plantation is suitable for detecting, recognizing, and reducing air pollution effects. Trees function as sinks of air pollution, besides their bio-aesthetical values, owing to its large surface area. The green belt supplements oxygen to the atmosphere and combat air pollution effectively. It not only improves the aesthetic beauty and landscape resulting in harmonizing and amalgamating the physical structure of the mines with surrounding environment, but also acts as pollution sink as indicated above. Thus, plantation is of paramount importance. It also checks soil erosion, make the eco-system more complex and functionally stable and make the climate more conducive. Fast growing plant species will be preferred. The plant will be of deep rooting system. The plant will be perennially green to improve the aesthetic beauty of the area. The plant species will be adopted to the local climatic condition. Native plant species will be planted.</p> <p>A suitable combination of trees (total 13,000) that can grow fast and have good leaf cover to contain dust pollution shall be adopted to develop greenbelt. Greenbelt development will be done wherever possible. Plantation will be done within first 2 years and in later years maintenance will be ensured. The gap plants also will be ensured to complete the numbers of total plants.</p>
Local Employment	The project proponent is conscious of its social responsibility and as any good corporate citizen; it is proposed to undertake the need specific (skilled & non-skilled) employment. This Project will provide employment to local people directly and indirectly. Indirect employers are shopkeepers, mechanic, drivers,

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Aspect	Project Benefits
	transporters etc. About 145 persons will get direct employment and 20 persons will get indirect employment form nearby villages. The workers will be mostly skilled.
Social Development	The salient features of the programme are as follows: <ul style="list-style-type: none"> <li>✓ Social welfare program like provision of medical facilities educational facilities, water supply for the employees as well as for nearby villagers will be taken.</li> <li>✓ A well laid plan for employment of the local people has been prepared by giving priority to local people.</li> <li>✓ Supplementing Govt. efforts in health monitoring camps, social welfare, and various awareness programs among the rural population.</li> <li>✓ Assisting social plantation program.</li> <li>✓ Adoption of villages for general development.</li> <li>✓ Supply of water to village nearby villages.</li> <li>✓ Development of facilities within villages like roads, etc.</li> </ul>

### 8.3. Budget allocation for EMP

The company will regularly evaluate the aspects of company operations that impact the environment. Opencast areas targeted for improvement are selected based on several factors, including changes in the regulatory environment, breadth of impact, impact on our customers and other stakeholders, and financial considerations. Management periodically reviews proponent’s progress towards mitigating adverse environmental impacts, appropriate actions will be taken that are designed to ensure the success of our proposed project. In line to the OM date 30.09.2020, the commitment approached during public hearing has been addressed in section 10.8, 10.9 & 10.10 of chapter 10 with allocated budget to the region.

### 8.4. Summary

The management will recruit the semi-skilled and unskilled workers from the nearby villages as demanding employment is 145 direct and 20 indirect. The project activity and the management will support the local Panchayat and provide other form of assistance for the development of public amenities in this region. The company management will contribute to the local schools, dispensaries for the welfare of the villagers. A suitable combination of trees that can grow fast and have good leaf cover will be adopted to develop the green belt.





**CHAPTER – 09**

**ENVIRONMENT COST  
BENEFIT ANALYSIS**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

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## 9. Environmental Cost Benefit Analysis

As per ToR granted by SEIAA Haryana Cost Benefit Analysis study is not required for the proposed project.



**CHAPTER – 10**

**ENVIRONMENTAL**

**MANAGEMENT PLAN**





Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## 10. Environment Management Plan

### 10.1. Introduction

The environmental management must be integrated into the process of mine planning so that ecological balance of the area is maintained, and adverse effects are minimized. An Environmental Management Plan (EMP) is a site-specific plan developed to ensure that the project is implemented in an environmentally sustainable manner. An effective EMP ensures the application of best practice environment management to a project.

**Table 10-1: Purpose & Design of Environment Management Plan**

Purpose of EMP	Design of EMP
✓ Assists proponent in the preparation of an effective and user-friendly EMP.	✓ To ensure adoption of state of art technological environmental control measures and implementing them satisfactorily.
✓ Improve the contribution that an EMP can make to the effectiveness of the environmental management process.	✓ Effectiveness of mitigation measures in mitigation of impacts.
✓ Ensure a minimum standard and consistent approach to the preparation of EMP's.	✓ Description of monitoring program of the surrounding environment.
✓ Ensure that the commitments made as part of the project's EIA are implemented throughout the project life.	✓ Institution arrangements to monitor effectively and take suitable corrective steps for implementation of proper EMP.
✓ Ensure that environment management details are captured and documented at all stages of the project.	✓ An Environmental Management Cell (EMC) should be set up to take care of all environment aspects and to maintain environmental quality in the project area.

### 10.2. Land Use Pattern

Deviation from planned mining procedure can lead to soil erosion/cutting and thereby degradation of land, causing loss of properties and degradation surrounding of landscape. Thus, for environmentally friendly major mining the following control / abatement measures will be followed:

- ✓ Mineral will be mined out in from the mine lease area and sufficient safety barrier should be taken during mining.
- ✓ Land use plan of mine lease area should be prepared to encompass pre-operational, operational and post operation phases and submitted.

### 10.3. Air Environment Management

Mitigative measures suggested for air emission control will be based on the baseline ambient air quality monitoring data. From the point of view of maintenance of an acceptable ambient air quality in the region, it is desirable that the air quality needs to be monitored on a regular basis to check it with reference to the NAAQS 2009 prescribed by MoEF&CC. To minimize impacts of mining on air and to maintain it within the prescribed limits of CPCB/ SPCB, an Environmental Management Plan (EMP) has been prepared. This will help in resolving all environmental and

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ecological issues likely to cause due to mining in the area. During mining no, toxic substances are released into the atmosphere as such there seems to be no potential threat to health of human beings. In the mining activities, the source of gaseous emissions is engines of vehicles, Operation of mining machinery/ loading / unloading and transportation. The reasons may be quality of fuel, improper operation of the engine, etc.; proper maintenance of engines will improve combustion process and brings reduction in pollution.

**Table 10-2: Air Pollution, Management & Monitoring**

S. No.	Particular	Description / Management
1	Control of Gaseous Pollution	<ul style="list-style-type: none"> <li>✓ The only source of gaseous emissions is from engines of Heavy earth moving machines (HEMM).</li> <li>✓ The emissions from the diesel engines of the machinery can be controlled by proper maintenance and monitoring of machines.</li> </ul>
2	Control of Dust Pollution	<ul style="list-style-type: none"> <li>✓ The main pollutant in air is Particulate Matter, which is generated due to various mining activities like, mineral loading, unloading &amp; transportation etc.</li> <li>✓ However, to reduce the impact of dust pollution the following steps have been taken during various mining activities.</li> </ul>
	During Loading Operation	<ul style="list-style-type: none"> <li>✓ The propagation of this dust is confined to loading point only and does not affect any person both the operators of excavator and dumpers who will sit in closed chamber and will be equipped with dust mask.</li> <li>✓ Skilled operators will operate excavators.</li> <li>✓ Avoid overloading of dumpers and consequent spillage on the roads.</li> <li>✓ The operators' cabin in the dumpers will be provided with dust free enclosure and persons working at high dust prone areas will be provided with dust mask.</li> </ul>
	During Transport Operation	<ul style="list-style-type: none"> <li>✓ All the haulage roads including the main ramp be kept wide, levelled, compacted, and properly maintained and watered regularly twice a day during the operation to prevent generation of dust due to movement of dumpers, and other vehicles.</li> <li>✓ Mineral carrying trucks will be effectively covered by Tarpaulin to avoid escape of fines to atmosphere.</li> <li>✓ Regular Compaction and grading of haul roads to clear accumulation of loose material.</li> </ul>
3	Plantation Work	<ul style="list-style-type: none"> <li>✓ To reduce air pollution in the surroundings, green belt will be developed on both siderophile approach road and nearby villages.</li> </ul>
4	Monitoring of Air Pollution	<ul style="list-style-type: none"> <li>✓ Air quality will be regularly monitored both in the core zone and the buffer zone.</li> <li>✓ Periodic air quality survey will be carried out to monitor the changes consequent upon mining activities as per the norms of State Pollution Control Board.</li> </ul>

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### 10.4. Noise Level Environment and Vibration

The ambient noise level monitoring carried out in and around the proposed mine lease area shows that ambient noise levels are well within the stipulated limits of MoEF&CC. There is no drilling or blasting for mineral extraction. Noise pollution will only be due to loading and transporting equipment, which cause some problem to the inhabitants of this area because there is human settlement near the link roads in lease area. Effective steps will be taken to keep the noise level well below the DGMS prescribed limit of 85 dB(A). That ambient noise levels are well within the stipulated limits of MoEF&CC.

**Table 10-3: Noise Level Pollution, Management & Monitoring**

Particular	Description / Management
Noise Pollution and Control	<ul style="list-style-type: none"> <li>✓ All the machineries including transport vehicles will be properly maintained to minimize generation of noise.</li> <li>✓ Silencers in the machineries will be provided to reduce generation of noise.</li> <li>✓ Attenuation between source and receive points will be encased.</li> <li>✓ Dense plantation in safety zone of mining area will also reduce propagation of noise outside the core zone.</li> <li>✓ Periodical monitoring of noise will be done to adopt corrective actions wherever needed.</li> <li>✓ Plantation will be taken up along the approach roads. The plantation minimizes propagation of noise and arrests dust.</li> </ul>

### 10.5. Water Management

There will be no wastewater generation from the mining operations. Only wastewater generation will be sanitary /municipal wastewater, which will be treated in septic tank followed by subsurface dispersion.

**Table 10-4: Water Pollution & Management**

S. No.	Particular	Description / Management
1	Surface Water	<ul style="list-style-type: none"> <li>✓ Safety zone will be left on both riverbank and no wastewater generate in operation.</li> <li>✓ Site office will be setup in ancillary area which are near to riverbank and the waste generated from the site office will not contaminate the river stream.</li> </ul>
2	Ground Water	<ul style="list-style-type: none"> <li>✓ Mining will not intersect the ground water table of the area. So, it will not disturb water environment.</li> <li>✓ Mining will not be operational in rainy season.</li> <li>✓ At the end of mining, no pit will be available on site as mined-out area will be automatically replenished in monsoon season.</li> </ul>
3	Wastewater	<ul style="list-style-type: none"> <li>✓ A small amount of wastewater 0.6 KLD will be generated from domestic demand of water which will be stored in septic tanks within lease area.</li> </ul>
4	Water Conservation	<ul style="list-style-type: none"> <li>✓ The project does not consume any process water except for drinking, dust suppression and plantation. Plantation is proposed, which will increase the water holding capacity and help in recharging of ground water.</li> </ul>

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### 10.6. Solid Waste Management

Waste management is an important facet of environment management. Thus, solid waste management is important from both aesthetics and environment viewpoints.

Generated food waste or any other domestic waste will be collected in dustbins and will be properly disposed-off. There are no toxic elements present in the mineral, which may contaminate the soil water.

This is the sandmining project from the riverbed so no solid waste will be generated as bi product. If some soil would be available on site, it will be utilized for bund development and plantation purpose.

### 10.7. Green Belt Development

A suitable combination of trees that can grow fast and have good leaf cover to contain dust pollution shall be adopted to develop greenbelt. Greenbelt development will be done wherever possible. Plantation will be done within first 2 years and in later years maintenance will be ensured. The gap plants also will be ensured to complete the numbers of total plants. Details of proposed plantation are given below:

**Table 10-5: Plantation Details**

Year	Plantation Proposed	Survival 80%	Gap Plantation	Species	Place of Plantation
I	6500	5200	-	Neem, Peepal, Mango, Shisham, Sirish, Babool, Gulmohar and other local fruity plants	Along the haul roads, Along the riverbanks in schools and public building and other social forestry programme.
II	6500	5200	1300		
III	-	-	1300		
IV	-	-	-		
V	-	-	-		
<b>Total</b>	<b>13000</b>	<b>10400</b>	<b>2600</b>		

**Table 10-6: Post Plantation Care**

Particular	Description / Management
Protection from Grazing and Fire	Fencing will be provided around the area where mass plantation has been proposed. This will help in preventing cattle from entering such area and will protect unauthorized entry of out-side person. Due to care will be taken to protect plantation as well as the fencing by the guards.
Watering During Dry Season	During dry spell, water will be sprinkled using private water tanker provided with hose pipes.
Manuring	Initially fertilizer/ manure will be given to the plants before and after plantation. Thereafter, manuring will be continued on reduced scale till the plant attains growth of 2 to 3m height. Provision of utilizing bio-manure will also be made within the lease area.
Weeding and Soil Working	Man, power will be engaged in mulching the soil frequently along with removal of weeds and other unwanted species.

### 10.8. Socio-economic Assurance

The project proponent is aware of his duty and responsibility towards the socio- economic development of the local community where the project activities will be carried. The proponent is also bound by the national policies and is vigorously passionate to carry out some initiative

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towards the society by improving their quality of life and fostering sustainable and integrated development in the communities in the vicinity of the lease area.

This objective of social responsibility is equally well-entrenched in the minds of the project proponent which is manifest from some of the ESR activities included in the mine plan. The project proponent wishes to play an active part in providing financial support and empowering rural communities to chart their own development.

### **10.8.1. Environmental & Social Responsibility**

The activities to be carried out under Environment & Social Responsibility initiatives will have a positive impact on socio economic fabric of the region. The Project Proponent may promote local NGO, ask the communities to prepare their micro level plans based on genuine needs. It is, therefore, proposed to have ESR plan focusing on following broad areas of activities that addresses the problems and needs of the community in the project area in a holistic manner:

**Livelihood and Entrepreneurship:** Helping rural communities in Thanthri & Rajupur Khadar near the project vicinity to become self-sufficient and sustainable by providing training in self-employment and supporting entrepreneurship and implement rainwater harvesting in the villages.

**Skill Development:** A driving social change in rural areas by empowering local people through education and training and promoting their Self-Help Groups (SHG) and micro finance for group, individual and community income generation activities such as tailoring/embroidery classes for women; and Orientation programs for self-employment in collaboration with District Industries Centre and District Rural Development Agencies.

**Education:** Empowering children and adults can be done by bringing quality education to remote rural areas. Under the plan it is proposed to aid local schools and scholarship.

**Sports:** Under the plan it is proposed to promote sports in the school as well as villages for which sports material shall be supplied to the schools / panchayats.

**Environment:** Promotion of environmental awareness and responsibility amongst rural, socially backward, and poor communities should be encouraged. In the light of "Swachh Bharat Abhiyan" it is proposed to construct separate toilets for boys and girls in gram panchayat and schools. It is also proposed to provide safe/ treated drinking water in villages by installing RO Plant in village Panchayat Bhawan.

**Health:** Provide affordable, quality healthcare to villages by giving community level health care training through village workers especially women. Under the plan it is proposed to provide drinking and sanitation facility to local panchayat.

**Energy Saving Devices:** It is proposed to install roof top solar panel in gram Panchayat Bhawan and in other government building for their lighting as well as street lighting.

### **10.8.2. Litigations against the Project Proponent**

No tree cutting will be proposed in the proposed sand mining project. Lease is allotted by state govt, and no litigation is pending toward project proponent.

### **10.8.3. Occupational Health and Safety**

Occupational Health and Safety professionals develop and coordinate safety and health systems and strategies within organizations. They identify workplace hazards, assess risks to employee



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health and safety, and recommend solutions. Increasingly, Health and Safety Professionals are also responsible for many of the environmental aspects of their workplace.

Boulder, Gravel, and Sand mining does not contain any toxic element. Therefore, the likelihood of any health hazard does not arise due to the mined product per se. However, the process of excavation / quarrying leads to some health hazards. The dust generated due to loading / unloading and movement on haul road creates air borne dust which has silica contents. The dust is the main pollutant of concern for the workers engaged in the mining activities. The most significant occupational health impacts are Noise Induced Hearing Loss (NIHL) and Occupational Lung Disease (OLD) like allergic rhinitis and asthma due to inhalation of dust. Working in open during summer can expose workers to the direct sun rays causing heat strokes, cramps and burns besides leading to exhaustion. In extreme windy conditions the dust particles forcing way into the eyes can create itching as well as allergic conjunctivitis of eye. As per Mines Rules, 1955, Chapter – IV-A, Section 29B, medical examination of employees at the initial stage and periodically, shall be done by a team of qualified medical officers provided by the project proponent.

The broad activities proposed under ESR initiative with occupational health & safety and year wise allocation of funds is shown in Table 10.7.

**Table 10-7: Facilities & Budget under ESR Initiatives & OHS**

S. No.	Description	Annual Budget
1	Health check-up camps	₹ 2,50,000
2	Insurance cover of workers	₹ 2,00,000
3	Assistance to local schools, scholarship to students at Govt. school in Thanthri & Rajupur Khadar Village	₹ 2,50,000
4	Computer Lab for Govt. school in Thanthri & Rajupur Khadar Village	₹ 1,00,000
5	Solar Street Lights on Panchayat & Govt. school in Thanthri & Rajupur Khadar Village	₹ 50,000
6	Sanitations (Toilets) and drinking water facility of Govt. school Thanthri & Rajupur Khadar Village	₹ 1,00,000
7	Vocational training to persons for income generation	₹ 75,000
8	Assistance to self-help groups	₹ 75,000
<b>Total</b>		<b>₹ 11,00,000</b>

As this profession matures there is an increased emphasis on risk management strategy and on the development of workplace culture. Occupational Health and Safety professionals in the minerals industry may perform the following tasks:

- ✓ The collection of minor minerals does not cause any occupational ill effects.
- ✓ Except fugitive dust generation there is no source which can show a probability for health-related diseases and proper dust suppression will control dust generation and dispersion.
- ✓ Dust masks will be provided to the workers working in the dust prone areas as additional personal protective equipment.
- ✓ Earmuffs will be provided for the workers avoid any noise induced hearing loss.
- ✓ There will be regular health camps for all workers and nearby rural people. Lung function tests, chest x-rays etc. shall be carried out and any health disorders will be evaluated. The

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budget shall be earmarked for the necessary protective devices and training needs by the project proponent.

- ✓ Awareness program will be conducted about likely occupational health hazards to have preventive action in place.
- ✓ Any workers health related problem will be properly addressed.
- ✓ Periodical medical check-up will be conducted.
- ✓ Promote occupational health and safety within their organization and develop safer and healthier ways of working.
- ✓ Coordinate emergency procedures, mine rescues, firefighting and first aid crews.
- ✓ Communicate frequently with management to report on the status of the health and safety strategy and risk management strategy, and develop occupational health and safety strategies and systems, including policies, procedures, and manuals.

### 10.9. Financial Assurance

Total 99.384 ha area will be put in use up to the end of the plan period. Details of area put in use as given below (As per circular No.4/2006 issued by CCOM, Nagpur following table has been considered for calculation for financial assurance). Against this mined out area the total financial assurance (@15000/- per ha. Comes out to Rs 14,90,760 / which will be deposited in the form of Surety bond/ bank guarantee to the Director Mines & Geology Haryana. Total project cost is INR 19.0 crores and CA certificate is enclosed as **Annex 10.1**.

**Table 10-8: Financial Assurance Calculation**

S. No.	Item	Area Present	End of Plan	Total Area	Fully Reclamation	Net Area Calculated
		(A)	-	(B)	(C)	D = (B-C)
1.	Area to be excavated	0.0	70.114	70.114	0.0	20.02
2.	Storage for topsoil	0.0	0.0	0.0	0.0	0.0
3.	Overburden/ dumps	0.0	0.0	0.0	0.0	0.0
4.	Mineral storage	0.0	8.0	8.0	0.0	8.0
5.	Infra (Workshop, Admin Building & Road)	-	0.34	0.34	0.0.34	0.34
6.	Safety zones	0.0	21.0	21.0	0.0	21.0
7.	Green belt (Ancillary area & Riverbank) *	0.0	4.0*	4.00	4.00	0.0
8.	Tailing pond	0.0	0.0	0.0	0.0	0.0
9.	Effluent treatment plan	0.0	0.0	0.0	0.0	0.0
10.	Mineral separation plant	0.0	0.0	0.0	0.0	0.0
11.	Township area	0.0	0.0	0.0	0.0	0.0
12.	Others to specify	0.0	0.0	0.0	0.0	0.0
<b>Total</b>		<b>0.0</b>	<b>99.384</b>	<b>99.384</b>	<b>0.0</b>	<b>99.384</b>

### 10.10. Environment Management Protection Plan (EMP)

Following provisions will be adopted for improving, controlling, and monitoring of environment protection measures. Management will also be monitoring the related concerns and its implementation. All the activities will be done by Environment Monitoring Cell (EMC).

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**Table 10-9: Environment Management Budget**

S. No.	Particulars	Capital	Recurring	Total
1	Pollution monitoring – Air, Water, Noise	₹ 0	₹ 60,000	₹ 3,00,000
2	Pollution Control – Water sprinkling	₹ 5,00,000	₹ 1,00,000	₹ 10,00,000
3	Wire fencing at plantation sites	₹ 2,00,000	₹ 50,000	₹ 4,50,000
4	Plantation including maintenance	₹ 6,00,000	₹ 1,50,000	₹ 13,50,000
5	Rainwater harvesting	₹ 2,00,000	₹ 20,000	₹ 3,00,000
6	Haul road and other roads repair and maintenance	₹ 2,00,000	₹ 50,000	₹ 4,50,000
7	Pre and post monsoon survey for sedimentation in the riverbed	₹ 0	₹ 1,50,000	₹ 7,50,000
<b>Total</b>		<b>₹ 17,00,000</b>	<b>₹ 5,80,000</b>	<b>₹ 46,00,000</b>

### 10.11. Rehabilitation and Resettlement (R&R)

There is no displacement of the population within the project area. However Social development of nearby villages will be considered as per social activities.

### 10.12. Summary

As per above discussion there is no major impact on the environment due to mining except fugitive emission during loading, unloading of mineral & transportation. The adequate preventive measures will be adopted to contain the various pollutants within permissible limits. It is proposed to plant about 13,000 saplings and gap plantation considering 1000 / plant including maintenance and fencing. It will prove an effective pollution mitigate technique and help avoid soil erosion during monsoon season. Employment opportunities will be provided to the locals only as providing extraction of minerals from the mine site is the only prevailing occupation for them for their livelihood. Plantation development will be carried out in the mine premises, along the approach roads, around Govt. buildings, schools approx.

**CHAPTER – 11**  
**SUMMARY &**  
**CONCLUSION**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## 11. Summary & Conclusion

### 11.1. General

This is the sand mine project on riverbed of Yamuna River. Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

- A Letter of Intent (LOI) has been issued by the Director Mines & Geology Haryana vide letter no. DMG/HY/Thantri Unit/Palwal/2023/4199 dated 21-07-2023 to M/s Minerio Mining Private Limited for Mining of Sand (Minor Mineral) in Thanthri Unit, comprising Thanthri & Rajupur Khadar villages over an area of 248.46 acres (99.384 hectares) in district Palwal, Haryana for a period of 10 years.
- The cluster NOC has been obtained from the Department of Mines and Geology, Faridabad vide letter MO/FBD/2449 dated 01.08.2023 confirms there is no other mining activity within 500m from project lease boundary to form mining cluster. So, it is individual project in the area.
- The mining plan was submitted to department and mining plan was approved vide reference no. DMG/HY/MP/THANTHRI SAND UNIT/ 2023/ 6111 DATED 26.10.2023.
- Forest NOC has been issued by the Office of Divisional Forest Officer, Palwal Forest Division, Palwal vide reference no. 1783 dated 24.08.2023 which confirms project site is not part of any reserve forest or protected forest.
- The water requirement will be fulfilled by private water tankers. Electrical supply is available in all nearby villages. The permission will be taken from concerned department for the electricity use.

**Table 11-1: Salient Features of Mine**

S. No.	Parameters	Description
1.	Name of the project	Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) by M/s Minerio Mining Private Limited.
2.	Nature & category of Mine	Non-Coal Mining Category 'B' of Activity 1(B)
3.	Project Proponent	M/s Minerio Mining Private Limited
4.	Khasra No.	<b>For Mining</b> 3// 11 min, 20/1, 20/2 min, 21 min, 4// 7, 8 min, 13/1 min, 13/2, 14, 15/1, 15/2, 16/1 min, 16/2 min, 17/1, 17/2, 18/1 min, 23 min, 24/1, 24/2, 25/1, 25/2, 10// 3 min, 4/1, 4/2, 5, 6/1, 6/2, 7/1, 7/2, 8/1, 8/2 min, 13/1 min, 13/2, 13/3, 14, 15/1, 15/2, 15/3, 15/4, 16/1, 16/2, 17, 18/1, 18/2 min, 23 min, 24, 25, 11// 1 min, 10 min, 11 min, 20 min, 21/1, 21/2, 22 min, 15// 1, 2 min, 9 min, 10/1, 10/2, 11, 12/1 min, 12/2 min, 19 min, 20/1, 20/2, 21, 22 min, 16// 3/2, 4, 5, 6, 7, 8/1, 13/1 min, 13/2 min, 14, 15, 16/1, 16/2, 17, 18/1 min, 23/2 min, 24, 25, 23// 3/2 min, 4/1, 4/2, 5/1, 5/2, 7, 8/1 min, 13/3 min, 14/1, 14/2, 15, 16/1, 16/2, 17/1, 17/2, 18/1 min, 23 min,



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Parameters	Description
		<p>24, 25/1, 25/2, 24// 1, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20, 21, 22 min, 28//, 1, 2 min, 9/1 min, 9/2 min, 10, 11, 12 min, 19 min, 20, 21/1, 21/2, 29//, 3 min, 4, 5/1, 5/2, 6/1, 6/2, 7/1, 7/2, 8 min, 13/2 min, 14/1, 14/2, 15/1, 15/2, 15/3, 16, 17/1, 17/2, 18/1 min, 23/2 min, 24/1, 24/2, 25, 38//, 3/2 min, 4/1, 4/2, 5/1, 5/2, 6, 7/1, 7/2, 8/1 min, 13/2 min, 14/1, 14/2, 15, 16, 17 min, 18/1 min, 24 min, 25, 39//, 1, 2 min, 3 min, 8 min, 9, 10, 11/1, 11/2, 12, 13/1 min, 13/2 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min, 41//, 1, 2, 3 min, 9, 10, 11, 42//, 4 min, 5, 6/1, 6/2, 6/3, 7 min, 14 min, 15, 17 min.</p> <p><b>For Ancillary area</b> 24// 4, 5/1, 5/2, 6, 7, 14, 15, 25// 1/ 1, 1/2, 10, 11.</p> <p><b>For Mining</b> 7//, 3/1, 3/2, 8/1 min, 8/2, 9, 11/2, 11/1, 12, 13 min, 14 min, 17 min, 18, 19, 20, 21, 22, 23, 24 min, 8// 16 min, 25/1 min, 25/2, 10// 5/1 min, 5/2, 6/1, 6/2, 7 min, 14 min, 15/1, 15/2, 16, 17 min, 24/2 min, 25, 11// 1, 2, 3, 4 min, 7 min, 8/1, 8/2, 9, 10/1, 10/2, 11, 12, 13/1, 13/2, 14 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min, 24// 1, 2/1, 2/2, 3/1, 3/2, 7 min, 8 min, 9, 10, 11, 12, 13, 14 min, 17/1 min, 17/2 min, 18, 19, 20, 21, 22/1, 22/2, 23, 24/1,2,3 min, 25// 4/2 min, 5, 6, 7 min, 15 min, 16 min, 25 min, 29//, 5 min, 6/1 min, 6/2 min, 15 min, 30// 1, 2/1, 2/2, 3/1, 3/2, 4 min, 7 min, 8, 9/1, 9/2, 10, 11, 12, 13, 14, 15 min, 16 min, 17, 30// 18, 19, 20 min, 21/1,2 min, 22/1, 22/2, 23, 24, 25 min, 44//, 10/2 min, 11/1 min, 20/1 min, 20/2 min, 21 min, 45// 1 min, 2, 3, 4, 5 min, 6 min, 7, 8, 9/1 min, 9/2 min, 10 min, 11 min, 12 min, 13, 14, 15, 16, 17, 18, 19 min, 22 min, 23, 24, 25/1, 25/2, 52// 2 min, 3, 4, 5, 6/1, 6/2, 7, 8 min, 13 min, 14, 15, 16, 17 min, 18 min, 23 min, 24, 25, 53// 1/1, 1/2 min, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20/1, 20/2, 21, 22, 23 min, 61// 1, 2/1, 2/2, 3/1, 8 min, 9, 10, 11, 62// 3 min, 4 min, 5, 6.</p> <p><b>For Ancillary area</b> 31// 6, 7, 8, 13, 14, 15, 16, 17, 18, 23, 24, 25/1</p>
5.	Total Lease area	99.384 Ha (248.46 Acre) - Riverbed of Yamuna River
6.	Location of the project	Village- Thanthri & Rajupur Khadar, Tehsil & District- Palwal, Haryana
7.	Toposheet No.	H43X7 - Project Site & H43X7, H43X8, H43X11 & H43X12 - Study Area.

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Parameters	Description		
8.	Maximum Production Capacity	37,80,000 Metric Tonne / Year		
9.	Geological Mineral Reserve	49,21,776 Metric Tonne		
10.	Blocked Mineral Reserve	11,34,000 Metric Tonne		
11.	Mineable Reserve	37,87,776 Metric Tonne		
12.	Geographical co-ordinates	<b>Point</b>	<b>Longitude</b>	<b>Latitude</b>
		<b>THANTRI</b>		
		J	28°11'11.62"N	77°28'28.66"E
		K	28°10'50.58"N	77°28'30.54"E
		L	28°10'35.01"N	77°28'32.27"E
		M	28°10'25.35"N	77°28'34.66"E
		N	28°10'20.42"N	77°28'24.11"E
		O	28°10'28.93"N	77°28'20.77"E
		P	28°10'36.97"N	77°28'19.87"E
		Q	28°10'48.08"N	77°28'20.60"E
		R	28°10'52.30"N	77°28'19.59"E
		S	28°10'55.35"N	77°28'19.11"E
		T	28°11'0.91"N	77°28'19.65"E
		U	28°11'8.03"N	77°28'19.79"E
		<b>RAJUPUR KHURD</b>		
		M	28°10'25.35"N	77°28'34.66"E
		M1	28°10'21.22"N	77°28'35.74"E
		N	28°10'20.42"N	77°28'24.11"E
		O	28°10'14.55"N	77°28'23.46"E
		O1	28°10'14.95"N	77°28'35.86"E
		P	28°10'10.57"N	77°28'23.13"E
		P1	28°10'10.80"N	77°28'35.24"E
		Q	28°10'1.74"N	77°28'24.64"E
		Q1	28°10'5.40"N	77°28'36.00"E
		R	28° 9'51.05"N	77°28'28.86"E
		R1	28° 9'58.90"N	77°28'38.00"E
		S	28° 9'45.29"N	77°28'30.54"E
		S1	28° 9'52.20"N	77°28'40.50"E
		T	28° 9'42.44"N	77°28'33.19"E
		T1	28° 9'46.60"N	77°28'43.00"E
		U	28° 9'40.08"N	77°28'34.35"E
		U1	28° 9'34.56"N	77°28'49.01"E
V	28° 9'29.87"N	77°28'36.25"E		
13.	Name of Rivers/ Nallahs/ Tanks/ Spring/ Lakes etc	<b>Description</b>	<b>Distance</b>	<b>Direction</b>
		Yamuna River	Project Site	
		Canal	8.6	NNW
		Chhansa Distributary	7.6	NW
		Rampur Distributary	11.3	W
		Alawalpur Polwa Minor	8.5	WNW
		Palak Minor	6.1	W

PROPONENT: M/S MINERIO MINING PRIVATE LIMITED

CONSULTANT: PARIVESH ENVIRONMENTAL ENGINEERING SERVICES (NABET / EIA/2124/IA 0092(Rev.01))

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Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Parameters	Description
		Rampur Distributary
		3.4
		W
		Raunija Drain
		11.3
		WSW
		Kithwari Drain
		11.1
		WSW
		Palwal Drain
		12.9
		WSW
		Hoshangabad Minor
		12.2
		SW
		Rasulpur Minor
		10.9
		SW
		Hasanpur Distributary
		9.4
		SW
		Nandabara Minor
		11.1
		SW
		Left Bata Drain
		12.5
		SSW
		Amrauli Minor
		11.9
		SSW
		Bata Escape
		14.6
		SSW
		Kharis Nala
		13.1
		SE
		Gopalgarh Minor
		12.2
		SE
		Waina Minor
		13.7
		SE
		Siwara Minor
		9.3
		ESE
		Kishorpur Minor
		13.1
		ESE
		Karoli Minor
		10.9
		E
		Dinayatpur Minor
		7.9
		ENE
		Jewar Distributary
		9.3
		NE
		Right Phaleda Minor
		7.5
		ENE
		Ranehra Minor
		11.4
		ENE
		Birampur Minor
		11.9
		ENE
		Tirthili Drain
		12.7
		NE
		Rabupura Minor
		12.1
		NE
		Kund Nala
		10.5
		NNE
14.	Reserve Forest(s), Wildlife Sanctuary/ National parks etc.	Sultanpur RF
		14.7
		S
		Karauli Khadar PF
		4.9
		NE
15.	Topography of ML area	Highest elevation in riverbed at extreme north end is 132.9 mRL and bank top level is 135.3 mRL whereas the levels at the extreme south end in riverbed is 129.5 mRL and Riverbank top is 133.0 mRL. The Yamuna River flows from N to S direction in Thanthri & Rajupur khadar revenue village.
16.	Mining Method & Technology	Opencast manual method will be adopted. No specific method of exploration is required as the river borne sediments are deposited all along the riverbed and are very well exposed on the surface. Moreover, these sediments are accumulated/ replenished every year during rainy season by flood waters to almost the same level depending on the intensity of rains on the upstream side. Adequate quantity of sand reserves is available for meeting consumer demand.
17.	Ultimate depth of Mining	3 m from the riverbed of Yamuna River
18.	Ground water level	05 - 10 m from the surface level

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Parameters	Description															
19.	GWT intersection	Mining will be done only up to 3m from surface. So, ground water table will not be intersected.															
20.	Drainage pattern/ water courses	Mining will be done in dry riverbed; stream will not be touched and will be done only during non-monsoon period.															
21.	Water requirement & source	The source of water is private water tankers. The break-up of water requirement is as follows:															
		<table border="1"> <thead> <tr> <th>S. No.</th> <th>Description</th> <th>Demand</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Dust Suppression</td> <td>31.0 KLD</td> </tr> <tr> <td>2</td> <td>Greenbelt Development</td> <td>13.0 KLD</td> </tr> <tr> <td>3</td> <td>Domestic Requirement</td> <td>6.5 KLD</td> </tr> <tr> <td colspan="2" style="text-align: right;"><b>Total</b></td> <td><b>50.5 KLD</b></td> </tr> </tbody> </table>	S. No.	Description	Demand	1	Dust Suppression	31.0 KLD	2	Greenbelt Development	13.0 KLD	3	Domestic Requirement	6.5 KLD	<b>Total</b>		<b>50.5 KLD</b>
		S. No.	Description	Demand													
		1	Dust Suppression	31.0 KLD													
		2	Greenbelt Development	13.0 KLD													
3	Domestic Requirement	6.5 KLD															
<b>Total</b>		<b>50.5 KLD</b>															
22.	Cost of project	The capital cost for the project will be Rs. 19 Crores including proposed lease area and machinery will be hired on contract bases.															

Source: Approved Mining Plan

## 11.2. Analysis of Alternative

It is case of fresh quarry lease. The mineral is site specific, so no alternative site was identified. Lease approval from concerned authority has been obtained and enclosed in report.

## 11.3. Description of Baseline Environment

Environmental data has been collected during post-monsoon season i.e., October 2023 to December 2023 in accordance with the guidelines for preparation of EIA studies.

**Table 11-2: Baseline Status**

Parameters	Baseline Status
Ambient Air Quality	<p><b>Particulate Matter:</b> PM<sub>10</sub> varying from 43 µg/m<sup>3</sup> to 79 µg/m<sup>3</sup>. PM<sub>2.5</sub> was observed 20 µg/m<sup>3</sup> to 38 µg/m<sup>3</sup>.</p> <p><b>Gaseous Pollutants:</b> SO<sub>2</sub> was varying from 6.2 µg/m<sup>3</sup> to 10.7 µg/m<sup>3</sup>. NOx was observed 10.0 µg/m<sup>3</sup> to 15.5 µg/m<sup>3</sup> in study area. CO was observed from 0.51 mg/m<sup>3</sup> to 1.09 mg/m<sup>3</sup> in study area.</p>
Noise Level	The Sound Pressure Level recorded during the daytime on all locations varies from 39.3 dB(A) to 54.9 dB(A) & in time it varies between 28.5 dB(A) to 40.2 dB(A).
Ground Water	All the parameters were observed mostly exceeding the acceptable limits but well within permissible limits for drinking water standard 10500:2012. pH (7.1 to 7.8), TDS (776 mg/l to 792 mg/l), alkalinity (214.9 mg/l to 254.8 mg/l), Total Hardness (266.0 mg/l to 295.5 mg/l), Calcium as Ca (58.6 mg/l to 72.4 mg/l), Magnesium as Mg (26.5 mg/l to 29.7 mg/l), Chloride (219.5 mg/l to 249.6 mg/l) & Sulphate (51.7 mg/l to 58.4 mg/l) parameters were analysed.
Surface Water	The pH was varying between 7.0 to 7.5. Dissolved Oxygen of the sources was varying between 6.1 mg/l to 6.9 mg/l. BOD was observed 4.9 mg/l to 37.8 mg/l. Total Coliform were observed varying between 300 MPN/100ml to 1500 MPN/100ml. Water was not usable due to bad quality.

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

Parameters	Baseline Status
Soil Quality	The soil was predominantly Loamy in the study area. The pH was ranges 7.1 to 7.8. The conductivity was varying from 339 µmhos/cm to 428 µmhos/cm. Organic Carbon was varying from 0.39% to 0.57%. Nitrogen was varying from 142 kg/ha to 173 kg/ha. Phosphorous was varying from 16 kg/ha to 22 kg/ha. Potassium was varying from 114 kg/ha to 131 kg/ha. Overall, the soil quality was good having the good bulk density & good moisture content which may be due to the basin of river Yamuna.
Meteorology	The maximum temperature recorded during the study period was 35.7°C in the month of October and the minimum temperature was 8.2°C in the month of December. The highest RH found in the study area was 76.5% in the month of October, while minimum monthly average RH found 42.6% in the month of December. The average wind speed recorded was 1.3 m/sec. Predominant wind direction during the study period was mainly South-West to North-East followed by North- East to South-West.

#### 11.4. Anticipated Environmental Impact and Mitigation Measures

The proposed mining operations are not anticipated to raise the concentration of the pollutants beyond prescribed limits. The identified impacts and mitigation measures are detailed below.

- ✓ Total 1,680 PCU/ day will increase in the existing traffic due to this mining activity hence vehicle collation may occur unwanted sound and can also cause impact on human health of villagers near to transportation route like effect on breathing and respiratory issues. Accidents may occur due to fast movement of vehicles. The truck movement will be from suggested transportation route only. It is proposed to plant 13,000 nos. of plants in plan period and water sprinkling will be done twice in a day to reduce the impact.
- ✓ The machinery will be maintained in good running condition so that noise will be reduced to minimum possible level. Vehicles with PUC certificate will be hired. Regular maintenance of vehicles will be done to ensure smooth running of vehicle. Awareness will be imparted to the workers about the permissible noise level and effect of maximum exposure to those levels. In addition, truck drivers will be instructed to make minimum use of horns in the village area and sensitive zones.
- ✓ There will be no impact on ground water table as the mining will be limited to 3m only and the water level of project site is 5-10m from the surface. So, no impact on water was identified. Only 1.3 KLD sanitary wastewater will be generated from the proposed mining activity which will be treated in septic tanks and will be used for plantation purpose.
- ✓ The mine worker will generate municipal solid waste of about 35 Kg per day, which will have an adverse impact on human health. There will be 10 Nos. of garbage bins, provided for domestic waste collection. There will be no overburden due to mining in the riverbed area.
- ✓ The mining activities will be done in a systematic manner by maintaining the road infrastructure and vehicle transport, which will be a protective measure for preserving the topography and drainage in the area.

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

- ✓ No human settlement is proposed in mining or ancillary area. Local manpower will be preferred.
- ✓ No mining will be carried out during the rainy season to minimize impact on aquatic life.
- ✓ According to field survey, interviews of residents and authenticated checklist from forest department indicates the presence of 06 Schedule-I species in the buffer area of study area of proposed mine lease area. Hence, for the protection of these schedule-I species, a detailed conservation plan is proposed with futuristic approach. The species are Varanus benghalensis (Common Indian Monitor lizard), Naja naja (Indian Cobra), Ptyas mucosa (Rat Snake), Pavo cristatus (Indian Peafowl), Herpestes edwardsii (Common Mongoose) & Felis chaus (Jungle Cat), for the same conservation plan was prepared. Subsequently, a budget of Rs. 25 Lakhs has allotted for the conservation of wildlife species.
- ✓ The mining of Sand is likely to increase the per capita income of local people by which the socioeconomic status of the people will be improved. The local people have been provided with either direct employments or indirect employment such as business, contract works and development work like roads, etc. and other welfare amenities such as medical facilities, conveyance, free education, drinking water supply etc.
- ✓ Except dust generation, there is no source which can show a probability for health-related diseases. Regular water sprinkling will be done with sprinkles mounted tankers and dust masks will be provided to the workers.
- ✓ Personal protective equipment will provide to prevent the noise exposure. Personal Protective Equipment will be provided during mining activity. Regular Health check-up camps will be organized. All the workers will be insured by employer.

### **11.5. Environmental Monitoring Program**

To maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary which will have complied as per conditions. For this the lessee has taken decision to formulate an Environment Policy of the mine and constitute an Environmental Management Cell and committed to operate the proposed mine with the objectives mentioned in approved Environment Policy. A budget for monitoring of Air, water, Noise and Soil will be Rs. 60.0 thousand annual which is to be incurred by the project proponent for undertaking pollution prevention measures during the mining activity.

### **11.6. Additional Studies**

As per proposal made under the mining plan the area will be developed by means of opencast mining method. Water table will not be touched during the mining process. No high-risk accidents like landslides, subsidence flood etc. have been apprehended.

The Safety Health and Environmental (SHE) policy is existing and accessible to all at site and to other stakeholders. The policy has been framed considering legislative compliance, stakeholder involvement, continual improvement, and management by objectives.

To minimize the health impacts PPE like dust masks, ear plugs/ muffs and other equipment will be provided for use by the work personnel. All workers will be subjected to Initial Medical Examination as per Mines Rule 1955 at the time of appointment. Periodical Medical Examination will be conducted at least once in five years. Medical camps will be organized Six Monthly by proponent.



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

There is no displacement of the population within the project area and adjacent nearby area. This working of mine will offer more employment, chances to some of the nearby population, it is always obvious that the safe mining activity will help to improve socio-economic conditions of the inhabitants.

### **11.7. Project Benefit**

The project proponent is conscious of its social responsibility and as any good corporate citizen; it is proposed to undertake the need specific (skilled & non-skilled) employment. This Project will provide employment to local people directly and indirectly. Indirect employers are shopkeepers, mechanic, drivers, transporters etc. About 145 persons will get direct employment and 20 persons will get indirect employment form nearby villages. The workers will be mostly skilled.

The developer will also adopt the ESR program as per norms and will provide vary facilities the nearby villages. The salient features of the programme are as follows:

- ✓ Social welfare program like provision of medical facilities educational facilities, water supply for the employees as well as for nearby villagers will be taken.
- ✓ A well laid plan for employment of the local people has been prepared by giving priority to local people.
- ✓ Supplementing Govt. efforts in health monitoring camps, social welfare, and various awareness programs among the rural population.
- ✓ Assisting social plantation program.
- ✓ Development of facilities within villages like roads, etc.

### **11.8. Cost of Environment Management Plan**

The detailed activity-wise has been calculated which are INR 17.0 Lakhs as a Capital Cost and INR 5.80 Lakhs per annum as a Recurring cost, respectively. Total budget of INR 46.0 Lakh for environmental measurements has been ensured by the developer for plan period.

### **11.9. Conclusion**

As per above discussion there is no major impact on the environment due to mining except fugitive emission during loading, unloading of mineral & transportation. The adequate preventive measures will be adopted to contain the various pollutants within permissible limits. It is proposed to plant about 13,000 saplings and gap plantation considering 1000 / plant including maintenance and fencing. It will prove an effective pollution mitigate technique and help avoid soil erosion during monsoon season. Employment opportunities will be provided to the locals only as providing extraction of minerals from the mine site is the only prevailing occupation for them for their livelihood. Plantation development will be carried out in the mine premises, along the approach roads, around Govt. buildings, schools approx.

**CHAPTER – 12**

**DISCLOSURE OF THE  
CONSULTANT**



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## 12. Disclosure of Consultant

### 12.1. Organizational Profile

PARIVESH ENVIRONMENTAL ENGINEERING SERVICES (PEES), is a NABET accredited firm at 5/916, Viram Khand, Gomti Nagar, Lucknow, Uttar Pradesh-226010. PEES is accredited by QCI/NABET as Category-A EIA consultancy organization. The objective of PEES is to revive, support, strengthen and promote the traditional and unconventional technologies, which have survived through ages. These technologies meet our target of achieving the eco-friendly environment in this modern age. For the same cause we, at PEES, take initiatives in associating with national and international institutions, working for the same cause.

PEES is also dedicated to collect, analyse, and disseminate the scientific, technical, and socioeconomic information and knowledge for the benefit of the masses. The advance technology like the Information Technology tools is positively used for a better perspective. In achieving the desired objective in each project, the vital factor of socioeconomic information collation and analysis always plays an indispensable role. PEES have always stood in the front lines in this important area.

To summarize PEES is a group which is inspired and guided by the nature and finds immense pleasure in working on scientific lines with a role of activator between the decision makers and the locals. The active participation of locals through the development of self-help groups is always on top of the main agenda. PEES is dedicated to work in the field of research, development and exploration of traditional technologies and unconventional energy resources. The benefit of these activities is propagated to the end users.

PEES is associated with Asia Enviro Lab, which is NABL Accredited, and MoEF&CC recognized covering vast scope of environmental testing.

### 12.2. Consultancy Services

The following major services are being provided.

- Environmental Impact Assessment
- Air Quality Assessment and Control Measures
- Water and Wastewater Quality Assessment, Treatment and Management
- Soil Quality Assessment
- Remediation Construction & Site Restoration
- Source apportionment Study
- Carrying Capacity Study
- Environmental Management Plan
- Training and Skill Development
- HAZOP Study
- EHS & Occupational Safety Management Consulting
- Socioeconomic & Impact Assessment
- Solid Waste Management Services
- Consent Management
- Environmental Legal Advice
- ETP & STP Establishment and Operation
- Natural resource management
- Environmental Research and Development

### 12.3. Disclosure of Consultants Engaged

Declaration by Experts contributing to the EIA of proposed Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

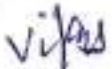


of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana by M/s Minerio Mining Private Limited.

I hereby, certify that I was a part of the EIA team in the following capacity that developed the above EIA.

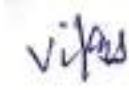



**Table 12-1: EIA Co-ordinator Details**

EIA Coordinator		Signature & Date
EIA Coordinator	Vikas Tripathi	 10.09.2023
Period of Involvement	September 2023 to till date	
Contact Information	9990156652 / 9819893405	

**Table 12-2: List of Functional Experts**

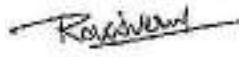
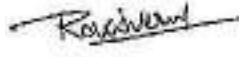
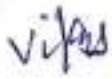
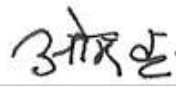

S. No.	Functional Areas	Name of Expert/s	Involvement (Period & Task**)	Signature & Date
1	AP	Vikas Tripathi	<b>Involvement Period: (October to December 2023)</b> <ul style="list-style-type: none"> <li>➤ Selection of AAQ stations in compliance with CPCB/ MoEF&amp;CC guidelines</li> <li>➤ Interpretation of baseline data w.r.t CPCB standards</li> <li>➤ Identification of sources of pollution and its Inventorization.</li> <li>➤ Preparation of Management plan with budgetary provision for all the sources of pollution.</li> <li>➤ Suggestion of Operational monitoring program to verify and keep the levels well within the norms from time to time.</li> </ul>	
2	WP	Ram Sushil Mishra	<b>Involvement Period: (October to December 2023)</b> <ul style="list-style-type: none"> <li>➤ Selection of water monitoring locations in line with CPCB norms</li> <li>➤ Interpretation of baseline data w.r.t to CPCB standards</li> <li>➤ Identification of pollution sources with relevant Inventorization.</li> <li>➤ Preparation of Water Balance.</li> <li>➤ Prediction of water pollution and its management plan.</li> </ul>	
3	SHW	Ashish Kumar	<b>Involvement Period: (October to December 2023)</b>	

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Functional Areas	Name of Expert/s	Involvement (Period & Task**)	Signature & Date
		Vikas Tripathi	<ul style="list-style-type: none"> <li>➤ Identification of nature of waste, categorization, and quantity of generated waste.</li> <li>➤ Prediction of waste pollution and preparation of its management.</li> </ul>	
4	SE	Kripna Shukla	<ul style="list-style-type: none"> <li>➤ Collection of Secondary data (Census of India &amp; District Handbook)</li> <li>➤ Collection of primary data of the study area through Questionnaire method</li> <li>➤ Compilation and analysis of primary &amp; secondary data to identify the various activities required on a need basis.</li> <li>➤ Identification and prediction of Socio-economic impacts</li> <li>➤ Enumerating the benefits of the project in terms of employment, development, etc.</li> <li>➤ Preparation of Environmental Social Responsibility activities based on the need basis with budgetary provisions in compliance with Companies act and MoEF&amp;CC guidelines</li> </ul>	 
5	EB	Shilpi Anand  Ram Sushil Mishra	<p><b>Involvement Period: (October to December 2023)</b></p> <ul style="list-style-type: none"> <li>➤ Identification of samples and its size based on the present land use and land cover pattern.</li> <li>➤ Collection of primary data of flora and fauna for the study area with standard methodology and guidelines</li> <li>➤ Collection of secondary data for cross verification of the primary data</li> <li>➤ Inventorization and compilation of biological aspects of the study area</li> <li>➤ Identification and prediction of various impacts on Ecological and biodiversity</li> </ul>	 



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.




S. No.	Functional Areas	Name of Expert/s	Involvement (Period & Task**)	Signature & Date
			<ul style="list-style-type: none"> <li>➤ Preparation of management plan including greenbelt development plan with budgetary allocation</li> </ul>	
6	HG	Ravindra K. Verma	<b>Involvement Period: (October to December 2023)</b> <ul style="list-style-type: none"> <li>➤ Collection of secondary data (Ground water Authority)</li> <li>➤ Interpretation of Water resource evaluation of the area.</li> <li>➤ Interpretation of Pre-monsoon &amp; post-monsoon water levels &amp; quality data.</li> </ul>	
7	GEO	Ravindra K. Verma	<b>Involvement Period: (October to December 2023)</b> <ul style="list-style-type: none"> <li>➤ Collection of secondary data with respect to regional and local geology from Ground water Department.</li> <li>➤ Interpretation of collected data in the report</li> </ul>	
8	AQ	Vikas Tripathi	<b>Involvement Period: (October to December 2023)</b> <ul style="list-style-type: none"> <li>➤ Collection of primary data</li> <li>➤ Quantification of Air pollution sources (point and line sources)</li> <li>➤ Impact prediction using AERMOD View Modelling and its interpretation.</li> <li>➤ Delineating the Incremental load on the existing scenario</li> <li>➤ Suggesting management plan with budgetary provision</li> <li>➤ Suggestion of Operational monitoring program to verify and follow up to keep the levels well within the norms from time to time</li> </ul>	
9	NV	Om Krishna  Tarun Saharan	<b>Involvement Period: (October to December 2023)</b> <ul style="list-style-type: none"> <li>➤ Identification and selection of NAAQ monitoring locations.</li> <li>➤ Collection of primary data (noise quality of the study area)</li> <li>➤ Identification of Noise pollution sources.</li> </ul>	  

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Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Functional Areas	Name of Expert/s	Involvement (Period & Task**)	Signature & Date
			<ul style="list-style-type: none"> <li>➤ Impact prediction of noise pollution sources and its interpretation</li> <li>➤ Preparation of management plan with budgetary provision</li> <li>➤ Suggestion of Operational monitoring program to verify and follow up to keep the levels well within the norms from time to time</li> </ul>	
10	LU	Debarati Ghosh	<p><b>Involvement Period: (October to December 2023)</b></p> <ul style="list-style-type: none"> <li>➤ Collection of Primary and secondary data (Topo sheet, satellite imaginary, coordinates of known vectors, etc.)</li> <li>➤ Geo-referencing the primary data with secondary data using AutoCad, ERDAS, GIS software.</li> <li>➤ Preparation of Land use and Land cover map</li> <li>➤ Identification and its Impact prediction (if any)</li> </ul>	
11	RH	Ram Sushil Mishra	<p><b>Involvement Period: (October to December 2023)</b></p> <ul style="list-style-type: none"> <li>➤ Identification of risk and hazards</li> <li>➤ QRA study and prediction of risks involved.</li> <li>➤ Management of Hazard controls due to chemical storage</li> <li>➤ Preparation of Disaster Management Plan with Onsite and Offsite Emergency Plan</li> <li>➤ Delineating firefighting facilities and system</li> <li>➤ Preparation of Occupational Health and Safety Management Plan with budgetary allocations.</li> </ul>	
12	SC	Shilpi Anand Ram Sushil Mishra*	<p><b>Involvement Period: (October to December 2023)</b></p> <ul style="list-style-type: none"> <li>➤ Collection of primary data</li> <li>➤ Interpretation of existing quality of soil.</li> <li>➤ Prediction of Impact and its management (if any).</li> </ul>	

**Team member \***

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CONSULTANT: PARIVESH ENVIRONMENTAL ENGINEERING SERVICES (NABET / EIA/2012/IA 0092(Rev.01))

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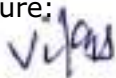
Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## **12.4. Declaration by the Head of the Accredited Consultant Organization**

I, Vikas Tripathi, hereby, confirm that the above-mentioned experts prepared the EIA of proposed Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana by M/s Minerio Mining Private Limited.

I also confirm that I shall be fully accountable for any misleading information mentioned in this statement.

Signature:



Name: **Vikas Tripathi**

Designation: **Managing Partner**

Name of Organization. **PARIVESH ENVIRONMENTAL ENGINEERING SERVICES, LUCKNOW**

NABET Certificate No.: **NABET/EIA/2124/IA 0092(Rev.01)**

Valid up to: **11.11.2024.**

# ANNEXURES



**ANNEXURES – 1.1**

**LEASE GRANT LETTER**





Through e-mail/Speed Post

From

The Director,  
Mines and Geology Haryana,  
2<sup>nd</sup> Floor Plot No. 9, I.T. Park, Sector-22, Panchkula

To

M/s Minerio Mining Pvt. Ltd.,  
through Sh. Sachin Sharma, MCD No. 01, First Floor,  
Samman Bazar Road, Bhogal, Delhi, South Delhi - 110014

Memo No. DMG/HY/Thantri Unit/Palwal/2023/ 4199  
Dated Panchkula, the 21-07-23

**Subject: Acceptance of the highest bid in respect of the minor mineral Sand contract of "Thantri Unit" having tentative area of 248.46 Acre in the district Palwal, offered in e-auction held on 13.06.2023/issuance of Letter of Intent (LoI)- regarding.**

You participated in the e-auction held on 13.06.2023 on the e-Auction web portal (<https://minesharyana.clauctions.com/>) for grant of mining contract of minor mineral sand mines after accepting the terms and conditions of the auction notice issued vide notification no. DMG/HY/Auction/Palwal/2022/2523 dated 10.05.2023 & corrigendum No. 3272 dated 07.06.2023 in order to obtain mining contract of minor mineral sand mine of the district Palwal.

2. You offered the highest bid of Rs. 13,18,00,000/- (Rs. Thirteen Crores Eighteen Lakhs only) per annum against the Reserve Price of Rs. 13,13,00,000/- for obtaining the Mining Contract of Minor Mineral Mine namely "Thantri Unit" for extraction of "Sand" having total area of 248.46 Acre. The details of the khasra number of the area under above said Mining Unit is attached as Annexure 'A'.

3. You are hereby informed that the State Government has accepted the highest bid of Rs. 13,18,00,000/- per annum offered by you in respect of "Thantri Unit" under the provision of Haryana Minor Mineral Concession, Stocking, Transportation of Minerals & Prevention of Illegal Mining Rules, 2012 (State Rules, 2012). Accordingly, you have become the successful bidder in respect of above said mine.

4. The State Government having accepted the aforementioned highest bid of Rs. 13,18,00,000/- offered by you, the Department is pleased to issue this Letter of Intent (LoI) in your favour in respect of the Mining Unit/area namely "Thantri Unit" subject to the following terms and conditions:

4.1 The period of the contract shall be 10 years and the same shall commence w.e.f. the date of grant of Environmental Clearance by the competent authority and the Consent to Operate (CTO) by the State Pollution Control Board, whichever is later, or on expiry of the period of 12 months from the date of issuance of LoI, whichever is earlier;

4.2 You may note that the detail of the area of the mining unit is tentative and was notified on "as is where is basis" (refer condition no. 3.4 of the auction notice). In

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case of any inadvertent mistake in the area detail/Khasra number etc., the same shall be got rectified/corrected before execution of the contract agreement (refer condition no. 3.3 of the auction notice);

- 4.3 No request regarding reduction in bid amount on account of reduction in land/area of the Mining Block/ Unit, on any other account including that of change in description of Khasra numbers / location etc. at any stage will be entertained on any ground. This shall also include any loss/reduction of area for actual mining for want of compliance of applicable laws/restrictions for mining or part of the contracted area had already been operated in the past. Needless to state that this also includes the changes, if any, as per condition no. 3.4 of the auction notice.
- 4.4 You offered bid after having gone through the terms and conditions of auction notice and also the applicable Acts and Rules for undertaking mining. The State government shall not be responsible for any kind of loss to you being the highest bidders/contractor at any point of time [before or after grant of contract] on any account including on account of reduction of land/ area/ production/ non grant of permission for mining in part area or otherwise on account of any condition stipulated for undertaking mining by any competent authority.
- 4.5 The amount of the highest bid i.e. Rs. 13,18,00,000/- (Rs. Thirteen Crores Eighteen Lakhs only) per annum shall be the "Annual Contract Money" payable by you as the contractor money in the manner prescribed in the contract agreement to be executed on form MC-1 appended to State Rules.

As per orders dated 01.07.2022 of the State Government you will have to open Escrow Account with the Department, wherein all the sale proceed made through e-Rawaana Portal will required to be deposited.

- 4.6 The above said annual contract money shall be increased at the rate of 10% on completion of each block of three years. Accordingly, the year-wise amount of the annual contract money shall be as per details given below:

Sr. No.	Year of the contract Period	Annual Contract Money [in Rs.]
1	First Year	13,18,00,000
2	Second Year	13,18,00,000
3	Third Year	13,18,00,000
4	Fourth Year	14,49,80,000
5	Fifth Year	14,49,80,000
6	Sixth Year	14,49,80,000
7	Seventh Year	15,94,78,000
8	Eighth Year	15,94,78,000
9	Ninth Year	15,94,78,000
10	Tenth Year	17,54,25,000

- 4.7 As per the terms and conditions of the grant, you are liable to deposit Rs. 3,29,50,000/- i.e. equal to 25% of the annual bid amount as "Security", out of which you have already deposited an amount of Rs. 1,31,80,000/- (Rs. One Crore Thirty One Lakhs Eighty Thousand only) i.e. equal to 10% of the annual bid amount as 'initial bid security' after the conclusion of e-auction. The balance amount of Rs.

1,97,70,000/- of the bid security i.e. 15% of the annual bid amount shall be deposited before commencement of the mining operation or before expiry of the period of 12 months from the date of issuance of Letter of Intent (LoI), whichever is earlier;

Provided that in case having taken all steps on your part, if you fails to obtain required environmental clearance and consent to operate(CTO) for undertaking mining operations within the said period of 12 months from the date of issuance of LoI, such letter of intent holder/contractor on a specific application submitted to the Director, at least thirty days prior to the end of the period mentioned above, giving details of the action already taken may seek additional time up to another twelve months, over and above the time of 12 months already allowed for commencement of the period of contract, on payment of a non-refundable fee as per the following:-

1	Extension of further period up to six months	On payment of a non-refundable fee at the rate of one percent per month of the annual bid for each month of requested extension period
2	Extension for a second period up to six months	On payment of a non-refundable fee at the rate of two percent per month of the annual bid for each month of requested extension period
<b>Note:</b> Extension shall be allowed only in month (s) and any request for period less/part of the month shall be summarily rejected and shall apply along with advance amount of the fee for such requested period of extension.		

4.8 You are directed to execute the Contract Agreement in Form MC-1 appended to the State Rules, 2012 within a period of 90 days from the date of order of issuance of this LoI.

Note: 90 days period is for execution of Contract Agreement. Therefore, it is advised to submit draft agreement along with all relevant documents preferably within 45 days, so that agreement could be executed within 90 days after completing all the formalities of scrutiny and verification.

4.9 In case of the Partnership Deed (where bidding entity is a partnership firm) or Articles of Association (where bidding entity is a registered Company) or an Affidavit (where bidding entity is a sole proprietorship firm and the bidder is participating as an individual), no transfer or addition or deletion of the Partners/Directors will be permissible before execution of the agreement;

4.10 The Contract Agreement executed shall be got duly Registered under relevant laws with concerned Registering Authority and you will be liable to pay applicable stamp duty and registration fee etc. as per the applicable rates and as demanded by the Registering Authority/Revenue Department at the time of Registration.

4.11 In case of failure to execute the agreement, after issuance of this acceptance of bid/LOI within the prescribed period of 90 days, this LoI shall be deemed to have been revoked and 10% amount of the highest bid deposited as initial bid security shall be forfeited and you, will be debarred from participation in any future auctions/tenders/competitive bidding process in respect of any area for obtaining mineral concession in the State for a period of 5 years.



- 4.12 You shall also furnish a solvent surety for a sum equal to the amount of the annual bid for execution of the Agreement. The documents in support of solvency of the surety shall be submitted duly evaluated by the concerned Revenue Authority along with Non Encumbrance Certificate from the concerned Revenue Authority. In case the surety offered by the contractor(s) during the subsistence of the contract is not found solvent, the contractor(s) shall offer another solvent surety and a supplementary deed shall be executed to this effect.
- 4.13 After execution of agreement, either before commencement of the mining operation or before expiry of the time allowed, if any, as per condition No. 4.7 above, in case of failure to deposit the balance 15% amount towards security (as required under clause 4.7 above), the acceptance of bid/issuance of Lol/execution of agreement shall be deemed to have been revoked and 10% amount deposited towards as initial bid security after the conclusion of auction shall stand forfeited. Further, such bidder shall be debarred from participation in any future auctions/Tenders/competitive bidding process in respect of any area for obtaining mineral concession in the State for a period of 5 years.
- 4.14 You shall be liable to deposit the contract money in advance at monthly intervals as per provisions of Contract Agreement i.e. from the date of commencement of the contract period.
- 4.15 You shall also deposit/ pay an additional amount equal to 7.5% of the due contract money along with the monthly instalments towards the 'Mines and Mineral Development, Restoration and Rehabilitation Fund'.
- 4.16 You shall also deposit/ pay an additional amount equal to 2.5% of the due contract money along with the monthly instalments towards the 'District Mineral Fund'.
- 4.17 You shall also be liable to pay advance Income Tax as per provisions of Section 206(c) of Income Tax Act in addition to contract money, payable as per terms and conditions of contract agreement.
- 4.18 On enhancement of the contract money with the expiry of every three years period, you shall deposit the balance amount of security so as to upscale the security amount equal to 10% of the revised annual contract money as applicable for one year with respect to the next block of three years. No interest, whatsoever, shall be payable on the security amount deposited under the prescribed security head of the government;
- 4.19 You shall prepare a Mining Plan along with the Mine Closure Plan (Progressive & Final) from the Recognized Qualified Person as per chapter 10 of the State Rules, 2012 for the "Mining Unit" and shall not commence mining operations in any area except in accordance with such Mining Plan duly approved by an officer authorised by the Director, Mines & Geology, in this behalf.
- 4.20 Further, the actual mining will be allowed to be commenced only after prior Environment Clearance is obtained by you as the Lol holder/ Mining contractor for the Mining Unit from the Competent Authority as required under EIA notification dated 14/09/2006 issued by Ministry of Environment, Forests and Climate Change, Government of India or as amended from time to time and also other required

- approvals for mining including Consent to Establish and Consent to Operate from the Haryana State Pollution Control Board before commencement of actual mining operations.
- 4.21 You will also be liable to pay the following to the landowners to undertake mining operations:
- (a) Annual rent in respect of the land area blocked under the concession but not being operated; and
  - (b) Rent Plus compensation in respect of the area used for actual mining operations.
- 4.22 The amount of annual rent and the compensation shall be settled mutually between the landowner and the mining contractor. In case of non-settlement of the rent and compensation, the same shall be decided by the District Collector concerned in accordance with the provisions contained in Chapter 9 of the "State Rules, 2012";
- 4.23 The total mineral excavated and stacked by the concession holder within the area granted on mining contract shall not exceed three times of the average monthly production as per approved Mining Plan and/or quantity approved under Environmental Clearance, at any point of time.
- 4.24 The Mining Contractor shall not stock any mineral outside the concession area granted on mining contract, without obtaining a valid Mineral Dealer License as per provisions contained in Chapter 14 of the State Rules, 2012.
- 4.25 The contractor shall not carry out any mining operations in any reserved/ protected forest or any area prohibited by any law in force in India, or prohibited by any authority without obtaining prior permission in writing from such authority or officer authorized in this behalf. In case of refusal of permission by such authority or officer authorised in this behalf, contractor(s) shall not be entitled to claim any relief in payment of contract money on this account;
- 4.26 Following are the general/ special conditions applicable for excavation of minor mineral(s) from river beds in order to ensure safety of riverbeds, structures and the adjoining areas:
- i. No mining would be permissible in a river-bed up to a distance of five times of the span of a bridge structure on up-stream side and ten time the span of such bridge structure on down-stream side, subject to a minimum of 250 meters on the up-stream side and 500 meters on the down-stream side;
  - ii. There shall be maintained an un-mined block of 50 meters width after every block of 1000 meters over which mining is undertaken or at such distance as may be directed by the Director or any officer authorised by him;
  - iii. The maximum depth of mining in the river-bed shall not exceed three meters from the un-mined bed level at any point in time with proper bench formation;
  - iv. Mining shall be restricted within the central 3/4<sup>th</sup> width of the river/ rivulet;
  - v. Any other condition(s), as may be required by the Irrigation Department of the state from time to time for river-bed mining in consultation with the Mines & Geology Department, may be made applicable to the mining operations in river-beds.



vi. No mining operation may be carried out from 1<sup>st</sup> July to 15<sup>th</sup> September every year (rainy season).

4.27 No mining operation shall be allowed in the urbanize zone of area notified by Town and Country Planning Department. Further, in case of the agriculture zone notified by Town and Country Planning Department mining shall be permissible only after obtaining prior permission from the competent authority;

4.28 The contractor shall not undertake any mining operation in the area granted on mining contract without obtaining requisite permission from the competent authority as required for undertaking mining operations under relevant laws;

4.29 The contractor shall be under obligation to carry out mining in accordance with all other provisions as applicable under the Mines Act, 1952, Mines and Minerals (Development and Regulation) Act, 1957, Indian Explosive Act, 1884, Forest (Conservation) Act, 1980 and Environment (Protection) Act, 1986 and the rules made there under, Wild life (Protection) Act, 1972, Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981;

4.30 All other terms and conditions shall remain as per auction notice and the provisions of the Mines and Minerals (Development and Regulation) Act, 1957 and Rules made there under shall prevail over all the terms and conditions.

5. Accordingly, you are advised to submit the Draft Contract Agreement along with other requisite documents including a solvent surety(s) for a sum equal to the amount of the annual bid for execution of the agreement, within a period of 90 days from the date of issue of this bid acceptance letter and the Lol.

  
Director  
Mines & Geology, Haryana

**Speed/Registered Post**

Endst. No. DMG/HY/Thantri Unit/Palwal/2023/

Dated

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

1. Additional Chief Secretary to Government Haryana, Mines and Geology Department.
2. The Chairman, Haryana State Pollution Control Board, Panchkula.
3. The Deputy Commissioner, Palwal.
4. The Mining Officer, Mines & Geology Department, Faridabad. He is directed to ensure that proper and complete 'Draft Contract Agreement Documents' as required are submitted within stipulated period.

  
Director  
Mines & Geology, Haryana

Annexure A

Sr. No.	Name of Unit	Name of the Village	Details of Khasra Numbers	Area in acre as per revenue record	Total Mineral Concession Area (in acre)	Period (in years)
J	Thamri	Thamri	<p><b>For Mining</b>                      3// 11 min, 20/1, 20/2 min, 21 min                      4// 7, 8 min, 13/1 min, 13/2, 14, 15/1, 15/2, 16/1 min, 16/2 min, 17/1, 17/2, 18/1 min, 23 min, 24/1, 24/2, 25/1, 25/2, 10// 3 min, 4/1, 4/2, 5, 6/1, 6/2, 7/1, 7/2, 8/1, 8/2 min, 13/1 min, 13/2, 13/3, 14, 15/1, 15/2, 15/3, 15/4, 16/1, 16/2, 17, 18/1, 18/2 min, 23 min, 24, 25, 11// 5 min, 10 min, 11 min, 20 min, 21/1, 21/2, 22 min                      15// 1, 2 min, 9 min, 10/1, 10/2, 11, 12/1 min, 12/2 min, 19 min, 20/1, 20/2, 21, 22 min                      16// 1/2, 4, 5, 6, 7, 8/1, 8/2 min, 13/2 min, 14, 15, 16/1, 16/2, 17, 18/1 min, 23/2 min, 24, 25, 23// 3/2 min, 4/1, 4/2, 5/1, 5/2, 7, 8/1 min, 12/3 min, 14/1, 14/2, 15, 16/1, 16/2, 17/1, 17/2, 18/1 min, 23 min, 24, 25/1, 25/2, 24// 1, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20, 21, 22 min                      20// 1, 2 min, 4/1 min, 9/2 min, 10, 11, 12 min, 19 min, 20, 21/1, 21/2, 20// 1 min, 4, 5/1, 5/2, 6/1, 6/2, 7/1, 7/2, 8 min, 13/2 min, 14/1, 14/2, 15/1, 15/2, 15/3, 16, 17/1, 17/2, 18/1 min, 23/2 min, 24/1, 24/2, 25, 10// 1, 1/2 min, 4/1, 4/2, 5/1, 5/2, 6, 7/1, 7/2, 8/1 min, 12/2 min, 14/1, 14/2, 15, 16, 17 min, 18/1 min, 24 min, 25, 19// 1, 2 min, 3 min, 8 min, 9, 10, 11/1, 11/2, 12, 13/1 min, 13/2 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min                      41// 1, 2, 3 min, 4, 10, 11, 42// 4 min, 5, 6/1, 6/2, 7, 8 min, 13, 17 min</p> <p><b>For Ancillary area</b>                      24// 4, 5/1, 5/2, 6, 7, 14, 15, 25// 1/1, 1/2, 10, 11</p>	107.29	248.60	10
		Rajapur Nhadar	<p><b>For Mining</b>                      7// 1, 1/2, 2/1 min, 8/2, 9, 11/2, 11/1, 12, 13 min, 14 min, 15 min, 16, 19, 20, 21, 22, 23, 24 min, 8// 16 min, 25/1 min, 25/2, 10// 5/1 min, 5/1, 6/1, 6/2, 7 min, 14 min, 15/1, 15/2, 16, 17 min, 24/2 min, 25, 11// 1, 2, 3, 4 min, 7 min, 8/1, 8/2, 9, 10/1, 10/2, 11, 12, 13/1, 13/2, 14 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min                      24// 1, 2/1, 2/2, 3/1, 3/2, 7 min, 8 min, 9, 10, 11, 12, 13, 14 min, 17/2 min, 17/2 min, 18, 19, 20, 21, 22/1, 22/2, 23, 24/1, 23 min                      25// 4/2 min, 5, 6, 7 min, 13 min, 18 min, 25 min                      29// 5 min, 6/1 min, 7/2 min, 15 min                      30// 1, 2/1, 2/2, 3/1, 3/2, 4 min, 7 min, 8, 9/1, 9/2, 10, 11, 12, 13, 14, 15 min, 16 min, 17, 18// 18, 19, 20 min, 21/1, 2 min, 22/1, 22/2, 23, 24, 25 min                      44// 10/2 min, 11/1 min, 20/3 min, 20/2 min, 21 min                      45// 1 min, 2, 3, 4, 1 min, 6 min, 7, 8, 9/1 min, 9/2 min, 10 min, 11 min, 12 min, 13, 14, 15, 16, 17, 18, 19 min, 22 min, 23, 24, 25/1, 25/2, 26// 2 min, 3, 4, 5, 6/1, 6/2, 7, 8 min, 18 min, 19, 15, 16, 17 min, 18 min, 23 min, 24, 25, 26// 1/1, 1/2 min, 2/3 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20/1, 20/2, 21, 22, 23, 24 min, 61// 1, 2/1, 2/2, 3/1, 8 min, 9, 10, 11, 62// 3 min, 4 min, 5, 6</p> <p><b>For Ancillary area</b>                      11// 6, 7, 8, 13, 14, 15, 16, 17, 18, 23, 24, 25/1</p>	120.57	9.10	
				11.56		



**ANNEXURES – 1.2**  
**CLUSTER NOC**





Department of Mines & Geology, Faridabad



Memo No. :- MO/FBD/ 2449

Dated :- 11/8/23

To

M/s Minerio Mining Pvt. Ltd.  
A-1 1<sup>st</sup> Floor, Samman Bazar Road, Bhogal  
New Delhi.

Subject :- Regarding issuance of cluster certificate with respect to our mining query/project located at village Thantri Unit, Tehsil and Distt Palwal( Haryana).

Kindly refer to your letter no. nil dated 28.07.2023 on the subject noted above.

2. In this regard, it is intimated that there is no mining contract within a radius of 500 meters of Thantri Unit but there is no contract/lease is working at present. This is for your information and further necessary action.

*Handwritten signature*  
01/08/2023

Mining Officer  
Deptt of Mines & Geology  
Faridabad/Palwal





**ANNEXURES – 1.3**

**APPROVED MINING**

**PLAN**



From

The Director,  
Mines and Geology Haryana,  
Plot No. 9, I.T. Park, Sector-22,  
Panchkula

To

M/S Minerio Mining Pvt.Ltd.,  
Through Sh.Sachin Sharma,  
MCD No-01, First Floor, Suman Bazar Road,  
Bhogal, South Delhi-110014.

Memo No. DMG/HY/MP/ Thanthri sand unit/Palwal/2023/ 6111  
Dated Panchkula the 26/10/23

**Subject: Submission of Mining Plan including Progressive Mine Closure Plan of Thanthri unit of sand (Minor Minerals) Mine in District Palwal, Haryana, comprising an area of 248.46 Acres (99.384 Hectares ) of M/s Minerio Mining Pvt.Ltd, South Delhi.**

\*\*\*\*\*

Reference to your letter dated 20.10.2023 on the subject noted above.

2. Vide letter under reference, the Mining Plan along with Progressive Mine Closure Plan in respect of an area of 248.46 Acres (99.384 Hectares ) of land in villages Thanthri and Rajpur Khadar, district Palwal was submitted for approval.

3. In exercise of the powers conferred by Rule 69 of the Haryana Minor Mineral Concession, Stoking, Transportation of Minerals and Prevention of Illegal Mining Rules, 2012, I hereby approve the above said Mining Plan along with Progressive Mine Closure Plan in respect of Sand Mine (Minor Minerals) over an area of 248.46 Acres (99.384 hectares) of land situated in villages Thanthri and Rajpur Khadar, of district Palwal. This approval is subject to the following conditions:-

- (i) That this Mining Plan and Progressive Mine Closure Plan is approved without prejudice to any other laws applicable to the mine/area from time to time whether made by the Central Government or State Government or any other authority.
- (ii) That this approval of the "Mining Plan along with Progressive Mine Closure Plan" of Mining does not in any way imply the approval of the State Government in terms of any other provisions of the Mines and Minerals (Development & Regulation) Act, 1957 or Haryana Minor Mineral Concession, Stoking, Transportation of Minerals and Prevention of Illegal Mining Rules, 2012 or any other law including Forest (Conservation) Act, 1980 and Environment Protection Act, 1986 and rules framed there under.
- (iii) That this "Mining Plan along with Progressive Mine Closure Plan" is being approved on the basis of data provided by you. In case, at any point of time any ambiguity in the same is found, the approval will be revoked with suspension of the mining operations and will be allowed to resume operation only after modification/rectification of the same, if so required.

- (iv) That this "Mining Plan along with Progressive Mine Closure Plan" is approved without prejudice to any other order or direction from any court of any competent jurisdiction and is for a period of five years only and shall not be make you entitled for any extension of the lease period
- (v) That all the norms and provisions as envisaged in the Mining Plan would be adhered to, during the working of mine
- (vi) That the Financial Assurance of Rs. 14,90,000/- (Rs. Fourteen lac ninty thousand only) as required under the provisions of Rule 21(6) of "Haryana Minor Mineral Concession, Stocking, Transportation of Minerals & Prevention of Illegal Mining Rules, 2012, shall be furnished within a period of 60 days or before start of mining operations, whichever is earlier

4. Further, as per condition no. 4.20 of the Lol dated 21.07.2023, the actual mining will be allowed to be commenced only after Prior Environmental Clearance from the Competent Authority as required under EIA notification dated 14/9/2006, as amended from time to time by the MoE&F, Govt and guidelines/ circulars issued in this behalf.

Encl: Mining Plan & Progressive  
Mine Closure Plan (2 copies)

  
State Geologist,  
for Director, Mines and Geology,  
Haryana

Registered Post

Endst. No. DMG/HY/MP/ Thanthri sand unit/Palwal/2023/

Dated:

A copy along with a copy of the dully approved Mining Plan and Progressive Mine Closure Plan is forwarded to the Director Mines Safety, Room No. 201-203, 2<sup>nd</sup> Floor, B-Block, CGO Complex-II, Hapur Road, Ghaziabad for information and necessary action.

Encl: Mining Plan & Progressive  
Mine Closure Plan

  
State Geologist,  
for Director, Mines and Geology,  
Haryana

Endst. No. DMG/HY/MP/ Thanthri sand unit/Palwal/2023/

Dated:

A copy along with a copy of the dully approved Mining Plan and Progressive Mine Closure Plan is forwarded to the Mining Officer, Mines and Geology Department, Faridabad for information and necessary action.

Encl: Mining Plan & Progressive  
Mine Closure Plan

  
State Geologist,  
for Director, Mines and Geology,  
Haryana

Endst. No DMG/HY/MP/ Thanthri sand unit/Palwal/2023/

Dated:

A copy is forwarded to Shri D.C. Yadav, House No. 282, Sector 11-D, Faridabad - 121 001 (Haryana) w.r.t. his letter dated 20.10.2023 for information and necessary action.

  
State Geologist,  
for Director General, Mines and Geology,  
Haryana

# MINING PLAN AND PROGRESSIVE MINE CLOSURE PLAN

(Prepared under Rule 70 of Haryana Minor Mineral Concession, Stocking, Transportation of Minerals & Prevention of Illegal Mining Rules, 2012)

FOR

RIVER SAND

DMG/HY/MP/Thantri Unit

Thantri Unit



Total lease area=248.46 acres (99.384 Hectares)

DISTRICT - PALWAL, STATE- HARYANA.

APPLICANT-

M/s Minerio Mining Pvt.Ltd.,Through Sh.Sachin Sharma,MCD No.01,First floor,Suman Bazar Road,Bhogal,Delhi,South Delhi-110014

PREPARED BY

Dr. S.N.Sharma( BE Mining, 1982 ) Qualified Person &

D.C.Yadav ( M.Sc Geology,1984) RQP/DMG/HRY/2018/03.

House No. 282, sector 11-D, Faridabad (Haryana)

SUBMITTED TO- THE DIRECTOR GENERAL, MINES & GEOLOGY HARYANA (AUGUST 2023)



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**List of annexure**

Sr.no.	Description
1	A copy of LOI
2	Consent letter from applicant to prepare the mining plan
3	RQP Certificates
4	Copy of Replenishment report



LIST OF PLATES

Plate. No.	Description
1	Location Plan
2	Key plan
3	Surface Geological plan and section
4	Plan showing the position of Mine Workings at the end of Each Year.
5	Reclamation Map
6	Environmental Plan





**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
AREA-248.46 Acres. (99.384 ha) District- Palwal (Haryana) Open cast Semi mechanized**

## INTRODUCTION

M/s Minerio Mining Pvt.Ltd.,Through Sh.Sachin Sharma,MCD No.01,First floor,Suman Bazar Road,Bhogal,Delhi,South Delhi-110014 was the highest bidder (13.18 Crores) for the Sand quarries of Thantri Unit for which auction held on 13-06-2023.

**A Letter of Intent (LOI) has been issued by the Director Mines & Geology Haryana vide letter no. DMG/HY/Thantri Unit/Palwal/2023/4199 dated 21-07-2023 for Mining of Sand (Minor Mineral) in Thantri Unit , comprising Thantri & Rajupur Khaddar villages over an area of 248.46 acres (99.384 hectares) in district Palwal, Haryana for a period of 10 years (Annex. I).**

The applicant is involved in the Mining business for last many years. The applicant can invest necessary funds for the scientific and systematic development of mines including land rejuvenation and progressive reclamation programme and other measures necessary to protect the quality of the environment and human health etc.

**The objective of preparation of this mining plan and progressive mine closure plan is to fulfill the conditions stipulated by the Department of Mines & Geology, Haryana required under Haryana Minor Mineral Concession Rules, 2012. The conditions which are related to the contract/mining plan are reproduced here below.**

- The period of contract shall be 10 years and shall commence w.e.f. the date of grant of environmental clearance by competent authority and Consent to operate( CTO) by State Pollution Control Board, whichever is later, or on expiry of the period of 12 months from the date of issuance of "Letter of Intent", (LOI) whichever is earlier;
- The contractor shall also deposit/pay an additional amount equal to 7.5 % of the due contract money along with installments towards the 'Mines and Minerals Development, Restoration and Rehabilitation Fund';
- The contractor shall also deposit/pay an additional amount equal to 2.5% of the due contract money along with installments towards the 'District Mineral Fund'



**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
AREA-248.46 Acres. (99.384 ha) District- Palwal (Haryana) Open cast Semi mechanized**

- The mining contractor shall get prepare a "Mining Plan" along with the Mine Closure Plan (Progressive & Final) from the Recognized Qualified Person as per chapter 10 of the "Haryana Minor Mineral Concession, Stocking, Transportation of Minerals and Prevention of Illegal Mining Rules, 2012" for mining area granted on contract. The contractor shall not commence mining operations in any area except in accordance with such Mining Plan duly approved by an officer authorized by the Director, Mines & Geology, in this behalf.
- Further, the actual mining will be allowed to be commenced only after prior Environmental Clearance is obtained by the LOI holder/mining contractor for the Mining blocks area from Competent Authority as required under notification dated 14/9/2006 issued by the Ministry of Environment, Forests and Climate Change, Government of India or as amended from time to time.
- The Mining contractor would also be liable to pay following to the land owners;
  - a) The annual rent in respect of the land area blocked under the concession but not being operated, and;
  - (b) The rent plus compensation in respect of the area used for actual mining operations.
- The total mineral excavated and stacked by the concession holder within the area granted on mining contract shall not exceed three times of the average monthly production as per approved Mining Plan and/or quantity approved under Environment Clearance at any point of time.
- The amount of annual rent and the compensation shall be settled mutually between the landowner and the mining contractor. In case of non-settlement of the rent and compensation, the same shall be decided by the District Collector concerned in accordance with the provisions of Chapter 9 of " the State Rules, 2012";
- The Mining contractor shall not stock any mineral outside the concession area granted on mining contract, without obtaining a valid mineral dealer license as per provisions contained in Chapter 14 of the "Haryana Minor Mineral Concession, Stocking, Transportation of Minerals and Prevention of Illegal Mining Rules, 2012".





**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
AREA-248.46 Acres. (99.384 ha) District- Palwal (Haryana) Open cast Semi mechanized**

- The contractor shall not carry out any mining operations in any reserved/protected forest or any area prohibited by any law in force in India, or prohibited by any authority without obtaining prior permission in writing from such authority or officer authorized in this behalf. In case of refusal of permission by such authority or officer authorized in this behalf, contractor(s) shall not be entitled to claim any relief in payment of contract money on this account.
- Following special conditions shall be applicable for excavation of minor mineral(s) from river beds in order to ensure safety of river-beds, structures and the adjoining areas:
  - (i) No mining would be permissible in a river-bed up to a distance of five times of the span of a bridge on up-stream side and ten times the span of such bridge on down-stream side, subject to a minimum of 250 meters on the up-stream side and 500 meters on the down-stream side;
  - (ii) There shall be maintained an un-mined block of 50 meters width after every block of 1000 meters over which mining is undertaken or at such distance as may be directed by the Director or any officer authorized by him;
  - (iii) The maximum depth of mining in the river-bed shall not exceed three meter from the un-mined bed level at any point in time with proper bench formation;
  - (iv) Mining shall be restricted within the central 3/4th width of the river/ rivulet;
  - (v) Any other condition(s), as may be required by the Irrigation Department of the state from time to time for river-bed mining in consultation with the Mines & Geology Department, may be made applicable to the mining operations in river-beds.
- **No mining operation may be carried out from 01<sup>st</sup> July to 15<sup>th</sup> September every year (rainy season)**



**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
AREA-248.46 Acres. (99.384 ha) District- Palwal (Haryana) Open cast Semi mechanized**

- That no mining operation shall be allowed in the urbanize zone of area notified by Town and Country Planning Department. Further, in case of the agriculture zone notified by Town and Country Planning Department mining shall be permissible only after obtaining prior permission from the competent authority.
- The contractor shall not undertake any mining operations in the area granted on mining contract without obtaining requisite permission from the competent authority as required for undertaking mining operations under relevant laws.
- The contractor shall be under obligation to carryout mining in accordance with all other provisions applicable as per Mines Act, 1952, Mines and Minerals (Development and Regulation) Act, 1957, Indian Explosive Act, 1884, Forest (Conservation) Act, 1980 and Environment (Protection) Act, 1986 and the rules made there under Wild Life (Protection) Act, 1972, Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981.
- All other terms and conditions shall remain as per auction notice and the provisions of the Mines and Minerals (Development and Regulation) Act, 1957 and Rules made there under shall prevail over all the terms and conditions.

**1.0. GENERAL:**

**a) Name and address of the Lessee/applicant:**

M/s Minerio Mining Pvt.Ltd.,Through Sh.Sachin Sharma,MCD No.01,First floor,Suman Bazar Road,Bhogal,Delhi,South Delhi-110014

Phone no.

E mail ID-

**b) Status of the Applicant;-The applicant is a Pvt. Ltd Co.**

**c) Name, Address and registration number of the RQP preparing the mining plan**





**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
 AREA-248.46 Acres. (99.384 ha) District- Palwal (Haryana) Open cast Semi mechanized**

The applicant has assigned the work of preparation of mining plan to Sh D.C.Yadav Regd. No RQP/DMG/HRY/2018/03 & S.N.Sharma QP.(Consent letter enclosed as annexure -2 and copy of RQP certificates as annexure-3(i) and 3 (ii).

House No. 282 Sector 11-D Faridabad (Haryana)

Mobile no. 9416214247; 09560848579

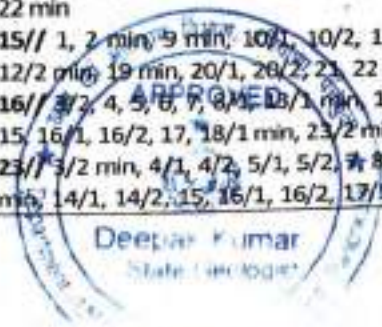
Email- [dcyadav747@gmail.com](mailto:dcyadav747@gmail.com)

**2.0 Details of the Mining lease**

a) Details of the land covered in the 'Area' given in LOI dated 21-07-2023 is as under:-

Mining Lease of Sand (Minor Mineral) over an area of 99.384 ha is located in District Palwal namely Thantri Unit covering Thantri and Rajupur Khadar villages for extraction of the sand (river bed);

Name of block	Name of village	Area in Acres as per revenue record		Total Mineral concession Area	Details of Khasra Nos
		For Mining	For Ancillary Area		
Thanthri	Thanthri	107.29	.10	248.46	<b>For Mining</b> 3// 11 min, 20/1, 20/2 min, 21 min 4// 7, 8 min, 13/1 min, 13/2, 14, 15/1, 15/2, 16/1 min, 16/2 min, 17/1, 17/2, 18/1 min, 23 min, 24/1, 24/2, 25/1, 25/2, 10// 3 min, 4/1, 4/2, 5, 6/1, 6/2, 7/1, 7/2, 8/1, 8/2 min, 13/1 min, 13/2, 13/3, 14, 15/1, 15/2, 15/3, 15/4, 16/1, 16/2, 17, 18/1, 18/2 min, 23 min, 24, 25 11// 1 min, 10 min, 11 min, 20 min, 21/1, 21/2, 22 min 15// 1, 2 min, 9 min, 10/1, 10/2, 11, 12/1 min, 12/2 min, 19 min, 20/1, 20/2, 21, 22 min 16// 3/2, 4, 5, 6, 7, 8, 9, 10, 11 min, 13/2 min, 14, 15, 16/1, 16/2, 17, 18/1 min, 23/2 min, 24, 25 23// 3/2 min, 4/1, 4/2, 5/1, 5/2, 8/1 min, 13/3 min, 14/1, 14/2, 15, 16/1, 16/2, 17/1, 17/2, 18/1



**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
AREA-248.46 Acres. (99.384 ha) District- Palwal (Haryana) Open cast Semi mechanized**

				<p>min, 23 min, 24, 25/1, 25/2,  <b>24//</b> 1, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2,                  12 min, 19 min, 20, 21, 22 min  <b>28//</b>, 1, 2 min, 9/1 min, 9/2 min, 10, 11, 12 min,                  19 min, 20, 21/1, 21/2, <b>29//</b>, 3 min, 4, 5/1, 5/2,                  6/1, 6/2, 7/1, 7/2, 8 min, 13/2 min, 14/1, 14/2,                  15/1, 15/2, 15/3, 16, 17/1, 17/2, 18/1 min, 23/2                  min, 24/1, 24/2, 25, <b>38//</b>, 3/2 min, 4/1, 4/2, 5/1,                  5/2, 6, 7/1, 7/2, 8/1 min, 13/2 min, 14/1, 14/2,                  15, 16, 17 min, 18/1 min, 24 min, 25  <b>39//</b>, 1, 2 min, 3 min, 8 min, 9, 10, 11/1, 11/2,                  12, 13/1 min, 13/2 min, 18 min, 19/1, 19/2, 20,                  21, 22, 23 min  <b>41//</b>, 1, 2, 3 min, 9, 10, 11  <b>42//</b>, 4 min, 5, 6/1, 6/2, 6/3, 7 min, 14 min, 15,                  17 min.  <b>For Ancillary area</b>  <b>24//</b> 4, 5/1, 5/2, 6, 7, 14, 15.  <b>25//</b> 1/ 1, 1/2, 10, 11.</p>
Rajpur Khadar	120.57	11.50		<p><b>For Mining</b>  <b>7//</b>, 3/1, 3/2, 8/1 min, 8/2, 9, 11/2, 11/1, 12,                  13 min, 14 min, 17 min, 18, 19, 20, 21, 22,                  23, 24 min  <b>8//</b> 16 min, 25/1 min, 25/2  <b>10//</b> 5/1 min, 5/2 , 6/1, 6/2, 7 min, 14 min,                  15/1, 15/2, 16, 17 min, 24/2 min, 25  <b>11//</b> 1, 2, 3, 4 min, 7 min, 8/1, 8/2, 9, 10/1,                  10/2, 11, 12, 13/1, 13/2, 14 min, 18 min,                  19/1, 19/2, 20, 21, 22 , 23 min  <b>24//</b> 1, 2/1, 2/2, 3/1, 3/2, 7 min, 8 min, 9,                  10, 11, 12, 13, 14 min, 17/1 min, 17/2 min,                  18, 19, 20, 21, 22/1, 22/2, 23, 24/1,2,3 min  <b>25//</b> 4/2 min, 5, 6, 7 min, 15 min, 16 min, 25                  min  <b>29//</b>, 5 min, 6/1 min, 6/2 min, 15 min  <b>30//</b> 1, 2/1, 2/2, 3/1, 3/2, 4 min, 7 min, 8,                  9/1, 9/2, 10, 11, 12, 13, 14, 15 min, 16 min,                  17  <b>30//</b> 18, 19, 20 min, 21/1,2 min, 22/1, 22/2,                  23, 24, 25 min  <b>44//</b>, 10/2 min, 11/1 min, 20/1 min, 20/2                  min, 21 min  <b>45//</b> 1 min, 2, 3, 4, 5 min, 6 min, 7, 8, 9/1                  min, 9/2 min, 10 min, 11 min, 12 min, 13, 14,                  15, 16, 17, 18, 19 min, 22 min, 23, 24, 25/1,                  25/2  <b>52//</b> 2 min, 3, 4, 5, 6/1, 6/2, 7, 8 min, 13                  min, 14, 15, 16, 17 min, 18 min, 23 min, 24,</p>


  
 APPROVED  
 Deena Kumar  
 State Geologist



**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
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				25 53// 1/1, 1/2 min, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20/1, 20/2, 21, 22, 23 min, 61// 1, 2/1, 2/2, 3/1, 8 min, 9, 10, 11, 62// 3 min, 4 min, 5, 6. For Ancillary area 31// 6, 7, 8, 13, 14, 15, 16, 17, 18, 23, 24, 25/1
--	--	--	--	--

GPS Coordinates of the proposed area provided by Mines & Geology Department  
Haryana as published in auction Notice are as under:

Block Name	Name of Village	Pillar	Latitude	Longitude
Thanthri	Thanthri	J	28° 11'11.616"N	77° 28' 28.660"E
		K	28° 10'50.582"N	77° 28' 30.541"E
		L	28° 10'35.009"N	77° 28' 32.268"E
		M	28° 10'25.346"N	77° 28' 34.655"E
		N	28° 10'20.421"N	77° 28' 24.109"E
		O	28° 10'28.928"N	77° 28' 20.774"E
		P	28° 10'36.972"N	77° 28' 19.865"E
		Q	28° 10'48.076"N	77° 28' 20.602"E
		R	28° 10'52.298"N	77° 28' 19.586"E
		S	28° 10'55.349"N	77° 28' 19.111"E
		T	28° 11'0.907"N	77° 28' 19.651"E
		U	28° 11'8.026"N	77° 28' 19.793"E
		Rajupur Khadar	Rajupur Khadar	M
M1	28° 10' 21.221"N			77° 28' 35.743"E
N	28° 10' 20.421"N			77° 28' 24.109"E

7



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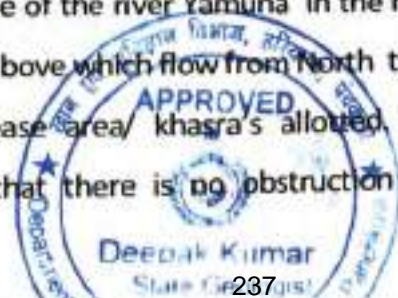
	O	28° 10' 14.553"N	77° 28' 23.463"E
	O1	28° 10' 14.946"N	77° 28' 35.860"E
	P	28° 10' 9.329"N	77° 28' 23.131"E
	P1	28° 10' 10.804"N	77° 28' 35.240"E
	Q	28° 10' 1.736"N	77° 28' 24.643"E
	Q1	28° 10' 5.400"N	77° 28' 36.000"E
	R	28° 9' 51.048"N	77° 28' 28.863"E
	R1	28° 9' 58.900"N	77° 28' 38.000"E
	S	28° 9' 45.294"N	77° 28' 30.544"E
	S1	28° 9' 52.200"N	77° 28' 40.500"E
	T	28° 9' 42.436"N	77° 28' 33.186"E
	T1	28° 9' 46.600"N	77° 28' 43.000"E
	U	28° 9' 40.079"N	77° 28' 34.352"E
	U1	28° 9' 34.561"N	77° 28' 49.013"E
	V	28° 9' 29.871"N	77° 28' 36.253"E

**b) Name of Mineral**

River Sand (minor mineral) .

**c) Description report of the mining lease/ quarry license with plan (copy of sanction order/ lease deed/ license)( Copy of LOI annexure-1)**

Based on the details published vide Haryana Government Gazette notification for auction dated 10-05-2023 & corrigendum no 3272 dated 07-06-2023 & LOI dated 21-07-2023 issued by DMG, Haryana and the Khasra map submitted by the applicant, survey of the area was carried out along the course of the river Yamuna in the revenue villages of Thantri and Rajapur Khadaras detailed above which flow from North to South side. Workings will be restricted within the lease area/ khasra's allowed. Mining activities will be carried out in a manner so that there is no obstruction to the





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movement of water flow, if any, during rainy season. The total length of the lease area is about 3.0kms

**d) Key plan of the area**

**Key plan:** key plan on 1:50,000 scales covering an area in a radius of 5 km showing salient features as per Rule 28(5) (a) of MCDR, 1988 has been prepared on Toposheet (Plate no. 2) The area is marked on the enclosed key map (Plate no. 2)

**e) Location map of the mining lease showing the details of the approach roads up to the mine**

Lease area is shown on the Key Plan **Plate – 2**. It forms a part of G. T. Sheet No's 53E/5,9 and 53 H/8,12 .The area is approachable from nearest town of Palwal, Faridabad, Hodal and Hassanpur. These are located about from 17 Kms east of Palwal City. All these quarries are connected by metalled road branching off from GT road NH-2 and road connecting Alawalpur Hassanpur-Palwal via Thantri and up to the river quarries as shown in the plate no, 2

State Headquarters: Chandigarh is about 345 km in the North of the lease area and National Capital Delhi is about 111 km from the north edge of the proposed area.

**f) Infrastructure facilities:**

<b>Nearest railway station</b>	Palwal , Railway station
<b>Police station</b>	Palwal
<b>Post office</b>	All the nearby villages
<b>Medical facilities</b>	Palwal, Balabgarh , Faridabad & New Delhi
<b>Electricity</b>	Electrical supply is available in all nearby villages.



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<b>Education facilities</b>	Most of the nearby villages have secondary schools and for higher education institutes are available at Palwal, Hodal, Hassanpur, Ballabgarh and Faridabad.
<b>Mode of transportation of mineral</b>	Mineral Sand will be transported by hired trucks. Loaded trucks will travel on Kuccha road made for plying of trucks. Temporary roads will provide access to the river bed and the movement of loaded trucks. As the lease area stretches in a length of around 3.0km, working will be carried out in both villages river bed. Each village has its outlet meeting the tar road on the nearby villages and from where the mineral will be sent to various destinations. Similarly, mineral will be transported on the other side through approach roads which finally merge with tar roads for final destinations.

- 3) DETAILS OF EXISTING MINING PITS, THEIR DIMENSION AND LOCATIONS**  
Presently there is no pit available in the river bed. The monsoon waters/flooding in Yamuna River have peneplained the earlier worked river bed. Surface & geological plan & sections enclosed as **Plate – 3**.

**Present Land use Pattern :- (in hectares)**

S. No.	Particulars	Present land use in Acres	Present land use in hectares
1.	Pit area	0.00	0.00
2.	Dump area	0.00	0.00
3.	Area for ancillary activities, office , rest shelter , mineral storage etc	20.60	8.24





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4	Restricted area	52.50	21.00
5.	Plantation	0.00	0.00
6.	Area available for mining	175.36	70.144
<b>Total</b>		<b>248.46</b>	<b>99.384</b>

**3.1 Physiography, Hydrogeology, Drainage and Climate**

Palwal district of Haryana lies between 27° 50' : 28° 15'40" north latitudes and 77° 05' : 77°33' east longitudes. Total geographical area of the district is 1364.55 sq.km. Administratively, Palwal is the district Headquarter of the district. It is divided into 4 development blocks namely Palwal, Hathin, Hodal and Hassanpur . The district area is bounded on western side Mewet district, Eastern side by U.P. state and northern side by Faridabad district and falls in survey of India topo sheets no. 53H/3, H/4, H/7, H/8, H/9, H/12, and 54E/5 and E/9. There are two main canals Agra canal and Gurgaon canal which passes through western and central part of the district respectively from north to south. In the northern part of the district Budia nala is flowing from east to west and discharges its rainy water in River Yamuna. The Gaunchi main drain passes through north south direction of the district running in between Agra canal and Gurgaon canal. CGWB has carried out groundwater exploration besides other hydro geological and geophysical studies in the district.

The river bed area is marked by North to South direction slope. Nearby area is almost flat topography of younger sedimentary formations, which are surrounded by fine-grained soil. Sand is transported and deposited in river bed during Monsoon. Sometimes floods crosses the river banks and deposit the sand in the flood plains as well.

The levels of the river bed and bank area of the proposed mining area are as under.

Location	River bed levels (mRL)	River bank top levels(mRL)
00 (south end )	129.50	133.00
400	129.66	132.00
800	129.87	133.00
1200	130.32	133.57
1600	130.87	133.90
2000	131.37	134.40
2400	131.60	135.20
2800	132.85	135.30





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( north end)

Highest elevation in river bed at extreme north end is 132.85 mRL and bank top level is 135.30 mRL where as the levels at the extreme south end in river bed is 129.50mRL and River bank top is 133.00 mRL

The Yamuna river flows from N to S direction in Thanthri & Rajpur khaddar revenue village.

**Hydrogeology**

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

**RAINFALL AND CLIMATE:**

The climate of Palwal district can be classified as tropical steppe, semi arid and hot which is mainly characterized by the extreme dryness of the Air except during monsoon months. During three months of south west monsoon from last week of June to September, the moist air of oceanic penetrate into the district and causes high humidity, cloudiness and monsoon rainfall.





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The period from October to December constitutes post monsoon season. The cold weather season prevails from January to the beginning of March and followed by the hot weather or summer season which prevails up to the last week of June. The normal annual rainfall in Palwal district is about 542 mm spread over 27 days. The south west monsoon sets in the last week of June and withdraws towards the end of September and contributes about 85% of the annual rainfall. July and August are the wet test months 15% of the annual rainfall occurs during the non-monsoon months in the wake of thunder storms and western disturbances.

Normal Annual Rainfall: 542 mm

Normal Monsoon Rainfall: 460 mm

Temperature

Mean Maximum: 41<sup>0</sup> C (May & June)

Mean Minimum: 8<sup>0</sup> C (January)

Normal Rainy days : 27

. (Source: District Groundwater Brochure CGWB).

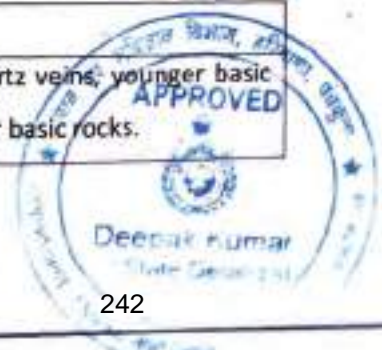
**3.2 Geology of the Area**

**3.2.1 Regional Geology**

The Regional Geology of Distt. Faridabd & Palwal (Haryana) is represented by varieties of formations belonging to Delhi Super Group. Stratigraphically the rock formations of Delhi super group are composed of arenaceous, argillaceous & calcareous sediments. These sediments have been placed by Heron (1923) in the Alwar & Ajabgarh series of Delhi system & intruded by basic granitic rocks.

The general succession of Delhi system can be represented as follows: (Das, Gupta S.P. 1968)

Series	Rock Types
Recent intrusive	Alluvium, dune sand, soil, ankerite, chert, quartz veins, younger basic dykes. Granites, Pegmatites, Quartz veins Older basic rocks.



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Ajabgarh series	Carbonaceous phyllites & schists etc. (Local).
	Massive Quartzites.
	Phyllites, Mica-shists (Local).
	Marble, calc-gneiss, amphibolite etc.
	Schist with or without garnet. Stauroite, Kyanite, Sillimenite, Andalusite, phyllites, sandy phyllites.
Alwar series	Amphibole quartzite, marble, Amphibolites.
	Arkosic quartzites, quartzites & Interealated phyllite & schists. Magnetite & Hametite quartzites etc.
	Phyllite & schists.

**3.2.2 LOCAL GEOLOGY**

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

The litho units encountered in the river bed are younger sedimentary formations in nature and are brought by river water from high reaches of Himalayan range of hills of Himachal Pradesh. The sediments are river borne and have been deposited in the riverbed and its flood plains

**i) Geology of the area**

The sediments of the river bed are of recent nature. These sediments have been brought by river water and deposited in the bed of Yamuna River. The following sequence of formations has been observed in the area;

- Soil/Alluvium
- Sand





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ii) **Description of formations**

Description of formations found in the area are as under:

Soil/ alluvium: The finer sediments have been deposited in the flood plains of the River Yamuna.

**Sand**

Sediments of less than 1-3 mm size are predominantly deposited in the riverbed by flood waters during rainy season. There is no perfect classification between Sand and Silt. They have been deposited in a mixed state. As usual the larger size sediments are deposited at the bottom and the smaller sizes are deposited at the top, on the edges/flanks of the riverbed. However, during the course of shifting of the river course towards East about five hundred years back, silt was deposited on top in thicker layers up to 3 meters in some cases underlain by about 6-15 meters of sand.

Sediments of various sizes and in mixed form are predominantly deposited in the river bed and there is no perfect classification between sediments. These may be called as coarse sand, medium sand and fine sand.

The term sand is used to denote an aggregate of mineral or rock grains greater than 1/16mm and less than 2 mm in diameter.



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Φ	PHI - mm CONVERSION $\phi = \log_2 (d \text{ in mm})$ $\phi_{mm} = 0.001mm$		SIZE TERMS (after Wentworth, 1922)	SIEVE SIZES		Intermediate diameters of natural grains equivalent to sieve size	Number of grains per mg		Settling Velocity (Quartz, 20°C)		Threshold Velocity for traction cm/sec		
	mm	Fractional mm and Decimal inches		ASTM No. (U.S. Standard)	Tyler Mesh No.		Quartz spheres	Natural sand	Spheres (Cobb, 1971) cm/sec	Crushed	(Nevin 1946)	(modified from Hyattson 1939)	
-8	256	10.1"	PEBBLES										
-7	128	5.04"											
-6	64.0	2.52"		very coarse	2 1/2"	2"							
-5	32.0	1.26"		coarse	1 1/2"	1 1/2"							
-4	16.0	0.63"		medium	1 1/4"	1.05"							
-3	8.00	0.32"		fine	3/4"	.742"							
-2	4.00	0.16"		very fine	5/8"	.625"							
-1	2.00	0.08"		Granules	1/2"	.525"							
0	1.00	1		very coarse	3/8"	.371"							
1	.500	1/2		coarse	20	20	1.2	.72	.6				
2	.250	1/4	medium	30	28	.86	2.0	1.5					
3	.125	1/8	fine	40	35	.59	5.6	4.5					
4	.062	1/16	very fine	60	60	.30	43	35					
5	.031	1/32	coarse	80	80	.215	120	91					
6	.016	1/64	medium	100	100	.155	350	240					
7	.008	1/128	fine	140	160	.115	1000	580					
8	.004	1/256	very fine	200	200	.080	2900	1700					
9	.002	1/512	Clay/Silt boundary for mineral analysis	270	270								
10	.001	1/1024	CLAY	325	325								



Note: The relation between the beginning of traction transport and the velocity depends on the height above the bottom that the velocity is measured, and on other factors.



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### 3.2 PHYSICAL & CHEMICAL CHARACTERISTICS OF MINERAL

Technically, sand is merely a size category. Sand is particulate matter that's larger than silt and smaller than gravel. Different specialists set different limits for sand:

Engineers call sand anything between 0.074 and 2 millimeter, or between a U.S. standard #200 sieve and a #10 sieve.

Soil scientists classify grains between 0.05 and 2 mm as sand, or between sieves #270 and #10.

Sedimentologists put sand between 0.062 mm (1/16 mm) and 2 mm on the Wentworth scale, or 4 to -1 unit on the phi scale, or between sieves #230 and #10. In some other nations a metric definition is used instead, between 0.1 and 1 mm.

From a geological viewpoint, sand is anything small enough to be carried by the wind but big enough that it doesn't stay in the air, roughly 0.06 to 1.5 millimeters. It indicates a vigorous environment.

#### **Sand Composition and Shape**

Most sand is made of quartz or its microcrystalline cousin chalcedony, because that common mineral is resistant to weathering. The farther from its source rock sand is, the closer it is to impure quartz. But Yamuna sands contain quartz grains, tiny bits of rock (lithics), or dark minerals like limestone and ferruginous concretions.

The size of the sediments is variable. The grains whether small or large are rounded in shape. Sand is grey, brown in color, coarse to fine grained. The present deposits are of good quality and can be used for building industries. There is no other use of this material.

#### **3.2.4 ORIGIN & CONTROL OF MINERALISATION (ANNUAL REPLENISHMENT OF MINERAL IN RIVER BED AREA vis-à-vis SEDIMENTATION)**





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Sedimentation, in the geological sciences, is a process of deposition of a solid material from a state of suspension or solution in a fluid (usually air or water). Broadly defined it also includes deposits from glacial ice and those materials collected under the impetus of gravity alone, as in talus deposits, or accumulations of rock debris at the base of cliffs. The term is commonly used as a synonym for sedimentary petrology and sedimentology.

Sedimentation is generally considered by geologists in terms of the textures, structures, and fossil content of the deposits lay down in different geographic and geomorphic environments.

The factors which affects the "Computation of Sediment":

a) Geomorphology & Drainage Pattern : The following geomorphic units plays important role :

- Structural Plain
- Structural Hill
- Structural Ridge
- Denudation Ridge & Valley
- Plain & Plateau of Gangetic plain
- Highly Dissected pediment
- Un dissected pediment

b) Distribution of Basin Area River wise ( Area in Sq. Km or Sq. Miles)

c) Drainage System/Pattern of the area (Drainage Density = .....Km/Sq. Km of Yamuna River

d) Rainfall & Climate : Year wise Rainfall data for previous 10 years of Yamuna Basin/River

e) As per Dandy & Bolton study "Sediment Yield" can be related to

f) Catchment Area and

g) Mean Annual Run-off

Sand is an essential minor mineral used extensively across the country as a useful construction constituent and variety of other uses in sports, agriculture, glass making (a form of sand with high silica content) etc. It is common knowledge that minerals are non-renewable but this form



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of mineral naturally gets replenished from time to time in a given river system and is very much interrelated to the hydrological cycle in a river basin.

The Rivers originating from the Himalayas bring with them lots of aggregate materials whereas as they move downstream, only finer elements / minerals like sand are found in abundance.

River Yamuna near Dakpathar barrage leaves Uttarakhand and enters Himachal Pradesh.

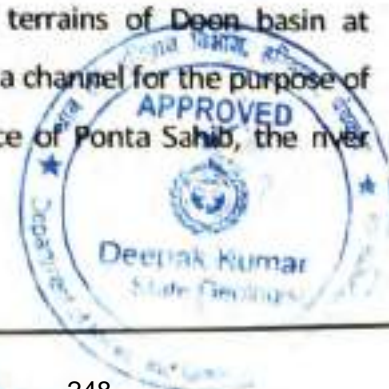
The YAMUNA RIVER is the biggest tributary of the river Ganga in North India. Its source in the Yamunotry glacier at an elevation of 6387 mtrs on South western sides of Banderpooch crests in the lower Himalayan ranges. The overall span of the Yamuna river is 1376 Kms (855 miles) with catchment area of 366223 square km ( 141,399 square mile). This encompasses 40.2 % of the whole Ganga valley, prior to joining Ganga at TriveniSangam in Allahabad (UP)

**Itinerary of Yamuna River and its tributaries**

The river passes through many states such as Uttrakhand, UP, Haryana, going across to HP and then Delhi. With yearly discharge of around 10,000 cubic billion meters (cbm) and consumption of 4400 cbm (of which irrigation comprises 96%), the river represents above 70% of water provision of Delhi. Yamuna water are fairly good quality for its entire span from Yamunotri in Himalayan ranges to Wazirabad in Delhi, the length of which is around 375 Kms.

**Itinerary of Drainage area of Yamuna:**

The origin of Yamuna is situated in the Yamunotri glacier at an elevation of 6387 mtrs on SE sides of Banderpooch crests, which are located in the Mussoorie range of lower Himalayan range in Uttrakashi district of Uttrakhand, to the North of Haridwar. From this place Yamuna runs to South around 200 Kms across the Shivalik mountain ranges and lower Himalayan ranges. A significant portion of its beginning of Drainage basin (with total area of 217.00 square km) is situated in HP and a major tributary sapping the upper drainage basin in the Tons, which is also biggest and most extensive tributary of the Yamuna. Other tributaries in the area are the Rishi Ganga, Giri, Hanuman Ganga, Kunta& Bata, which sap the upper drainage basin of the huge Yamuna river. Subsequently, the river moves down the terrains of Doon basin at DakPathar close to Dehradun, in this place water is redirected into a channel for the purpose of electricity generation. Once it goes across the sikh religious place of Ponta Sahib, the river





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arrives at Tajewala in the YAMUNANAGAR district of Haryana where a dam was constructed in 1873. This dam is the origin of the two major channels or water courses – Eastern Yamuna Canal and Western Yamuna Canal and both drain in UP & Haryana. The Western Yamuna Canal (WYC) traverses Kamal, Yamunanagar and Panipat prior to arriving at the Haiderpur water treatment plant, which provides a portion of municipal water provisions of Delhi. The Yamuna also forms natural boundary between the states of Uttrakhand& HP and also amid the states of UP and Haryana. Together with the Ganga to which it flows almost parallel once it meets the Indo-Gangetic plateau, the biggest Alluvial productive area in the World, it forms the Ganges-Yamuna Doab are stretched across 69,000 square Km which is 33% of the whole area.

Table of Drainage Basin area of River Yamuna (square KM/square mile) with % of Drainage Basin

1.	HP	5799/2240 (1.6 %)
2.	UP & Uttrakhand	74208/142 (21.50 %)
3.	Rajasthan	102883/39739 (29.80%)
4.	Haryana	21265/8214(6.5%)
5.	Delhi	1485/574(0.4%)
6.	MP	14023/5416 (40.6%)

**Dandy & Bolton formula for calculation of Sediment Yield:**

Dandy & Bolton formula is often used to check whether the sedimentation yield exceeds the replenishment rate but the whole question is whether there is adequate monitoring of the river basin, the answer is no as hydrological stations are sparsely spread. The formula uses catchment area and mean annual runoff as key determinants to give a yield value. It does not differentiate in basin wide smaller streams and their characteristics. CWC distinguishes river basins as classified and non-classified, as per the latest hydrological data for unclassified River basins; there are 122 GDSW (Gauge, Discharge, Sediment & Water Quality) sites in 12 such



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basins, the number was 147 in 2005. This brings in context the whole issue of scientific mining, thereby indicating that the monitoring of sediment yield in rivers / streams within the river basins is essential to arrive at extraction rates and express and conduct environmental studies based on these basin wide characteristics which should become part of the 'Terms of Reference'.

**Sediment Yield versus Drainage Area**

Dandy and Bolton studied sedimentation data from about 1500 reservoirs, ponds, and sediment detention basins. In developing their formulas, they used data from about 800 of these reservoirs with drainage areas greater than or equal to 1 mi<sup>2</sup>. The smaller watersheds- those of drainage area less than 1 mi<sup>2</sup>-were excluded because of their large variability of sediments yield, reflecting the diverse effects of soils, local terrain, vegetation, land use, and agricultural practices.

For drainage areas between 1 and 30,000 mi<sup>2</sup>, Dandy and Bolton found that the annual sediment yield per unit area was inversely related to the 0.16 power of the drainage area:

In which S= sediment yield in tons per square mile per year; SR = Reference sediment yield

Corresponding to a 1-mi<sup>2</sup> drainage area, equal to 1645 tons per year; A = drainage area in square

miles; and AR = reference drainage area (1 mi<sup>2</sup>)

**Sediments Yield versus Mean Annual Runoff**

Dandy and Bolton studied sedimentation data from 505 reservoirs having mean annual runoff data. Annual sediment yield per unit area was shown to increase sharply as mean annual runoff Q in- creased from 0 to 2 in. Thereafter, for mean annual runoff from 2 to 50 in. annual sediment yield per unit area decreased exponentially.

This led to the following equations.

For Q < 2 in.:

For Q > 2 in.:

In which QR = reference mean annual runoff QR = 2 in.





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Dandy and Bolton combined Equation 15-10 and 15-11 into a set of equations to express sediment

yield in terms of drainage area and mean annual runoff.

For Q < 2 in.:

For Q > 2 in.:

Sec: 15.2 Sediment Productions.

For SR = 1645 tons/mi<sup>2</sup>/y, QR = 2 in., and AR = 1 mi<sup>2</sup>, Eq. 15-12 reduces to the followings:

For Q < 2 in.:  $S = 1280 Q^{0.46} (1.43 - 0.26 \log A)$

For Q > 2 in.:  $S = 1965 e^{-0.055Q} (1.43 - 0.26 \log A)$

Equations 5-12 and 5-13 are based on average values of grouped data; therefore, they should be used with caution. In Certain cases, local factors such as soils, geology, topography, land use, and vegetation may have greater influence on sediment yield than either mean annual runoff or drainage area. Nevertheless, these equations provide a first approximation to be of sediment yield for watershed planning purposes.

**Calculation of Sediment Yield for Sand Mine of Thantri Block**

Total Targeted Production is 37.80 Lakh MT/year

- Drainage basin area of river Yamuna and its tributaries in Haryana : 8214 square miles
- Normal Annual Rainfall of Yamuna catchment area district (1978 to 2005) : 1076mm or 42.36 inch

With above inputs, the calculation of the sediment yield by the Dandy and Bolton formula is illustrated below:

Sample Set	S.No.	Q (in inches)	A (in square mile)	S
	1	3.5	150	1400.823
	2	27.4	8214	179.4756

$$S = 1965 e^{-0.055Q} [1.43 - 0.26 \log(A)]$$

Dandy & Boltan formula also says that actual sediments yield from individual drainage basins may vary 10-fold or even 100 fold from computed yields. Since itinerary of river Yamuna indicates that its basin comprises of sediment rocks with good average rainfall therefore there





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are fair chances of yield of sediments to be 50 fold of computed results hence Actual Sediment Yield will be about 40-42 Lakh Tones / Annum

The equations express the general relationships between sediment yield runoff and drainage area. They may provide a quick rough approximation of mean sediment yields on a regional basis for preliminary watershed planning. Because Dandy & Bolton have derived the equation from average values computed sediment yields normally would be low for highly erosive area and high for well stabilized drainage basins with high plant density. Factors which have direct bearing on sediments yield & limitations of Dandy & Bolton equation.

Sediment yield of a sediment basin has direct impact of local terrain, climate, vegetation, soils, agricultural practices & land use pattern of catchment area of the sediment basin aforesaid factors varies from basin to basin therefore, Dandy & Bolton has category stated that use of the equation to predict sediment yield for a specific location would be unwise because of the wide variability caused by local factors not considered in the equation development. Actual sediment yield from individual drainage basins may vary 10-fold or even 100-fold from computed yields.

### **3.2.5 Grade & Use of ( Sand)**

The minor mineral sand is made of quartz or quartzite/its microcrystalline cousin chalcedony, because that common mineral is resistant to weathering. Sands contain quartz, feldspar grains, tiny bits of rock (lithics), or dark minerals like ilmenite and magnetite.

The size of the sediments is variable. The grains whether small or large are rounded in shape. Sand is mainly grey, brown in color, coarse to fine grained. The present deposits are of good quality and can be used for building industries. There is no other use of this material.

### **3.2.6 Exploration**

No specific method of exploration is required as the river borne sediments are deposited all along the riverbed and are very well exposed on the surface. Moreover, these sediments are accumulated/ replenished every year during rainy season by flood waters to almost the same level depending on the



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intensity of rains on the upstream side. Adequate quantity of sand reserves is available for meeting consumer demand.

(Surface-cum-geological plan & sections plate-3 ).

### **3.3 RESERVE**

#### **3.3.1 METHOD OF ESTIMATION OF RESERVE**

Volumetric method is adopted for calculating reserves of sand. Reserves are estimated on the basis of established width, thickness, and strike length based on influence of the mineralized formation in the river bed. Where good inferences are available only such area are considered for reserve estimation. The depth is considered up to 3.0 m as working is permitted up to 3.0m depth in the riverbed.

#### **Geological & Mineable reserves**

##### **PROVED RESERVES**

Following special conditions which are applicable for excavation of minor mineral(s) from river beds in order to ensure safety of river-beds, structures and the adjoining areas are considered while calculating the reserves of this area:

- (i) No mining would be permissible in a river-bed up to a distance of five times of the span of a bridge on up-stream side and ten times the span of such bridge on down-stream side, subject to a minimum of 250 meters on the up-stream side and 500 meters on the down-stream side;
- (ii) There shall be maintained an un-mined block of 50 meters width after every block of 1000 meters over which mining is undertaken or at such distance as may be directed by the Director or any officer authorized by him;





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- (iii) The maximum depth of mining in the river-bed shall not exceed three meter from the un-mined bed level at any point in time with proper bench formation;
- (iv) Mining shall be restricted within the central 3/4th width of the river/ rivulet;
- (v) A barrier of 7.5 m width will be left from the lease boundary, if falling in the river bed.

River is not having any water flow during post monsoon period and sand bed remains dry.

**Mineral reserves are calculated up to 3 m depth from river bed surface RL.**

- a) Mineral Reserves falling in the river bed area has been calculated taking the maximum permissible depth of 3 m from the river bed surface RL.
- b) The bulk density of Sand is considered 1.80.
- c) Volumetric method is adopted for calculating reserves of Sand.
- d) The mineable reserves are calculated by deducting "Blocked Geological Reserves on account of river banks, lease boundary, railway line, highways, bridges, (where ever applicable) from total proved Geological Reserves".
- e) It is considered that river bed Sand shall be replenished every year as evident from preceding paragraph (3.2.6) on " Annual Replenishment of Mineral in River Bed Area vis-à-vis Sedimentation"

**UNFC classification – Codes of UNFC are followed for reserve calculation**

1. UNFC is a three digit code based system, the economic viability axis representing the first digit, the feasibility axis the second digit and the geological axis the third digit. Each digit provided.
2. Codes 1, 2 and 3 in decreasing order. The highest category of resources under UNFC system has code (111) and for lowest category the code is (334).



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3. Code (111): This code is provided for the economically mineable part of the measured mineral resources (proved category reserves).
4. Code (121): This code is provided for the economically mineable part of the indicated mineral resources (probable category reserves).
5. Code (211): The part of the measured mineral resources (proved category), which as per feasibility study has not found economically mineable. The reserves blocked in 7.5 meters buffer zone and 50 meters from permanent structure.
6. Code (222): The part of the indicated mineral resources (probable category), which as per feasibility study has not found economically mineable. The reserves blocked in 7.5 meters buffer zone and 50 meters from permanent structure.
7. Code (480): Tonnage, Grade and mineral contents can be estimated with low level of confidence and resources are also inferred from geological.

The reserves of Sand calculated by volumetric method and are  
All reserves are proved reserves. Details are given as below.

1. The entire reserves of Sand up to the depth of 3.0 m are calculated.
2. The bulk density of sand is considered 1.80 MT/CUM
3. Bulk density is based on the fact that the Regional Geology of the Sub-Himalyas comprising Subathu, Dhagsais, Kasaulis and Shiwaliks shows that the major mineral constituents in the catchment area of River Yamuna and its Tributaries are composed of clay, sand, silt, sandstone, shale, limestone, Marble, quartz, quartzite and ferruginous concretions etc. The bulk density of the constituent minerals is detailed as under.

4.

Mineral	Bulk density( g/cm <sup>2</sup> )
Clay	1.63 to 2.60
Silt	1.80 to 2.20
Sand	1.70 to 2.30
Sand stone	2.0 to 2.60
Shale	1.77 to 2.5
Limestone	1.93 to 2.90
Quartzite	2.70 to 2.80
Quartz	2.65
Marble	2.67 to 2.75





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5. Therefore the average density of River Sediments namely river sand is considered as 1.80.

6. The reserves of Sand calculated by volumetric method and are summarized here below:  
 Reserves in MT= Area in acres x4000X depth 3.0mx Bulk Density 1.80

Table : Geological Reserves

Total area in acres	Mining area in acres	Ancillary area in acres	Blocked area in acres including bed bar,7.5m & ¼ of river banks	Geological Reserves MT	Blocked reserves MT	Mineable reserves MT	Targetted Production MT
248.46	227.86	20.60	52.50	49,21,776	11,34,000	37,87,776	37,80,000

**A) PROVED RESERVES AS PER UNFC CODE (111)**

Total Geological reserves: 49, 21,776 MT

**B) BLOCKED RESERVES AS PER UNFC CODE (211 & 222) =11, 34, 000 MT**

**C) MINEABLE RESERVES = (A-B) = 37, 87, 776 MT**

**D) TARGETED PRODUCTION**

**37, 80,000 MT per Year up to the lease period (or say 3.780 Million MT/year)**

**E) Balance reserves & Life of Mine**

For Balance reserves it is presumed that the mineral will be replenished every year during the rainy season. New mineral will be added every year in the river bed. Period of Anticipated life of mine cannot be estimated accurately in the riverbed since the quantum of sand replenished every year depend on the intensity of flood waters from upstream side and proposed rate of production.





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**4.0 DETAILS OF PRODUCTION & DISPATCHES OF FIVE YEARS**

This is a new lease area allotted to the applicant. As it is a new mine. Preproduction activities are required. Roads from lease boundary to entry to the mining area, from mining faces to the proposed exit area, from ground level to the mining area, to the mines office complex, plantation area, and to the garage / workshop & Access roads / haul roads are proposed to be developed.

The Future production programme has been planned as per the details given below:

**4.1 RIVER SAND MINING WITH SIMULTANEOUS RECLAMATION**

Mechanized mining with simultaneous reclamation yearly by rain fed waters and pollution free mining method shall be adopted. River sand used for construction industry is available in River Yamuna as well as all along the river Yamuna in the plains of Haryana. Yamuna River flows along some major towns of Haryana from North to South like Yamuna Nagar, Karnal, Panipat, Sonapat, Faridabad and Palwal. The sand is a minor mineral and falls under the preview of the Mines and Geology Department, State of Haryana.

The sand mines of Thantri Unit District Palwal are approachable from Highway No.-2 and are about 15 -18 Kms on the East side from the highway. The villages of Thantri and Rajupur Khadar are well connected with Tar road network. The same will be used to take the mineral transported to various destinations. Katcha roads will be developed from Tar road to the mine site bypassing the villages.

**4.2 Mine Roads**

Both villages in the proposed lease area of Thantri Unit are connected by metal roads . The mine roads branching off the village roads, will be consolidated to prevent sinking of heavy truck wheels (IVA), the mine roads are proposed at least 10 mtrs wide to permit easy maneuverability of trucks, provide cross-over's and changing points. To keep pollution off the mine, dust is proposed to be suppressed by spraying roads with water at intervals of 3 hrs by



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using tractor/truck mounted water sprinklers. The water for this purpose will be obtained from tube wells located nearby/or permission will be taken to take/draw water from River Yamuna.

**4.3 Proposed Method**

Mining work will be carried out by mechanized method by forming one bench of 3 m high in river bed. There are no existing pits at present as the mining activities are closed for the last few years. The sand will be excavated by backhoe type excavators directly loading into dumpers/ trucks for dispatch to consumers situated in and around Delhi/NCR. Loading of mineral shall be mechanical, while transport of mineral out by the river bed shall be done through private truck owners.

**Salient Points of Proposed Scientific Mining are:**

- a) First requirement is to ascertain the maximum depth to which mineral is available and safe depth of working which has been fixed as 3.0 m in river bed in virgin areas.
- b) The depth of pit below the surface shall not exceed 3.0m in virgin areas where mining operations to some depth have not been carried out provided mining operations are carried out by formation of benches in accordance with the provisions of MMR 1961.
- d) The contractor shall comply with all other conditions and stipulations as given in the LOI and Auction document dated 10--05-2023.
- e) ***No mining operation may be carried out from 01-07 to 15-09 every year (rainy season)***
- f) Mining will be carried out about in about 270 days in a year.

**Production Programme (Plate no.4)**

Lease has been allotted for a period of 10 years only. Lease area consists of 99.384 ha area in 2 villages in a total stretch of about 3.0 km. Out of this about 21.00 hectares area is under restricted zone. About 70.144 hectare area is free from restriction and the mining is proposed in this area only. Mining is proposed in both village river bed areas at a time.





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S.no	Name of Quarries	Area free from restrictions in hectares	Per day production MT	Year wise production MT
1	Thantri Unit	70.144	14000	37,80,000

Daily production proposed = 14000 tons

Production programme is 560 trips/ day @ 25 ton per trip

Working days have been taken as 270 days per annum.

Projected Production per Year = 270 x14000=37,80,000 Tons

**Table : Five Years Proposed Production Details (MT/A)**

Year	Trips/ day	MMPA
I	560	3.780
II	560	3.780
III	560	3.780
IV	560	3.780
V	560	3.780

**5.0 PHYSICAL AND GEOLOGICAL CHARACTERISTICS OF THE DEPOSIT**

Deposit is moderate to good quality Sand. It is widely used in construction, buildings, bridges and other infrastructure. It is free from clay and non sticky in nature.

**6.0 DETAILS OF MINING MACHINERY DEPLOYED OR TO BE DEPLOYED AND THE DETAIL SPECIFICATIONS**

This is a new mining lease. Following equipments are proposed to be deployed for the desired production.



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**Table: List of Machinery**

S. No.	Name of machinery	Capacity	Nos.
1	Excavator cum loader	2.0 m <sup>3</sup>	8
2	Tippers/ Trucks	25 tons	112
3	Water Tanker	10000 litres	2
4	Light vehicles	--	2

**6.1 Fuel Consumption**

**Quantity of Diesel / Energy fuel Consumption per day: -**

S. No.	Machine	Details of Diesel requirements	Consumption of Diesel (In ltr.)
1.	Dumper	(Considering diesel consumption by the dumper is 3 km / ltr.) Total Diesel consumption for 112 Dumper = 112x100 =11200 Ltr	11200
2.	JCB	Diesel consumption 10ltr / hr working of 20 hrs diesel consumption = 10 x20x8 =1600 ltr	1600
3.	Water Tankers	Diesel consumption 10 ltr/Hour x10 x 2=200	200
4.	Light Vehicles	Diesel consumption 8 ltr/Hour x 10 x1=80 ltr	80
<b>Total diesel requirements per day</b>			<b>13080</b>

**7.0 METHOD OF MINING**

River bed mining is for extracting sand from Yamuna River bed. As per Haryana Minor Mineral Concession Rules, 2012 extraction is limited to 3.0 m depth only. Major part of the River bed remains dry except rainy season. Area available for mining is 70.140 ha in district –Palwal. Total length of the area as per the description report stretches in the length of 3.0 km. Mining activity will be carried out in allocated areas only, enclosed as **Annexure –I.**

Activities will be carried out as per the production schedule given earlier. The mining quarry will be working as self sustained units with all facilities like site office, rest





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shelter, first aid and drinking water etc. All these mines will be connected suitably with communication system.

Light weight excavators/JCB will be deployed for extraction. Mineral will be removed in 3.0 m layer only forming one bench. This is as per the digging depth of the equipments. Mineral will be loaded in trucks of 25 tons capacity. Trucks and equipments will be on hire basis. There will be no OB or waste generation as the sand is exposed in the river bed.

Bench will advance parallel to the banks of the river. Height of bench will be 3.0 m. Width of the bench will be around 20.0 m. Workings will be restricted within the lease area/ khasra as per the description report given by Mining Department. Mining activities will be carried out in a manner so that there is no obstruction to the movement of water flow, if any, during rainy season. The bench will be in the form of slices/ strips parallel to the banks of the river. Roads in the lease area for the movement of loaded trippers/ trucks will not have slopes more than 1 in 20. However, movement of trucks after mineral loading will be towards both sides through approach roads connecting to tar roads. Every block will have its own approach roads, well connected to main highways. No processing of mineral will be done.

**7.1 Proposed year wise development for five years**

Sand lease has been granted for a period of 10 years only. Calendar plan has already been made and details have been given. Sequence of operation has been depicted in **Plate No – 4**

Ultimate limit will be 3.0 m below existing bed level as indicated in the working section.





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**7.2 Proposed rate of production when the mine is fully developed**

Work will be carried out for 270 days in year. Year wise production during the plan period will be as follows:

**Table : Proposed Production**

Year	Targeted Production MMT/annum	OB/ Waste (M <sup>3</sup> )
1	3.780	-
2	3.780	-
3	3.780	-
4	3.780	-
5	3.780	-

**7.3 Mineable reserves and anticipated life of the mine**

Lease will be granted for a period of 10 years only as per HMMCR, 2012. During rainy season there is replenishment of the mineral, which helps in sustaining the production.

Estimated Mineable reserves up to 3.0 m available are = 37, 80,000 MT which are replenished every year during rains.

Anticipated production during lease period will be = 37.80 million MT

**7.4 Proposed method of mining**

Mining activity will be carried out by open cast mechanized method

- Light weight excavators will be used for digging & loading of mineral in tippers.
- No OB/ waste material will be produced.



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- No drilling/ blasting is required as the material is loose in nature.
- Proper benching of 3.0 m height will be maintained.
- Roads will be properly made and sprayed by water for suppression of dust.
- Roads in the lease area for the movement of loaded trippers/ trucks will not have slopes more than 1 in 20.
- Total extent of lease is about 3.0 km .
- Extraction activities will start in the blocks from the upstream side to downstream side. This will not obstruct the movement of water, if any, during monsoon period in the river course.
- Approach roads from the various blocks as already described earlier will be merging with permanent tar roads on both sides of the river for transportation of the mineral to final destinations. In case during any period, the replenishment was found less than 3 m or depth of exaction, the mining during said period would restrict to depth which would not be more than 3 m of the original level of the river bed.

**As per MMR 1961, following precautions shall be undertaken during operations of HEMM.**

**Shovel/ excavator: -**

1. Excavators will be provided with efficient warning devices, front & rear lights and efficient brakes.
2. Excavator will be under the charge of a competent person authorized in writing by the manager designated as operator.
3. No person other than the operator or his helper if any will ride on the excavator or even enter the excavator's cabin.
4. No person will be permitted to ride in the bucket of a Shovel/ excavator.
5. No inflammable material will be stored in the excavator housing or cab.
6. Shovel/ excavator dippers will be lowered to the ground during greasing operation.





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7. When a Shovel/ excavator is to be moved from one point to another its boom shall be kept in strict alignment with direction of travel while the bucket/ dipper shall be held m above the ground.
8. No Shovel/ excavator will be operated in the position where any part of the machines, suspended loads or lines are brought closer than 3 m to the exposed high voltage line.
9. Every movement of a Shovel/ excavator shall be preceded by warning signals.
10. When not in use, the Shovel/ excavator will be moved to and stood on stable ground, the bucket shall be kept resting on stable ground and will never be left hanging.
11. The Shovel/ excavator will be so spaced that there will be no danger of accident from flying & falling objects.
12. Safety appliances, booms will be examined thoroughly once in a year.
13. Emergency switches, safety limit switches will be examined and tested once in four months.
14. All brakes will be tested for their operation worthiness once in a week.
15. The following signboards will be carried in and around the machine: -
  - I. "Warning— Do Not Enter The Working Range Of The Machine".
  - II. "Lubricating Prohibited While the Machine in Running Condition".

**Duties of Shovel/ excavator operator: -**

1. At the commencement of every shift the operator will personally inspect and test the machine, paying special attention to the following details: -
  - (i) The brakes and every warning device are in working order.
  - (ii) Lights are in working order.
  - (iii) The operator will neither take out the machine for work nor will he work the machine unless he is satisfied that it is mechanically shown and in efficient working order.
  - (iv) The operator will maintained a record of every inspection made in a bond paged book, kept for the purpose and shall sign every entry made there in.
  - (v) The operator will keep the cab window clean so as to ensure clear vision at all times.



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- (vi) The operator will not operate the machine when persons are in such proximity as to be endangered.
- (vii) Before leaving the machine, the operator will lower the bucket to the ground.
- (viii) The operator will not leave his machine during the shift. Whenever, he finishes his work, he will hand over the machine to his relief or lock the excavators cab.
- (ix) The operator will not allow any unauthorized person to ride on the machine.

**Dumper: -**

1. Every dumper will be provided with efficient brakes.
2. Efficient audible warning devices will be provided with the dumpers.
3. The dumper, if required to work after daylight hours, efficient headlights and taillights will be used.
4. Every dumper will be under the charge of a competent person, authorized in writing by the manager.
5. No person, other than the driver or his helper, if any, will ride on a dumper.
6. No person will be permitted to ride in the running board of a dumper.
7. The loaded dumpers will not be reversed on gradients.
8. Sufficient stop blocks will be provided at every tipping point and these will be used on every occasion when material is dumped.
9. Standard traffic rules shall be adopted and followed during movement of all dumpers. They shall be prominently displayed at relevant places in the opencast workings and haulm roads.
10. When not in use, every dumper will be moved to and stood on proper parking places.
11. No person will be permitted to work on a chassis of a dumper, with the body in rest position, until after the dumper body has been securely blocked in position.
12. The mechanical wised mechanism will not be depended upon to whole the body of a dumper in a rest position.
13. No unauthorized person will be permitted to enter or remain in any turning points.
14. While inflating tyres, suitable protective cages shall be used.





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15. Tyres will never be inflated by sitting either in the front or on the top of the same.
16. While the vehicle is being loaded / unloaded on gradient, the same will be secured stationary by the parking brake, and other means suitably designed stopper block, which could be placed below the tyres.
17. At least once in every two weeks the brakes of every dumper will be tested as below: -
  - (a) Service Brake test: - The brake will be tested on a specified gradient and speed when the vehicle is fully loaded. The vehicle should stop within the specified distance when the brake is applied.
  - (b) Parking brake test: - The parking brake shall be capable to hold the vehicle when it is fully loaded and placed at the maximum gradient. Maximum gradient of the roadway which is permitted only for a period of at least 10 minutes.
  - (c) A record of such test will be maintained in a bound paged book and will be signed by the competent person carrying out the test. These records will be counter signed by the engineer and manager.
  - (d) All vehicles shall be tested and examined once at least in every 6 months.
  - (e) A notice shall be displayed outside every vehicle that **"No Unauthorized Travelling allowed"**.

**Duties of dumper operators: -**

1. At the commencement of every shift, the operator shall personally inspect and test the machine, paying special attention to the following details: -
  - (i) Tyre pressure, brakes, horn and the Lights are in working order.
  - (ii) The driver will neither take out the machine for work nor will he work the machine unless he is satisfied that it is mechanically shown and in efficient working order.
  - (iii) The driver will maintained a record of every inspection made in a bound paged book, kept for the purpose and shall sign every entry made there in.
  - (iv) The driver will keep the cab window clean so to ensure clear vision at all times.
  - (v) Driver will ensure that the gear is in neutral position before stopping the engine. He will park the vehicle: -





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- (a) In reverse gear, on level roads and down gradients.
- (b) In low gear, on up gradients.
- (vi) The driver will negotiate downhill gradients in low gear, so that minimum of braking is required.
- (vii) The driver will not drive too fast, avoid distractions and drive defensively.
- (viii) Before crossing a road / railway line he will reduce his speed looking both directions along the road or railway line and will proceed across the road or line only if it is safe to do so.
- (ix) The driver will not operate the dumper in reverse unless he has a clear view of the area behind the vehicle.
- (x) The driver will see that : -
- (xi) The vehicle is not overloaded.
- (xii) The material is not loaded in a dumper so as to project horizontally beyond the sides of its body.
- (xiii) The driver will not allow any unauthorized person to ride on the vehicle.
- (xiv) When there is a poor visibility, the speed of a vehicle will be restricted in a manner that the braking distance is maintained shorter the distance of visibility.
- (xv) The driver will not leave his machine during the shift. When he finishes his work, he will hand over the machine to his reliever or lock the excavators cab.

**7.5 Conceptual Mining Plan**

Mine lease area will be worked in blocks for ease of operation. However, as the digging depth will be restricted to 3.0 m only, material will still be available below. This will be further replenished during rainy season. Blocks will be worked systematically as the width is limited while length is much more. Sequence of working has been shown on Plate no -4 of Composite plan.

**(i) Final Slope Angle To Be Adopted**



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Thickness of the bench is limited to 3.0 m only and width will be more than the height of the bench. River bank side will be protected by working in 3/4 part of middle of the river. Bank side natural slope will not be disturbed. This will prevent collapse of bank and erosion. However, the height of the bank with respect to river bed is varying from 2-3 m only.

(ii) During plan period workings will be carried out in both villages at a time in the lease area simultaneously. Scattered workings will ensure safety, remove congestion of vehicles and will have better control and management.

**(iii) Ultimate Capacity Of Dumps**

- There will be no OB removal and waste generation during the plan period. No dumping area is needed. No outside material will be filled up in the extracted zone

**a) Land use Pattern of Mining Lease Area at Various Stages**

Land use pattern will be as follows:

**Table : Land Use Pattern of Mining Lease area at Various Phases**

S. No.	Particulars	Present land use (ha.)	At the end of 5 <sup>th</sup> year (ha.)
1.	Pit area	0.00	0.00
2.	Dump area	0.00	0.00
3.	Restricted area	21.00	21.00
4.	Mineral Storage and ancillary area,office etc	8.24	8.24
5.	Plantation (in safety zone and ancillary area)	0.00	4.00*
6.	Naturally reclaimed area	70.144	70.144
<b>Total</b>		<b>99.384</b>	<b>99.384</b>

\*Plantation in 4.0 ha land will be done under social forestry.

\* Plantation & infrastructure In restricted/ancillary area only





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**7.6 Blasting**

Sand extraction will not require any drilling, blasting activities. It will be directly loaded in to trucks.

**7.7 Mine Drainage**

The River Yamuna flows from N to S which originates from the Himalayas provides the major drainage in the lease area. The general slope of the land surface is From N to S The levels of the river bed and bank area of the proposed mining area are as under.

Location	River bed levels (mRL)	River bank top levels(mRL)
00 (south end )	129.50	133.00
400	129.66	132.00
800	129.87	133.00
1200	130.32	133.57
1600	130.87	133.90
2000	131.37	134.40
2400	131.60	135.20
2800 ( north end)	132.85	135.30

Highest elevation in river bed at extreme north end is 132.85 mRL and bank top level is 135.30 mRL where as the levels at the extreme south end in river bed is 129.50mRL and River bank top is 133.00 mRL

There is no flow of water in the river bed in post monsoon period. Area is having 542 mm rainfall in a year. During rainy season, catchment water flows in the river. During dry period the Sand is excavated which gets replenished during rainy period. No mining activities will be carried out during rainy season when there is water flowing in the working area.



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There will be no intersection of water table as working will be carried out upto 3.0 m depth only from surface of river bed while the water level is 5 -10 m below the surface of river bed.

**7.8 Water Requirement**

The requirement of water for the project will be as under

Sr.no	Activity	Requirment in KLD	Source
1	Dust suppression	25.0	Tube wells
2	Drinking	2.0	Tube wells
3	Green belt	5.00	Tube wells
	Total	32.00	

**8.0 YEAR WISE ANNUAL PROGRAMME OF MINING FOR NEXT 5 YEARS**

Sand mineral is targeted for 14000 tons per day i.e. 3.780 million tones per annum (maximum). Extraction is planned for 5 years duration which is proposed to be continued up to lease period. Production programme is given below:

**Table: Production Programme**

Year	Targeted Production (in MMTA)	OB/ Waste (M <sup>3</sup> )
1	3.780	-
2	3.780	-



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3	3.780	-
4	3.780	-
5	3.780	-

**9.0 DETAILS OF EMPLOYMENT**

Statutory personnel as detailed below are proposed to be deployed by project proponent as per requirement of Mines Act-1952 and latest DGMS circulars.

**Table : Employment Details**

S. No.	Category	Numbers
1	Manager – 1 <sup>st</sup> Class	1
2	Assistant managers	2
3	Foreman/Mates	2
4	Supervisory staff	2
5	Skilled personnel	16
6	Semi-skilled personnel	112
7	Un-skilled personnel	10
<b>Total</b>		<b>145</b>





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## ENVIRONMENT MANAGEMENT PLAN

### 10.0 MEASURES TAKEN AND TO BE TAKEN FOR LAND RESTORATION, RECLAMATION AND PLANTATION IN/ OR NEARBY LEASE AREA

- Envisaged mining operation will be carried out in the River bed. This will be dry bed mining. There will be no mining activities when there is flow of water in the working zones. During rainy season, the activities will be stopped, if there is flow in the river.
- Besides resource extraction, following activities will be kept in view:
  - a) Protection and restoration of ecological system
  - b) Prevent damages to the river regime
  - c) Protect riverine configuration such as bank erosion, change of water course gradient, flow regime etc.
  - d) Prevent contamination of ground water

#### Safeguard Measures

While carrying out mining activity following measures will be taken:

- Mining activities will be carried out only in dry bed. No in stream mining will be practiced.
- Identification of river stretches for mining will be completed.
- There will be no mining near the banks. This is to protect the bank erosion and river migration.
- Mineral Sand from river will be restricted to a maximum depth of 3.0 m from the existing bed level. This is for safety and sustainability.
- As the lease area is quite large and long in length, systematic extraction will be carried out to prevent seasonal scouring and enhanced erosion.
- Extraction will be carried out in a manner that there is no obstruction to flow of water, if any, during rainy season.
- Mining on the concave side of the river channel should be avoided to prevent bank erosion. Similarly meandering segment of river will be selected to prevent natural



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eroding banks and to promote mining on natural building (aggrading) meanders component

**Reclamation of Mined Out Area ( plate no.5 )**

There is no generation of OB/ waste material. No backfilling has been proposed in the excavated zone. River bed will be replenished by sediments during rainy season yearly.

**Greenbelt**

In order to restore the environment and ecological balance in the area affected by mining, a forestation is considered to be an effective measure. Afforestation is a major thrust area in pollution control of mining. Afforestation is suitable for detecting, recognizing and reducing air pollution effects. Tree functions as sinks of air pollutants, besides their bio-aesthetical values, owing to its large surface area. The green belt supplements Oxygen to the atmosphere and combat air pollution effectively and aesthetic beauty and landscape of the area improves. It also checks soil erosion and make eco-system and climate more conducive.

Following factors will be considered while selecting species for plantation:-

- i) Fast growing plant species shall be preferred.
- ii) The plant will be of deep rooting system.
- iii) The plant will be perennially green to improve aesthetic beauty of the area.
- iv) The plant species will be adoptable to the local climatic conditions.
- v) Native plant species will be planted.

Forestation programme shall be carried out basically, along the mine boundaries and roads as permitted by land owners. The mining area in the river bed is devoid of any vegetation, will not cause any harm to riparian vegetation cover. It is proposed to have plantation on both sides of the roads as greenbelt to provide cover against dust dissemination. Plantation will also be carried out as social forestry programme in villages, school and the areas allocated by the Panchayat/ State authorities.

Native plants like Neem, shisham, , Mango and other local species will be planted as suitable





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combination of trees that can grow fast and also have good leaf cover shall be adopted to develop the greenbelt. It is proposed to plant 5,000 no's of native species along with some fruit bearing and medicinal trees during the plan period.

The lease area is in the river bed and devoid of any vegetation. Mining activities will not cause any harm to riparian vegetation cover as the working will not extend beyond the offset left against the banks in the river. Land on both sides is the private agriculture land. Link road from the active zone pass through the areas. It is proposed to have plantation on both sides of the roads as greenbelt to provide cover against dust dissemination. River banks will be strengthened by way of plantation on the banks. Plantation will also be carried out as social forestry programme in villages, school and the areas allocated by the Panchayat/ State authorities.

Native plants like Neem, Pipal, Khejri, Mango and other local species will be planted. A suitable combination of trees that can grow fast and also have good leaf cover shall be adopted to develop the greenbelt. It is proposed to plant 5000 no's of native species @ 1000 plant/ha along with some fruit bearing and medicinal trees during the plan period.

**Table: Greenbelt Programme**

Year	Saplings to be planted	Survival 80 %	Species	Place of Plantation
I	1000	800	Neem, Peepal, Mango, Shisham, Sirish, Gulmohar.and other local fruity plants	Along the roads, Along the river banks in schools and public building and other social forestry programme.
II	1000	800		
III	1000	800		
IV	1000	800		
V	1000	800		
<b>Total</b>	<b>5000</b>	<b>4000</b>		



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**11.0 MEASURES TAKEN AND TO BE TAKEN FOR PROTECTION OF ENVIRONMENT IN AND AROUND MINING LEASE AREA**

- Dry bed mining will only be carried out.
- Mining activities will be confined to 3.0 m depth from surface level of river bed.
- All link roads from the mining area to the tar road will be properly sprayed with water for dust suppression.
- Greenbelt and plantation on road side and river banks will help in dust suppression and will also reduce noise level.
- Plantation will improve ecology and aesthetic beauty of the area
- Measures will be taken to prevent the workings from extending in safety zones, cutting the banks and exceeding 3.0 m depth limit from the river bed surface.

**12.0 MEASURES TAKEN AND TO BE TAKEN FOR DUMPING OVERBURDEN, STACKING OF TOP SOIL AND UTILIZATION OF TOP SOIL**

There is no top soil in the lease area. No overburden and waste is likely to be generated during lease period. There will be neither any stacking of soil nor creation of OB dumps.

**13.0 MEASURES TAKEN AND TO BE TAKEN FOR THE CONTROL OF WATER, NOISE AND AIR POLLUTION**

**Air Pollution:**

Emission of gases and dust takes place due to movement of vehicles. Spraying of water and plantation along the road side prevents the spread of dust. Plantation also acts as barrier for restricting pollution. Impact on air environment has been assessed taking in to consideration the proposed production and increase emissions. The sources of air pollution are given below:

- Operation of mining machinery/ loading operations





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- Transportation of mineral
- Wind erosion from barren area and river bed

**Air pollutants released during production can be checked by:**

1. Plantation road side as it will prevent the spreading of dust.
2. Water spraying will be done twice in a day over the haul road & roads leading to adjoining state roads.
3. Dust respirators will be provided to the operators of the heavy earth moving machineries.
4. Preventive maintenance shall be carried out of equipment.
5. At every work place where, the air borne dust generated, to be sampled and the concentration of the respirable dust will be determined regularly. If any measurement at any workplace and at source, the concentration in excess of 50% or 75% of the available concentration of permissible limit then measurements shall be carried on, at intervals not exceeding 3 months or 1 month respectively.
6. Silencers will be fitted to the dumpers.

The following table indicates the concentration of Ambient Air as per the CPCB guidelines:

**Table -14: National Ambient Air Quality Standards**

S. No.	Pollutants	Time weighted Average	Concentration of Ambient Air	
			Industrial, Residential, Rural and Other Areas	Ecologically Sensitive Area (notified central Government)
1.	2.	3.	4.	5.
1	Sulphur Dioxide (SO <sub>2</sub> ), µg/m <sup>3</sup>	Annual*	50	20
		24 hours**	80	80
2	Nitrogen Dioxide (NO <sub>x</sub> ), µg/m <sup>3</sup>	Annual*	40	30
		24 hours**	80	80
3	Particulate Matter (Size less than 10µm) or PM <sub>10</sub> , µg/m <sup>3</sup>	Annual*	60	60
		24 hours**	100	100





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4	Particulate Matter (Size less than 2.5 $\mu\text{m}$ ) or $\text{PM}_{2.5}$ , $\mu\text{g}/\text{m}^3$	Annual*	40	40
		24 hours**	60	60
5	Ozone ( $\text{O}_3$ ), $\mu\text{g}/\text{m}^3$	8 hours**	100	100
		1 hours**	180	180
6	Lead (Pb), $\mu\text{g}/\text{m}^3$	Annual*	0.50	0.50
		24 hours**	1.0	1.0
7	Carbon Monoxide (CO), $\text{mg}/\text{m}^3$	8 hours**	02	02
		1 hours**	04	04
8	Ammonia ( $\text{NH}_3$ ), $\mu\text{g}/\text{m}^3$	Annual*	100	100
		24 hours**	400	400
9	Benzene ( $\text{C}_6\text{H}_6$ ), $\mu\text{g}/\text{m}^3$	Annual*	05	05
10	Benzo(O) Pyrene Particulate Phae only $\text{ng}/\text{m}^3$	Annual*	01	01
11	Arsenic (As), $\text{ng}/\text{m}^3$	Annual*	06	06
12	Nickel (Ni), $\text{ng}/\text{m}^3$	Annual*	20	20

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

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

(Source: CPCB notification Dated 18<sup>th</sup> November 2009)

**Air pollutants released during production can be checked by:**

- Dust suppression system/ water spraying would be adopted at mine working and loading points
- Excavation operations to be suspended during very strong wind conditions
- Afforestation will be carried out for control of dust
- Plantation with wide canopy trees along approach road will help in dust suppression
- Persons to be provided with dust mask and other personal protective equipments, particularly during summer months and dust storm periods



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**Transportation**

- Regular water spraying on haulage roads during mineral transportation by water sprinklers,
- Avoid over loading of tippers & consequent spillage on the roads,
- Mineral carrying trucks will be effectively covered by tarpaulin to avoid escape of fines to atmosphere,
- Air quality shall be regularly monitored both in the core zone and the buffer zone.

**Controlling of NOx level**

The source of NOx is due to vehicular emission. This can be controlled by proper maintenance and servicing of vehicles. Only P.U.C. certificated vehicles will be permitted

**Noise Pollution**

There is no drilling and blasting for mineral extraction. Noise pollution due to transportation will not cause any problem to the inhabitants of this area because there is no human settlement in close proximity to the link roads in lease area. Effective steps will be taken to keep the noise level well below the DGMS prescribed limit of 85 dBA.

**Noise control is achieved by the following:**

- Proper care and maintenance of the equipments will be carried out.
- Personal protective equipments will be provided to the workers.

**14.0 DEMOGRAPHIC DETAILS OF THE STUDY AREA ( plate no.2)**

Total number of villages in which lease area falls is 2. Demographic details of the nearby villages are as follows. Main occupation is agriculture. The details are given below:-





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**Table: Demographic Details**

Name	Households	Population	Males	Females
Maksudpur	9	57	32	25
Hansapur	147	1120	587	533
Thanthri	339	2190	1215	975
Rajapur Khadar	191	1246	666	580
Dostpur	30	273	152	119
Ghori	904	5977	3239	2738
Gurwari	92	628	334	294
Pahladpur	80	499	268	231

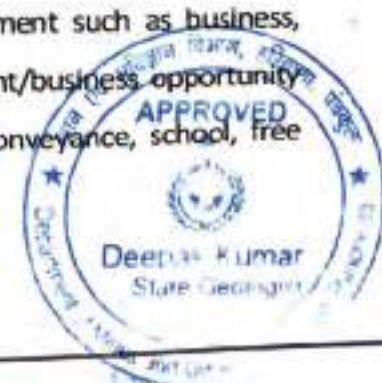
**15.0 DETAILS OF HEALTH CHECKUP AND INSURANCE OF ALL THE EMPLOYED PERSONS (FOR EXISTING LEASE)**

All workers will be subjected to medical examination as per Mines Rule 1955 both at times of appointment and at least once in five years. Medical camps will be organized for this activity. Insurance of all employees as per the rules will be carried out.

**15.1 Corporate Social Responsibility**

As a corporate responsibility following measures along with budget provision is proposed for improving the conditions of persons in and around the project area:

The Palwal District of Haryana State is relatively less developed in respect of employment and facilities. Thus, it can be seen that the proposed project offers good potential for the local people for employment directly and indirectly. The Project Affected Persons, if any, of the lease area will be provided with compensation or job or indirect employment such as business, contract works etc. With the starting of mining operation, employment/business opportunity will increase and welfare amenities such as free medical facilities, conveyance, school, free education, drinking water supply etc will be available for the area.



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The details of benefits to the people in the adjoining villages are discussed here under:

**a) Employment**

From the study of socio economic environment at the study area it is quite evident that the area is not quite developed as far as job opportunities and living standard of the population is concerned. Apart from cultivation, agriculture, etc mining, industries and ancillary activities play an important source of livelihood in this as well as adjoining districts.

With the start of mining operations, various employment opportunities will be generated.

Several persons will be benefited with mining works, employment through contractor, running of jeep and buses, canteens, different kind of shops and transport related business avenues.

The Project Affected Persons, if any, will be provided with either compensation or direct employment or indirect employment. They would be mostly recruited in unskilled, semi-skilled categories etc. This will improve the economic condition of the local people. The employment of local people in primary and secondary sectors of project shall upgrade the prosperity of the region.

**(b) Educational facilities**

Industrial on-job training will be provided to the interested local people and the trained people will be absorbed in jobs as per the requirement of the project. Proponent will also provide full cooperation and monetary assistance for adult education programme. Other activities proposed are:

1. Targeted programmes for primary education for specially girl child
2. Augmentation of infrastructure and equipments, furniture, blackboard, toilets etc inschools
3. Scholarships to meritorious students
4. Adult education & awareness about saving & investment plans.
5. Partnerships in state sponsored education programmes
6. School wall boundary maintenance
7. Existing govt. school strengthening by boundary wall construction, construction of toilets, roof repair, drinking water taps, etc.





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8. Monetary contribution for expansion of govt. school from 6<sup>th</sup> to 12<sup>th</sup> class (construction of classrooms, field, toilets, taps etc.)

Capacity building activities such as following will be undertaken:

1. Scholarship for ITI training outside for 20 persons.
2. Sponsorship of land losers / wards for full term courses
3. Short term courses for skill up gradation
4. Vocational training (dairy, poultry, bee keeping, sericulture)
5. Specific Programmes for Ladies (stitching, embroidery, tailoring etc)

**(c) Medical facilities**

Project shall provide aid to improve the existing medical facilities in the villages and also improve awareness and provide sufficient training in hygiene, sanitation and proper diet. Some of the activities that can be carried out are as follows:

1. Mobile Clinic with testing and diagnostic facilities
2. Health Camps for Family Planning, HIV/AIDS and other communicable diseases.
3. Addressing local health related issues through audio visuals and group meetings
4. Subsidized treatment in hospital with which tie-up will be there
5. Specific Programmes for hygiene and sanitation
6. Helping aids to each category of physically challenged as per requirement
7. Eye camps to address the issue of cataracts specially

**(a) Infrastructure facilities**

Infrastructure facilities like road, Post & Telegraph, Telephone, Banks etc are basics for each and every area. These facilities are already well developed in the surrounding areas. The lessee will take various steps for upliftment of the basic amenities of the area by providing drinking water, communication facilities, etc. Construction of roads, drainage, community halls, school buildings, health centers, street lighting, equipments to educational institutions, public utilities, sanitation facilities, etc in nearby area will be undertaken.

As a corporate responsibility following measures along with budget provision is proposed for improving the conditions of persons in and around the project area:



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Sr No	Description	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> Year	5 <sup>th</sup> Year
1	Health check up camps	2.50	2.50	2.50	2.50	2.50
2	Insurance cover of workers	2.0	2.00	2.00	2.50	3.00
3	Assistance to local schools, scholarship to students	5.0	5.0	5.0	5.0	5.0
4	Sanitations and drinking water facilities	1.75	1.75	1.75	2.00	2.00
5	Vocational training to persons for income generation	0.75	0.75	0.75	0.75	0.75
6	Assistance to self help groups	2.00	2.00	2.00	2.00	2.00
<b>Total</b>		<b>14.00</b>	<b>14.00</b>	<b>14.00</b>	<b>14.00</b>	<b>14.00</b>

**15.2 Fund Provision for Environmental Management**

It is proposed to create an Environment Management Fund. The contractor shall deposit/pay an amount equal to 7.5 % of the due contract money along with installments towards the 'Mines and Minerals Development, Restoration and Rehabilitation fund & 2.5% of the due contract money along with the monthly installments towards the " District Mineral Fund".

**15.3 Fund Provision for EMP Measures:** following provisions are proposed to be taken for

Improving, control and monitoring of environment protection measures

Sr. No.	Particulars	Amount (in lacs)
1	Pollution monitoring – Air, Water, Noise	3.0
2	Pollution monitoring – Water sprinkling	5.0
3	Wire fencing at plantation sites	0.6
4	Plantation including maintenance	1.50
5	Rainwater harvesting	3.0
6	Haul road and other roads repair and maintenance	3.0
7	Pre-monsoon and post monsoon survey for sedimentation in the river bed	2.0
<b>Total</b>		<b>18.10</b>





MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
 AREA-248.46 Acres. (99.384 ha) District- Palwal (Haryana) Open cast Semi mechanized

**PART –II**

**PROGRESSIVE MINE CLOSURE PLAN**

**1.0 Introduction**

**Name & address of the lessee**

M/s Minerio Mining Pvt.Ltd.,Through Sh.Sachin Sharma,MCD No.01,First floor,Suman Bazar Road,Bhogal,Delhi,South Delhi-110014

**(B) LOCATION OF THE LEASE AREA**

Block Name	Name of Village	Pillar	Latitude	Longitude
Thanthri	Thanthri	J	28° 11' 11.616"N	77° 28' 28.660"E
		K	28° 10' 50.582"N	77° 28' 30.541"E
		L	28° 10' 35.009"N	77° 28' 32.268"E
		M	28° 10' 25.346"N	77° 28' 34.655"E
		N	28° 10' 20.421"N	77° 28' 24.109"E
		O	28° 10' 28.928"N	77° 28' 20.774"E
		P	28° 10' 36.972"N	77° 28' 19.865"E
		Q	28° 10' 48.076"N	77° 28' 20.602"E
		R	28° 10' 52.298"N	77° 28' 19.586"E
		S	28° 10' 55.349"N	77° 28' 19.111"E
		T	28° 11' 0.907"N	77° 28' 19.651"E
		U	28° 11' 8.026"N	77° 28' 19.793"E
	Rajupur Khadar	M	28° 10' 25.346"N	77° 28' 34.655"E
		M1	28° 10' 21.221"N	77° 28' 35.743"E

**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
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	N	28° 10' 20.421"N	77° 28' 24.109"E
	O	28° 10' 14.553"N	77° 28' 23.463"E
	O1	28° 10' 14.946"N	77° 28' 35.860"E
	P	28° 10' 9.329"N	77° 28' 23.131"E
	P1	28° 10' 10.804"N	77° 28' 35.240"E
	Q	28° 10' 1.736"N	77° 28' 24.643"E
	Q1	28° 10' 5.400"N	77° 28' 36.000"E
	R	28° 9' 51.048"N	77° 28' 28.863"E
	R1	28° 9' 58.900"N	77° 28' 38.000"E
	S	28° 9' 45.294"N	77° 28' 30.544"E
	S1	28° 9' 52.200"N	77° 28' 40.500"E
	T	28° 9' 42.436"N	77° 28' 33.186"E
	T1	28° 9' 46.600"N	77° 28' 43.000"E
	U	28° 9' 40.079"N	77° 28' 34.352"E
	U1	28° 9' 34.561"N	77° 28' 49.013"E
	V	28° 9' 29.871"N	77° 28' 36.253"E

**(C) EXTENT OF THE LEASE AREA**

99.384 ha spread over 2 villages as explained at 2.0 in the main mining plan

**(D) PRESENT LAND USE PATTERN**

Details are given below:

S. No.	Particulars	Present land use (ha.)
1.	Pit area	0.00
2.	Dump area	0.00





**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
AREA-248.46 Acres. (99.384 ha) District- Palwal (Haryana) Open cast Semi mechanized**

3.	Area for ancillary activities,mineral storage, office etc	8.24
4	Restricted area	21.00
5.	Plantation	0.00
6.	Area for mining	70.144
<b>Total</b>		<b>99.384</b>

**(E) METHOD OF MINING:**

Lease area allotted for mining is 70.144 ha. Total length of the proposed lease area as per the description report stretches in the length of 3.0 km. Mining activity will be carried out in allocated areas only,

Total production envisaged is 14000 TPD. Activities will be carried out as per the production schedule given earlier. These blocks will be working as self sustained units with all facilities like site office, rest shelter, first aid and drinking water etc. All these blocks will be connected suitably with communication system.

Light weight excavators will be deployed for extraction. Mineral will be removed in 3.0 m layer only forming one bench. This is as per the digging depth of the equipments. Mineral will be loaded in trucks of 25 tons capacity. Trucks and equipments will be on hire basis. There will be no OB or waste generation as the sand is exposed in the river bed.

Mining activity will be carried out by open cast mechanized method.

- Light weight excavators will be used for digging & loading of mineral in upper.
- No OB/ waste material will be produced.
- No drilling/ blasting is required as the material is loose in nature.



**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
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- Proper benching of 3.0 m height will be maintained.
- Roads will be properly made and sprayed by water for suppression of dust.
- Roads in the lease area for the movement of loaded trippers/ trucks will not have slopes more than 1 in 20.
- Total extent of lease is about 99.384 ha including prohibited area.
- Extraction activities will start in the blocks from the upstream side to downstream side. This will not obstruct the movement of water, if any, during monsoon period in the river course.
- Approach roads from the various blocks as already described earlier will be merging with permanent tar roads on both sides of the river for transportation of the mineral to final destinations.

**(F) MINERAL PROCESSING OPERATION:**

No mineral processing is envisaged for Sand (minor mineral) produced during the mining activity.

**1.1 Reasons for closure:**

The progressive mine closure plan has been prepared in compliance of Haryana Minor Mineral Concession Rules 2012 under MMCR 1986. No immediate closure is planned as sufficient reserves are available to carry on the activities. There is market potential in domestic demands.

**1.2 Statutory Obligations:**

The lessee is bound to submit the Progressive mine closure plan either with Mining plan or Scheme of Mining.

Lessee is bound to follow the terms and conditions as will be stipulated in the lease deed.

In addition to it the rules pertaining to the Protection of Environment i.e Environment Act, Environment Rules and other associated rules for the protection of environment will have to be followed.





**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
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During the course of mining the rules stipulated in Mines Act, Mines rules Metalliferous Mines Regulation 1961 and RMMCR.1986 will be followed.

All other rules pertaining to the mining existing at that time will be followed during the course of mining activities.

**1.3 Closure plan preparations**

NAME, ADDRESS AND REGISTRATION NUMBER OF THE RECOGNISED PERSONS WHO PREPARED THE PROGRESSIVE CLOSURE PLAN AND NAME AND ADDRESS OF THE EXECUTING AGENCY WHO IS INVOLVED IN THE PREPARATION OF PROGRESSIVE MINE CLOSURE PLAN.

D.C.Yadav Regd. No RQP/DMG/HRY/2018/03 & Dr. S.N.Sharma (Annexure-III)

Lessee will himself implement the closure plan; no outside agency will be involved.

**2.0 MINE DESCRIPTION**

**2.1 General Geology and Local Geology**

**2.1.1 Regional Geology - Explained at item no.3.2.1 of the mining plan.**

**2.1.2 LOCAL GEOLOGY –Explained at 3.2.2 of the main document Mining plan**

**2.2 Reserves-**

**Mineral reserves are calculated up to 3 m depth from river bed surface RL.**

All reserves are proved reserves. Details are given as below.

The entire reserves of Sand up to the depth of 3.0 m are calculated.

The bulk density of sand is considered 1.80 MT/CUM

The reserves of Sand calculated by volumetric method and are summarized here below:

Reserves in MT= Area in acres x4000X depth 3.0mx Bulk Density 1.80



**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
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Table : Geological Reserves

Total area in acres	Mining area in acres	Ancillary area in acres	Blocked area in acres including bed bar, 7.5m & ¼ of river banks	Geological Reserves MT	Blocked reserves MT	Mineable reserves MT	Targetted Production MT
248.46	227.86	20.60	52.50	49,21,776	11,34,000	37,87,776	37,80,000

**A) PROVED RESERVES AS PER UNFC CODE (111)**

Total Geological reserves: 49,21,776 MT

**B) BLOCKED RESERVES AS PER UNFC CODE (211 & 222) =11, 34, 000 MT**

**C) MINEABLE RESERVES = (A-B) = 37, 87, 776 MT**

**D) TARGETED PRODUCTION**

**37, 80,000 MT per Year up to the lease period (or say 3.780 Million MT/year)**

**E) Balance reserves & Life of Mine**

For Balance reserves it is presumed that the mineral will be replenished every year during the rainy season. New mineral will be added every year in the river bed. Period of Anticipated life of mine cannot be estimated accurately in the riverbed since the quantum of sand replenished every year depend on the intensity of flood waters from upstream side and proposed rate of production.

**2.3.1 Mining Method**

Mining method to be followed is described in chapter of mining at 7.0 in mining plan.

**2.4 Mineral Beneficiation**

No mineral beneficiation is envisaged.





**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
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**3.0 Review of implementation of mining plan including five years progressive closure plan upto the final closure plan**

Mining Plan and Progressive mine closure plan are being submitted for the first time. It will be reviewed after five years and review of implementation will be given with next mining scheme.

**4.0 CLOSURE PLAN**

**4.1 Mined - out land**

About 70.144 hectare area is available for mining. Land use at various stages is given in the table below:

**Table : Land Use**

Sr. No.	Particulars	Present land use (ha.)	Land use at the end of 5 years (ha.)
1.	Pit area	0.00	0.00
2.	Dump area	0.00	0.00
3.	Area for ancillary activities, mineral storage	8.24	8.24
4	Infrastructure (Office, Temp. shelter etc)	0.00	0.00
5.	Plantation	0.00	0.00
6.	Area for mining	70.144	70.144
7	Restricted area	21.00	21.00
<b>Total</b>		<b>99.384</b>	<b>99.384</b>



**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
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**4.2 Water quality management**

Mining is being proposed in the river bed in the river Yamuna. The general water table in the area is 5-10 m, . There are no surface or ground water bodies within the lease area except the running water in river Yamuna the quantum of which varies throughout the year depending on rains and release of water from dams upstream.

There is a little flow of water in the river bed in post monsoon period. Area is having 542 mm rainfall in a year. During rainy season, catchment water flows in the river. During dry period the Sand is excavated which gets replenished to some extent during this period. No mining activities will be carried out during rainy season when there is flooding in the working area.

There will be no intersection of water table as working will be carried out upto 3.0 m depth only from surface of river bed while the water level is 5-10 m below the surface of river bed.

**4.3 Air Quality Management:**

The proposed mining method is not likely to produce much of dust and fugitive emissions to cause damage to ambient air quality of the area. Workers will be provided with personnel protective equipment like face mask, ear plug/ muffs.

For air pollution management at the progressive mine closure of mine, green belt will be developed to prevent and control air pollution.

**4.4 Waste Management:**

As stated in mining method, there will be no OB/ waste generation and there will not be any OB/ waste dumps.

**4.5 Top Soil Management**

There is no top soil.

**4.6 Tailing dam management**





**MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
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There is no proposal of beneficiation of mineral. No tailing dam is envisaged.

**4.7 Infrastructure:**

The infrastructure facilities like site office, first –aid station, rest shelter/ store, drinking water etc. will be established.

**4.8 Disposal of mining machinery:**

Machinery is proposed on hire basis. Hence no decommissioning of mining machinery is proposed.

**4.9 Safety & Security:**

Safety measures will be implemented to prevent access to excavation area by unauthorized persons as per Mine Act 1952, MMR 1961.

- i. Safety measures will be implemented as per Mine Act 1952, MMR 1961, Mines Rules 1955.
- ii. Provisions of MMR1961 shall be followed strictly and all roads shall be 10 m wide and have a gradient of not more than 1 in 20.
- iii. Excavation will be not more than 3 m depth.
- iv. Width of bench will be kept around 20.0 m for ease of operations and provide sufficient room for the movement of equipments.
- v. Protective equipment like dust masks, ear plugs/ muffs and other equipments shall be provided for use by the work persons.
- vi. Notices giving warning to prevent inadvertent entry of persons shall be displayed at all conspicuous places and in particular near mine entries.
- vii. Danger signs shall be displayed near the excavations.
- viii. Security guards will be posted.
- ix. In the event of temporary closer, approaches will be fenced off and notice displayed.

**4.10 Disaster Management and Risk Assessment:**



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This should deal with action plan for high risk accidents like landslides, subsidence, flood, inundation in underground mines, fire, seismic activities, tailing dam failures etc. and emergency plan proposed for quick evacuation, ameliorative measures to be taken etc. The capability of lessee to meet such eventualities and the assistance to be required from the local authorities should be described.

- The shallow depth of activities in river bed mining will not involve any high risk accident due to side falls/collapse.
- The complete mining operation will be carried out under the Management and control of experienced and qualified Mines Manager having Certificate of Competency to manage the mines granted by DGMS.
- All the provisions of Mines Act 1952, MMR 1961 and Mines Rules 1955, RMMCR 1986 and other laws applicable to mine will strictly be complied with.
- During heavy rainfall the mining activities will be closed.
- All persons in supervisory capacity will be provided with proper communication facilities.

Competent persons will be provided FIRST AID kits which they will always carry.

**4.11 Care and Maintenance during Temporary Discontinuance:**

In case of any temporary discontinuance due to court order or due to statutory requirement or any other unforeseen circumstance following measures shall be taken for care, maintenance and monitoring of conditions.

- Notice of temporary discontinuance of work in mine shall be given to the DGMS as per the MMR 1961.
- All the mining machinery shall be shifted to a safe place.
- Entrance to the mine or part of the mine, to be discontinued shall be fenced off. Fencing shall be as per the circular 11/1959 from DGMS.
- Security Guards shall be posted for the safety and to prevent any unauthorized entry to the area.





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- Carry out regular maintenance of the facilities/area detailed below in such a way as would have been done as if the mines were operation:
  - Mine roads and approach roads,
  - Fencing on approach roads,
  - Checking and maintenance of machines and equipment,
  - Drinking water arrangements,
  - Mine office, first aid stations etc.
- Competent persons shall inspect the area regularly.
- Air, water and other environmental monitoring shall be carried out as per CPCB and IBM Guideline.
- Care and upkeep of plantation shall be carried out on regular basis.
- Status of the working and status monitoring for re-opening of the mines shall be discussed daily.

In case of discontinuance due to any natural calamities/abnormal conditions, mining operation will be restarted as early as possible after completing rescue work, restoring safety and security, repairs of roads etc.

**5.0 ECONOMIC REPERCUSSION OF CLOSURE OF MINE AND MANPOWER RETRENCHMENTS**

Lease area will be granted for a period of 10 years only. As per the production programme envisaged, at the end of lease period, still sufficient un-worked area would be left available for continuing production activities further. Hence, no closure is planned. There will be no affect on the man power as the persons belong to nearby villages and will have an option either to be available for employment for the next contract/ lease or do the agriculture in their fields.

**6.0 TIME SCHEDULING FOR ABANDONMENT**

The lease area has enormous potential for continuance of operations even after the expiry of the awarded period. The details of time schedule of all abandonment will be



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given at the time of final closer plan. Mining activities are confined to river bed, up to 3.0 m. depth, relatively shallow depth of workings. Partial replenishment of the Sand being removed from the river bed is a natural process particularly during monsoon periods.

**7.0 ABANDONMENT COST**

As at present mining is not going to be closed so abandonment cost could not be assessed. However based on the progressive mine closure activities during the plan period, cost is assessed as given below:

**Abandonment Cost**

ACTIVITY	YEAR					Rate	Amount (in lakh Rs.)
	First	Second	Third	Fourth	Fifth		
Plantation (in no.)	1000	1000	1000	1000	1000	@ 100Rs per sapling	5.00
Plantation cost	100000	100000	100000	100000	100000	including maintenance	
Wire fencing (meter)	500	500	500	-	-	@ of 200Rs per meter	3.00
<b>Total</b>							<b>8.00</b>

**8.0 FINANCIAL ASSURANCE**

Total 99.384 ha area will be put in use upto the end of the plan period. Details of area put in use as given below (As per circular No.4/2006 issued by CCOM, Nagpur following table has been considered for calculation for financial assurance)





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S. No.	Particulars	Present land use (ha.)	Land use at the end of 5 years (ha.)
1.	Pit area	0.00	0.00
2.	Dump area	0.00	0.00
3.	Area for ancillary activities,mineral storage,office etc	8.24	8.24
4	Restricted area	21.00	21.00
5.	Plantation	0.00	4.00*
6.	Area for mining	70.144	70.144
<b>Total</b>		<b>99.384</b>	<b>99.384</b>

**Plantation will be done on the land provided by village panchayat/forest department.**

**Calculation for Financial Assurance**

S. No.	Item	Area put on use at start of plan (Ha) (A)	Requirement at the end of plan period (Ha)	Total area put to use (Ha) (B)	Area considered as fully reclaimed & rehabilitation (Ha) (C)	Net area considered for calculation (Ha) D = (B-C)
1.	Area to be excavated	0.0	70.144	70.144	0.0	70.144
2.	Storage for topsoil	0.0	0.0	0.0	0.0	0.0



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3.	Overburden/ dumps	0.0	0.0	0.0	0.0	0.0
4.	Mineral storage	0.0	8.00	8.00	0.0	8.00
5.	Infrastructure (Workshop, Adm. Building & Road)	-	0.35	0.35	0.00	0.35
6.	Safety zones	0.0	21.00	21.00	0.0	21.00
7.	Green belt	0.0	4.0*	4.00	4.00	0.0
8.	Tailing pond	0.0	0.0	0.0	0.0	0.0
9.	Effluent treatment plan	0.0	0.0	0.0	0.0	0.0
10.	Mineralseparation plant	0.0	0.0	0.0	0.0	0.0
11.	Township area	0.0	0.0	0.0	0.0	0.0
12.	Others to specify	0.0	0.0	0.0	0.0	0.0
<b>Total</b>		<b>0.0</b>	<b>99.384</b>	<b>99.384</b>	<b>0.0</b>	<b>99.384</b>

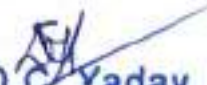
Total 99.384 ha area will be put in use. Against this mined out area the total financial assurance (@15000/- per ha. Comes out to Rs 14,90,000 / which will be deposited in the form of Surety bond/ bank guarantee to the Director Mines & Geology Haryana.

**9.0 CERTIFICATE**

It is enclosed with the report.

**10.0 PLAN AND SECTION**

Plan and section are prepared and enclosed with the mining plan.

  
**D.C. Yadav**  
**M.Sc. Geology**  
**Qualified Person**






MINING PLAN & PROGRESSIVE MINE CLOSURE PLAN FOR SAND IN THANTRI UNIT ,  
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**Certificate**

I, D.C.Yadav, duly recognized qualified person to prepare mining plan under Rule 22 C of the Mineral Concession Rules, 1960 (Revised 2016) & Haryana Minor Mineral Concession Rules 2012 ,has prepared the Mining Plan & Progressive Mine Closure Plan of SAND ( Minor Mineral) over an area of 99.384 hectares of M/s Minerio Mining Pvt.Ltd.,Through Sh.Sachin Sharma,MCD No.01,First floor,Suman Bazar Road,Bhogal,Delhi,South Delhi-110014 for Thantri Unit,district Palwal.The various data and write up enclosed have been complied and verified by us. The working plan and all other details given in the plan have been prepared under my guidance and duly verified by me. The mining plan and progressive mine closure plan complies all statutory rules , regulations , orders made by the Central or State Government, statutory organizations, court etc. have been taken into consideration and wherever any specific permission is required the lessee will approach the concerned authorities

  
D.C. Yadav  
M.Sc. Geology  
QB/DMG/HRY/2018/03  
Qualified Person



Through e-mail/Speed Post

From

The Director,  
Mines and Geology Haryana,  
2<sup>nd</sup> Floor Plot No. 9, I.T. Park, Sector-22, Panchkula.

To

M/s Minerio Mining Pvt. Ltd.,  
through Sh. Sachin Sharma, MCD No. 01, First Floor,  
Samman Bazar Road, Bhogal, Delhi, South Delhi - 110014

Memo No. DMG/HY/Thantri Unit/Palwal/2023/ 4199  
Dated Panchkula, the 21-07-23

**Subject:** Acceptance of the highest bid in respect of the minor mineral Sand contract of "Thantri Unit" having tentative area of 248.46 Acre in the district Palwal, offered in e-auction held on 13.06.2023/issuance of Letter of Intent (LoI)- regarding.

You participated in the e-auction held on 13.06.2023 on the e-Auction web portal (<https://minesharyana.eauctions.com/>) for grant of mining contract of minor mineral sand mines after accepting the terms and conditions of the auction notice issued vide notification no. DMG/HY/Auction/Palwal/2022/2523 dated 10.05.2023 & corrigendum No. 3272 dated 07.06.2023 in order to obtain mining contract of minor mineral sand mine of the district Palwal.

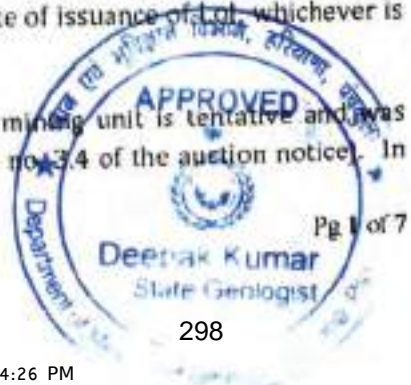
2. You offered the highest bid of Rs. 13,18,00,000/- (Rs. Thirteen Crores Eighteen Lakhs only) per annum against the Reserve Price of Rs. 13,13,00,000/- for obtaining the Mining Contract of Minor Mineral Mine namely 'Thantri Unit' for extraction of 'Sand' having total area of 248.46 Acre. The details of the khasra number of the area under above said Mining Unit is attached as Annexure 'A'.

3. You are hereby informed that the State Government has accepted the highest bid of Rs. 13,18,00,000/- per annum offered by you in respect of 'Thantri Unit' under the provision of Haryana Minor Mineral Concession, Stocking, Transportation of Minerals & Prevention of Illegal Mining Rules, 2012 (State Rules, 2012). Accordingly, you have become the successful bidder in respect of above said mine.

4. The State Government having accepted the aforementioned highest bid of Rs. 13,18,00,000/- offered by you, the Department is pleased to issue this Letter of Intent (LoI) in your favour in respect of the Mining Unit/area namely 'Thantri Unit' subject to the following terms and conditions:

4.1 The period of the contract shall be 10 years and the same shall commence w.e.f. the date of grant of Environmental Clearance by the competent authority and the Consent to Operate (CTO) by the State Pollution Control Board, whichever is later, or on expiry of the period of 12 months from the date of issuance of LoI, whichever is earlier;

4.2 You may note that the detail of the area of the mining unit is tentative and was notified on "as is where is basis" (refer condition no. 3.4 of the auction notice). In





case of any inadvertent mistake in the area detail/Khasra number etc., the same shall be got rectified/corrected before execution of the contract agreement (refer condition no. 3.3 of the auction notice):

- 4.3. No request regarding reduction in bid amount on account of reduction in land/area of the Mining Block/ Unit, on any other account including that of change in description of Khasra numbers / location etc. at any stage will be entertained on any ground. This shall also include any loss/reduction of area for actual mining for want of compliance of applicable laws/restrictions for mining or part of the contracted area had already been operated in the past. Needless to state that this also includes the changes, if any, as per condition no. 3.4 of the auction notice.
- 4.4. You offered bid after having gone through the terms and conditions of auction notice and also the applicable Acts and Rules for undertaking mining. The State government shall not be responsible for any kind of loss to you being the highest bidders/contractor at any point of time (before or after grant of contract) on any account including on account of reduction of land/ area/ production/ non grant of permission for mining in part area or otherwise on account of any condition stipulated for undertaking mining by any competent authority.
- 4.5. The amount of the highest bid i.e. Rs. 13,18,00,000/- (Rs. Thirteen Crores Eighteen Lakhs only) per annum shall be the "Annual Contract Money" payable by you as the contractor money in the manner prescribed in the contract agreement to be executed on form MC-1 appended to State Rules.

As per orders dated 01.07.2022 of the State Government you will have to open Escrow Account with the Department, wherein all the sale proceed made through e-Rawaana Portal will required to be deposited.

- 4.6. The above said annual contract money shall be increased at the rate of 10% on completion of each block of three years. Accordingly, the year-wise amount of the annual contract money shall be as per details given below:

Sr. No.	Year of the contract Period	Annual Contract Money [in Rs.]
1	First Year	13,18,00,000
2	Second Year	13,18,00,000
3	Third Year	13,18,00,000
4	Fourth Year	14,49,80,000
5	Fifth Year	14,49,80,000
6	Sixth Year	14,49,80,000
7	Seventh Year	15,94,78,000
8	Eighth Year	15,94,78,000
9	Ninth Year	15,94,78,000
10	Tenth Year	17,54,25,800

- 4.7. As per the terms and conditions of the grant, you are liable to deposit Rs. 3,29,50,000/- i.e. equal to 25% of the annual bid amount as "Security", out of which you have already deposited an amount of Rs. 1,31,80,000/- (Rs. One Crore Thirty One Lakhs Eighty Thousand only) i.e. equal to 10% of the annual bid amount as 'initial bid security' after the conclusion of e-auction. The balance amount of Rs.



1,97,70,000/- of the bid security i.e. 15% of the annual bid amount shall be deposited before commencement of the mining operation or before expiry of the period of 12 months from the date of issuance of Letter of Intent (LoI), whichever is earlier;

Provided that in case having taken all steps on your part, if you fails to obtain required environmental clearance and consent to operate(CTO) for undertaking mining operations within the said period of 12 months from the date of issuance of LoI, such letter of intent holder/contractor on a specific application submitted to the Director, at least thirty days prior to the end of the period mentioned above, giving details of the action already taken may seek additional time up to another twelve months, over and above the time of 12 months already allowed for commencement of the period of contract, on payment of a non-refundable fee as per the following:-

1	Extension of further period up to six months	On payment of a non-refundable fee at the rate of one percent per month of the annual bid for each month of requested extension period
2	Extension for a second period up to six months	On payment of a non-refundable fee at the rate of two percent per month of the annual bid for each month of requested extension period
<p>Note: Extension shall be allowed only in month (s) and any request for period less/part of the month shall be summarily rejected and shall apply along with advance amount of the fee for such requested period of extension.</p>		

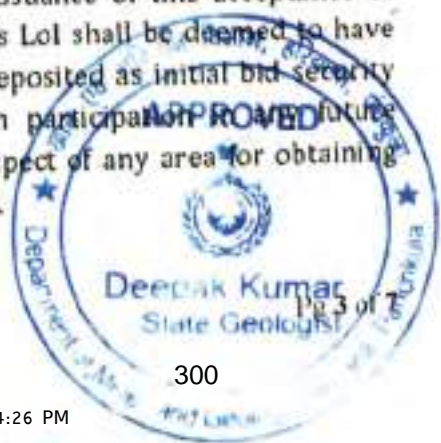
4.8 You are directed to execute the Contract Agreement in Form MC-1 appended to the State Rules, 2012 within a period of 90 days from the date of order of issuance of this LoI.

Note: 90 days period is for execution of Contract Agreement. Therefore, it is advised to submit draft agreement along with all relevant documents preferably within 45 days, so that agreement could be executed within 90 days after completing all the formalities of scrutiny and verification.

4.9 In case of the Partnership Deed (where bidding entity is a partnership firm) or Articles of Association (where bidding entity is a registered Company) or an Affidavit (where bidding entity is a sole proprietorship firm and the bidder is participating as an Individual), no transfer or addition or deletion of the Partners/Directors will be permissible before execution of the agreement;

4.10 The Contract Agreement executed shall be got duly Registered under relevant laws with concerned Registering Authority and you will be liable to pay applicable stamp duty and registration fee etc. as per the applicable rates and as demanded by the Registering Authority/Revenue Department at the time of Registration.

4.11 In case of failure to execute the agreement, after issuance of this acceptance of bid/LOI within the prescribed period of 90 days, this LoI shall be deemed to have been revoked and 10% amount of the highest bid deposited as initial bid security shall be forfeited and you, will be debarred from participation in future auctions/tenders/competitive bidding process in respect of any area for obtaining mineral concession in the State for a period of 5 years.





- 4.12 You shall also furnish a solvent surety for a sum equal to the amount of the annual bid for execution of the Agreement. The documents in support of solvency of the surety shall be submitted duly evaluated by the concerned Revenue Authority along with Non Encumbrance Certificate from the concerned Revenue Authority. In case the surety offered by the contractor(s) during the subsistence of the contract is not found solvent, the contractor(s) shall offer another solvent surety and a supplementary deed shall be executed to this effect.
- 4.13 After execution of agreement, either before commencement of the mining operation or before expiry of the time allowed, if any, as per condition No. 4.7 above, in case of failure to deposit the balance 15% amount towards security (as required under clause 4.7 above), the acceptance of bid/issuance of Lol/execution of agreement shall be deemed to have been revoked and 10% amount deposited towards as initial bid security after the conclusion of auction shall stand forfeited. Further, such bidder shall be debarred from participation in any future auctions/Tenders/competitive bidding process in respect of any area for obtaining mineral concession in the State for a period of 5 years.
- 4.14 You shall be liable to deposit the contract money in advance at monthly intervals as per provisions of Contract Agreement i.e. from the date of commencement of the contract period.
- 4.15 You shall also deposit/ pay an additional amount equal to 7.5% of the due contract money along with the monthly instalments towards the 'Mines and Mineral Development, Restoration and Rehabilitation Fund.
- 4.16 You shall also deposit/ pay an additional amount equal to 2.5% of the due contract money along with the monthly instalments towards the 'District Mineral Fund'.
- 4.17 You shall also be liable to pay advance Income Tax as per provisions of Section 206(c) of Income Tax Act in addition to contract money, payable as per terms and conditions of contract agreement.
- 4.18 On enhancement of the contract money with the expiry of every three years period, you shall deposit the balance amount of security so as to upscale the security amount equal to 10% of the revised annual contract money as applicable for one year with respect to the next block of three years. No interest, whatsoever, shall be payable on the security amount deposited under the prescribed security head of the government;
- 4.19 You shall prepare a Mining Plan along with the Mine Closure Plan (Progressive & Final) from the Recognized Qualified Person as per chapter 10 of the State Rules, 2012 for the "Mining Unit" and shall not commence mining operations in any area except in accordance with such Mining Plan duly approved by an officer authorised by the Director, Mines & Geology, in this behalf.
- 4.20 Further, the actual mining will be allowed to be commenced only after prior Environment Clearance is obtained by you as the Lol holder/ Mining contractor for the Mining Unit from the Competent Authority as required under EIA notification dated 14/09/2006 issued by Ministry of Environment, Forests and Climate Change, Government of India or as amended from time to time and also other required





Consents for mining including Consent to Establish and Consent to Operate from the Haryana State Pollution Control Board before commencement of actual mining operations.

- 4.21 You will also be liable to pay the following to the landowners to undertake mining operations:
- (a) Annual rent in respect of the land area blocked under the concession but not being operated; and
  - (b) Rent Plus compensation in respect of the area used for actual mining operations.
- 4.22 The amount of annual rent and the compensation shall be settled mutually between the landowner and the mining contractor. In case of non-settlement of the rent and compensation, the same shall be decided by the District Collector concerned in accordance with the provisions contained in Chapter 9 of the "State Rules, 2012";
- 4.23 The total mineral excavated and stacked by the concession holder within the area granted on mining contract shall not exceed three times of the average monthly production as per approved Mining Plan and/or quantity approved under Environmental Clearance, at any point of time.
- 4.24 The Mining Contractor shall not stock any mineral outside the concession area granted on mining contract, without obtaining a valid Mineral Dealer License as per provisions contained in Chapter 14 of the State Rules, 2012.
- 4.25 The contractor shall not carry out any mining operations in any reserved/ protected forest or any area prohibited by any law in force in India, or prohibited by any authority without obtaining prior permission in writing from such authority or officer authorized in this behalf. In case of refusal of permission by such authority or officer authorised in this behalf, contractor(s) shall not be entitled to claim any relief in payment of contract money on this account;
- 4.26 Following are the general/ special conditions applicable for excavation of minor mineral(s) from river beds in order to ensure safety of riverbeds, structures and the adjoining areas:
- i. No mining would be permissible in a river-bed up to a distance of five times of the span of a bridge structure on up-stream side and ten time the span of such bridge structure on down-stream side, subject to a minimum of 250 meters on the up-stream side and 500 meters on the down-stream side;
  - ii. There shall be maintained an un-mined block of 50 meters width after every block of 1000 meters over which mining is undertaken or at such distance as may be directed by the Director or any officer authorised by him;
  - iii. The maximum depth of mining in the river-bed shall not exceed three meters from the un-mined bed level at any point in time with proper bench formation;
  - iv. Mining shall be restricted within the central 3/4<sup>th</sup> width of the river/ rivulet;
  - v. Any other condition(s), as may be required by the Irrigation Department or state from time to time for river-bed mining in consultation with the Mines & Geology Department, may be made applicable to the mining operations in river-beds.






approvals for mining including Consent to Establish and Consent to Operate from the Haryana State Pollution Control Board before commencement of actual mining operations.

- 4.21 You will also be liable to pay the following to the landowners to undertake mining operations:
- (a) Annual rent in respect of the land area blocked under the concession but not being operated; and
  - (b) Rent Plus compensation in respect of the area used for actual mining operations.
- 4.22 The amount of annual rent and the compensation shall be settled mutually between the landowner and the mining contractor. In case of non-settlement of the rent and compensation, the same shall be decided by the District Collector concerned in accordance with the provisions contained in Chapter 9 of the "State Rules, 2012";
- 4.23 The total mineral excavated and stacked by the concession holder within the area granted on mining contract shall not exceed three times of the average monthly production as per approved Mining Plan and/or quantity approved under Environmental Clearance, at any point of time.
- 4.24 The Mining Contractor shall not stock any mineral outside the concession area granted on mining contract, without obtaining a valid Mineral Dealer License as per provisions contained in Chapter 14 of the State Rules, 2012.
- 4.25 The contractor shall not carry out any mining operations in any reserved/ protected forest or any area prohibited by any law in force in India, or prohibited by any authority without obtaining prior permission in writing from such authority or officer authorized in this behalf. In case of refusal of permission by such authority or officer authorised in this behalf, contractor(s) shall not be entitled to claim any relief in payment of contract money on this account;
- 4.26 Following are the general/ special conditions applicable for excavation of minor mineral(s) from river beds in order to ensure safety of riverbeds, structures and the adjoining areas:
- i. No mining would be permissible in a river-bed up to a distance of five times of the span of a bridge structure on up-stream side and ten time the span of such bridge structure on down-stream side, subject to a minimum of 250 meters on the up-stream side and 500 meters on the down-stream side;
  - ii. There shall be maintained an un-mined block of 50 meters width after every block of 1000 meters over which mining is undertaken or at such distance as may be directed by the Director or any officer authorised by him;
  - iii. The maximum depth of mining in the river-bed shall not exceed three meters from the un-mined bed level at any point in time with proper bench formation;
  - iv. Mining shall be restricted within the central 3/4<sup>th</sup> width of the river/ rivulet;
  - v. Any other condition(s), as may be required by the Irrigation Department of state from time to time for river-bed mining in consultation with the Mines & Geology Department, may be made applicable to the mining operations in river-beds.



- vi. No mining operation may be carried out from 1<sup>st</sup> July to 15<sup>th</sup> September every year (rainy season)
- 4.27 No mining operation shall be allowed in the urbanize zone of area notified by Town and Country Planning Department. Further, in case of the agriculture zone notified by Town and Country Planning Department mining shall be permissible only after obtaining prior permission from the competent authority;
- 4.28 The contractor shall not undertake any mining operation in the area granted on mining contract without obtaining requisite permission from the competent authority as required for undertaking mining operations under relevant laws;
- 4.29 The contractor shall be under obligation to carry out mining in accordance with all other provisions as applicaule under the Mines Act, 1952. Mines and Minerals (Development and Regulation) Act, 1957, Indian Explosive Act, 1884, Forest (Conservation) Act, 1980 and Environment (Protection) Act, 1986 and the rules made there under, Wild life (Protection) Act, 1972, Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981;
- 4.30 All other terms and conditions shall remain as per auction notice and the provisions of the Mines and Minerals (Development and Regulation) Act, 1957 and Rules made there under shall prevail over all the terms and conditions.
5. Accordingly, you are advised to submit the Draft Contract Agreement along with other requisite documents including a solvent surety(s) for a sum equal to the amount of the annual bid for execution of the agreement, within a period of 90 days from the date of issue of this bid acceptance letter and the Lol.

  
Director  
Mines & Geology, Haryana

**Speed/Registered Post**

Endst. No. DMG/HY/Thantri Unit/Palwal/2023/

Dated

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

1. Additional Chief Secretary to Government Haryana, Mines and Geology Department.
2. The Chairman, Haryana State Pollution Control Board, Panchkula.
3. The Deputy Commissioner, Palwal.
4. The Mining Officer, Mines & Geology Department, Faridabad. He is directed to ensure that proper and complete 'Draft Contract Agreement Documents' as required are submitted within stipulated period.

  
**APPROVED**  
Director  
Mines & Geology, Haryana  
Deepak Kumar  
State Geologists

Pg 6 of 7



Sr. No.	Name of Unit	Name of the Village	Details of Khasra Numbers	Area in acre as per revenue record	Total Mineral Concession Area (in acre)	Period (in years)
1	Yashraj	Sharni	<p>For Mining</p> <p>3/1, 11/1, 20/1, 25/2 min, 21 min                      4/1, 7, 8 min, 13/1 min, 13/2, 14, 15/1, 15/2                      16/1 min, 16/2 min, 17/1, 17/2, 18/1 min, 18                      min, 24/1, 24/2, 25/1, 25/2, 10/1, 1 min, 4/1                      9/2, 5, 6/1, 6/2, 7/1, 7/2, 8/1, 8/2 min, 13/1                      min, 13/2, 13/3, 14, 15/1, 15/2, 15/3, 15/4                      16/1, 16/2, 17, 18/1, 18/2 min, 21 min, 24, 25                      11/1, 1 min, 10 min, 11 min, 20 min, 13/1, 13/2,                      21 min                      11/1, 1, 2 min, 5 min, 19/1, 10/2, 11, 11/1, 1 min                      11/2 min, 19 min, 20/1, 20/2, 21, 22 min                      16/1, 1/2, 4, 5, 6, 7, 8/1, 13/1 min, 11/2 min,                      13, 15, 16/1, 16/2, 17, 18/1 min, 23/2 min, 24, 25                      22/1, 3/2 min, 4/1, 4/2, 5/1, 5/2, 7, 8/1 min                      11/1 min, 14/1, 14/2, 15, 16/1, 19/2, 17/1,                      17/2, 18/1 min, 21 min, 24, 25/1, 25/2,                      24/1, 1, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2,                      12 min, 19 min, 20, 21, 22 min                      28/1, 1, 2 min, 3/1 min, 4/2 min, 10, 11, 12 min,                      19 min, 20, 21/1, 21/2, 25/1, 3 min, 4, 5/1, 5/2,                      6/1, 6/2, 7/1, 7/2, 8 min, 11/2 min, 14/1, 14/2,                      15/1, 15/2, 15/3, 16, 17/1, 17/2, 18/1 min, 24/2                      min, 24/1, 24/2, 25, 30/1, 1/2 min, 4/1, 4/2,                      5/1, 5/2, 6, 7/1, 7/2, 8/1 min, 11/2 min, 14/1,                      14/2, 15, 16, 17 min, 18/1 min, 24 min, 25                      19/1, 1, 2 min, 3 min, 8 min, 9, 10, 11/1, 11/2, 12,                      13/1 min, 13/2 min, 19 min, 19/1, 19/2, 20, 21,                      22, 23 min                      41/1, 1, 2, 3 min, 9, 10, 11                      42/1, 4 min, 16/1, 16/2, 17 min, 14 min, 15, 17 min.</p> <p>For Auxiliary area                      24/1, 4, 5/1, 5/2, 6, 7, 14, 15                      25/1, 1/1, 1/2, 10, 11</p>	107.29	248.46	10
		Ranapur Khadar	<p>For Mining</p> <p>7/1, 3/1, 3/2, 8/1 min, 4/2, 9, 11/2, 11/1, 12, 13                      min, 14 min, 15 min, 16, 19, 20, 21, 22, 21, 24 min                      8/1, 16 min, 25/1 min, 25/2                      10/1, 5/1 min, 5/2, 6/1, 6/2, 7 min, 14 min,                      15/1, 15/2, 16, 17 min, 24/2 min, 25                      18/1, 1, 2, 3, 4 min, 7 min, 8/1, 8/2, 9, 10/1, 10/2,                      11, 12, 13/1, 13/2, 14 min, 19 min, 19/1, 19/2,                      20, 21, 22, 23 min                      24/1, 1, 2/1, 2/2, 3/1, 3/2, 7 min, 8 min, 9, 10, 11,                      12, 13, 14 min, 17/1 min, 17/2 min, 18, 19, 20,                      21, 22/1, 22/2, 23, 24/1, 23 min                      25/1, 4/2 min, 5, 6, 7 min, 15 min, 16 min, 25 min                      29/1, 5 min, 6/1 min, 6/2 min, 15 min                      30/1, 1, 2/1, 2/2, 3/1, 3/2, 4 min, 7 min, 8, 9/1,                      9/2, 10, 11, 12, 13, 14, 15 min, 16 min, 17                      20/1, 18, 19, 20 min, 21/1, 2 min, 22/1, 22/2, 23,                      24, 25 min                      44/1, 10/2 min, 11/1 min, 20/1 min, 20/2 min,                      21 min                      45/1, 1 min, 2, 3, 4, 5 min, 6 min, 7, 8, 9/1 min,                      9/2 min, 10 min, 11 min, 12 min, 13, 14, 15, 16,                      17, 18, 19 min, 22 min, 23, 24, 25/1, 25/2                      62/1, 2 min, 3, 4, 5, 6/1, 6/2, 7, 8 min, 13 min, 14,                      15, 16, 17 min, 18 min, 23 min, 24, 25                      33/1, 1/1, 1/2 min, 2/1 min, 2/2 min, 9 min, 10,                      11/1, 11/2, 12 min, 19 min, 20/1, 20/2, 21, 22,                      23 min,                      61/1, 3, 2/1, 2/2, 3/1, 3 min, 4, 10, 11,                      62/1, 3 min, 4 min, 5, 6</p> <p>For Auxiliary area                      33/1, 6, 7, 8, 13, 14, 15, 16, 17, 18, 21, 24, 25/1</p>	120.57	9.10	11.50



GSTIN : 07AAPCM1108D125  
PAN : AAPCM1108D

MOB. +91 88020 22297 +91 91336 98000  
E-mail : elitemining2020@gmail.com

# MINERIO MINING PRIVATE LIMITED

H OFFICE : 1<sup>st</sup> floor, MCD office - 1A  
Samman Bazar Road, Bhogal,  
New Delhi -110014

SITE ADDRESS :  
1st floor, MCD office - 1A  
Samman Bazar Road, Bhogal,  
New Delhi -110014

## CONSENT LETTER FROM APPLICANT (Annexure-2)

The mining plan in respect of M/s Minerio Mining Pvt.Ltd.,Through Sh.Sachin Sharma,MCD No.01,First floor,Suman Bazar Road,Bhogal,Delhi,South Delhi-110014 for Thantri Unit, over an area of 99.384 Hectares District- Palwal State -Haryana has been prepared by Dr.S.N.Sharma & D.C.Yadav RQPs .

We request The Director Mines and Geology, Haryana to make further correspondence regarding modification of the mining plan with the said RQPs on the following address:-

D.C.Yadav RQP/DMG/HRY/2018/03 & Dr.S.N.Sharma ( QP).

# First Floor,282 sector 11 D, DLF , Faridabad -121006 ( Haryana)

We also authorize Shri D.C.Yadav to make correspondence with your office.

I hereby undertake that the mining plan in respect of the area prepared by RQP be deemed to have been made with my knowledge and consent and shall be acceptable to me and binding on me in all respects.

This is to declare that the Mining Plan & Progressive Mine Closure Plan complies all statutory Rules, Regulations, orders made by the Central or State Government, statutory organizations, court etc. have been taken into consideration and wherever any specific permission is required the lessee will approach the concerned authorities. It is also undertaken that all the measures proposed in the Progressive Mine Closure Plan will be implemented in a time bound manner as proposed.

Place:

Date: 10-08-2023

Signature of the Applicant



GOVERNMENT OF HARYANA

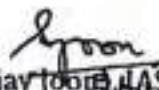
DIRECTORATE OF MINES AND GEOLOGY, HARYANA,  
30-BAYS BUILDING, SECTOR 17, CHANDIGARH.

**CERTIFICATE OF RECOGNITION AS A QUALIFIED PERSON TO PREPARE  
MINING PLAN/SCHEME OF MINING FOR MINOR MINERAL MINES**  
(Under Rule 67 of Haryana Minor Mineral Concession, Stocking, Transportation of Minerals and  
Prevention of Illegal Mining Rules, 2012)

**Shri Duli Chand Yadav S/o Shri Ramji Lal, resident of village Dhani  
Bania Wall, PO Nangal Chaudhary, District Mahendergarh** having given  
satisfactory evidence of his qualifications and experience, is hereby granted recognition  
under Rule 67 of the Haryana Minor Mineral Concession, Stocking, Transportation of  
Minerals and Prevention of Illegal Mining Rules, 2012, as a "Qualified Person" to prepare  
Mining Plans/Scheme of Mining in respect of minor minerals mines in the State of Haryana.

2. His registration No. is DMG/HRY/RQP/2018/03.
3. This recognition shall be valid for a period of ten years ending on 26.04.2028

Place : Chandigarh  
Dated : 26.04.2018

  
(Sanjay Kumar)  
Director,  
Mines & Geology, Haryana,  
Chandigarh.







खनन योजना तैयार करने हेतु  
योग्य व्यक्ति के रूप में  
मान्यता का प्रमाणपत्र

Renewed/नवीनीकृत up to 29/3/2024

*Schoddy* 28/3/11  
क्षेत्रीय खान नियंत्रक  
Regional Controller of Mines  
भारतीय खान ब्यूरो  
Indian Bureau of Mines

(खनिज रियायत नियमावली 1960 के नियम 22(सी) के अंतर्गत)

श्री एस. एन. शर्मा

पत्नी श्री के. सी. शर्मा

निवासी हाउस नं. 2181, सेक्टर-16, फरीदाबाद, हरियाणा

द्वारा अपनी योग्यताओं और अनुभव का संतोषप्रद प्रमाण प्रस्तुत करने के फलस्वरूप  
खनिज रियायत नियमावली, 1960 के नियम 22(सी) के अंतर्गत उन्हें एतद्वारा खनन  
योजना तैयार करने हेतु योग्य व्यक्ति के रूप में मान्यता प्रदान की जाती है।

उपरोक्त पंजीयन क्रमांक RAP/DDN/135/2001/A है।

यह मान्यता दिनांक 29.03.2011 को समाप्त

होने वाली ~~हस्ताक्षर~~ की अवधि के लिए वैध है।

स्वान : देहरादून

दिनांक : 30.03.2001

*Schoddy*  
क्षेत्रीय खान नियंत्रक  
भारतीय खान ब्यूरो  
Regional Controller of Mines  
भारतीय खान ब्यूरो  
Indian Bureau of Mines





REPLENISHMENT STUDY REPORT(POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha DISTRICT-PALWAL (Haryana)

**SUBJECT:REPORT ON REPLENISHMENT STUDY FOR RIVER BED MINING PROJECT OF MINORMINERAL SAND OF THANTHRI BLOCK, DISTRICT PALWAL(HARYANA) OFM/s Minerio Mining Pvt.Ltd.,ThroughSh.SachinSharma,MCD No.01,First floor,Suman Bazar Road,Bhogal,Delhi,South Delhi-110014**

**References:**

- a) Letter of Intent (LOI) :A Letter of Intent (LOI) has been issued by the Director Mines & Geology Haryana vide letter no. DMG/HY/Thantri Unit/Palwal/2023/4199 dated 21-07-2023 for Mining of Sand (Minor Mineral) in Thantri Unit , comprising Thantri&Rajupur Khaddar villages over an area of 248.46 acres (99.384 hectares) in district Palwal, Haryana for a period of 10 years

**1) The Project :**

- M/s Minerio Mining Pvt.Ltd.,ThroughSh.SachinSharma,MCD No.01,First floor,Suman Bazar Road,Bhogal,Delhi,South Delhi-110014 was the highest bidder (13.18 Crores) for the Sand quarries of Thantri Unit for which auction held on 13-06-2023.
- A Letter of Intent (LOI) has been issued by the Director Mines & Geology Haryana vide letter no. DMG/HY/Thantri Unit/Palwal/2023/4199 dated 21-07-2023 for Mining of Sand (Minor Mineral) in Thantri Unit , comprising Thantri&Rajupur Khaddar villages over an area of 248.46 acres (99.384 hectares) in district Palwal, Haryana for a period of 10 years It forms a part of G. T. Sheet No's 53E/5,9 and 53 H/8,12 . The area is approachable from nearest town of Palwal, Faridabad, Hodal and Hassanpur. These are located about from 17 Kms east of Palwal City. All these quarries are connected by metalled road branching off from GT road NH-2 and road connecting AlawalpurHassanpur-Palwal via Thantri and up to the river quarries .

**Khasra Details of the lease area as under**

Name of block	Name of village	Area in Acres as per revenue record		Total Mineral concession Area	Details of Khasra Nos
		For Mining	For Ancillary Area		
Thanthri	Thanthri	107.29	.10	248.46	For Mining 3// 11 min, 20/1, 20/2 min, 21 min 4// 7, 8 min, 13/1 min, 13/2, 14, 15/1, 15/2, 16/1 min, 16/2 min, 17/1, 17/2, 18/1 min, 23 min, 24/1,

REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

					24/2, 25/1, 25/2, 10// 3 min, 4/1, 4/2, 5, 6/1, 6/2, 7/1, 7/2, 8/1, 8/2 min, 13/1 min, 13/2, 13/3, 14, 15/1, 15/2, 15/3, 15/4, 16/1, 16/2, 17, 18/1, 18/2 min, 23 min, 24, 25 11// 1 min, 10 min, 11 min, 20 min, 21/1, 21/2, 22 min 15// 1, 2 min, 9 min, 10/1, 10/2, 11, 12/1 min, 12/2 min, 19 min, 20/1, 20/2, 21, 22 min 16// 3/2, 4, 5, 6, 7, 8/1, 13/1 min, 13/2 min, 14, 15, 16/1, 16/2, 17, 18/1 min, 23/2 min, 24, 25 23// 3/2 min, 4/1, 4/2, 5/1, 5/2, 7, 8/1 min, 13/3 min, 14/1, 14/2, 15, 16/1, 16/2, 17/1, 17/2, 18/1 min, 23 min, 24, 25/1, 25/2, 24// 1, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20, 21, 22 min 28//, 1, 2 min, 9/1 min, 9/2 min, 10, 11, 12 min, 19 min, 20, 21/1, 21/2, 29//, 3 min, 4, 5/1, 5/2, 6/1, 6/2, 7/1, 7/2, 8 min, 13/2 min, 14/1, 14/2, 15/1, 15/2, 15/3, 16, 17/1, 17/2, 18/1 min, 23/2 min, 24/1, 24/2, 25, 38//, 3/2 min, 4/1, 4/2, 5/1, 5/2, 6, 7/1, 7/2, 8/1 min, 13/2 min, 14/1, 14/2, 15, 16, 17 min, 18/1 min, 24 min, 25 39//, 1, 2 min, 3 min, 8 min, 9, 10, 11/1, 11/2, 12, 13/1 min, 13/2 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min 41//, 1, 2, 3 min, 9, 10, 11 42//, 4 min, 5, 6/1, 6/2, 6/3, 7 min, 14 min, 15, 17 min 24// 4, 5/1, 5/2, 6, 7, 14, 15. 25// 1/ 1, 1/2, 10, 11.
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APPROVED  
For Ancillary area  
Deepak Kumar  
State Geologist  
Palwal District



ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK AREA-99.384ha. DISTRICT-PALWAL (Haryana)

	RajpurKhadar	120.57	11.50	<p><b>For Mining</b></p> <p><b>7//</b>, 3/1, 3/2, 8/1 min, 8/2, 9, 11/2, 11/1, 12, 13 min, 14 min, 17 min, 18, 19, 20, 21, 22, 23, 24 min</p> <p><b>8//</b> 16 min, 25/1 min, 25/2</p> <p><b>10//</b> 5/1 min, 5/2, 6/1, 6/2, 7 min, 14 min, 15/1, 15/2, 16, 17 min, 24/2 min, 25</p> <p><b>11//</b> 1, 2, 3, 4 min, 7 min, 8/1, 8/2, 9, 10/1, 10/2, 11, 12, 13/1, 13/2, 14 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min</p> <p><b>24//</b> 1, 2/1, 2/2, 3/1, 3/2, 7 min, 8 min, 9, 10, 11, 12, 13, 14 min, 17/1 min, 17/2 min, 18, 19, 20, 21, 22/1, 22/2, 23, 24/1,2,3 min</p> <p><b>25//</b> 4/2 min, 5, 6, 7 min, 15 min, 16 min, 25 min</p> <p><b>29//</b>, 5 min, 6/1 min, 6/2 min, 15 min</p> <p><b>30//</b> 1, 2/1, 2/2, 3/1, 3/2, 4 min, 7 min, 8, 9/1, 9/2, 10, 11, 12, 13, 14, 15 min, 16 min, 17</p> <p><b>30//</b> 18, 19, 20 min, 21/1,2 min, 22/1, 22/2, 23, 24, 25 min</p> <p><b>44//</b>, 10/2 min, 11/1 min, 20/1 min, 20/2 min, 21 min</p> <p><b>45//</b> 1 min, 2, 3, 4, 5 min, 6 min, 7, 8, 9/1 min, 9/2 min, 10 min, 11 min, 12 min, 13, 14, 15, 16, 17, 18, 19 min, 22 min, 23, 24, 25/1, 25/2</p> <p><b>52//</b> 2 min, 3, 4, 5, 6/1, 6/2, 7, 8 min, 13 min, 14, 15, 16, 17 min, 18 min, 23 min, 24, 25</p> <p><b>53//</b> 1/1, 1/2 min, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20/1, 20/2, 21, 22, 23 min,</p> <p><b>61//</b> 1, 2/1, 2/2, 3/1, 8 min, 9, 10, 11,</p> <p><b>62//</b> 3 min, 4 min, 5, 6.</p>
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REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

					For Ancillary area 31// 6, 7, 8, 13, 14, 15, 16, 17, 18, 23, 24, 25/1
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### Objective for Replenishment Study

The Mining Plan & Progressive Mine Closure Plan has already been prepared. Department of Mines & Geology Haryana has advised to prepare and submit the replenishment study report along with the Mining Plan for approval. Although it is a fresh lease for which LOI was issued recently and replenishment could only be measured/assessed after mining up to 15<sup>th</sup> June and then replenishment by rainy water during rainy season up to 15<sup>th</sup> Sept. Therefore the existing surface level of River Yamuna after the rainy season is over is the same as Surface Geological plan. However Detailed surface level surveys carried out to know the quantity of sand deposits. Applicant has assigned the work of assessment of replenishment/ sand deposition in the area to M/s JBB Technocrat Private Limited, Faridabad., who carried out the surveys for the assessment of sand deposits. The replenishment study comprises of Post Monsoon survey and Pre-monsoon survey will be carried out during the next year after 15<sup>th</sup> of June 2024 and again post monsoon survey after the of Sept 2024 and only then could arrive at volume calculation of sand replenished.

#### 2) Period of Replenishment Study (2023)

a) The Post-Monsoon Period : 10-12<sup>th</sup> October, 2023

#### 3) Need for present Annual Replenishment Study

- By large as per prevailing EC& CTE conditions the Project Proponent should carry out replenishment study annually to ascertain the quantity of material replenished.
- As directed Department of Mines & Geology Haryana.
- The project proponent will submit the replenishment study report to Regional Office, MoEF&CC every year. The proponent should carry out a comprehensive replenishment study considering data collected at same location and at same time for at least three years and same needs to be submitted to Regional Office, MoEF&CC.

4) To fulfill to objective of the replenishment study and to comply with the direction of Director Mines & Geology Haryana Project Proponent assigned the work to M/s JBB Technocrat with "Monitoring Committee" of following experts for this purpose:

- |      |                      |  |
|------|----------------------|--|
| i)   | S.N. Sharma :        | Mining Expert                                |
| ii)  | DC Yadav :           | Sr. Geologist                                |
| iii) | Yogeshwar P Mishra : | Environmental Expert cum Drone Survey expert |
| iv)  | Arafat Khan :        | GIS cum Survey Expert                        |





## 5. Software & Equipment Deployed

### Equipment:

- DGPS
- Drone

### Software:

- Drone Mapper (Software)
- DJI Mavic GPS & Glonass Based Software
- Arc Gis 10.8 (Software)
- AutoCAD 2011 (Software)

Project Proponent appointed M/S JBB Technocrat Private Limited, Faridabad (Haryana), an Environmental Consulting Company for undertaking

- a) Pre-monsoon survey and replenishment study
- b) Post-monsoon survey and replenishment study
- c) To prepare composite sections of pre and post monsoon survey findings
- d) To calculate the volume of sand replenished during study period.
- e) Finally to prepare "Replenishment Study Report"

However as the Mine has not yet started, the actual mineral mined and replenishment of mineral after next coming rainy season is over will be assessed.

## 6. Replenishment Study

### 6.1 General Introduction:

**Sediment** is a naturally occurring material that is broken down by processes of weathering and erosion, and is subsequently transported by the action of wind, water, or ice or by the force of gravity acting on the particles

Sand is an essential minor mineral used extensively across the country as a useful construction constituent and variety of other uses in sports, agriculture, glass making (a form of sand with high silica content) etc. It is common knowledge that minerals are Non-renewable but this form of mineral naturally gets replenished from time to time in a given river system and is very much interrelated to the hydrological cycle in a river basin. But its over-exploitation and



indiscriminate mining supersedes replenishment & optimum extraction is overtaken by profits, extraction has exceeded its replenishment rate and it neglects laws of mineral conservation. Sand mining has become a widely spread activity and does not require a huge set up or technology, the number of ventures has increased extensively and it has become a footloose industry in itself but the backward-forward linkages are becoming stronger as many are getting employed as well as the construction activity / industry requires this mineral at consistent rates. The Rivers originating from the Himalayas bring with them lots of aggregate materials whereas as they move downstream, only finer elements / minerals like sand are found in abundance. The Yamuna River is the biggest tributary of the river Ganga in North India. Its source in the Yamunotri glacier at an elevation of 6387 mtrs on South western sides of Banderpooch crests in the lower Himalayan ranges. The overall span of the Yamuna river is 1376 Kms (855 miles) with catchment area of 366223 square km (141,399 square km). This encompasses 40.2 % of the whole Ganga valley, prior to joining Ganga at TriveniSangam in Allahabad (UP)

#### **Itinerary of Yamuna River:**

The river passes through many states such as Utrakhand, UP, Haryana, going across to HP and then Delhi. With yearly discharge of around 10,000 cubic billion meters (cbm) and consumption of 4400 cbm (of which irrigation comprises 96%), the river represents above 70% of water provision of Delhi. Yamuna water are fairly good quality for its entire span from Yamunotri in Himalayan ranges to Wazirabad in Delhi, the length of which is around 375 Kms.

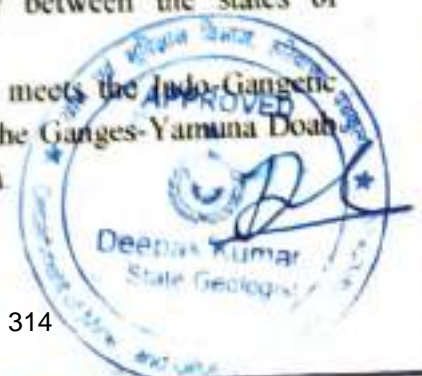
#### **Itinerary of Drainage area of Yamuna:**

The origin of Yamuna is situated in the Yamunotri glacier at an elevation of 6387 mtrs on SE sides of Banderpooch crests, which are located in the Mussoorie range of lower Himalayan range in Utrakashi district of Utrakhand, to the North of Haridwar. From this place Yamuna runs to South around 200 Kms across the Shivalik mountain ranges and lower Himalayan ranges.

A significant portion of its beginning of Drainage basin (with total area of 2320 square km) is situated in HP and a major tributary sapping the upper drainage basin in the Tons, which is also biggest and most extensive tributary of the Yamuna. Other tributaries in the area are the Rishi Ganga, Giri, Hanuman Ganga, Kunta & Bata, which sap the upper drainage basin of the huge Yamuna river. Subsequently, the river moves down the terrains of Doon basin at DakPathar close to Dehradun, in this place water is redirected into a channel for the purpose of electricity generation. Once it goes across the sikh religious place of Ponta Sahib, the river arrives at Tajewala in the Yamunanagar district of Haryana where a dam was constructed in 1873. This dam is the origin of the two major channels or water courses – Eastern Yamuna Canal and Western Yamuna Canal and both drain in UP & Haryana.

The Western Yamuna Canal (WYC) traverses Karnal, Yamunanagar and Panipat prior to arriving at the Haiderpur water treatment plant, which provides a portion of municipal water provisions of Delhi. The Yamuna also forms natural boundary between the states of Utrakhand & HP and also amid the states of UP and Haryana.

Together with the Ganga to which it flows almost parallel once it meets the Indo-Gangetic plateau, the biggest Alluvial productive area in the World, it forms the Ganges-Yamuna Doab are stretched across 69,000 square Km which is 33% of the whole area.





Drainage system is the pattern formed by streams, rivers and lakes in a drainage basin. In a drainage system, streams or rivers always connect together to form networks. Many factors such as topography, soil type, bedrock type, climate & vegetation cover influence input, output and transport of sediment and water in a drainage basin (Charlton, 2008). These factors also influence the nature of the pattern of water bodies (Twidale, 2004). As a consequence, drainage pattern can reflect geographical characteristics of a river network to a certain extent. There are several types of drainage pattern. So far, much research has been done on the description of drainage patterns in geology and hydrology (e.g. Howard, 1967; Lambert, 1998; Twidale, 2004; Pidwirny, 2006).

In addition, sediment transport knowledge is important in river restoration, ecosystem protection, navigation, watershed studies and reservoir management. Bed load represents the lower portion of sediment load in natural rivers. Fluvial sediment load materials are transported by rivers. Sediment load can be divided into bed load and suspended load based on the mode of transport. Bed load is transported close to the bed where particles moved by rolling, sliding, or dissolving (Adegbola, 2012). Xiaoling (2003) explained that bed load transport in natural rivers is a complicated event. Its movement is quite uneven in both the transverse & longitudinal directions, which vary considerably.

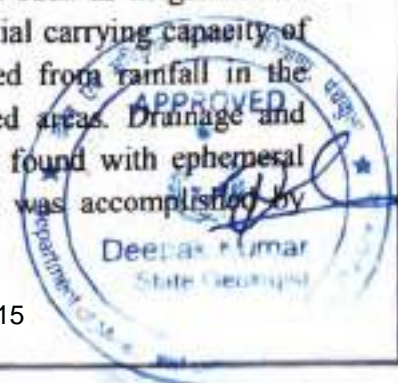
### 6.2 Physiography:

The area forms a part of the Indo-Gangetic plains and exhibit flat terrain with general slope from north to south. The area is devoid of any prominent topographic features. However, a natural slope of topography in the District Palwal along the Great River Yamuna. Topographically the Yamuna Belt area and its flood plains (Active flood plains along the present day course of the river Yamuna) in eastern part of the district. These are generally bordering the active flood plains and are wider, low lying flat tracts.

### 6.3 Drainage:

The Yamuna which marks the eastern boundary of the Haryana State provides the major drainage in the area. The River Yamuna emerges from Yamnotri off the Bansur-Punch glacier in Tehri Garhwal district of Uttarakhand at an elevation of 6330 meters. It emerges into the plains from the foothills at Kalesar just north of Tajewala. The area constitutes alluvial plain without any conspicuous topographical features and forms a part of the vast Indo-Gangetic plain. The general slope of the area is southwards.

The Yamuna Rivers are plays an important role for the nation and provide water required by various sectors such as irrigation, drinking, recreation and industrial requirements etc. Besides, mining activities are also being carried out in the rivers for the developmental process. Dredging (remove of excess sand and stone from river bed) of the river helps to maintain the carrying capacity and provides protection from flooding during monsoon season. Further, continuous flow of river is essential for ecological and economic needs such as irrigation and biodiversity etc. Drainage study of the river helps to understand potential carrying capacity of water during pre-monsoon & post monsoon season which is generated from rainfall in the watershed and quantity of dredging of rivers under mining affected areas. Drainage and replenishment study was carried out in Yamuna River, Haryana was found with ephemeral streams. Quantification and estimation of river bed material (RBM) was accomplished by





followed three scientific approaches i. e. mapping of watersheds by using Arc GIS software & and ERDAS software using analysis, survey of proposed mining area and grain size distribution of sand and gravel.

#### 6.4 Sedimentation. Assessment and Infrastructure

Dandy & Bolton formula is often used to check whether the sedimentation yield exceeds the replenishment rate but the whole question is whether there is adequate monitoring of the river basin, the answer is no as hydrological stations are sparsely spread. The formula uses catchment area and mean annual runoff as key determinants to give a yield value. It does not differentiate in basin wide smaller streams and their characteristics. CWC distinguishes river basins as classified and non-classified, as per the latest hydrological data for unclassified River basins; there are 122 GDSW (Gauge, Discharge, Sediment & Water Quality) sites in 12 such basins, the number was 147 in 2005. This brings in context the whole issue of scientific mining, thereby indicating that the monitoring of sediment yield in rivers / streams within the river basins is essential to arrive at extraction rates and express and conduct environmental studies based on these basin wide characteristics which should become part of the 'Terms of Reference'. **Sedimentation**, in the geological sciences, process of deposition of a solid material from a state of suspension or solution in a fluid (usually air or water). Broadly defined it also includes deposits from glacial ice and those materials collected under the impetus of gravity alone, as in talus deposits, or accumulations of rock debris at the base of cliffs. The term is commonly used as a synonym for sedimentary petrology and sedimentology.

Sedimentation is generally considered by geologists in terms of the textures, structures, and fossil content of the deposits laid down in different geographic and geomorphic environments. Great efforts have been made to differentiate between continental, near-shore, marine, and other deposits in the geologic record. The classification of environments and criteria for their recognition is still a subject of lively debate. The analysis and interpretation of ancient deposits has been advanced by the study of modern sedimentation.

Chemical sedimentation is understood in terms of chemical principles and laws. Although the famous physical chemist J.H. van't Hoff applied the principles of phase equilibria to the problem of crystallizing brines and the origin of salt deposits as early as 1905, little effort was made to apply physical chemistry to the problems of chemical sedimentation. More recently, however, there has been investigation of the role of the redox (mutual reduction and oxidation) potential and pH (acidity-alkalinity) in the precipitation of many chemical sediments, and a renewed effort has been made to apply known thermodynamic principles to the origin of anhydrite and gypsum deposits, to the chemistry of dolomite formation, and to the problem of the ironstones and related sediments.

The factors which affects the "Computation of Sediment" :-

- a) Geomorphology & Drainage Pattern : The following geomorphic units are important role :
  - Structural Plain





REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

- Structural Hill
  - Structural Ridge
  - Denudation Ridge & Valley
  - Plain & Plateau of Gangetic plain
  - Highly Dissected pediment
  - Un dissected pediment
  -
- b) Distribution of Basin Area River wise ( Area in Sq. Km or Sq. Miles)
- c) Drainage System/Pattern of the area (Drainage Density = Km/Sq. Km of Yamuna River)
- d) Rainfall & Climate : Year wise Rainfall data for previous 10 years of Yamuna Basin/River
- e) As per Dandy & Bolton study "Sediment Yield" can be related to i) Catchment Area and ii) Mean Annual Run-off

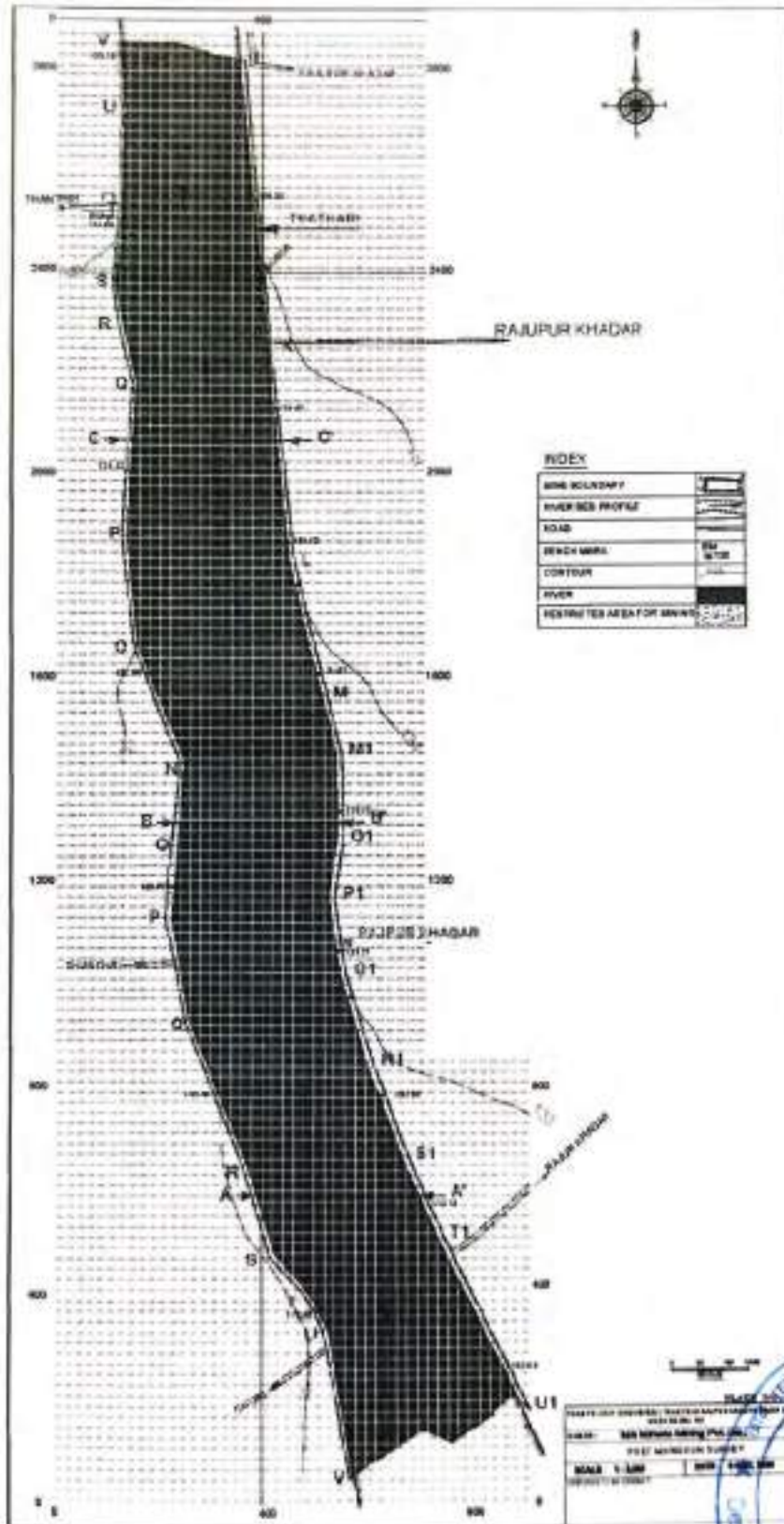
**7. Approach & Methodology Followed for Replenishment Study of ThanthriSud Unit (Minor Mineral Sand Mine):-**

- a) To draw post-monsoon contour map (Base map considered as per mining plan under consideration)
- b) Post-monsoon survey of River bed with the help of GPS and Drone.
- c) Same Grid pattern (30 m x 20 m) or part thereof was considered for survey.
- d) To draw post-monsoon contour map (Base map considered as per approved mining plan)
- e) To draw composite sections of Pre and post monsoon maps. This will determine the depth and volume of sand replenished.
- f) Finally to calculate the volume of sand with grid pattern of 30 m x 20 m multiplied by depth of replenishment.
- i) The tonnage of replenishment will be volume of sand multiplied by density of sand (which is 2 T per Cubic m).It will be completed after the next rainy season is over.



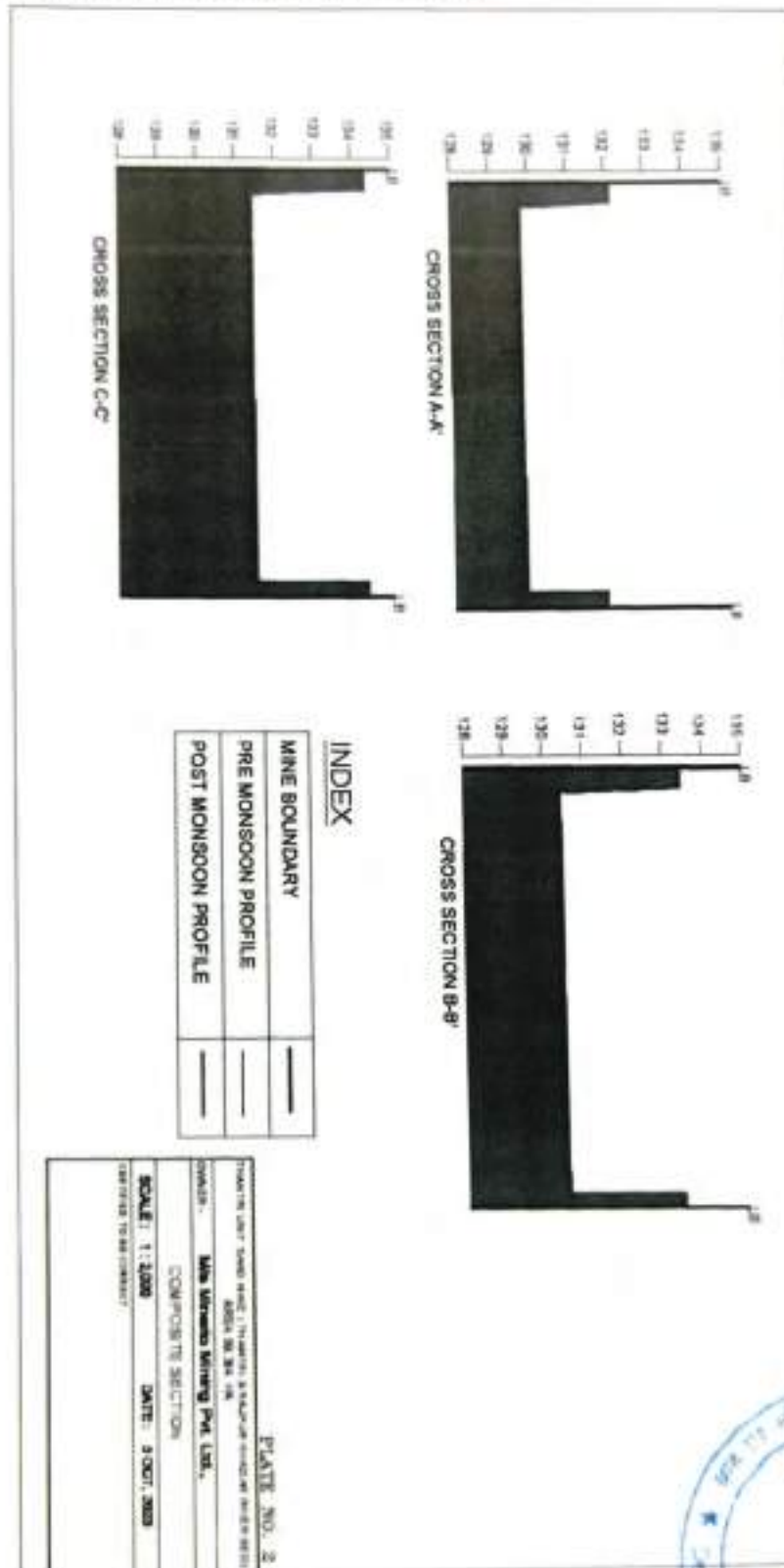
RENEWISHMENT STUDY REPORT(POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK, AREA-99.384ha. DISTRICT-PALWAL (Haryana)

a) Post-monsoon Contour Map (Grid Pattern : 20m x 20m or Part Thereof)



REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTIURI BLOCK  
 AREA-99.384ha. DISTRICT-PALWAL (Haryana)

a) Composite section of Post Monsoon Contour Map





REPLENISHMENT STUDY REPORT(POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK AREA-99.384ha. DISTRICT-PALWAL (Haryana)

a) Tonnage calculation of Sand Replenished.

Grid	Grid Area	Post Monsoon Elevation
121	50.21	129.42
167	433.71	129.42
168	379.78	129.42
169	27.57	129.42
213	553.53	129.42
214	400.00	129.42
215	557.49	129.42
216	195.33	129.42
258	34.96	129.42
259	636.84	129.42
260	400.00	129.42
261	400.00	129.42
262	639.81	129.42
263	419.75	129.42
264	54.11	129.42
304	150.07	129.42
305	400.00	129.42
306	400.00	129.42
307	400.00	129.42
308	400.00	129.42
309	400.00	129.42
310	590.20	129.42
311	229.17	129.42
312	1.99	129.42
313	94.30	129.42
314	376.50	129.42
315	499.87	129.42
316	98.79	129.42
350	268.33	129.42
351	400.00	129.42
352	400.00	129.42
353	400.00	129.42
354	400.00	129.42
355	400.00	129.42
356	400.00	129.42
357	400.00	129.42
358	570.07	129.42
359	634.82	129.42
360	400.00	129.42
361	400.00	129.42





362	619.79	129.42
363	301.89	129.42
364	10.50	129.42
396	386.60	129.42
397	400.00	129.42
398	400.00	129.42
399	400.00	129.42
400	400.00	129.42
401	400.00	129.42
402	400.00	129.42
403	400.00	129.42
404	400.00	129.42
405	400.00	129.42
406	400.00	129.42
407	400.00	129.42
408	400.00	129.42
409	400.00	129.42
410	514.72	129.42
411	86.23	129.42
442	504.87	129.42
443	400.00	129.42
444	400.00	129.42
445	400.00	129.42
446	400.00	129.42
447	400.00	129.42
448	400.00	129.42
449	400.00	129.42
450	400.00	129.42
451	400.00	129.42
452	400.00	129.42
453	400.00	129.42
454	400.00	129.42
455	400.00	129.42
456	400.00	129.42
457	534.60	129.42
458	68.51	129.42
459	16.66	129.42
460	183.39	129.42
487	7.56	129.42
488	615.58	129.42
489	400.00	129.42
490	400.00	129.42
491	400.00	129.42
492	400.00	129.42



REPLENISHMENT STUDY REPORT(POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha. DISTRICT-PALWAL (Haryana)

493	400.00	129.42
494	400.00	129.42
495	400.00	129.42
496	400.00	129.42
497	400.00	129.42
498	400.00	129.42
499	400.00	129.42
500	400.00	129.42
501	400.00	129.42
502	400.00	129.42
503	400.00	129.42
504	584.05	129.42
505	495.01	129.42
506	104.39	129.42
533	101.41	129.42
534	400.00	129.42
535	400.00	129.42
536	400.00	129.42
537	400.00	129.42
538	400.00	129.42
539	400.00	129.42
540	400.00	129.42
541	400.00	129.42
542	400.00	129.42
543	400.00	129.42
544	400.00	129.42
545	400.00	129.42
546	400.00	129.42
547	400.00	129.42
548	400.00	129.42
549	400.00	129.42
550	400.00	129.42
551	418.01	129.42
579	219.68	129.42
580	400.00	129.42
581	400.00	129.42
582	400.00	129.42
583	400.00	129.42
584	400.00	129.42
585	400.00	129.42
586	400.00	129.42
587	400.00	129.42
588	400.00	129.42
589	400.00	129.42







REFRESHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha. DISTRICT-PALWAL (Haryana)

717	574.48	129.66
718	400.00	129.66
719	400.00	129.66
720	400.00	129.66
721	400.00	129.66
722	400.00	129.66
723	400.00	129.66
724	400.00	129.66
725	400.00	129.66
726	400.00	129.66
727	400.00	129.66
728	400.00	129.66
729	400.00	129.66
730	400.00	129.66
731	400.00	129.66
732	400.00	129.66
733	416.30	129.66
762	70.04	129.66
763	639.83	129.66
764	400.00	129.66
765	400.00	129.66
766	400.00	129.66
767	400.00	129.66
768	400.00	129.66
769	400.00	129.66
770	400.00	129.66
771	400.00	129.66
772	400.00	129.66
773	400.00	129.66
774	400.00	129.66
775	400.00	129.66
776	400.00	129.66
777	400.00	129.66
778	633.54	129.66
779	102.34	129.66
808	354.54	129.66
809	400.00	129.66
810	400.00	129.66
811	400.00	129.66
812	400.00	129.66
813	400.00	129.66
814	400.00	129.66
815	400.00	129.66
816	400.00	129.66





ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK AREA-99.384ha DISTRICT-PALWAL (Haryana)

817	400.00	129.66
818	400.00	129.66
819	400.00	129.66
820	400.00	129.66
821	400.00	129.66
822	400.00	129.66
823	400.00	129.66
824	415.45	129.66
853	58.67	129.66
854	615.23	129.66
855	400.00	129.66
856	400.00	129.66
857	400.00	129.66
858	400.00	129.66
859	400.00	129.66
860	400.00	129.66
861	400.00	129.66
862	400.00	129.66
863	400.00	129.66
864	400.00	129.66
865	400.00	129.66
866	400.00	129.66
867	400.00	129.66
868	400.00	129.66
869	633.37	129.66
870	101.65	129.66
899	358.32	129.66
900	638.60	129.66
901	638.60	129.66
902	638.60	129.66
903	638.60	129.66
904	638.60	129.66
905	638.60	129.66
906	638.60	129.66
907	638.60	129.66
908	638.60	129.66
909	638.60	129.66
910	638.60	129.66
911	638.60	129.66
912	638.60	129.66
913	638.60	129.66
914	638.60	129.66
915	414.04	129.66
944	231.43	129.66



REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha DISTRICT-PALWAL (Haryana)

945	637.28	129.66
946	641.40	129.66
947	641.40	129.66
948	641.40	129.66
949	641.40	129.66
950	641.40	129.66
951	641.40	129.66
952	641.40	129.66
953	641.40	129.66
954	641.40	129.66
955	641.40	129.66
956	641.40	129.66
957	641.40	129.66
958	641.40	129.66
959	641.40	129.66
960	634.59	129.66
961	101.53	129.66
989	190.85	129.66
990	628.52	129.66
991	400.00	129.66
992	400.00	129.66
993	400.00	129.66
994	400.00	129.66
995	400.00	129.66
996	400.00	129.66
997	400.00	129.66
998	400.00	129.66
999	400.00	129.66
1000	400.00	129.66
1001	400.00	129.66
1002	400.00	129.66
1003	400.00	129.66
1004	400.00	129.66
1005	400.00	129.66
1006	413.74	129.66
1034	154.18	129.66
1035	617.09	129.66
1036	400.00	129.66
1037	400.00	129.66
1038	400.00	129.66
1039	400.00	129.66
1040	400.00	129.66
1041	400.00	129.66
1042	400.00	129.66



REPLENISHMENT STUDY REPORT(POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha DISTRICT-PALWAL (Haryana)

1043	400.00	129.66
1044	400.00	129.66
1045	400.00	129.66
1046	400.00	129.66
1047	400.00	129.66
1048	400.00	129.66
1049	400.00	129.66
1050	400.00	129.66
1051	633.02	129.66
1052	100.30	129.66
1079	99.52	129.66
1080	601.76	129.66
1081	400.00	129.66
1082	400.00	129.66
1083	400.00	129.66
1084	400.00	129.66
1085	400.00	129.66
1086	400.00	129.66
1087	400.00	129.66
1088	400.00	129.66
1089	400.00	129.66
1090	400.00	129.66
1091	400.00	129.66
1092	400.00	129.66
1093	400.00	129.66
1094	400.00	129.66
1095	400.00	129.66
1096	400.00	129.66
1097	412.88	129.66
1125	338.15	129.66
1126	400.00	129.66
1127	400.00	129.66
1128	400.00	129.66
1129	400.00	129.66
1130	400.00	129.66
1131	400.00	129.66
1132	400.00	129.66
1133	400.00	129.66
1134	400.00	129.66
1135	400.00	129.66
1136	400.00	129.66
1137	400.00	129.66
1138	400.00	129.66
1139	400.00	129.66





REVENUE ENHANCEMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha DISTRICT-PALWAL (Haryana)

1140	400.00	129.66
1141	400.00	129.66
1142	632.84	129.66
1143	99.62	129.66
1171	523.18	129.66
1172	400.00	129.66
1173	400.00	129.66
1174	400.00	129.66
1175	400.00	129.66
1176	400.00	129.66
1177	400.00	129.66
1178	400.00	129.66
1179	400.00	129.66
1180	400.00	129.66
1181	400.00	129.66
1182	400.00	129.66
1183	400.00	129.66
1184	400.00	129.66
1185	400.00	129.66
1186	400.00	129.66
1187	400.00	129.66
1188	418.12	129.66
1216	69.81	129.66
1217	638.40	129.66
1218	400.00	129.66
1219	400.00	129.66
1220	400.00	129.66
1221	400.00	129.66
1222	400.00	129.66
1223	400.00	129.66
1224	400.00	129.66
1225	400.00	129.66
1226	400.00	129.66
1227	400.00	129.66
1228	400.00	129.66
1229	400.00	129.66
1230	400.00	129.66
1231	400.00	129.66
1232	400.00	129.66
1233	639.66	129.66
1234	129.46	129.66
1262	253.24	129.66
1263	400.00	129.66
1264	400.00	129.66





1265	400.00	129.66
1266	400.00	129.66
1267	400.00	129.66
1268	400.00	129.66
1269	400.00	129.66
1270	400.00	129.66
1271	400.00	129.66
1272	400.00	129.66
1273	400.00	129.66
1274	400.00	129.66
1275	400.00	129.66
1276	400.00	129.66
1277	400.00	129.66
1278	400.00	129.66
1279	482.92	129.66
1308	438.27	129.66
1309	400.00	129.66
1310	400.00	129.66
1311	400.00	129.66
1312	400.00	129.66
1313	400.00	129.66
1314	400.00	129.66
1315	400.00	129.66
1316	400.00	129.66
1317	400.00	129.66
1318	400.00	129.66
1319	400.00	129.66
1320	400.00	129.66
1321	400.00	129.66
1322	400.00	129.66
1323	400.00	129.66
1324	400.00	129.66
1325	196.71	129.66
1353	15.53	129.66
1354	607.77	129.66
1355	400.00	129.66
1356	400.00	129.66
1357	400.00	129.66
1358	400.00	129.66
1359	400.00	129.66
1360	400.00	129.66
1361	400.00	129.66
1362	400.00	129.66
1363	400.00	129.66



REFRESHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHIRI BLOCK  
 AREA-99 384ha DISTRICT-PALWAL (Haryana)

1364	400.00	129.66
1365	400.00	129.66
1366	400.00	129.66
1367	400.00	129.66
1368	400.00	129.66
1369	400.00	129.66
1370	545.48	129.66
1371	5.02	129.66
1399	168.33	129.66
1400	400.00	129.66
1401	400.00	129.66
1402	400.00	129.66
1403	400.00	129.66
1404	400.00	129.66
1405	400.00	129.66
1406	400.00	129.66
1407	400.00	129.66
1408	400.00	129.66
1409	400.00	129.66
1410	400.00	129.66
1411	400.00	129.66
1412	400.00	129.66
1413	400.00	129.66
1414	400.00	129.66
1415	400.00	129.66
1416	264.30	129.66
1445	362.29	129.66
1446	400.00	129.66
1447	400.00	129.66
1448	400.00	129.66
1449	400.00	129.66
1450	400.00	129.66
1451	400.00	129.66
1452	400.00	129.66
1453	400.00	129.66
1454	400.00	129.66
1455	400.00	129.66
1456	400.00	129.66
1457	400.00	129.66
1458	400.00	129.66
1459	400.00	129.66
1460	400.00	129.66
1461	592.43	129.66
1462	25.66	129.66





1590	400.00	129.87
1591	400.00	129.87
1592	400.00	129.87
1593	400.00	129.87
1594	400.00	129.87
1595	400.00	129.87
1596	400.00	129.87
1597	400.00	129.87
1598	470.64	129.87
1627	89.75	129.87
1628	636.85	129.87
1629	400.00	129.87
1630	400.00	129.87
1631	400.00	129.87
1632	400.00	129.87
1633	400.00	129.87
1634	400.00	129.87
1635	400.00	129.87
1636	400.00	129.87
1637	400.00	129.87
1638	400.00	129.87
1639	400.00	129.87
1640	400.00	129.87
1641	400.00	129.87
1642	400.00	129.87
1643	400.00	129.87
1644	232.59	129.87
1673	339.70	129.87
1674	400.00	129.87
1675	400.00	129.87
1676	400.00	129.87
1677	400.00	129.87
1678	400.00	129.87
1679	400.00	129.87
1680	400.00	129.87
1681	400.00	129.87
1682	400.00	129.87
1683	400.00	129.87
1684	400.00	129.87
1685	400.00	129.87
1686	400.00	129.87
1687	400.00	129.87
1688	400.00	129.87
1689	607.45	129.87



REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

1690	27.09	129.87
1718	12.44	129.87
1719	580.36	129.87
1720	400.00	129.87
1721	400.00	129.87
1722	400.00	129.87
1723	400.00	129.87
1724	400.00	129.87
1725	400.00	129.87
1726	400.00	129.87
1727	400.00	129.87
1728	400.00	129.87
1729	400.00	129.87
1730	400.00	129.87
1731	400.00	129.87
1732	400.00	129.87
1733	400.00	129.87
1734	400.00	129.87
1735	396.49	129.87
1764	205.91	129.87
1765	400.00	129.87
1766	400.00	129.87
1767	400.00	129.87
1768	400.00	129.87
1769	400.00	129.87
1770	400.00	129.87
1771	400.00	129.87
1772	400.00	129.87
1773	400.00	129.87
1774	400.00	129.87
1775	400.00	129.87
1776	400.00	129.87
1777	400.00	129.87
1778	400.00	129.87
1779	400.00	129.87
1780	400.00	129.87
1781	158.44	129.87
1810	458.16	129.87
1811	639.07	129.87
1812	639.07	129.87
1813	639.07	129.87
1814	639.07	129.87
1815	639.07	129.87
1816	639.07	129.87





REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

1817	639.07	129.87
1818	639.07	129.87
1819	639.07	129.87
1820	639.07	129.87
1821	639.07	129.87
1822	639.07	129.87
1823	639.07	129.87
1824	639.07	129.87
1825	639.07	129.87
1826	556.48	129.87
1827	3.26	129.87
1855	77.97	129.87
1856	635.00	129.87
1857	400.93	129.87
1858	400.93	129.87
1859	400.93	129.87
1860	400.93	129.87
1861	400.93	129.87
1862	400.93	129.87
1863	400.93	129.87
1864	400.93	129.87
1865	400.93	129.87
1866	400.93	129.87
1867	400.93	129.87
1868	400.93	129.87
1869	400.93	129.87
1870	400.93	129.87
1871	400.93	129.87
1872	322.98	129.87
1901	325.22	129.87
1902	400.00	129.87
1903	400.00	129.87
1904	400.00	129.87
1905	400.00	129.87
1906	400.00	129.87
1907	400.00	129.87
1908	400.00	129.87
1909	400.00	129.87
1910	400.00	129.87
1911	400.00	129.87
1912	400.00	129.87
1913	400.00	129.87
1914	400.00	129.87
1915	400.00	129.87



REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha. DISTRICT-PALWAL (Haryana)

1916	400.00	129.87
1917	637.47	129.87
1918	86.82	129.87
1946	8.31	129.87
1947	570.01	129.87
1948	400.00	129.87
1949	400.00	129.87
1950	400.00	129.87
1951	400.00	129.87
1952	400.00	129.87
1953	400.00	129.87
1954	400.00	129.87
1955	400.00	129.87
1956	400.00	129.87
1957	400.00	129.87
1958	400.00	129.87
1959	400.00	129.87
1960	400.00	129.87
1961	400.00	129.87
1962	400.00	129.87
1963	500.60	129.87
1992	191.42	129.87
1993	400.00	129.87
1994	400.00	129.87
1995	400.00	129.87
1996	400.00	129.87
1997	400.00	129.87
1998	400.00	129.87
1999	400.00	129.87
2000	400.00	129.87
2001	400.00	129.87
2002	400.00	129.87
2003	400.00	129.87
2004	400.00	129.87
2005	400.00	129.87
2006	400.00	129.87
2007	400.00	129.87
2008	400.00	129.87
2009	301.00	129.87
2028	444.53	129.87
2029	400.00	129.87
2030	400.00	129.87
2031	400.00	129.87
2032	400.00	129.87



REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

2033	400.00	129.87
2034	400.00	129.87
2035	400.00	129.87
2036	400.00	129.87
2037	400.00	129.87
2038	400.00	129.87
2039	400.00	129.87
2040	400.00	129.87
2041	400.00	129.87
2042	400.00	129.87
2043	400.00	129.87
2044	400.00	129.87
2045	101.77	129.87
2063	67.01	129.87
2064	630.62	129.87
2065	400.00	129.87
2066	400.00	129.87
2067	400.00	129.87
2068	400.00	129.87
2069	400.00	129.87
2070	400.00	129.87
2071	400.00	129.87
2072	400.00	129.87
2073	400.00	129.87
2074	400.00	129.87
2075	400.00	129.87
2076	400.00	129.87
2077	400.00	129.87
2078	400.00	129.87
2079	400.00	129.87
2080	542.54	129.87
2081	0.01	129.87
2099	250.00	129.87
2100	400.00	129.87
2101	400.00	129.87
2102	400.00	129.87
2103	400.00	129.87
2104	400.00	129.87
2105	400.00	129.87
2106	400.00	129.87
2107	400.00	129.87
2108	400.00	129.87
2109	400.00	129.87
2110	400.00	129.87





REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHIRI BLOCK  
AREA-99 384ha DISTRICT-PALWAL (Haryana)

2111	400.00	129.87
2112	400.00	129.87
2113	400.00	129.87
2114	400.00	129.87
2115	400.00	129.87
2116	343.32	129.87
2135	378.66	129.87
2136	400.00	129.87
2137	400.00	129.87
2138	400.00	129.87
2139	400.00	129.87
2140	400.00	129.87
2141	400.00	129.87
2142	400.00	129.87
2143	400.00	129.87
2144	400.00	129.87
2145	400.00	129.87
2146	400.00	129.87
2147	400.00	129.87
2148	400.00	129.87
2149	400.00	129.87
2150	400.00	129.87
2151	400.00	129.87
2152	144.10	129.87
2171	507.30	129.87
2172	400.00	129.87
2173	400.00	129.87
2174	400.00	129.87
2175	400.00	129.87
2176	400.00	129.87
2177	400.00	129.87
2178	400.00	129.87
2179	400.00	129.87
2180	400.00	129.87
2181	400.00	129.87
2182	400.00	129.87
2183	400.00	129.87
2184	400.00	129.87
2185	400.00	129.87
2186	400.00	129.87
2187	579.90	129.87
2188	4.97	129.87
2206	14.12	130.32
2207	621.83	130.32





2208	400.00	130.32
2209	400.00	130.32
2210	400.00	130.32
2211	400.00	130.32
2212	400.00	130.32
2213	400.00	130.32
2214	400.00	130.32
2215	400.00	130.32
2216	400.00	130.32
2217	400.00	130.32
2218	400.00	130.32
2219	400.00	130.32
2220	400.00	130.32
2221	400.00	130.32
2222	400.00	130.32
2223	385.64	130.32
2242	124.59	130.32
2243	400.00	130.32
2244	400.00	130.32
2245	400.00	130.32
2246	400.00	130.32
2247	400.00	130.32
2248	400.00	130.32
2249	400.00	130.32
2250	400.00	130.32
2251	400.00	130.32
2252	400.00	130.32
2253	400.00	130.32
2254	400.00	130.32
2255	400.00	130.32
2256	400.00	130.32
2257	400.00	130.32
2258	400.00	130.32
2259	186.55	130.32
2278	253.23	130.32
2279	400.00	130.32
2280	400.00	130.32
2281	400.00	130.32
2282	400.00	130.32
2283	400.00	130.32
2284	400.00	130.32
2285	400.00	130.32
2286	400.00	130.32
2287	400.00	130.32



ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha DISTRICT-PALWAL (Haryana)

2288	400.00	130.32
2289	400.00	130.32
2290	400.00	130.32
2291	400.00	130.32
2292	400.00	130.32
2293	400.00	130.32
2294	400.00	130.32
2295	46.54	130.32
2314	381.88	130.32
2315	400.00	130.32
2316	400.00	130.32
2317	400.00	130.32
2318	400.00	130.32
2319	400.00	130.32
2320	400.00	130.32
2321	400.00	130.32
2322	400.00	130.32
2323	400.00	130.32
2324	400.00	130.32
2325	400.00	130.32
2326	400.00	130.32
2327	400.00	130.32
2328	400.00	130.32
2329	400.00	130.32
2330	595.28	130.32
2331	0.00	130.32
2350	510.52	130.32
2351	400.00	130.32
2352	400.00	130.32
2353	400.00	130.32
2354	400.00	130.32
2355	400.00	130.32
2356	400.00	130.32
2357	400.00	130.32
2358	400.00	130.32
2359	400.00	130.32
2360	400.00	130.32
2361	400.00	130.32
2362	400.00	130.32
2363	400.00	130.32
2364	400.00	130.32
2365	400.00	130.32
2366	504.03	130.32
2385	15.67	130.32





REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

2386	623.50	130.32
2387	400.00	130.32
2388	400.00	130.32
2389	400.00	130.32
2390	400.00	130.32
2391	400.00	130.32
2392	400.00	130.32
2393	400.00	130.32
2394	400.00	130.32
2395	400.00	130.32
2396	400.00	130.32
2397	400.00	130.32
2398	400.00	130.32
2399	400.00	130.32
2400	400.00	130.32
2401	400.00	130.32
2402	412.77	130.32
2421	127.81	130.32
2422	400.00	130.32
2423	400.00	130.32
2424	400.00	130.32
2425	400.00	130.32
2426	400.00	130.32
2427	400.00	130.32
2428	400.00	130.32
2429	400.00	130.32
2430	400.00	130.32
2431	400.00	130.32
2432	400.00	130.32
2433	400.00	130.32
2434	400.00	130.32
2435	400.00	130.32
2436	400.00	130.32
2437	400.00	130.32
2438	321.52	130.32
2457	218.48	130.32
2458	400.00	130.32
2459	400.00	130.32
2460	400.00	130.32
2461	400.00	130.32
2462	400.00	130.32
2463	400.00	130.32
2464	400.00	130.32
2465	400.00	130.32



ENVIRONMENTAL IMPROVEMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK AREA-99.384ha. DISTRICT-PALWAL (Haryana)

2466	400.00	130.32
2467	400.00	130.32
2468	400.00	130.32
2469	400.00	130.32
2470	400.00	130.32
2471	400.00	130.32
2472	400.00	130.32
2473	400.00	130.32
2474	230.26	130.32
2493	185.41	130.32
2494	400.00	130.32
2495	400.00	130.32
2496	400.00	130.32
2497	400.00	130.32
2498	400.00	130.32
2499	400.00	130.32
2500	400.00	130.32
2501	400.00	130.32
2502	400.00	130.32
2503	400.00	130.32
2504	400.00	130.32
2505	400.00	130.32
2506	400.00	130.32
2507	400.00	130.32
2508	400.00	130.32
2509	400.00	130.32
2510	139.00	130.32
2529	142.77	130.32
2530	400.00	130.32
2531	400.00	130.32
2532	400.00	130.32
2533	400.00	130.32
2534	400.00	130.32
2535	400.00	130.32
2536	400.00	130.32
2537	400.00	130.32
2538	400.00	130.32
2539	400.00	130.32
2540	400.00	130.32
2541	400.00	130.32
2542	400.00	130.32
2543	400.00	130.32
2544	400.00	130.32
2545	400.00	130.32





REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.38ha. DISTRICT-PALWAL (Haryana)

2546	91.11	130.32
2565	100.09	130.32
2566	639.53	130.32
2567	639.53	130.32
2568	639.53	130.32
2569	639.53	130.32
2570	639.53	130.32
2571	639.53	130.32
2572	639.53	130.32
2573	639.53	130.32
2574	639.53	130.32
2575	639.53	130.32
2576	639.53	130.32
2577	639.53	130.32
2578	639.53	130.32
2579	639.53	130.32
2580	639.53	130.32
2581	639.53	130.32
2582	178.77	130.32
2601	57.57	130.32
2602	400.47	130.32
2603	400.47	130.32
2604	400.47	130.32
2605	400.47	130.32
2606	400.47	130.32
2607	400.47	130.32
2608	400.47	130.32
2609	400.47	130.32
2610	400.47	130.32
2611	400.47	130.32
2612	400.47	130.32
2613	400.47	130.32
2614	400.47	130.32
2615	400.47	130.32
2616	400.47	130.32
2617	400.47	130.32
2618	276.75	130.32
2637	15.37	130.32
2638	639.51	130.32
2639	400.00	130.32
2640	400.00	130.32
2641	400.00	130.32
2642	400.00	130.32
2643	400.00	130.32



REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE TIJANTHRI BLOCK  
AREA-99.384ha DISTRICT-PALWAL (Haryana)

2644	400.00	130.32
2645	400.00	130.32
2646	400.00	130.32
2647	400.00	130.32
2648	400.00	130.32
2649	400.00	130.32
2650	400.00	130.32
2651	400.00	130.32
2652	400.00	130.32
2653	400.00	130.32
2654	374.24	130.32
2674	612.25	130.32
2675	400.00	130.32
2676	400.00	130.32
2677	400.00	130.32
2678	400.00	130.32
2679	400.00	130.32
2680	400.00	130.32
2681	400.00	130.32
2682	400.00	130.32
2683	400.00	130.32
2684	400.00	130.32
2685	400.00	130.32
2686	400.00	130.32
2687	400.00	130.32
2688	400.00	130.32
2689	400.00	130.32
2690	471.88	130.32
2710	565.32	130.32
2711	400.00	130.32
2712	400.00	130.32
2713	400.00	130.32
2714	400.00	130.32
2715	400.00	130.32
2716	400.00	130.32
2717	400.00	130.32
2718	400.00	130.32
2719	400.00	130.32
2720	400.00	130.32
2721	400.00	130.32
2722	400.00	130.32
2723	400.00	130.32
2724	400.00	130.32
2725	400.00	130.32



REPLENISHMENT STUDY REPORT (PDST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha. DISTRICT-PALWAL (Haryana)

2726	569.48	130.32
2746	497.61	130.32
2747	400.00	130.32
2748	400.00	130.32
2749	400.00	130.32
2750	400.00	130.32
2751	400.00	130.32
2752	400.00	130.32
2753	400.00	130.32
2754	400.00	130.32
2755	400.00	130.32
2756	400.00	130.32
2757	400.00	130.32
2758	400.00	130.32
2759	400.00	130.32
2760	400.00	130.32
2761	400.00	130.32
2762	607.92	130.32
2782	427.16	130.32
2783	400.00	130.32
2784	400.00	130.32
2785	400.00	130.32
2786	400.00	130.32
2787	400.00	130.32
2788	400.00	130.32
2789	400.00	130.32
2790	400.00	130.32
2791	400.00	130.32
2792	400.00	130.32
2793	400.00	130.32
2794	400.00	130.32
2795	400.00	130.32
2796	400.00	130.32
2797	400.00	130.32
2798	593.85	130.32
2818	356.72	130.32
2819	400.00	130.32
2820	400.00	130.32
2821	400.00	130.32
2822	400.00	130.32
2823	400.00	130.32
2824	400.00	130.32
2825	400.00	130.32
2826	400.00	130.32





REPLENISHMENT STUDY REPORT(POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha DISTRICT-PALWAL (Haryana)

2827	400.00	130.32
2828	400.00	130.32
2829	400.00	130.32
2830	400.00	130.32
2831	400.00	130.32
2832	400.00	130.32
2833	400.00	130.32
2834	579.78	130.32
2854	286.28	130.47
2855	400.00	130.47
2856	400.00	130.47
2857	400.00	130.47
2858	400.00	130.47
2859	400.00	130.47
2860	400.00	130.47
2861	400.00	130.47
2862	400.00	130.47
2863	400.00	130.47
2864	400.00	130.47
2865	400.00	130.47
2866	400.00	130.47
2867	400.00	130.47
2868	400.00	130.47
2869	400.00	130.47
2870	565.71	130.47
2890	215.83	130.47
2891	400.00	130.47
2892	400.00	130.47
2893	400.00	130.47
2894	400.00	130.47
2895	400.00	130.47
2896	400.00	130.47
2897	400.00	130.47
2898	400.00	130.47
2899	400.00	130.47
2900	400.00	130.47
2901	400.00	130.47
2902	400.00	130.47
2903	400.00	130.47
2904	400.00	130.47
2905	400.00	130.47
2906	551.64	130.47
2926	145.39	130.47
2927	400.00	130.47





REPLENISHMENT STUDY REPORT(POST MONSOON-OCT-2023) FOR SAND MINE THIANTHRI- BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

2928	400.00	130.47
2929	400.00	130.47
2930	400.00	130.47
2931	400.00	130.47
2932	400.00	130.47
2933	400.00	130.47
2934	400.00	130.47
2935	400.00	130.47
2936	400.00	130.47
2937	400.00	130.47
2938	400.00	130.47
2939	400.00	130.47
2940	400.00	130.47
2941	400.00	130.47
2942	537.57	130.47
2962	74.95	130.47
2963	400.00	130.47
2964	400.00	130.47
2965	400.00	130.47
2966	400.00	130.47
2967	400.00	130.47
2968	400.00	130.47
2969	400.00	130.47
2970	400.00	130.47
2971	400.00	130.47
2972	400.00	130.47
2973	400.00	130.47
2974	400.00	130.47
2975	400.00	130.47
2976	400.00	130.47
2977	400.00	130.47
2978	523.51	130.47
2998	56.07	130.47
2999	400.00	130.47
3000	400.00	130.47
3001	400.00	130.47
3002	400.00	130.47
3003	400.00	130.47
3004	400.00	130.47
3005	400.00	130.47
3006	400.00	130.47
3007	400.00	130.47
3008	400.00	130.47
3009	400.00	130.47



3010	400.00	130.47
3011	400.00	130.47
3012	400.00	130.47
3013	400.00	130.47
3014	509.44	130.47
3034	276.54	130.47
3035	400.00	130.47
3036	400.00	130.47
3037	400.00	130.47
3038	400.00	130.47
3039	400.00	130.47
3040	400.00	130.47
3041	400.00	130.47
3042	400.00	130.47
3043	400.00	130.47
3044	400.00	130.47
3045	400.00	130.47
3046	400.00	130.47
3047	400.00	130.47
3048	400.00	130.47
3049	400.00	130.47
3050	475.77	130.47
3069	0.42	130.47
3070	528.07	130.47
3071	400.00	130.47
3072	400.00	130.47
3073	400.00	130.47
3074	400.00	130.47
3075	400.00	130.47
3076	400.00	130.47
3077	400.00	130.47
3078	400.00	130.47
3079	400.00	130.47
3080	400.00	130.47
3081	400.00	130.47
3082	400.00	130.47
3083	400.00	130.47
3084	400.00	130.47
3085	400.00	130.47
3086	327.51	130.47
3105	140.44	130.47
3106	400.00	130.47
3107	400.00	130.47
3108	400.00	130.47





REFRESHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

3109	400.00	130.47
3110	400.00	130.47
3111	400.00	130.47
3112	400.00	130.47
3113	400.00	130.47
3114	400.00	130.47
3115	400.00	130.47
3116	400.00	130.47
3117	400.00	130.47
3118	400.00	130.47
3119	400.00	130.47
3120	400.00	130.47
3121	400.00	130.47
3122	160.65	130.47
3141	392.39	130.47
3142	400.00	130.47
3143	400.00	130.47
3144	400.00	130.47
3145	400.00	130.47
3146	400.00	130.47
3147	400.00	130.47
3148	400.00	130.47
3149	400.00	130.47
3150	400.00	130.47
3151	400.00	130.47
3152	400.00	130.47
3153	400.00	130.47
3154	400.00	130.47
3155	400.00	130.47
3156	400.00	130.47
3157	615.93	130.47
3158	17.87	130.47
3176	33.70	130.75
3177	610.40	130.75
3178	400.00	130.75
3179	400.00	130.75
3180	400.00	130.75
3181	400.00	130.75
3182	400.00	130.75
3183	400.00	130.75
3184	400.00	130.75
3185	400.00	130.75
3186	400.00	130.75
3187	400.00	130.75



REFRESHMENT STUDY REPORT(POST MONSOON-OCT-2023) FOR SAND MINE TIANTHRI BLOCK  
 AREA-99.384ha DISTRICT-PALWAL (Haryana)

3188	400.00	130.75
3189	400.00	130.75
3190	400.00	130.75
3191	400.00	130.75
3192	400.00	130.75
3193	466.94	130.75
3212	256.30	130.75
3213	400.00	130.75
3214	400.00	130.75
3215	400.00	130.75
3216	400.00	130.75
3217	400.00	130.75
3218	400.00	130.75
3219	400.00	130.75
3220	400.00	130.75
3221	400.00	130.75
3222	400.00	130.75
3223	400.00	130.75
3224	400.00	130.75
3225	400.00	130.75
3226	400.00	130.75
3227	400.00	130.75
3228	400.00	130.75
3229	300.08	130.75
3248	508.25	130.75
3249	400.00	130.75
3250	400.00	130.75
3251	400.00	130.75
3252	400.00	130.75
3253	400.00	130.75
3254	400.00	130.75
3255	400.00	130.75
3256	400.00	130.75
3257	400.00	130.75
3258	400.00	130.75
3259	400.00	130.75
3260	400.00	130.75
3261	400.00	130.75
3262	400.00	130.75
3263	400.00	130.75
3264	400.00	130.75
3265	163.18	130.75
3283	120.27	130.75
3284	639.93	130.75





REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha. DISTRICT-PALWAL (Haryana)

3285	400.00	130.75
3286	400.00	130.75
3287	400.00	130.75
3288	400.00	130.75
3289	400.00	130.75
3290	400.00	130.75
3291	400.00	130.75
3292	400.00	130.75
3293	400.00	130.75
3294	400.00	130.75
3295	400.00	130.75
3296	400.00	130.75
3297	400.00	130.75
3298	400.00	130.75
3299	400.00	130.75
3300	622.90	130.75
3301	22.82	130.75
3319	273.14	130.75
3320	505.66	130.75
3321	505.66	130.75
3322	505.66	130.75
3323	505.66	130.75
3324	505.66	130.75
3325	505.66	130.75
3326	505.66	130.75
3327	505.66	130.75
3328	505.66	130.75
3329	505.66	130.75
3330	505.66	130.75
3331	505.66	130.75
3332	505.66	130.75
3333	505.66	130.75
3334	505.66	130.75
3335	505.66	130.75
3336	397.83	130.75
3354	6.49	130.75
3355	564.73	130.75
3356	400.00	130.75
3357	400.00	130.75
3358	400.00	130.75
3359	400.00	130.75
3360	400.00	130.75
3361	400.00	130.75
3362	400.00	130.75



REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK AREA-99.384ha DISTRICT-PALWAL (Haryana)

3363	400.00	130.75
3364	400.00	130.75
3365	400.00	130.75
3366	400.00	130.75
3367	400.00	130.75
3368	400.00	130.75
3369	400.00	130.75
3370	400.00	130.75
3371	400.00	130.75
3372	361.34	130.75
3390	183.17	130.75
3391	400.00	130.75
3392	400.00	130.75
3393	400.00	130.75
3394	400.00	130.75
3395	400.00	130.75
3396	400.00	130.75
3397	400.00	130.75
3398	400.00	130.75
3399	400.00	130.75
3400	400.00	130.75
3401	400.00	130.75
3402	400.00	130.75
3403	400.00	130.75
3404	400.00	130.75
3405	400.00	130.75
3406	400.00	130.75
3407	400.00	130.75
3408	202.48	130.75
3426	361.90	130.75
3427	400.00	130.75
3428	400.00	130.75
3429	400.00	130.75
3430	400.00	130.75
3431	400.00	130.75
3432	400.00	130.75
3433	400.00	130.75
3434	400.00	130.75
3435	400.00	130.75
3436	400.00	130.75
3437	400.00	130.75
3438	400.00	130.75
3439	400.00	130.75
3440	400.00	130.75





REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

3441	400.00	130.75
3442	400.00	130.75
3443	635.96	130.75
3444	47.66	130.75
3462	431.49	130.75
3463	400.00	130.75
3464	400.00	130.75
3465	400.00	130.75
3466	400.00	130.75
3467	400.00	130.75
3468	400.00	130.75
3469	400.00	130.75
3470	400.00	130.75
3471	400.00	130.75
3472	400.00	130.75
3473	400.00	130.75
3474	400.00	130.75
3475	400.00	130.75
3476	400.00	130.75
3477	400.00	130.75
3478	400.00	130.75
3479	524.76	130.75
3498	500.05	131.23
3499	400.00	131.23
3500	400.00	131.23
3501	400.00	131.23
3502	400.00	131.23
3503	400.00	131.23
3504	400.00	131.23
3505	400.00	131.23
3506	400.00	131.23
3507	400.00	131.23
3508	400.00	131.23
3509	400.00	131.23
3510	400.00	131.23
3511	400.00	131.23
3512	400.00	131.23
3513	400.00	131.23
3514	400.00	131.23
3515	365.90	131.23
3534	568.60	131.23
3535	400.00	131.23
3536	400.00	131.23
3537	400.00	131.23



REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha DISTRICT-PALWAL (Haryana)

3538	400.00	131.23
3539	400.00	131.23
3540	400.00	131.23
3541	400.00	131.23
3542	400.00	131.23
3543	400.00	131.23
3544	400.00	131.23
3545	400.00	131.23
3546	400.00	131.23
3547	400.00	131.23
3548	400.00	131.23
3549	400.00	131.23
3550	400.00	131.23
3551	207.04	131.23
3569	7.20	131.23
3570	629.95	131.23
3571	400.00	131.23
3572	400.00	131.23
3573	400.00	131.23
3574	400.00	131.23
3575	400.00	131.23
3576	400.00	131.23
3577	400.00	131.23
3578	400.00	131.23
3579	400.00	131.23
3580	400.00	131.23
3581	400.00	131.23
3582	400.00	131.23
3583	400.00	131.23
3584	400.00	131.23
3585	400.00	131.23
3586	636.93	131.23
3587	51.26	131.23
3605	65.70	131.23
3606	400.00	131.23
3607	400.00	131.23
3608	400.00	131.23
3609	400.00	131.23
3610	400.00	131.23
3611	400.00	131.23
3612	400.00	131.23
3613	400.00	131.23
3614	400.00	131.23
3615	400.00	131.23





3616	400.00	131.23
3617	400.00	131.23
3618	400.00	131.23
3619	400.00	131.23
3620	400.00	131.23
3621	400.00	131.23
3622	529.32	131.23
3641	134.25	131.23
3642	400.00	131.23
3643	400.00	131.23
3644	400.00	131.23
3645	400.00	131.23
3646	400.00	131.23
3647	400.00	131.23
3648	400.00	131.23
3649	400.00	131.23
3650	400.00	131.23
3651	400.00	131.23
3652	400.00	131.23
3653	400.00	131.23
3654	400.00	131.23
3655	400.00	131.23
3656	400.00	131.23
3657	400.00	131.23
3658	370.44	131.23
3677	202.81	131.23
3678	400.00	131.23
3679	400.00	131.23
3680	400.00	131.23
3681	400.00	131.23
3682	400.00	131.23
3683	400.00	131.23
3684	400.00	131.23
3685	400.00	131.23
3686	400.00	131.23
3687	400.00	131.23
3688	400.00	131.23
3689	400.00	131.23
3690	400.00	131.23
3691	400.00	131.23
3692	400.00	131.23
3693	400.00	131.23
3694	211.60	131.23
3713	271.36	131.23



RENEWISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha. DISTRICT-PALWAL (Haryana)

3714	400.00	131.23
3715	400.00	131.23
3716	400.00	131.23
3717	400.00	131.23
3718	400.00	131.23
3719	400.00	131.23
3720	400.00	131.23
3721	400.00	131.23
3722	400.00	131.23
3723	400.00	131.23
3724	400.00	131.23
3725	400.00	131.23
3726	400.00	131.23
3727	400.00	131.23
3728	400.00	131.23
3729	400.00	131.23
3730	70.69	131.23
3749	339.91	131.23
3750	400.00	131.23
3751	400.00	131.23
3752	400.00	131.23
3753	400.00	131.23
3754	400.00	131.23
3755	400.00	131.23
3756	400.00	131.23
3757	400.00	131.23
3758	400.00	131.23
3759	400.00	131.23
3760	400.00	131.23
3761	400.00	131.23
3762	400.00	131.23
3763	400.00	131.23
3764	400.00	131.23
3765	628.78	131.23
3766	6.47	131.23
3785	408.46	131.23
3786	400.00	131.23
3787	400.00	131.23
3788	400.00	131.23
3789	400.00	131.23
3790	400.00	131.23
3791	400.00	131.23
3792	400.00	131.23
3793	400.00	131.23



REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHURU BLOCK  
 AREA-99.384ha DISTRICT-PALWAL (Haryana)

3794	400.00	131.23
3795	400.00	131.23
3796	400.00	131.23
3797	400.00	131.23
3798	400.00	131.23
3799	400.00	131.23
3800	400.00	131.23
3801	565.81	131.23
3821	431.06	131.23
3822	400.00	131.23
3823	400.00	131.23
3824	400.00	131.23
3825	400.00	131.23
3826	400.00	131.23
3827	400.00	131.23
3828	400.00	131.23
3829	400.00	131.23
3830	400.00	131.23
3831	400.00	131.23
3832	400.00	131.23
3833	400.00	131.23
3834	400.00	131.23
3835	400.00	131.23
3836	400.00	131.23
3837	496.38	131.23
3857	386.38	131.23
3858	400.00	131.23
3859	400.00	131.23
3860	400.00	131.23
3861	400.00	131.23
3862	400.00	131.23
3863	400.00	131.23
3864	400.00	131.23
3865	400.00	131.23
3866	400.00	131.23
3867	400.00	131.23
3868	400.00	131.23
3869	400.00	131.23
3870	400.00	131.23
3871	400.00	131.23
3872	400.00	131.23
3873	426.95	131.23
3893	341.12	131.17
3894	400.00	131.17





REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-09 384ha. DISTRICT-PALWAL (Haryana)

3895	400.00	131.17
3896	400.00	131.17
3897	400.00	131.17
3898	400.00	131.17
3899	400.00	131.17
3900	400.00	131.17
3901	400.00	131.17
3902	400.00	131.17
3903	400.00	131.17
3904	400.00	131.17
3905	400.00	131.17
3906	400.00	131.17
3907	400.00	131.17
3908	400.00	131.17
3909	357.51	131.17
3929	295.85	131.17
3930	400.00	131.17
3931	400.00	131.17
3932	400.00	131.17
3933	400.00	131.17
3934	400.00	131.17
3935	400.00	131.17
3936	400.00	131.17
3937	400.00	131.17
3938	400.00	131.17
3939	400.00	131.17
3940	400.00	131.17
3941	400.00	131.17
3942	400.00	131.17
3943	400.00	131.17
3944	400.00	131.17
3945	288.08	131.17
3965	250.59	131.17
3966	400.00	131.17
3967	400.00	131.17
3968	400.00	131.17
3969	400.00	131.17
3970	400.00	131.17
3971	400.00	131.17
3972	400.00	131.17
3973	400.00	131.17
3974	400.00	131.17
3975	400.00	131.17
3976	400.00	131.17





REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTIRI BLOCK  
 AREA-99.384ha. DISTRICT-PALWAL (Haryana)

3977	400.00	131.17
3978	400.00	131.17
3979	400.00	131.17
3980	400.00	131.17
3981	218.64	131.17
4001	205.33	131.17
4002	400.00	131.17
4003	400.00	131.17
4004	400.00	131.17
4005	400.00	131.17
4006	400.00	131.17
4007	400.00	131.17
4008	400.00	131.17
4009	400.00	131.17
4010	400.00	131.17
4011	400.00	131.17
4012	400.00	131.17
4013	400.00	131.17
4014	400.00	131.17
4015	400.00	131.17
4016	400.00	131.17
4017	149.21	131.17
4037	160.07	131.17
4038	400.00	131.17
4039	400.00	131.17
4040	400.00	131.17
4041	400.00	131.17
4042	400.00	131.17
4043	400.00	131.17
4044	400.00	131.17
4045	400.00	131.17
4046	400.00	131.17
4047	400.00	131.17
4048	400.00	131.17
4049	400.00	131.17
4050	400.00	131.17
4051	400.00	131.17
4052	400.00	131.17
4053	79.78	131.17
4073	114.80	131.17
4074	400.00	131.17
4075	400.00	131.17
4076	400.00	131.17
4077	400.00	131.17



REVENUE ENHANCEMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

4078	400.00	131.17
4079	400.00	131.17
4080	400.00	131.17
4081	400.00	131.17
4082	400.00	131.17
4083	400.00	131.17
4084	400.00	131.17
4085	400.00	131.17
4086	400.00	131.17
4087	400.00	131.17
4088	635.72	131.17
4089	14.62	131.17
4109	69.54	131.17
4110	400.00	131.17
4111	400.00	131.17
4112	400.00	131.17
4113	400.00	131.17
4114	400.00	131.17
4115	400.00	131.17
4116	400.00	131.17
4117	400.00	131.17
4118	400.00	131.17
4119	400.00	131.17
4120	400.00	131.17
4121	400.00	131.17
4122	400.00	131.17
4123	400.00	131.17
4124	580.91	131.17
4145	24.28	131.17
4146	400.00	131.17
4147	400.00	131.17
4148	400.00	131.17
4149	400.00	131.17
4150	400.00	131.17
4151	400.00	131.17
4152	400.00	131.17
4153	400.00	131.17
4154	400.00	131.17
4155	400.00	131.17
4156	400.00	131.17
4157	400.00	131.17
4158	400.00	131.17
4159	400.00	131.17
4160	511.47	131.17





REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha. DISTRICT-PALWAL (Haryana)

4181	0.03	131.17
4182	618.98	131.17
4183	400.00	131.17
4184	400.00	131.17
4185	400.00	131.17
4186	400.00	131.17
4187	400.00	131.17
4188	400.00	131.17
4189	400.00	131.17
4190	400.00	131.17
4191	400.00	131.17
4192	400.00	131.17
4193	400.00	131.17
4194	400.00	131.17
4195	400.00	131.17
4196	442.04	131.17
4218	573.75	131.17
4219	400.00	131.17
4220	400.00	131.17
4221	400.00	131.17
4222	400.00	131.17
4223	400.00	131.17
4224	400.00	131.17
4225	400.00	131.17
4226	400.00	131.17
4227	400.00	131.17
4228	400.00	131.17
4229	400.00	131.17
4230	400.00	131.17
4231	400.00	131.17
4232	372.60	131.17
4254	528.48	131.17
4255	400.00	131.17
4256	400.00	131.17
4257	400.00	131.17
4258	400.00	131.17
4259	400.00	131.17
4260	400.00	131.17
4261	400.00	131.17
4262	400.00	131.17
4263	400.00	131.17
4264	400.00	131.17
4265	400.00	131.17
4266	400.00	131.17



ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha DISTRICT-PALWAL (Haryana)

4267	400.00	131.17
4268	303.17	131.17
4290	483.22	131.17
4291	400.00	131.17
4292	400.00	131.17
4293	400.00	131.17
4294	400.00	131.17
4295	400.00	131.17
4296	400.00	131.17
4297	400.00	131.17
4298	400.00	131.17
4299	400.00	131.17
4300	400.00	131.17
4301	400.00	131.17
4302	400.00	131.17
4303	400.00	131.17
4304	233.73	131.17
4326	437.96	131.17
4327	400.00	131.17
4328	400.00	131.17
4329	400.00	131.17
4330	400.00	131.17
4331	400.00	131.17
4332	400.00	131.17
4333	400.00	131.17
4334	400.00	131.17
4335	400.00	131.17
4336	400.00	131.17
4337	400.00	131.17
4338	400.00	131.17
4339	400.00	131.17
4340	164.30	131.17
4362	463.87	131.17
4363	400.00	131.17
4364	400.00	131.17
4365	400.00	131.17
4366	400.00	131.17
4367	400.00	131.17
4368	400.00	131.17
4369	400.00	131.17
4370	400.00	131.17
4371	400.00	131.17
4372	400.00	131.17
4373	400.00	131.17





ENVIRONMENTAL STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha. DISTRICT-PALWAL (Haryana)

4374	400.00	131.17
4375	400.00	131.17
4376	94.87	131.17
4397	9.27	131.5
4398	606.91	131.5
4399	400.00	131.5
4400	400.00	131.5
4401	400.00	131.5
4402	400.00	131.5
4403	400.00	131.5
4404	400.00	131.5
4405	400.00	131.5
4406	400.00	131.5
4407	400.00	131.5
4408	400.00	131.5
4409	400.00	131.5
4410	400.00	131.5
4411	639.38	131.5
4412	26.05	131.5
4433	130.94	131.5
4434	400.00	131.5
4435	400.00	131.5
4436	400.00	131.5
4437	400.00	131.5
4438	400.00	131.5
4439	400.00	131.5
4440	400.00	131.5
4441	400.00	131.5
4442	400.00	131.5
4443	400.00	131.5
4444	400.00	131.5
4445	400.00	131.5
4446	400.00	131.5
4447	596.00	131.5
4469	285.69	131.5
4470	400.00	131.5
4471	400.00	131.5
4472	400.00	131.5
4473	400.00	131.5
4474	400.00	131.5
4475	400.00	131.5
4476	400.00	131.5
4477	400.00	131.5
4478	400.00	131.5



REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
 AREA-99.384ha DISTRICT-PALWAL (Haryana)

4479	400.00	131.5
4480	400.00	131.5
4481	400.00	131.5
4482	400.00	131.5
4483	527.76	131.5
4505	440.45	131.5
4506	400.00	131.5
4507	400.00	131.5
4508	400.00	131.5
4509	400.00	131.5
4510	400.00	131.5
4511	400.00	131.5
4512	400.00	131.5
4513	400.00	131.5
4514	400.00	131.5
4515	400.00	131.5
4516	400.00	131.5
4517	400.00	131.5
4518	400.00	131.5
4519	467.55	131.5
4540	3.03	131.5
4541	591.78	131.5
4542	400.00	131.5
4543	400.00	131.5
4544	400.00	131.5
4545	400.00	131.5
4546	400.00	131.5
4547	400.00	131.5
4548	400.00	131.5
4549	400.00	131.5
4550	400.00	131.5
4551	400.00	131.5
4552	400.00	131.5
4553	400.00	131.5
4554	400.00	131.5
4555	408.81	131.5
4576	77.93	131.5
4577	400.00	131.5
4578	400.00	131.5
4579	400.00	131.5
4580	400.00	131.5
4581	400.00	131.5
4582	400.00	131.5
4583	400.00	131.5



REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

4584	400.00	131.5
4585	400.00	131.5
4586	400.00	131.5
4587	400.00	131.5
4588	400.00	131.5
4589	400.00	131.5
4590	400.00	131.5
4591	350.08	131.5
4612	181.37	131.5
4613	400.00	131.5
4614	400.00	131.5
4615	400.00	131.5
4616	400.00	131.5
4617	400.00	131.5
4618	400.00	131.5
4619	400.00	131.5
4620	400.00	131.5
4621	400.00	131.5
4622	400.00	131.5
4623	400.00	131.5
4624	400.00	131.5
4625	400.00	131.5
4626	400.00	131.5
4627	291.34	131.5
4648	284.81	131.5
4649	400.00	131.5
4650	400.00	131.5
4651	400.00	131.5
4652	400.00	131.5
4653	400.00	131.5
4654	400.00	131.5
4655	400.00	131.5
4656	400.00	131.5
4657	400.00	131.5
4658	400.00	131.5
4659	400.00	131.5
4660	400.00	131.5
4661	400.00	131.5
4662	400.00	131.5
4663	232.61	131.5
4684	388.25	131.5
4685	400.00	131.5
4686	400.00	131.5
4687	400.00	131.5





ENRICHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE, THANTHRI, BLOCK AREA-09/347a, DISTRICT-PALWAL (Haryana)

4688	400.00	131.5
4689	400.00	131.5
4690	400.00	131.5
4691	400.00	131.5
4692	400.00	131.5
4693	400.00	131.5
4694	400.00	131.5
4695	400.00	131.5
4696	400.00	131.5
4697	400.00	131.5
4698	400.00	131.5
4699	173.88	131.5
4720	413.12	131.5
4721	400.00	131.5
4722	400.00	131.5
4723	400.00	131.5
4724	400.00	131.5
4725	400.00	131.5
4726	400.00	131.5
4727	400.00	131.5
4728	400.00	131.5
4729	400.00	131.5
4730	400.00	131.5
4731	400.00	131.5
4732	400.00	131.5
4733	400.00	131.5
4734	400.00	131.5
4735	115.14	131.5
4756	350.64	131.5
4757	400.00	131.5
4758	400.00	131.5
4759	400.00	131.5
4760	400.00	131.5
4761	400.00	131.5
4762	400.00	131.5
4763	400.00	131.5
4764	400.00	131.5
4765	400.00	131.5
4766	400.00	131.5
4767	400.00	131.5
4768	400.00	131.5
4769	400.00	131.5
4770	400.00	131.5
4771	56.40	131.5





REFRESHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha. DISTRICT-PALWAL (Haryana)

4792	288.10	131.5
4793	400.00	131.5
4794	400.00	131.5
4795	400.00	131.5
4796	400.00	131.5
4797	400.00	131.5
4798	400.00	131.5
4799	400.00	131.5
4800	400.00	131.5
4801	400.00	131.5
4802	400.00	131.5
4803	400.00	131.5
4804	400.00	131.5
4805	400.00	131.5
4806	631.45	131.5
4807	6.22	131.5
4828	225.56	131.5
4829	400.00	131.5
4830	400.00	131.5
4831	400.00	131.5
4832	400.00	131.5
4833	400.00	131.5
4834	400.00	131.5
4835	400.00	131.5
4836	400.00	131.5
4837	400.00	131.5
4838	400.00	131.5
4839	400.00	131.5
4840	400.00	131.5
4841	400.00	131.5
4842	578.94	131.5
4864	163.02	131.5
4865	400.00	131.5
4866	400.00	131.5
4867	400.00	131.5
4868	400.00	131.5
4869	400.00	131.5
4870	400.00	131.5
4871	400.00	131.5
4872	400.00	131.5
4873	400.00	131.5
4874	400.00	131.5
4875	400.00	131.5
4876	400.00	131.5



ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THIANTHRI BLOCK  
 AREA-99.384ha. DISTRICT-PALWAL (Haryana)

4877	400.00	131.5
4878	520.20	131.5
4900	100.47	131.5
4901	400.00	131.5
4902	400.00	131.5
4903	400.00	131.5
4904	400.00	131.5
4905	400.00	131.5
4906	400.00	131.5
4907	400.00	131.5
4908	400.00	131.5
4909	400.00	131.5
4910	400.00	131.5
4911	400.00	131.5
4912	400.00	131.5
4913	400.00	131.5
4914	461.47	131.5
4936	37.93	131.5
4937	400.00	131.5
4938	400.00	131.5
4939	400.00	131.5
4940	400.00	131.5
4941	400.00	131.5
4942	400.00	131.5
4943	400.00	131.5
4944	400.00	131.5
4945	400.00	131.5
4946	400.00	131.5
4947	400.00	131.5
4948	400.00	131.5
4949	400.00	131.5
4950	402.74	131.5
4972	0.35	131.5
4973	619.81	131.5
4974	400.00	131.5
4975	400.00	131.5
4976	400.00	131.5
4977	400.00	131.5
4978	400.00	131.5
4979	400.00	131.5
4980	400.00	131.5
4981	400.00	131.5
4982	400.00	131.5
4983	400.00	131.5



REFRESHMENT STUDY REPORT(POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK AREA-99.384ha DISTRICT-PALWAL (Haryana)

4984	400.00	131.5
4985	400.00	131.5
4986	344.00	131.5
5009	599.09	132.4
5010	400.00	132.4
5011	400.00	132.4
5012	400.00	132.4
5013	400.00	132.4
5014	400.00	132.4
5015	400.00	132.4
5016	400.00	132.4
5017	400.00	132.4
5018	400.00	132.4
5019	400.00	132.4
5020	400.00	132.4
5021	400.00	132.4
5022	285.27	132.4
5045	585.69	132.4
5046	400.00	132.4
5047	400.00	132.4
5048	400.00	132.4
5049	400.00	132.4
5050	400.00	132.4
5051	400.00	132.4
5052	400.00	132.4
5053	400.00	132.4
5054	400.00	132.4
5055	400.00	132.4
5056	400.00	132.4
5057	400.00	132.4
5058	226.99	132.4
5081	572.29	132.4
5082	400.00	132.4
5083	400.00	132.4
5084	400.00	132.4
5085	400.00	132.4
5086	400.00	132.4
5087	400.00	132.4
5088	400.00	132.4
5089	400.00	132.4
5090	400.00	132.4
5091	400.00	132.4
5092	400.00	132.4
5093	400.00	132.4





REPLENISHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI, BLOCK AREA-99.38ha, DISTRICT-PALWAL (Haryana)

5094	172.26	132.4
5117	558.89	132.4
5118	400.00	132.4
5119	400.00	132.4
5120	400.00	132.4
5121	400.00	132.4
5122	400.00	132.4
5123	400.00	132.4
5124	400.00	132.4
5125	400.00	132.4
5126	400.00	132.4
5127	400.00	132.4
5128	400.00	132.4
5129	400.00	132.4
5130	118.28	132.4
5153	545.49	132.4
5154	400.00	132.4
5155	400.00	132.4
5156	400.00	132.4
5157	400.00	132.4
5158	400.00	132.4
5159	400.00	132.4
5160	400.00	132.4
5161	400.00	132.4
5162	400.00	132.4
5163	400.00	132.4
5164	400.00	132.4
5165	400.00	132.4
5166	64.31	132.4
5189	532.10	132.4
5190	400.00	132.4
5191	400.00	132.4
5192	400.00	132.4
5193	400.00	132.4
5194	400.00	132.4
5195	400.00	132.4
5196	400.00	132.4
5197	400.00	132.4
5198	400.00	132.4
5199	400.00	132.4
5200	400.00	132.4
5201	637.43	132.4
5202	12.90	132.4
5225	518.70	132.4





REFRESHMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHRI BLOCK  
AREA-99.384ha DISTRICT-PALWAL (Haryana)

5226	400.00	132.4
5227	400.00	132.4
5228	400.00	132.4
5229	400.00	132.4
5230	400.00	132.4
5231	400.00	132.4
5232	400.00	132.4
5233	400.00	132.4
5234	400.00	132.4
5235	400.00	132.4
5236	400.00	132.4
5237	596.36	132.4
5261	505.30	132.4
5262	400.00	132.4
5263	400.00	132.4
5264	400.00	132.4
5265	400.00	132.4
5266	400.00	132.4
5267	400.00	132.4
5268	400.00	132.4
5269	400.00	132.4
5270	400.00	132.4
5271	400.00	132.4
5272	400.00	132.4
5273	542.38	132.4
5297	491.90	132.4
5298	400.00	132.4
5299	400.00	132.4
5300	400.00	132.4
5301	400.00	132.4
5302	400.00	132.4
5303	400.00	132.4
5304	400.00	132.4
5305	400.00	132.4
5306	400.00	132.4
5307	400.00	132.4
5308	400.00	132.4
5309	488.41	132.4
5333	492.45	132.7
5334	400.00	132.7
5335	400.00	132.7
5336	400.00	132.7
5337	400.00	132.7
5338	400.00	132.7



REFRESHMENT STUDY REPORT(POST MONSOON-OCT-2023) FOR SAND MINE THANTHIRI BLOCK  
AREA-99,384ha. DISTRICT-PALWAL (Haryana)

5339	400.00	132.7
5340	400.00	132.7
5341	400.00	132.7
5342	400.00	132.7
5343	400.00	132.7
5344	400.00	132.7
5345	434.43	132.7
5369	530.00	132.7
5370	400.00	132.7
5371	400.00	132.7
5372	400.00	132.7
5373	400.00	132.7
5374	400.00	132.7
5375	400.00	132.7
5376	400.00	132.7
5377	400.00	132.7
5378	400.00	132.7
5379	400.00	132.7
5380	400.00	132.7
5381	380.46	132.7
5405	569.53	132.7
5406	400.00	132.7
5407	400.00	132.7
5408	400.00	132.7
5409	400.00	132.7
5410	400.00	132.7
5411	400.00	132.7
5412	400.00	132.7
5413	400.00	132.7
5414	400.00	132.7
5415	400.00	132.7
5416	400.00	132.7
5417	326.48	132.7
5441	609.06	132.7
5442	400.00	132.7
5443	400.00	132.7
5444	400.00	132.7
5445	400.00	132.7
5446	400.00	132.7
5447	400.00	132.7
5448	400.00	132.7
5449	400.00	132.7
5450	400.00	132.7
5451	400.00	132.7



ENVIRONMENTAL IMPACT ASSESSMENT STUDY REPORT (POST MONSOON-OCT-2023) FOR SAND MINE THANTHOKI BLOCK, AREA-99.384ha, DISTRICT-PALWAL (Haryana)


5452	400.00	132.7
5453	272.51	132.7
5476	10.17	132.7
5477	638.42	132.7
5478	400.00	132.7
5479	400.00	132.7
5480	400.00	132.7
5481	400.00	132.7
5482	400.00	132.7
5483	400.00	132.7
5484	400.00	132.7
5485	400.00	132.7
5486	400.00	132.7
5487	400.00	132.7
5488	400.00	132.7
5489	218.54	132.7
5512	48.12	132.7
5513	400.00	132.7
5514	400.00	132.7
5515	400.00	132.7
5516	400.00	132.7
5517	400.00	132.7
5518	400.00	132.7
5519	400.00	132.7
5520	634.94	132.7
5521	489.75	132.7
5522	316.06	132.7
5523	213.72	132.7
5524	113.47	132.7
5525	14.40	132.7
5548	61.89	132.7
5549	474.49	132.7
5550	466.52	132.7
5551	458.56	132.7
5552	450.59	132.7
5553	442.62	132.7
5554	425.88	132.7
5555	267.02	132.7
5556	63.44	132.7





**Conclusion**

Present study is only the surface level measurements only after deposition/replenishment of the old worked mines if any. As The LOI was issued on 21-07-2023 (during the mid of the rainy season. No pre-monsoon study could be conducted as River Yamuna was full of water during the month of July, August and part of Sept 2023. It will be conducted during the next year and final result of the study report will come out after the next rainy season is over.

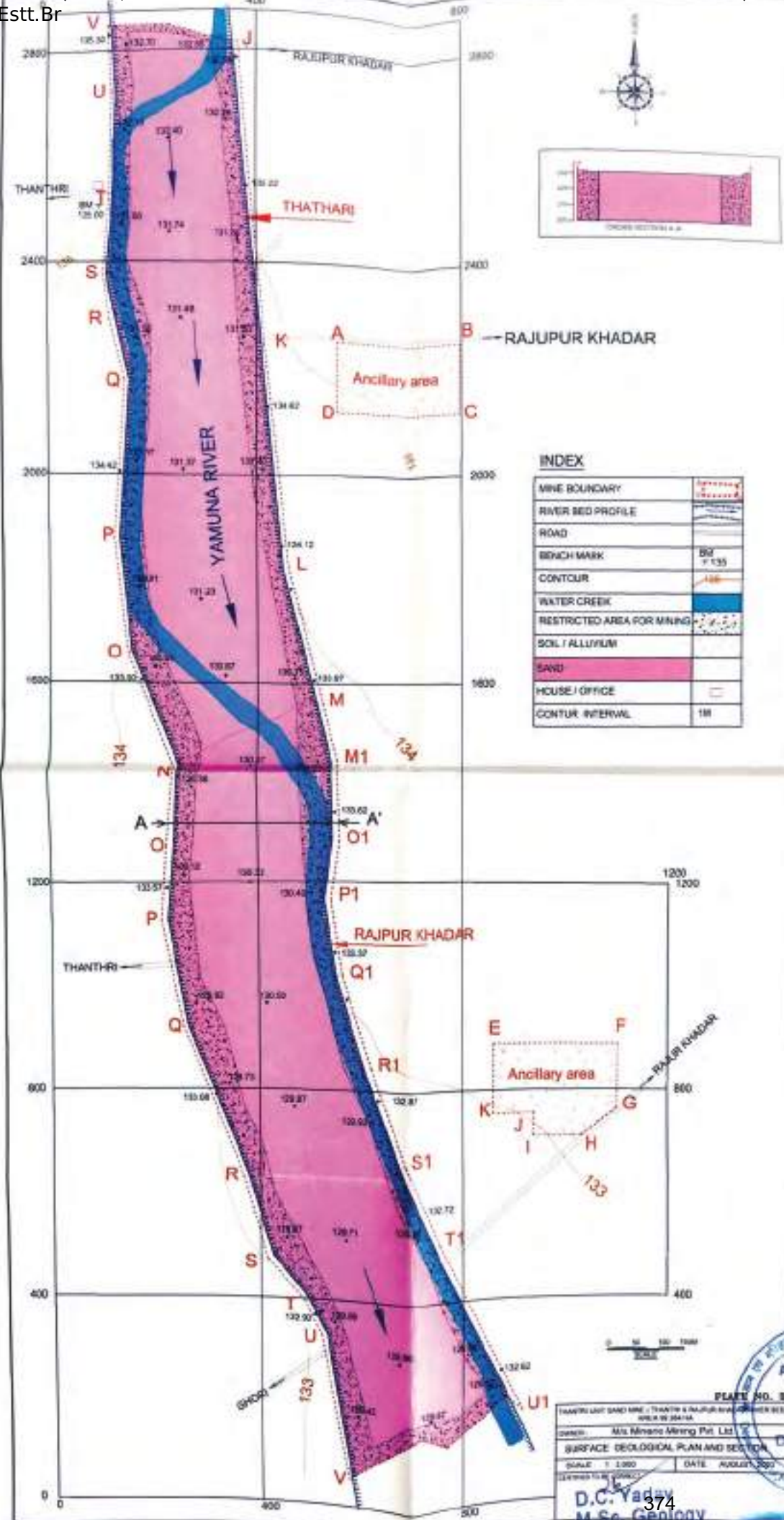
  
D.C. Yadav  
M.Sc. Geology  
Qualified Person











APPROVED

THANTHI LIME SAND MINE - THANTHI & RAJUPUR KHADAR (LOWER BELT)  
 W.P.N. 24/124

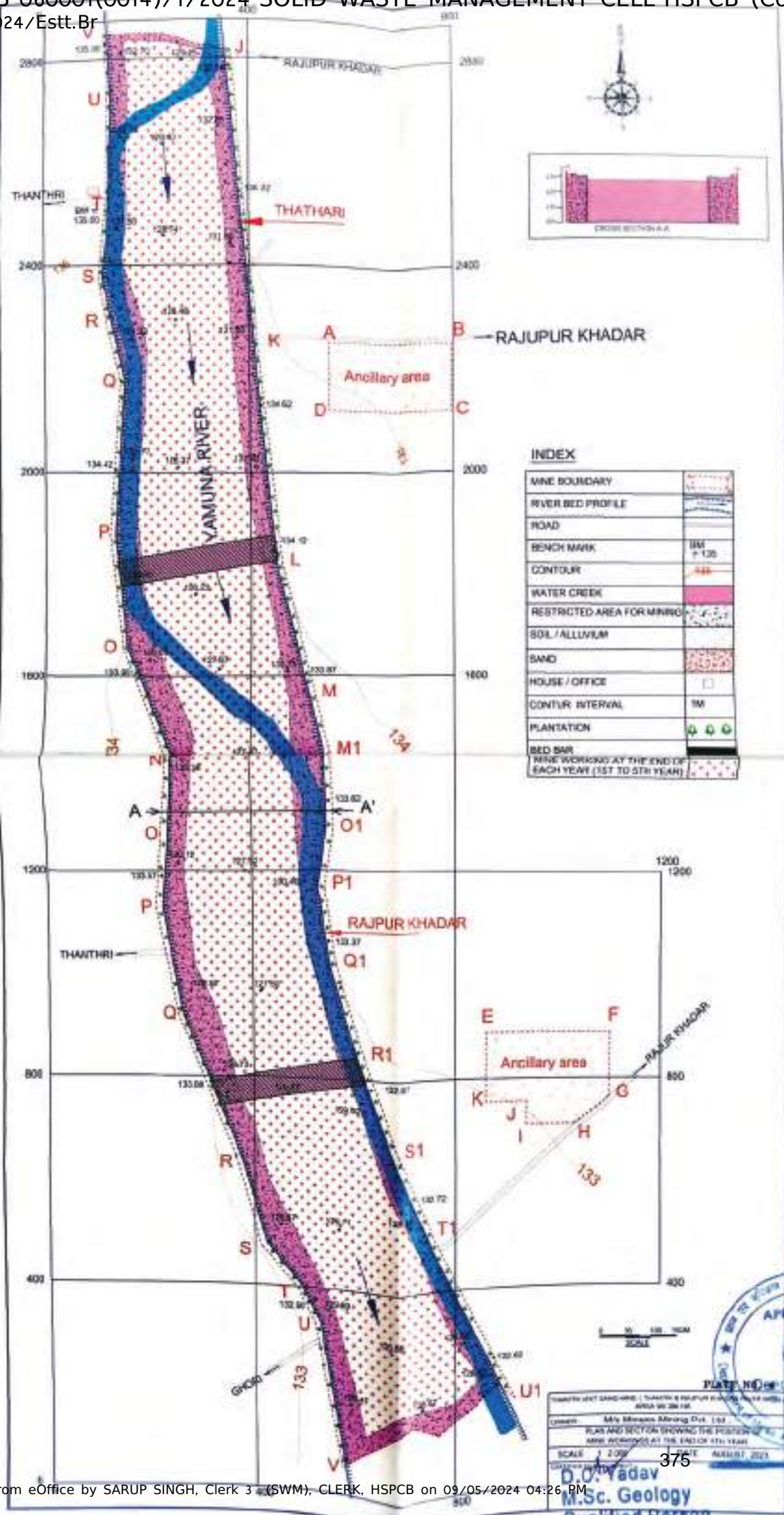
DESIGN: M/s. Minerals Mining Pvt. Ltd.

SURFACE GEOLOGICAL PLAN AND SECTION

SCALE: 1:2000 DATE: AUGUST, 2020

DESIGNED BY: D.C. YADAV

D.C. Yadav  
 M.Sc. Geology  
 Qualified Person



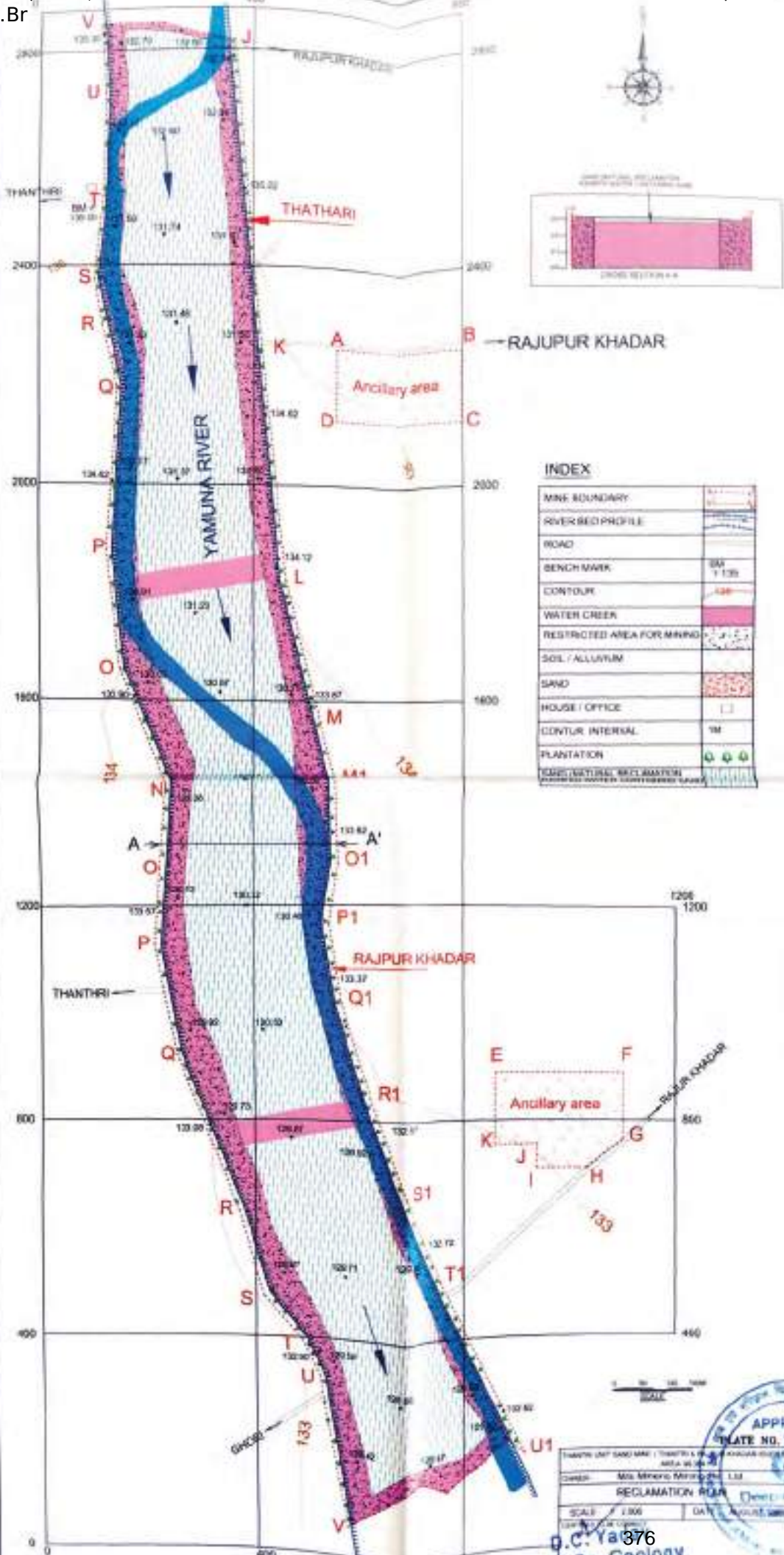
**INDEX**

MINE BOUNDARY	
RIVER BED PROFILE	
ROAD	
BENCH MARK	BM + 1.25
CONTOUR	
WATER CREEK	
RESTRICTED AREA FOR MINING	
SOIL / ALLUVIUM	
SAND	
HOUSE / OFFICE	
CONTOUR INTERVAL	5M
PLANTATION	
BED BAR	
MINE WORKING AT THE END OF EACH YEAR (1ST TO 5TH YEAR)	



SCALE 1:2000  
 DATE AUGUST, 2024  
**D.O. Yadav**  
 M.Sc. Geology  
 Qualified Person

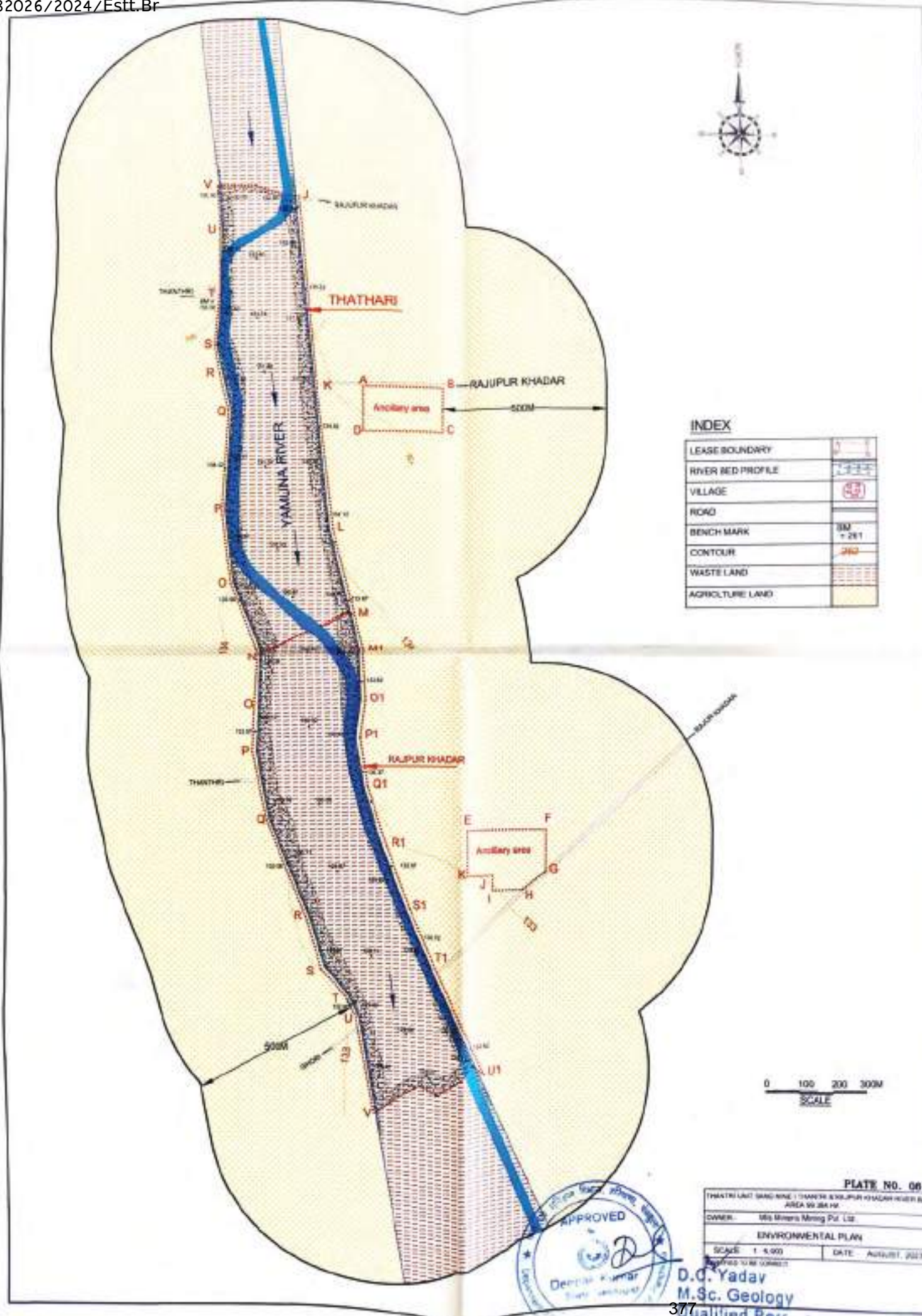




APPROVED  
 STATE NO. 7  
 M.S. Mining Ministry Ltd. Ltd.  
 RECLAMATION PLAN  
 SCALE: 1:500  
 DATE: 09/05/2024

G.C. Yadav  
 M.Sc. Geology  
 Qualified Person





**INDEX**

LEASE BOUNDARY	
RIVER BED PROFILE	
VILLAGE	
ROAD	
BENCH MARK	
CONTOUR	
WASTE LAND	
AGRICULTURE LAND	

0 100 200 300M  
SCALE

**PLATE NO. 06**  
 THATHARI LAKE (SAND WINE) THATHARI & RAJAPUR KHADAR RIVER BEDS  
 AREA 99.284 HA  
 OWNER: M/s Minerals Mining Pvt. Ltd.  
 ENVIRONMENTAL PLAN  
 SCALE: 1:5,000  
 DATE: AUGUST, 2023  
 APPROVED  
 D.D. Yadav  
 M.Sc. Geology  
 Qualified Person



**ANNEXURES – 1.4**

**NOC FROM FOREST  
DEPARTMENT**





**OFFICE OF DIVISIONAL FOREST OFFICER**  
**PALWAL FOREST DIVISION, PALWAL**  
**BHANGOORI RAJWAH, NEAR JAWAHAR NAGAR, CAMP, PALWAL-121102**  
**Tel : 01275-248978, E-Mail-dfopalwak@gmail.com**

No : 1783

Date : 24/08/2023

To,

Authorised Signatory,  
Minerio Mining Private Limited,  
Add. A-1 1st Floor, samman Bazar road, Bhogal, New Delhi-110014  
e-mail ID: miningminerio2023@gmail.com

**Sub: Clarification regarding applicability of forest laws on Non forest land.**

**Ref.: Your office letter dated 25.07.2023**

Applicant Authorised Signatory, Minerio Mining Private Limited, Add. A-1 1st Floor. samman Bazar road, Bhogal, New Delhi-110014 vide letter no Nil dated 25.07.2023 made a request in connection with clarification regarding applicability of forest laws on non forest land for Minor Mineral sand project at Village Thantri Khasara No. 3//11min, 20/1, 20/2min, 21min, 4//7, 8min, 13/1min, 13/2, 14, 15/1, 15/2, 16/1min, 16/2min, 17/1, 17/2, 18/1min, 23/min, 24/1, 24/2, 25/1, 25/2, 10//3min, 4/1, 4/2, 5, 6/1, 6/2, 7/1, 7/2, 8/1, 8/2min, 13/1min, 13/2, 13/3, 14, 15/1, 15/2, 15/3, 15/4, 16/1, 16/2, 17, 18/1, 18/2min, 23min, 24, 25, 11//1min, 10min, 11min, 20min, 21/\*1, 21/2, 22min, 15//1, 2min, 9min, 10/1, 10/2, 11, 12/1min, 12/2min, 19min, 20/1min, 20/2, 21, 22min, 16//3/2, 4, 5, 6, 7, 8/1, 13/1min, 13/2min, 14, 15, 16/1min, 16/2, 17, 18/1min, 23/2min, 24, 25, 23//3/2min, 4/1, 4/2, 5/1, 5/2, 7, 8/1min, 13/3 min, 14/1, 14/2, 15, 16/1, 16/2, 17/1, 17/2, 18/1min, 23min, 24, 25/1, 25/2, 24//1, 2/1min, 2/2min, 9min, 10, 11/1, 11/2, 12min, 19min, 20, 21, 22min, 28//1, 2min, 9/1min, 9/2min, 10, 11, 12min, 19min, 20, 21/1, 21/2, 29//3min, 4, 5/1, 5/2, 6/1, 6/2, 7/1, 7/2, 8min, 13/2min, 14/1, 14/2, 15/1, 15/2, 15/3, 16, 17/1, 17/2, 18/1, 23/2min, 24/1, 24/2, 25, 38//, 3/2min, 4/1, 4/2, 5/1, 5/2, 6, 7/1, 7/2, 8/1min, 13/2min, 14/1, 14/2, 15, 16, 17min, 18/1min, 24min, 25, 39//1, 2min, 3min, 8min, 9, 10, 11/1, 11/2, 12, 13/1min, 13/2min, 18min, 19/1, 19/2, 20, 21, 22, 23min, 41//, 1, 2, 3min, 9, 10, 11, 42//4min, 5, 6/1, 6/2, 6/3, 7min, 14min, 15, 17min for ancillary area 24//4, 5/1, 5/2, 6, 7, 14, 15, 25//1/1, 1/2, 10, 11. In Continuation of report submitted by RFO, Palwal Vide letter No. 710 dated 14.08.2023, It is made clear that:

- a) As per records available above said land is not part of notified Reserved Forest. Strip Protected Forest land or any area closed under Section 4 & 5 of Punjab Land Preservation Act, 1900.
- b) As per records available as explained in para (a) no act /rules of forest department is applicable on the said land.
- c) As per the records available with the Forest Department, Palwal, the Area does not fall in areas where plantations were raised by the Forest Department under Aravalli project.
- d) All other statutory clearances mandated under the Environment Protection Act, 1986 as per the notification of Ministry of Environment and Forests, Government of India, dated 07.05.1992 or any other Act/order shall be obtained as applicable by the project proponents from the concerned authorities.
- e) It shall be the responsibility of user agency/ applicant to get necessary clearances/ permissions under various Act and Rules applicable if any, from the respective authorities/Department.

  
Dy. Conservator of Forests  
Palwal



**ANNEXURES – 1.5**

**APPROVED DISTRICT**

**SURVEY REPORT**





From

Deputy Commissioner  
Palwal

To

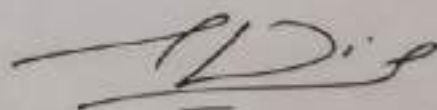
The Chairman  
State Environment Impact Assessment Authority(SEIAA)  
Bays no. 55 – 58 Paryatan Bhawan,  
1<sup>st</sup> Floor Sector- 2, Panchkula, Haryana

No. 10814

Dated :- 31/10/23

**Subject:- Regarding correction in the district survey report (DSR) of  
Palwal District, Haryana.**

Apropos the above noted subject, it has been reported by Mining Officer, Palwal / Faridabad vide letter No. MO/FBD/3266 dated 16.10.2023 that District Survey Report of Palwal district was approved on dated 13.02.2023 but in that some clerical mistake were found (copy of letter enclosed). The report of Mining Officer with necessary corrections in the DSR with a request to consider the corrections and accept them as an integral part of the District Survey Report (DSR) of district Palwal, is hereby sent for your kind information and necessary action please.



Deputy Commissioner,  
Palwal.



Department of Mines & Geology, Faridabad



To be substitute  
Some No. of Date

Memo No. :- MO/FBD/ 3266

Dated :- 16/10/2023

From,

Mining Officer  
Deptt. of Mines & Geology  
Faridabad / Palwal

To,

The Deputy Commissioner,  
Palwal

**Subject:** Regarding correction in the district survey report (DSR) of Palwal District, Haryana

**Ref:** Your letter no. 9245 dated 06.1.2023

On the subject noted above, it is intimated that District Survey Report was approved on dated 13.02.2023 but in that some clerical mistake were found by the competent authority i.e. SEIAA, following corrections has been done in the available DSR of district Palwal and the same are mentioned below for your reference:

(1) No. of villages as mentioned in the DSR has been corrected and the correct number of tehsil subtehsil, Towns and villages (Revenue Estates) are below. Total length in district of river Yamuna is 28 KM.

Tehsils	-	03
Sub Tehsils	-	02
Towns	-	03
Villages ( Revenue Estates)	-	28

Correct name is district Palwal shows a geographical boundary with Mewat, Aligarh, Gurugram and Faridabad.

(1.2) In district Palwal Aravali Hills are in the south.

(3.1) As per rough estimate total river bed passing through district Palwal is about 28 KM.

(3.2) Highest bidder Unit -1- 27.56 cr. And unit 2 - 29.5 cr.

(3.11) In point no. 3.11 correct name is district Palwal.

(11.2) In point no. 11.2 correct name is district Palwal.

प्रथम तल, जिला उद्योग केंद्र, नजदीक खजाना अधिकारी कार्यालय, नीलम चौक, फरीदाबाद - 121001  
1<sup>st</sup> Floor, DIC Building, Near Treasury Office, Neelam Chowk, Faridabad - 121001  
E-Mail - [mominingfbd@gmail.com](mailto:mominingfbd@gmail.com), Office Telephone No. 0129-2425530.

(14 & 16) Based on the study conducted and the surveys done the mineable mineral potential (MT) 60 percent of total mineral potential has been corrected and the correct figures are 2,01,93,157 MT in place of 2,74,05,000 MT respectively which is mentioned in para no. 14 and 16.

Hence forth Methodology adopted for calculation of Mineral Potential is corrected as follows:-

Portion of the river or stream recommended for mineral concession	Length of area recommended for mineral concession (in Kilometer)	Average width of area recommended for mineral concession (in meters)	Area recommended for mineral concession (in square meter)	Mineable potential ( in metric tonne ) (60./ of total mineral potential)
28 KM	28KM	290 M.	8,120,000 sqm	2,01,93,157 MT

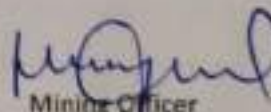
Mineral potential is corrected as follows:-

Sand (MT) min.	Total Mineable Mineral Potential (MT)
2,01,93,157	2,01,93,157
Annual Deposition	
3,27,12,914	3,27,12,914

**Recommendation**

From the above, it is clear that about 2,01,93,157 MT of mineral is available up to depth of three meters in the river bed of Yamuna River in Palwal District. The annual deposition is 3,27,12,914 MT. Hence 2,01,93,157 /- MT of mineral can be safely removed and disposed off every year.

Hence you are requested to kindly consider the above corrections and accept this letter as an integral part of the District Survey Report (DSR) of district Palwal, Haryana and same is forwarded to SEIAA for further necessary action.

  
 Mining Officer  
 Deptt. of Mines & Geology  
 Faridabad / Palwal



District Palwal

Palwal	Sr. No.	Name of village	Area earlier auction (in hectare)	Re-verified area (in hectare)	Area ancillary activity for like weighbridge, stocking etc
Sand Unit (I)	1	Maksudpur	28.00	10.00	Nil
	2	Hassapur	40.00	32.10	12.78
	3	Thanthari	43.34	47.00	14.30
	4	Rajupur Khaddar	34.80	69.94	8.75
	5	Dostpur	49.60	70.14	11.70
	6	Pehladpur	27.60	38.20	9.85
	7	Ghori	30.12	00.00	00.00
	8	Gurwari	60.90	55.40	17.57
Sand Unit (II)	9	Chandhut	88.40	60.99	19.15
	10	Rahimpur	07.50	00.00	00.00
	11	Sultanpur	Nil	18.00	09.83
	12	Atwa	Nil	17.10	10.00
	13	Kashipur	39.68	13.80	10.20
	14	Pataskonagar	85.90	00.00	00.00
	15	Hasanpur	Nil	39.54	20.00
Total			535.84	455.11	134.13



## DISTRICT SURVEY REPORT

The main objective of the preparation of District Survey Report, as per "The Sustainable Sand Mining Guideline" is to identify the areas of aggradations or deposition where mining can be allowed, and identification of areas of erosion and proximity to infrastructural structures and installations where mining should be prohibited and calculation of annual rate of replenishment and allowing time for replenishment after mining in that area.

### 1. Introduction

#### **Minor Mineral Deposits:**

- 1.1 Palwal district of Haryana is located in South-eastern part of Haryana State and lies between  $28^{\circ}15'57.00''$  to  $27^{\circ}51'34.0''$  North latitudes and  $77^{\circ}07'12.9''$  to  $77^{\circ}32'38.46''$  East longitudes. The total area is 1359 square kilometers, in which there are 62 villages, 2 towns, 2 tehsils and 1 sub-tehsils. Large part of the district of Faridabad is situated between Aravalies in west and river Yamuna in east. Faridabad district is bounded by the state of Delhi in the north, by the state of Uttar Pradesh in the east, in west by Gurugram district and south by Palwal and Mewat Districts.
- 1.2 The district has a sub-tropical continental monsoon climate where we find seasonal rhythm, hot summer, cool winter, unreliable rainfall and great variation in temperature. In winters, frost sometimes occurs during December and January. The district also gets occasional winter rains from cyclones. The rain fall is mostly restricted to rainy season. The district has Aravali hills in the West and flood - plain along the Yamuna river in the east.
- 1.3 River Sand (Minor Minerals) finding use as construction material are found in the river bed areas and flood plain areas. The size and the concentration of material

gradually reduce towards down stream as the heavy material of larger size settles with reduction in flow of water stream. The material deposits are found in villages of the districts located along the river or their flood plains and abandoned water courses/drains.

Quartzite (Minor Minerals) is also found in hilly areas of Aravali within jurisdiction of district Palwal in West of the district sharing with District Mewat.

- 1.4 The water of river Yamuna is diverted partly towards Uttar Pradesh and Haryana for different Canal Systems for Irrigation purposes. In the main river bed area, the maximum water is only due to release of water from Kalindikunj Barrage during rainy seasons. The water released in the river during rainy season brings huge quantity of Sand which gets deposits in the river bed area.
- 1.5 Part area of river Yamuna in the State of Uttar Pradesh and part area falls in the State of Haryana. Though in general river Yamuna acts as natural boundary between the two state i.e eastern part in Haryana and western part in Uttar Pradesh. However at certain places, the entire area of river (both sides of river bank) falls in either of the State. In other words there are areas of river where entire riverbed area falls within the jurisdiction of Haryana or Uttar Pradesh.

**Location Map of Mineral Bearing Areas:**

- 1.6 The minor mineral deposits in the district Palwal can be divided mainly in two locations / blocks marked on a map of the area (Annexure "D"). The areas broadly can be divided in following Two categories for the purpose of location and type of areas :
- (i) Area in river Yamuna for excavation of Sand [ Location A ].
  - (ii) Area in Aravali hill range [ Location B ].

2.1.3

This report primarily relates to Location A as a litigation regarding location B is pending adjudication in Hon'ble Apex court.

Apart from above, Ordinary Clay/Ordinary Earth/Brick earth is also extensively available through the district.

## **2 Overview of Mining Activity in the District**

### **Grant of Mineral Concessions for Mining of Minor Minerals.**

#### **2.1 Mode of grant of mineral concession**

Before giving details of actual sites / number of sites or mineral concessions it would be appropriate to explain that the Mineral Concession in respect of minor minerals are granted as per provisions of the State Rules, framed by the respective State Governments in exercise of power under section 15 of the Mines and Minerals (D&R) Act, 1957.

2.1.1 The State of Haryana at the time of bifurcation in 1966, opted prevailing Rules namely "Punjab Minor Mineral Concession Rules 1964". These Rules were amended from time to time as per policy of the State Government for Minor Minerals. The Hon'ble Supreme Court vide its order dated 27.02.2012 directed all State Governments to revise their State Rules making provisions in accordance with various recommendations contained in the report of the 'Group' of MoE&F, GoI, on mining of minor minerals and the Model draft guidelines issued by the Ministry of Mines, GoI.

2.1.2 Accordingly, the State of Haryana comprehensively revised its State Rules namely, the "Haryana Minor Mineral Concession, Stocking, Transportation of Minerals, and Prevention of Illegal Mining Rules, 2012", repealing the prevailing Rules namely "Punjab Minor Mineral Concession Rules 1964".



2.1.3 The mineral concessions in the Haryana are being granted in the form of "Mining Contract" or "Mining Lease" through online competitive bidding process. The Mining Contracts are granted for a minimum period of 07 years and maximum period of 10 years. Whereas the Mining Leases are granted for a minimum period of 10 years and maximum period of 20 years

2.1.4 In district Palwal mineral concessions for Yamuna River bed are/were granted in the form of Mining contracts. The areas selected for mining in river bed are allowed to excavate mineral in the central 3/4<sup>th</sup> of river bed that too up to a maximum depth of 03 meters from existing level of river bed. Further following conditions are also being imposed for excavation of minor mineral(s) from river beds in order to ensure safety of river-beds, structures and the adjoining areas:

(i) No mining would be permissible in a river-bed up to a distance of five times of the span of a bridge on up-stream side and ten times the span of such bridge on down-stream side, subject to a minimum of 250 meters on the up-stream side and 500 meters on the down-stream side;

(ii) There shall be maintained an un-mined block of 50 meters width after every block of 1000 meters over which mining is undertaken or at such distance as may be directed by the Director or any officer authorized by him;

(iii) The maximum depth of mining in the river-bed shall not exceed three meters measured from the un-mined bed level at any point in time with proper bench formation;

(iv) Mining shall be restricted within the central 3/4<sup>th</sup> width of the river/ rivulet;

2.1.5 The method of excavation for mineral as stated above takes place only up to a maximum depth of 03 meters in the Central 3/4<sup>th</sup> part of the river bed. The area left on both side of the river bank not only ensures the safety of banks (bank cutting due to water stream) but also ensures that in the central part of river, water stream



requirement  
through

flows smoothly during rains and process of river meandering does not occur. mineral from river bed is remove up to maximum depth of 03-meter layer from general level of the bed of the River Yamuna. The mineral excavated is directly loaded in the vehicles/dumpers and the vehicles owners and drivers take away the mineral directly to the consumers. In certain cases, mineral concession holders stacks mineral on the river bank in case, are not able to sell the material on actual mining itself

2.1.6 Further, in case of excavation of Ordinary Clay/Ordinary Earth/Brick Earth, Short Term Permits are being issued to either the owner of the land or to a person/owner of Brick Kiln, having consent from the owner of the land. The Short-Term Permits are being issued under rule 6, 30 and 31 of the "Haryana Minor Mineral Concession, Stocking, Transportation of Minerals, and Prevention of Illegal Mining Rules, 2012".

**2.A. Method of Mining in river bed areas (semi-mechanized/mechanized or manual)**

2.A.1 The Hon'ble NGT with regards to river bed mining has specifically desired to examine the mode of mining - shall the same be **semi mechanized /mechanized or manual**.

2.A.2 There is no specific definition of **Semi - Mechanized Mining**. The term Semi - mechanized mining in general is used were method of working in general are undertaken mechanically, however, some operations are also undertaken manually. Therefore, the semi mechanized mining or mechanized mining, is the same method of working. Sometime mechanized mining with light machines are also referred as semi- mechanized mining. The term semi mechanized mining is being used in general parlance where in the very same mining area in part area as per requirement manual mining is also under taken along with mechanized mining of manual sand/river bed mining.

2.A.3 Whereas **Manual** mining operations are undertaken using conventional hand tools only like chisel, hammer and crowbar etc. and operations are only labour intensive. As per

requirement manual lifting of sand and directly loading the sand in tractor trolleys etc. through labours itself.

**2.A.4** The **Mechanized** mining operations in respect of sand mining are undertaken with the help of excavator-cum-loaders. In this process sand is lifted/excavated from the river bed through excavator-cum-loaders and directly loaded in dumpers or other mode of transport. The vehicles carrying the mineral from mines to site of use/ site of construction or sale stocks outside lease hold areas (*an independent business than that of mining*).

**2.A.5** In the current scenario, it is impractical to undertake manual mining because :

- (i) The labours are not easily available;
- (ii) Manual mining cannot be undertaken in systematic and scientific manner as compared to mechanical mining which can be undertaken systematic/ scientific and controlled mining.
- (iii) In case of manual mining to achieve desired level of production more number of manpower would be required meaning thereby human interface within river bed area would increase and more ecological damage would be caused.

**2.A.6** The method of mining even otherwise can not be uniform even for same area and all the methods have their own pros and cons, however, considering the current scenario wherever feasible mechanized (semi-mechanized or mechanized is same thing ) mining should be preferred over manual method.

## **2.B Regulation relating to Mining**

**2.B.1** As per prevailing State Rules, the Mineral Concession holders are required to get a Mining Plan for the area prepared from a "Registered Qualified Persons". The mining plan includes the area specific details along with the Mine Closure Plan (Progressive & Final) taking into consideration the details of the geology and lithology of the area including the estimated mineral reserves of the area. Proposed method of mining/ development of mines, use of explosives and blasting operations, if any, stacking and disposal of minerals, mine-drainage pattern, handling of the overburden, location of weigh bridges, and mineral



Earlier (at)  
granted

(i)

processing, if any. The extent of manual mining or mining with the use of machinery and mechanical devices along Level of Production (production from year-to-year for a period of five years), Mechanization, Type of Machinery to be used, nature and extent of the mineral body/ spot or spots where the mining operations are proposed to be undertaken; natural water courses, limits of mineral reserves and other forest areas and density of trees, if any, assessment of impact of mining activity on land surface and environment including air and water pollution i.e. the environment management plan. In addition to this Mining plan also suggests the details of scheme of restoration/ rehabilitation of the area through land reclamation, use of pollution control devices and such other measures as may be directed by the State Government from time to time.

2.B.2 The Mining Plan are to be got approved from the authorized officer of the State Government. Based on mining plan prior environmental clearance from the competent authority as per provisions of EIA Notification dated 14.09.2006 of MoEF, CC, Gol.

2.B.3 After obtaining the Environmental Clearances as Further, to comply with requirement of Air Act, 1981, the consent to establish and "consent to operate" from State Pollution Control Board are also obtained before actual mining

2.B.4 The above said provisions mainly relates to mineral conservation and environmental protection. With regards to provisions related to safety in mines and welfare of labors provisions under the Mines Act, 1952 are ensured by the Directorate General Mines Safety a department under the Ministry of Labour, Government of India.

### **3 The List of Mining Leases in the District with location, area and period of validity**

#### **Areas selected for Mining in District Palwal**

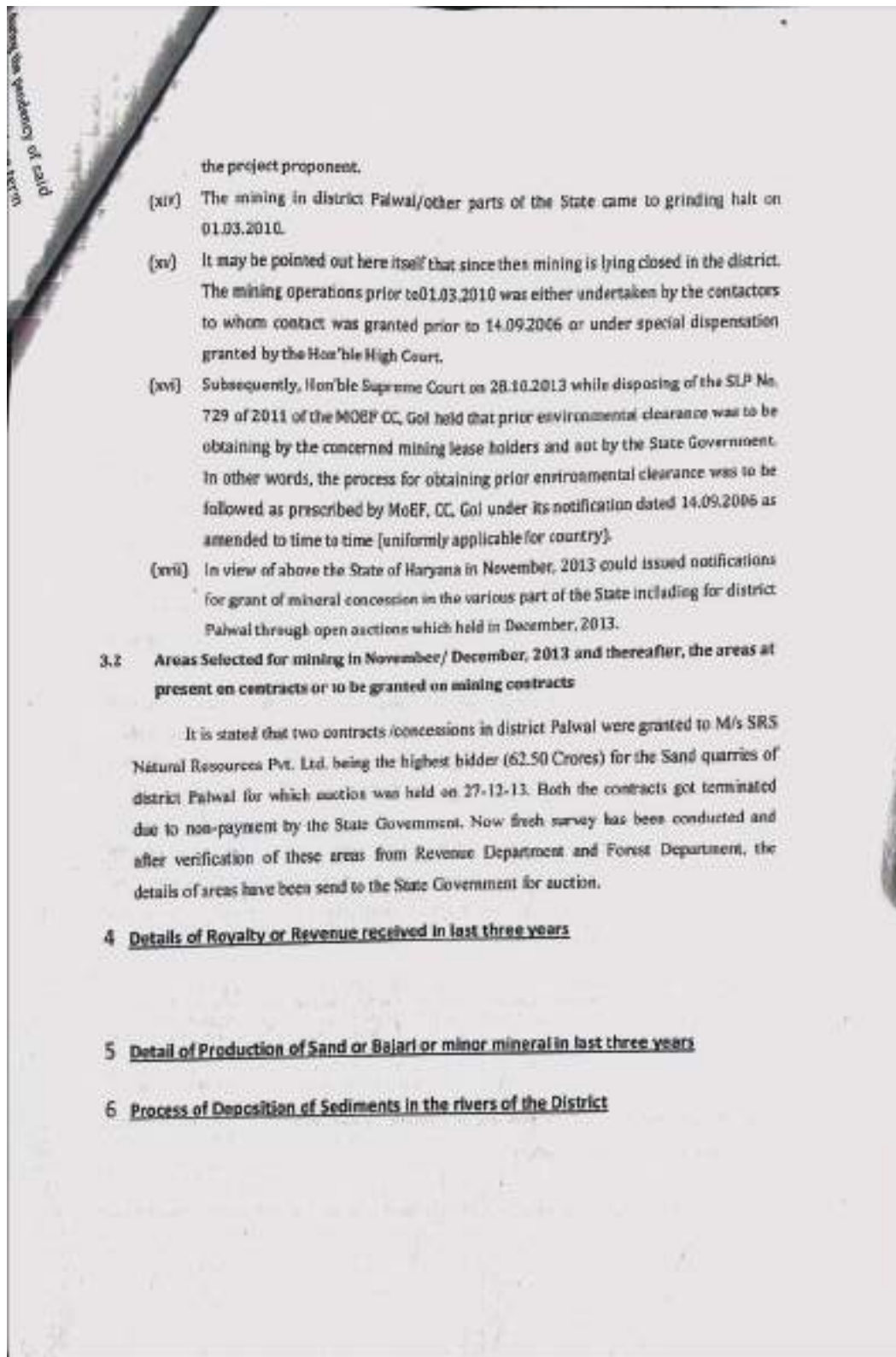
3.1 As per rough estimate total area of rivers beds passing through district Palwal is about 9 sq. km. As regards selection of area for mining it may be pointed out that:

- (i) Earlier, (about 16-18 years back) mineral concession/mining contracts were being granted for extraction of sand from river Yamuna of district Palwal on revenue estate basis, subject to various restrictions. The mineral concession holders used to undertake mining in areas after leaving restricted area.
- (ii) Initially about 28 villages (Includes 12 villages of present district Palwal) during joint Faridabad were being offered for mining, as area of some of the villages came under other restrictions either because of construction of some bridges on river bed or due to other development projects including habitation.
- (iii) The mode of grant of mining contracts of individual quarries/revenue estates in Palwal district was changed in late nineties and instead granting individual quarries on contract, number of adjoining quarries were clubbed for the purpose of granting mineral concession. On 18.04.2000, three zones namely Agwanpur- Basantpur Zone, Chandpur Zone and Murtzabad Zone were auctioned for three years. This mode was further changed and all minor mineral quarries of the district were given "as one unit". In this way they used to be a single contractor for all minor mineral quarries of a "district as one unit" from 03.06.2003 for a period up to 28.02.2010.
- (iv) *Needless to state that such mineral concession areas use to have even the areas having no mineral deposits the areas otherwise not permissible for mining. The mineral concession holders were under obligation to undertake mining only in the areas free from all restriction and as per prevailing all Rules and Regulations. Mineral Concessions for minor Mineral prior to 14.09.2006 were not required to obtain Environmental Clearance.*
- (v) The EIA notification dated 14.09.2006 became applicable for fresh contacts/ leases and in the year 2008 for grant of mineral concessions in respect of other areas in the State fresh auction was notified subject to condition that mining will be allowed to be undertaken only after prior environmental clearance is obtained as per requirement of EIA notification dated 14.09.2006 of MoEF,CC, Gol. However, said condition was challenged by some prospective bidders on the plea that the notification dated 14.09.2006 was not applicable for mining of minor minerals.
- (vi) The operation of notification dated 14.09.2006 for mining of minor mineral was stayed by the Hon'ble Punjab and Haryana High Court vide its interim order dated 07.04.2008 in CWP No. 4578 of 2008- Chandi Mandir Stone Crusher Consumer Company Vs. Union of India and Others.



(xiv)

- (vii) The State could not have granted long term contracts during the pendency of this case because operation of the notification was under stay and in case long term contracts were granted the mineral concession holders would have claimed that at the time of grant the notification was not applicable for them or may have sought to cancel the contract.
- (viii) Subsequently, the Hon'ble High Court on 15.05.2009 while disposing of the above said writ petition (along with CWP no 20134 of 2004 Vijay Bansal V/s State) upheld that notification dated 14.09.2006 was applicable for mining of minor mineral also.
- (ix) However, as regards the process of obtaining the prior environmental clearance, the Hon'ble High Court directed the process to be followed in two parts. In the first stage, it was directed that the state of Haryana would submit the ToRs to the EAC and the EIA report will be prepared by Expert Appraisal Committee (EAC) in the MoEF, GoI before conducting the auctions. Subsequent to the holding of the auctions, the successful bidder shall obtain the prior environmental clearance from the competent authority.
- (x) The Hon'ble High Court, considering that some time would be required for completing the process as per above, and general public would face problems due to sudden closure of mining, permitted mining without environmental clearance for the period up to 28.02.2010.
- (xi) Accordingly, no long-term contract in Faridabad area could be granted due to above litigation and after expiry of the last contract the mining operations was allowed in district Faridabad (as well as in other part of the state) for the period of up to 28.02.2010 without environmental clearance as per orders of Hon'ble High Court.
- (xii) However, the order dated 15.05.2009 of Hon'ble High Court relating to preparation of EIA report by the State Government was not acceptable to the MoEF, CC, GoI. The MoEF was of the view that state being regulating agency can not prepare the said report at its own. Therefore, the applications submitted by State of Haryana for approval of ToR were not considered.
- (xiii) The MoEF initially filed a Review Application before the Hon'ble High Court and thereafter SLP before the Hon'ble Supreme Court. During the pendency of said matter the state of Haryana neither could take further action relating to preparation of EIA report nor could auctioned its minor mineral areas for grant of mineral concessions subject to condition that Environmental Clearance shall be obtained by



## **Description of formations**

Description of formations found in the area is as under:

*Soil/ alluvium: The finer sediments have been deposited in the flood plains of the River Yamuna.*

### **6.1 Sand**

Sediments of less than 1-3 mm size are predominantly deposited in the riverbed by flood waters during rainy season. There is no perfect classification between Sand and Silt. They have been deposited in a mixed state. As usual the larger size sediments are deposited at the bottom and the smaller sizes are deposited at the top, on the edges/flanks of the riverbed.

However, during the course of shifting of the river course towards East about five hundred years back, silt was deposited on top in thicker layers up to 3 meters in some cases underlain by about 6-15 meters of sand.

*Sediments of various sizes and in mixed form are predominantly deposited in the river bed and there is no perfect classification between sediments. These may be called as coarse sand, medium sand and fine sand. The term sand is used to denote an aggregate of mineral or rock grains greater than 1/16mm and less than 2 mm in diameter.*

*Most sand is made of quartz or its microcrystalline cousin chalcedony, because that common mineral is resistant to weathering. The farther from its source rock sand is, the closer it is to impure quartz. But Yamuna sands contain quartz grains, tiny bits of rock (lithics), or dark minerals like limestone and ferruginous concretions.*

*The size of the sediments is variable. The grains whether small or large are rounded in shape. Sand is grey, brown in color, coarse to fine grained. The present deposits are of good quality and can be used for building industries. There is no other use of this material.*

### **6.2 Origin and control of mineralization (annual replenishment of mineral in river bed area vis-a-vis sedimentation)**

*Yamuna basin is bordered by river Yamuna from Yamunsnagar to Delhi and National Highway*



No. 1 from Nilokheri to Delhi. Between Nilokheri and Delhi the National Highway No. 1 is aligned on the levee of River Yamuna and acts as water divide between the ancient River Saraswati and Yamuna. The Riverine action deposited several meter thick sand layers in the riverbed. Slow shifting of river Yamuna towards east left behind several meter deep sand deposits, which was subsequently covered by alluvium consisting sand, silt and clay to form topsoil. The Yamuna basin measuring around 1700 sq km is estimated to have 300 billion cu m of sand deposits in the basin.

River sediment is transported based on the strength of the flow that carries it and its own size, volume, density, and shape. Stronger flows will increase the lift and drag on the particle, causing it to rise, while larger or denser particles will be more likely to fall through the flow. Rivers and streams carry sediment in their flows. This sediment can be in a variety of locations within the flow, depending on the balance between the upwards velocity on the particle (drag and lift forces), and the settling velocity of the particle

If the upwards velocity is approximately equal to the settling velocity, sediment will be transported downstream entirely as suspended load. If the upwards velocity is much less than the settling velocity, but still high enough for the sediment to move (see Initiation of motion), it will move along the bed as bed load by rolling, sliding, and saltating (jumping up into the flow, being transported a short distance then settling again). If the upwards velocity is higher than the settling velocity, the sediment will be transported high in the flow as wash load.

**Sedimentation**, in the geological sciences, is a process of deposition of a solid material from a state of suspension or solution in a fluid (usually air or water). Broadly defined it also includes deposits from glacial ice and those materials collected under the impetus of gravity alone, as in talus deposits.

or accumulations of rock debris at the base of cliffs. The term is commonly used as a synonym for sedimentary petrology and sedimentology. Sedimentation is generally considered by geologists in terms of the textures, structures, and fossil content of the deposits lay down in different geographic and geomorphic environments. The factors which affects the "Computation of Sediment":

a) Geomorphology & Drainage Pattern: The following geomorphic units plays important role:



- Structural Plain
- Structural Hill
- Structural Ridge
- Denudation Ridge & Valley
- Plain & Plateau of Gangetic plain
- Highly Dissected pediment
- Un dissected pediment

b) Distribution of Basin Area River wise (Area in Sq. Km or Sq. Miles)

c) Drainage System/Pattern of the area (Drainage Density = Km/Sq. Km of Yamuna River

d) Rainfall & Climate: Year wise Rainfall data for previous 10 years of Yamuna Basin/River

e) As per Dandy & Bolton study "Sediment Yield" can be related to

- i) Catchment Area and
- ii) Mean Annual Run-off

Sand is an essential minor mineral used extensively across the country as a useful construction constituent and variety of other uses in sports, agriculture, glass making (a form of sand with high silica content) etc. It is common knowledge that minerals are non-renewable but this form of mineral naturally gets replenished from time to time in a given river system and is very much interrelated to the hydrological cycle in a river basin.

Sand mining has become a widely spread activity and does not require a huge set up or technology, the number of ventures has increased extensively and it has become a foolproof industry in itself but the backward-forward linkages are becoming stronger as many are getting employed as well as the construction activity / industry requires this mineral at consistent rates. In the state of Punjab, sand has been declared as an essential commodity so as to control its extraction and sale price. Andhra Pradesh on the hand is heading towards a lottery system. Riverine environmental systems are unique in them selves and provide environmental services, natural resources to meet variety of needs of urban and rural communities. The Rivers originating from the Himalayas bring with them lots of aggregate materials whereas as they move downstream, only finer elements / minerals like sand are found in abundance. River Yamuna near Dak pather barrage leaves Uttarakhnad and enters Himachal Pradesh.

The YAMUNA RIVER is the biggest tributary of the river Ganga in North India. Its source in the Yamunotry glacier at an elevation of 6387 mtrs on South western sides of Banderpooch

crests in the lower Himalayan ranges. The overall span of the Yamuna river is 1376 Kms (855 miles) with catchment area of 366223 square km (141,399 square mile). This encompasses 40.2 % of the whole Ganga valley, prior to joining Ganga at Triveni Sangam in Allahabad (UP) Itinerary of Yamuna River:

The river passes through many states such as Utrakhand, UP, Haryana, going across to HP and then Delhi. With yearly discharge of around 10,000 cubic billion meters (cbm) and consumption of 4400 cbm (of which irrigation comprises 96), the river represents above 70 of water provision of Delhi. Yamuna water are fairly good quality for its entire span from Yamunotri in Himalayan ranges to Wazirabad in Delhi, the length of which is around 375 Kms.

Itinerary of Drainage area of Yamuna:

The origin of Yamuna is situated in the Yamunotri glacier at an elevation of 6387 mtrs on SE sides of Banderpooch crests, which are located in the Mussoorie range of lower Himalayan range in Utrakashi district of Utrakhand, to the North of Haridwar. From this place Yamuna runs to South around 200 Kms across the Shivalik mountain ranges and lower Himalayan ranges. A significant portion of its beginning of Drainage basin (with total area of 2320 square km) is situated in HP and a major tributary sapping the upper drainage basin in the Tons, which is also biggest and most extensive tributary of the Yamuna. Other tributaries in the area are the Rishi Ganga, Giri, Hanuman Ganga, Kunta & Bata, which sap the upper drainage basin of the huge Yamuna river. Subsequently, the river moves down the terrains of Doon basin at Oak Pathar close to Dehradun, in this place water is redirected into a channel for the purpose of electricity generation. Once it goes across the sikh religious place of Ponta Sahib, the river arrives at Mamdubas village near Hathnikund in the YAMUNANAGAR district of Haryana where a Barrage is being constructed. This Barrage/dam is the origin of the two major channels or water courses - Eastern Yamuna Canal and Western Yamuna Canal and both drain in UP & Haryana. The Western Yamuna Canal (WYC) traverses Kamal, Yamunanagar and Panipat prior to arriving at the Halderpur water treatment plant, which provides a portion of municipal water provisions of Delhi. The Yamuna also forms natural boundary between the states of Utrakhand & HP and also amid the states of UP and Haryana. Together with the Ganga to which it flows almost parallel once it meets the Indo-Gangetic plateau, the biggest Alluvial productive area in the World, it forms the Ganges-Yamuna Doad are stretched across 69,000 square Km which



is 33% of the whole area. Table of Drainage Basin area of River Yamuna (square KM/square mile)

with of Drainage Basin

1	HP	5799/2240 (1.6)
2	UP & Uttrakhand	74208/28662 (21.50)
3	Rajasthan	102883/39739 (29.80)
4	Haryana	21265/8214(6.5)
5	Delhi	1485/574(0.4)
6	MP	14023/5416 (40.6)

The closest mountain system in all these places is the Shivaliks i.e. Outer Himalayan region where the sub-mountainous regions begin and eventually expand into plains. As the river flows further down, the reach or its active floodplains increase

**Dandy & Bolton formula for calculation of Sediment Yield:**

Dandy bolton formula is often used to check whether the sedimentation yield exceeds the replenishment rate but the whole question is whether there is adequate monitoring of the river basin, the answer is no as hydrological stations are sparsely spread. The formula uses catchment area and mean annual runoff as key determinants to give a yield value. It does not differentiate in basin wide smaller streams and their characteristics. EWE distinguishes river basins as classified and non-classified, as per the latest hydrological data for unclassified River basins; there are 122 GDSW (Gauge, Discharge, Sediment & Water Quality) sites in 12 such basins, the number was 147 in 2005. This brings in context the whole issue of scientific mining, thereby indicating that the monitoring of sediment yield in rivers / streams within the river basin is essential to arrive at extraction rates and express and conduct environmental studies based on these basin wide characteristics which should become part of the Terms of Reference' Sediment Yield versus Drainage Area

Dandy and Bolton studied sedimentation data from about 1500 reservoirs, ponds, and sediment detention basins. In developing their formulas, they used data from about 800 of these reservoirs with drainage areas greater than or equal to 1 mi<sup>2</sup>. The smaller watersheds- those of drainage area less than 1 mi<sup>2</sup>-were excluded because of their large variability of sediments yield, reflecting the diverse effects of soils, local terrain, vegetation, land use, and

agricultural practices.

For drainage areas between 1 and 30,000 mi<sup>2</sup>, Dandy and Bolton found that the annual sediment yield per unit area was inversely related to the 0.16 power of the drainage area: In which  $S =$  sediment yield in tons per square mile per year,  $SR =$  Reference sediment yield corresponding to a 1-mi<sup>2</sup> drainage area, equal to 1645 tons per year,  $A =$  drainage area in square miles; and  $AR =$  reference drainage area (1 mi<sup>2</sup>)

#### Sediments Yield versus Mean Annual Runoff

Dandy and Bolton studied sedimentation data from 505 reservoirs having mean annual runoff data. Annual sediment yield per unit area was shown to increase sharply as mean annual runoff  $Q$  increased from 0 to 2 inches. Thereafter, for mean annual runoff from 2 to 50 inches, annual sediment yield per unit area decreased exponentially. This led to the following equations.

For  $Q \leq 2$  in.:

For  $Q > 2$  in.:

In which  $OR =$  reference mean annual runoff  $OR = 2$  in.

Dandy and Bolton combined above equations into a set of equations to express sediment yield in terms of drainage area and mean annual runoff ( $Q$ ).

For  $Q < 2$  in.:

For  $Q > 2$  in.:

#### **Sediment Productions/yield.**

For  $S = 1645$  tons/mi<sup>2</sup>/y,  $Q = 2$  in., and  $A = 1$  mi<sup>2</sup>, reduces to the followings:

For  $Q < 2$  in.:  $S = 1280 Q^{0.46}(1.43 - 0.26 \log A)$

For  $Q > 2$  in.:  $S = 1985e^{-0.055Q}(1.43 - 0.26 \log A)$

Above equations are based on average values of grouped data; therefore, they should be used with caution. In Certain cases, local factors such as soils, geology, topography, land use, and vegetation may have greater influence on sediment yield than either mean annual runoff or drainage area. Nevertheless, these equations provide a first approximation to be regional assessment of sediment yield for watershed planning purposes.

#### **Calculation of Sediment Yield for Sand Mines of Palwal-**

- Area under riverbed: 9 square KM.



- Drainage basin area of river Yamuna in Haryana : 21265 square kilometers
  - Average Annual Runoff from Yamuna Nagar to Palwal district: 140.50 mm  
(the data used for runoff calculation is of the year 2004-2008 of district Yamunanagar, Karnal, Panipat, Sonapat, Faridabad and 25% is being taken as runoff)
- With above inputs, the calculation of the sediment yield by the Dandy and Bolton formula is illustrated below.

#### Formulas

For  $Q < 2$ :

$$S = 1280 Q^{0.46} [1.43 - 0.26 \log(A)]$$

For  $Q \geq 2$ :

$$S = 1165 e^{-0.0714Q} [1.43 - 0.26 \log(A)]$$

[ Q (mm), A (km<sup>2</sup>), Y (tons/km<sup>2</sup>/yr) ]

#### Reference

Ponce, V. M., 1989. Engineering Hydrology, Principles and Practices, Prentice Hall, pages 547-548.

With above formula the value of S = 209.39 T/ square KM / annum

Therefore the Total Sediment Yield per annum for drainage basin of 21265 square kilometers will be = 21265 x 209.39 = 44,52,678 T per annum.

Dandy & Bolton formula also says that actual sediments yield from individual drainage basins may vary 10-fold or even 100 fold from computed yields. Since itinerary of river Yamuna indicates that its basin comprises of sediment rocks with good average rainfall and high drainage density therefore there are fair chances of yield of sediments to be 50 fold of computed results hence Annual Sediment Yield will be : 44,52,678 T x 50 fold = 22,26,33,900 T / Annum. Even if calculated on lower side of 10 folds then also the Annual Sediment Yield will be 44,52,678 x 10 = 4,45,26,780 T / Annum.

The equations express the general relationships between sediment yield runoff and drainage area. They may provide a quick rough approximation of mean sediment yields on a regional basis for preliminary watershed planning. Because Dandy & Bolton have derived the equation from average values computed sediment yields normally would be low for highly erosive area and high for well stabilized drainage basins with high plant density. Factors which have direct bearing on sediments yield & limitations of Dandy & Bolton equation.

Sediment yield of a sediment basin has direct impact of local terrain, climate, vegetation, soils,

agricultural practices & land use pattern of catchment area of the sediment basin aforesaid factors varies from basin to basin therefore, Dandy & Bolton has category stated that use of the equation to predict sediment yield for a specific location would be unwise because of the wide variability caused by local factors not considered in the equation development. Actual sediment yield from individual drainage basins may vary 10-fold or even 100-fold from computed yields.

The sediments are river borne and are the product of sedimentary process. The entire river bed is having ample quantity of sediments. The size of the sediments depends upon the velocity of flow of water in the river.

River sediment are transported based on the strength of the flow that carries it and its own size, volume, density, and shape. Stronger flows will increase the lift and drag on the particle, causing it to rise, while larger or denser particles will be more likely to fall through the flow. Rivers and streams carry sediment in their flows. This sediment can be in a variety of locations within the flow, depending on the balance between the upwards velocity on the particle (drag and lift forces), and the settling velocity of the particle

If the upwards velocity is approximately equal to the settling velocity, sediment will be transported downstream entirely as suspended load. If the upwards velocity is much less than the settling velocity, but still high enough for the sediment to move (see Initiation of motion), it will move along the bed as bed load by rolling, sliding, and saltating (jumping up into the flow, being transported a short distance then settling again). If the upwards velocity is higher than the settling velocity, the sediment will be transported high in the flow as wash load.

## **7 General Profile of the District**

As regards to the profile of the district is concerned on the western edge of the district there are varieties of formations of Delhi Super Group ranging from 200 at bottom and 315 at top. On the eastern edge of the district is river Yamuna

## **8 Land Utilization Pattern in the district:**

Forest, Agriculture, Horticulture, Mining etc. In district Palwal, part area is under Agriculture and Horticulture, part area is for mining and few part of land is also forest.

## **9 Physiography of the District;**

### **9.1 Physiography, Hydrogeology, Drainage and Climate**

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

The Yamuna river flows from N to S direction. The alluvial ground surface area over lying sand some distance away from the riverbed is under cultivation. It is believed that in the past, the River Yamuna used to flow closer to the present GT road which has now moved about 5-15 kms towards east.

## 9.2 Hydrogeology

Ground water occurs in alluvium and the underlying weathered/ fractured quartzite. Alluvium comprises sands silt, kankar and gravel which form the principal ground water bearing horizon. In Quartzite formation, occupying the north- western part of the district, ground water occurs in weathered and jointed fractured horizons. Weathering and fracturing has resulted in format ion of semi-consolidated sand beds (BADARPUR SANDS) which form potential aquifer zones. In alluvium, granular zones are evenly distributed in entire thickness which is negligible near the quartzite outcrops to over 350 m in the eastern parts near Yamuna River. The discharge of the wells ranges from 750 lpm to 900 lpm at a drawdown of 5.5 to 7.00m. The transmissivity 'T' value ranges between 55 to 200 m<sup>2</sup>/day was determined. Shallow tube wells for irrigation use are generally constructed upto a depth of 40 m. The discharge of these shallow tubewells range 360 -600 litres per minutes. The depth to water level ranges from 2.00 m bgl to 10.75 m bgl during pre-monsoon period (Plate1), and m. bgl village. 2 to 9.40 m. bgl. during post monsoon period (Plate 2). The water level trend during pre-monsoon period indicates average fall of 0.20m/year. The long term water level trend is show small decline and other places rise in district.

## 10 Rainfall:



ENVIRONMENT STATISTICS (CLIMATE)  
 Monthly Normal Rainfall by Districts Average of 5 years (2004-2008)

No. 4.2

District	Monthly					(Millimetres)
	January	February	March	April	May	
1	2	3	4	5	6	
Ambala	28.00					
Panchkula		51.00				
Yamunanagar	30.06	48.40	46.50	12.30	47.70	
Kurukshetra	28.36	41.56	56.40	2.80	24.60	
Kaithal	17.40	24.90	32.68	18.56	33.79	
Karnal	7.48	19.48	21.19	4.80	24.90	
Paripat	16.60	34.99	23.12	5.64	29.26	
Sonapat	13.60	16.00	18.50	6.10	29.80	
Rohluk	10.80	17.80	22.00	3.20	17.20	
Jhajjar	3.40	12.80	19.60	4.70	38.90	
Faridabad	3.44	17.48	16.70	6.40	27.20	
Gurgaon	4.64	15.84	21.24	6.60	38.82	
Mewat	1.72	24.56	10.96	8.06	30.04	
Rewari	0.0	16.32	24.32	2.04	34.52	
Mehendragarh	2.64	23.24	7.20	1.00	21.24	
Bhiwari	4.68	21.86	22.04	3.64	31.38	
Jind	3.20	18.66	14.30	6.66	26.82	
Hisar	10.74	32.86	18.72	8.44	35.24	
Fatehabad	6.76	15.90	27.94	5.06	43.34	
Sirsa	7.50	16.16	15.88	6.16	22.22	
Sisra	2.80	14.60	17.88	10.10	23.36	
			16.50	3.30	11.10	



**ENVIRONMENT STATISTICS (CLIMATE)**

Monthly Normal Rainfall by District Average of 5 years (2004-2008)

No. 4.2 (Contd.)

(Millimetres)

District	Monthly								Annual Total
	June	July	August	September	October	November	December		
1	2	3	4	5	6	7	8	9	
Ahmednagar	152.10	255.00	271.00	194.50	32.50	1.20	1.50	1004.00	
Bhandara	78.40	200.40	209.00	112.24	22.40	0.00	1.20	613.90	
Yashwantrao Chavan	150.00	234.00	171.00	31.40	10.70	1.20	4.00	512.20	
Khandwa	86.00	92.50	35.70	45.10	0.00	0.00	1.10	255.50	
Wardha	30.74	36.10	104.00	107.50	2.54	0.00	0.00	480.28	
Normal	25.70	30.12	100.50	90.40	12.50	1.00	0.00	442.50	
Pune	32.00	100.00	110.00	22.40	0.20	1.40	0.20	466.20	
Solapur	7.40	20.00	140.00	17.00	21.40	0.00	0.20	165.72	
Yashwantrao Chavan	90.40	80.50	110.00	31.40	10.00	2.00	2.40	426.70	
Wardha	10.00	17.20	110.00	80.00	7.40	0.0	0.00	404.60	
Yashwantrao Chavan	40.00	102.10	150.70	30.00	20.00	0.40	0.00	443.20	
Yashwantrao Chavan	31.20	36.20	102.20	80.00	20.00	0.40	2.04	451.00	
Wardha	47.20	11.00	21.00	14.20	0.0	0.00	0.00	193.40	
Wardha	7.20	10.20	100.00	80.00	2.00	0.00	0.20	191.60	
Yashwantrao Chavan	100.00	80.00	70.00	80.00	0.00	2.00	0.20	332.20	
Wardha	20.00	80.00	110.00	30.00	10.00	1.00	0.70	401.70	
Wardha	30.74	30.00	110.00	100.00	10.00	1.00	0.70	401.70	
Wardha	52.10	30.00	21.00	10.00	2.00	1.00	1.00	117.10	
Wardha	20.00	30.40	10.00	10.00	1.00	0.00	1.40	71.80	
Wardha	17.20	40.00	30.00	27.00	2.00	1.00	1.50	200.70	

Source: Director of Land Records, Maharashtra.

**11 Geology and Mineral Wealth**

**11.1 Regional Geology**

The regional geology of Dist. Faridkot & Patiala (Haryana) is represented by varieties of formations belonging to Delhi Super Group. Stratigraphically the rock formations of Delhi super group are composed of arenaceous, argillaceous & calcareous sediments. These sediments have been placed by Heem (1923) in the Alwar & Ajaygarh series of Delhi system & intruded by basic granitic rocks.

The general succession of Delhi system can be represented as follows: (Das, Gupta S.P. 1968)

Series	Rock Types
Recent intrusives	Alluvium, fine sand, soil,ankerite, chert, quartz veins, younger basic dykes, Granites, Pegmatites.



**12. Drainage system with description of main rivers**

S. No.	Name of the river	Area drained (Sq. Km)	% Area drained
1	Yamuna River (1376 km)	21265	6.5

**13. Salient Feature of Important Rivers and Streams:**

S. No.	Name of the River or Stream	Total Length in the District (in Km)	Place of origin	Altitude at Origin
1	River Yamuna	38.50	Yamnotri	3291 mts Or 10797 feet

**14. Methodology adopted for calculation of Mineral Potential**

Portion of the River or Stream Recommended for Mineral Concession	Length of area recommended for mineral concession (in kilometer)	Average width of area recommended for mineral concession (in meters)	Area recommended for mineral concession (in square meter)	Mineable mineral potential (in metric tonne) (60% of total mineral potential)
35 km	35	290 meters	1,01,50,000 Sqm	2,74,05,000 MT

**15. Present Status of mining**

**16. Mineral Potential**

Sand (MT) min.	Total Mineable Mineral Potential (MT)
2,74,05,000	2,74,05,000
Annual Deposition	
4,45,26,780	4,45,26,780

**Recommendation:**

From the above, it is clear that about 2,74,05,000 MT of mineral is available up to depth of three meters in the river bed of Yamuna River in Faridabad District. The annual deposition is 4,45,26,780 MT. Hence, 2,74,05,000/- MT of mineral can be safely removed and disposed off every year.

Further, if any new area with mineral deposit is available in future, inadvertently left out or received under any scheme of the Government from neighboring state then the same will also be part of the mineral concession.





**ANNEXURES – 1.6**  
**TERMS OF**  
**REFERENCE ISSUED**  
**BY SEIAA, MP**



**File No.SEIAA/HR/2023/439**

Government of India  
State Level Environment Impact Assessment Authority  
Haryana

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To,

M/s MINERIO MINING PRIVATE LIMITED  
FIRST FLOOR, MCD NO-1A, BHOGAL, SAMMAN BAZAR ROAD, NEW DELHI,  
South East-110014  
Haryana

**Tel.No.-; Email: [miningminerio@gmail.com](mailto:miningminerio@gmail.com)**

**Sub. Terms of Reference to the Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana., FIRST FLOOR, MCD NO-1A, BHOGAL, SAMMAN BAZAR ROAD, NEW DELHI**

Dear Sir/Madam,

This has reference to the proposal submitted in the Ministry of Environment, Forest and Climate Change to prescribe the Terms of Reference (TOR) for undertaking detailed EIA study for the purpose of obtaining Environmental Clearance in accordance with the provisions of the EIA Notification, 2006. For this purpose, the proponent had submitted online information in the prescribed format (Form-1 ) along with a Pre-feasibility Report. The details of the proposal are given below:

- 1. Proposal No.:** SIA/HR/MIN/450653/2023
- 2. Name of the Proposal:** Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajapur Khadar, Tehsil & District Palwal and State Haryana.
- 3. Category of the Proposal:** Non-Coal Mining
- 4. Project/Activity applied for:** 1(a) Mining of minerals
- 5. Date of submission for TOR:** 15 Nov 2023

Date : 23-11-2023

Sh. Pardeep Kumar, IAS  
( Member Secretary )

Office : **Bays No. 55-58, 1st Floor, Prayatan Bhawan, Sector-2, Panchkula, Haryana**

Phone No : Mobile : **9812844250**

Email id : [seiaa-21.env@hry.gov.in](mailto:seiaa-21.env@hry.gov.in)

**Note :** This is auto tor granted letter.

In this regard, under the provisions of the EIA Notification 2006 as amended, the Standard TOR for the purpose of preparing environment impact assessment report and environment management plan for obtaining prior environment clearance is prescribed with public consultation as follows:



## **STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE**

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Terms of Reference (TOR) for preparation of Environmental Impact Assessment (EIA) and Environmental Management Plan (EMP) for "Mining of Minerals" as per the EIA Notification, 2006 has been devised to improve the quality of the reports and facilitate decision-making transparent and easy. TOR will help the project proponents to prepare report with relevant project specific data and easily interpretable information. TOR for mining of minerals is expected to cover all environmental related features.

Mining of minerals plays a positive role in the process of country's economic development. In addition to the contribution towards economic growth, mining can also be a major source of degradation of physical as well as social environment, unless it is properly managed. Environmental impacts can arise during all activities of the mining process. Minimizing the damage due to mining operations depends on sound environmental practices in a framework of balanced environmental legislation. The potential adverse effects of mining activities include air pollution, surface and groundwater pollution, noise and vibration, damage to local ecology, natural topography and drainage, depletion of water resources etc. All these environmental components are required to be considered while selecting a proper methodology of mining, mitigation measures to reduce pollution load, conservation of natural resources etc.

The projects of mining of minerals as stated in the schedule require prior environment clearance under the EIA notification, 2006. Category 'A' Projects are handled in the MoEF&CC and Category 'B' projects are being handled by the respective State Environment Impact Assessment Authorities (SEIAAs) notified by MoEF&CC and following the procedure prescribed under the EIA Notification, 2006. As per this Notification, as amended, the projects of mining of minor minerals with mining lease area equal to or greater than 50 hectare are to be handled at the level of the MoEF&CC for grant of EC. Such projects with mining lease area less than 50 hectare are to be handled by the respective State Environment Impact Assessment Authority (SEIAA).

### **1(a):STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR NON-COAL MINING PROJECTS AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT**

- 1) Year-wise production details since 1994 should be given, clearly stating the highest production achieved in any one year prior to 1994. It may also be categorically informed whether there had been any increase in production after the EIA Notification 1994 came into force, w.r.t. the highest production achieved prior to 1994.
- 2) A copy of the document in support of the fact that the Proponent is the rightful lessee of the mine should be given.
- 3) All documents including approved mine plan, EIA and Public Hearing should be compatible with one another in terms of the mine lease area, production levels, waste generation and its management, mining technology etc. and should be in the name of the lessee.
- 4) All corner coordinates of the mine lease area, superimposed on a High Resolution Imagery/ toposheet, topographic sheet, geomorphology and geology of the areashould be provided. Such an Imagery of

## **STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE**

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the proposed area should clearly show the land use and other ecological features of the study area (core and buffer zone).

- 5) Information should be provided in Survey of India Toposheet in 1:50,000 scale indicating geological map of the area, geomorphology of land forms of the area, existing minerals and mining history of the area, important water bodies, streams and rivers and soil characteristics.
- 6) Details about the land proposed for mining activities should be given with information as to whether mining conforms to the land use policy of the State; land diversion for mining should have approval from State land use board or the concerned authority.
- 7) It should be clearly stated whether the proponent Company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be spelt out in the EIA Report with description of the prescribed operating process/procedures to bring into focus any infringement/deviation/violation of the environmental or forest norms/ conditions? The hierarchical system or administrative order of the Company to deal with the environmental issues and for ensuring compliance with the EC conditions may also be given. The system of reporting of non-compliances / violations of environmental norms to the Board of Directors of the Company and/or shareholders or stakeholders at large, may also be detailed in the EIA Report.
- 8) Issues relating to Mine Safety, including subsidence study in case of underground mining and slope study in case of open cast mining, blasting study etc. should be detailed. The proposed safeguard measures in each case should also be provided.
- 9) The study area will comprise of 10 km zone around the mine lease from lease periphery and the data contained in the EIA such as waste generation etc. should be for the life of the mine / lease period.
- 10) Land use of the study area delineating forest area, agricultural land, grazing land, wildlife sanctuary, national park, migratory routes of fauna, water bodies, human settlements and other ecological features should be indicated. Land use plan of the mine lease area should be prepared to encompass preoperational, operational and post operational phases and submitted. Impact, if any, of change of land use should be given.
- 11) Details of the land for any Over Burden Dumps outside the mine lease, such as extent of land area, distance from mine lease, its land use, R&R issues, if any, should be given.
- 12) A Certificate from the Competent Authority in the State Forest Department should be provided, confirming the involvement of forest land, if any, in the project area. In the event of any contrary claim by the Project Proponent regarding the status of forests, the site may be inspected by the State Forest Department along with the Regional Office of the Ministry to ascertain the status of forests, based on which, the Certificate in this regard as mentioned above be issued. In all such cases, it would be desirable for representative of the State Forest Department to assist the Expert Appraisal Committees.
- 13) Status of forestry clearance for the broken up area and virgin forestland involved in the Project including deposition of net present value (NPV) and compensatory afforestation (CA) should be indicated. A copy of the forestry clearance should also be furnished.

## **STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE**

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- 14) Implementation status of recognition of forest rights under the Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 should be indicated.
- 15) The vegetation in the RF / PF areas in the study area, with necessary details, should be given.
- 16) A study shall be got done to ascertain the impact of the Mining Project on wildlife of the study area and details furnished. Impact of the project on the wildlife in the surrounding and any other protected area and accordingly, detailed mitigative measures required, should be worked out with cost implications and submitted.
- 17) Location of National Parks, Sanctuaries, Biosphere Reserves, Wildlife Corridors, Ramsar site Tiger/ Elephant Reserves/(existing as well as proposed), if any, within 10 km of the mine lease should be clearly indicated, supported by a location map duly authenticated by Chief Wildlife Warden. Necessary clearance, as may be applicable to such projects due to proximity of the ecologically sensitive areas as mentioned above, should be obtained from the Standing Committee of National Board of Wildlife and copy furnished.
- 18) A detailed biological study of the study area [core zone and buffer zone (10 km radius of the periphery of the mine lease)] shall be carried out. Details of flora and fauna, endangered, endemic and RET Species duly authenticated, separately for core and buffer zone should be furnished based on such primary field survey, clearly indicating the Schedule of the fauna present. In case of any scheduled-I fauna found in the study area, the necessary plan alongwith budgetary provisions for their conservation should be prepared in consultation with State Forest and Wildlife Department and details furnished. Necessary allocation of funds for implementing the same should be made as part of the project cost.
- 19) Proximity to Areas declared as 'Critically Polluted' or the Project areas likely to come under the 'Aravali Range', (attracting court restrictions for mining operations), should also be indicated and where so required, clearance certifications from the prescribed Authorities, such as the SPCB or State Mining Dept. Should be secured and furnished to the effect that the proposed mining activities could be considered.
- 20) Similarly, for coastal Projects, A CRZ map duly authenticated by one of the authorized agencies demarcating LTL, HTL, CRZ area, location of the mine lease w.r.t CRZ, coastal features such as mangroves, if any, should be furnished. (Note: The Mining Projects falling under CRZ would also need to obtain approval of the concerned Coastal Zone Management Authority).
- 21) R&R Plan/compensation details for the Project Affected People (PAP) should be furnished. While preparing the R&R Plan, the relevant State/National Rehabilitation & Resettlement Policy should be kept in view. In respect of SCs /STs and other weaker sections of the society in the study area, a need based sample survey, family-wise, should be undertaken to assess their requirements, and action programmes prepared and submitted accordingly, integrating the sectoral programmes of line departments of the State Government. It may be clearly brought out whether the village(s) located in the mine lease area will be shifted or not. The issues relating to shifting of village(s) including their R&R and socio-economic aspects should be discussed in the Report.

## **STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE**

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- 22) One season (non-monsoon) [i.e. March-May (Summer Season); October-December (post monsoon season) ; December-February (winter season)]primary baseline data on ambient air quality as per CPCB Notification of 2009, water quality, noise level, soil and flora and fauna shall be collected and the AAQ and other data so compiled presented date-wise in the EIA and EMP Report. Site-specific meteorological data should also be collected. The location of the monitoring stations should be such as to represent whole of the study area and justified keeping in view the pre-dominant downwind direction and location of sensitive receptors. There should be at least one monitoring station within 500 m of the mine lease in the pre-dominant downwind direction. The mineralogical composition of PM10, particularly for free silica, should be given.
- 23) Air quality modeling should be carried out for prediction of impact of the project on the air quality of the area. It should also take into account the impact of movement of vehicles for transportation of mineral. The details of the model used and input parameters used for modeling should be provided. The air quality contours may be shown on a location map clearly indicating the location of the site, location of sensitive receptors, if any, and the habitation. The wind roses showing pre-dominant wind direction may also be indicated on the map.
- 24) The water requirement for the Project, its availability and source should be furnished. A detailed water balance should also be provided. Fresh water requirement for the Project should be indicated.
- 25) Necessary clearance from the Competent Authority for drawl of requisite quantity of water for the Project should be provided.
- 26) Description of water conservation measures proposed to be adopted in the Project should be given. Details of rainwater harvesting proposed in the Project, if any, should be provided.
- 27) Impact of the Project on the water quality, both surface and groundwater, should be assessed and necessary safeguard measures, if any required, should be provided.
- 28) Based on actual monitored data, it may clearly be shown whether working will intersect groundwater. Necessary data and documentation in this regard may be provided. In case the working will intersect groundwater table, a detailed Hydro Geological Study should be undertaken and Report furnished. The Report inter-alia, shall include details of the aquifers present and impact of mining activities on these aquifers. Necessary permission from Central Ground Water Authority for working below ground water and for pumping of ground water should also be obtained and copy furnished.
- 29) Details of any stream, seasonal or otherwise, passing through the lease area and modification / diversion proposed, if any, and the impact of the same on the hydrology should be brought out.
- 30) Information on site elevation, working depth, groundwater table etc. Should be provided both in AMSL and bgl. A schematic diagram may also be provided for the same.
- 31) A time bound Progressive Greenbelt Development Plan shall be prepared in a tabular form (indicating the linear and quantitative coverage, plant species and time frame) and submitted, keeping in mind, the same will have to be executed up front on commencement of the Project. Phase-wise plan of plantation and compensatory afforestation should be charted clearly indicating the area to be covered



## **STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE**

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under plantation and the species to be planted. The details of plantation already done should be given. The plant species selected for green belt should have greater ecological value and should be of good utility value to the local population with emphasis on local and native species and the species which are tolerant to pollution.

- 32) Impact on local transport infrastructure due to the Project should be indicated. Projected increase in truck traffic as a result of the Project in the present road network (including those outside the Project area) should be worked out, indicating whether it is capable of handling the incremental load. Arrangement for improving the infrastructure, if contemplated (including action to be taken by other agencies such as State Government) should be covered. Project Proponent shall conduct Impact of Transportation study as per Indian Road Congress Guidelines.
- 33) Details of the onsite shelter and facilities to be provided to the mine workers should be included in the EIA Report.
- 34) Conceptual post mining land use and Reclamation and Restoration of mined out areas (with plans and with adequate number of sections) should be given in the EIA report.
- 35) Occupational Health impacts of the Project should be anticipated and the proposed preventive measures spelt out in detail. Details of pre-placement medical examination and periodical medical examination schedules should be incorporated in the EMP. The project specific occupational health mitigation measures with required facilities proposed in the mining area may be detailed.
- 36) Public health implications of the Project and related activities for the population in the impact zone should be systematically evaluated and the proposed remedial measures should be detailed along with budgetary allocations.
- 37) Measures of socio economic significance and influence to the local community proposed to be provided by the Project Proponent should be indicated. As far as possible, quantitative dimensions may be given with time frames for implementation.
- 38) Detailed environmental management plan (EMP) to mitigate the environmental impacts which, should inter-alia include the impacts of change of land use, loss of agricultural and grazing land, if any, occupational health impacts besides other impacts specific to the proposed Project.
- 39) Public Hearing points raised and commitment of the Project Proponent on the same along with time bound Action Plan with budgetary provisions to implement the same should be provided and also incorporated in the final EIA/EMP Report of the Project.
- 40) Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.
- 41) The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.
- 42) A Disaster management Plan shall be prepared and included in the EIA/EMP Report.

## **STANDARD TERMS OF REFERENCE (TOR) FOR EIA/EMP REPORT FOR PROJECTS/ ACTIVITIES REQUIRING ENVIRONMENT CLEARANCE**

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- 43) Benefits of the Project if the Project is implemented should be spelt out. The benefits of the Project shall clearly indicate environmental, social, economic, employment potential, etc.
- 44) Besides the above, the below mentioned general points are also to be followed:-
- a) All documents to be properly referenced with index and continuous page numbering.
  - b) Where data are presented in the Report especially in Tables, the period in which the data were collected and the sources should be indicated.
  - c) Project Proponent shall enclose all the analysis/testing reports of water, air, soil, noise etc. using the MoEF&CC/NABL accredited laboratories. All the original analysis/testing reports should be available during appraisal of the Project.
  - d) Where the documents provided are in a language other than English, an English translation should be provided.
  - e) The Questionnaire for environmental appraisal of mining projects as devised earlier by the Ministry shall also be filled and submitted.
  - f) While preparing the EIA report, the instructions for the Proponents and instructions for the Consultants issued by MoEF vide O.M. No. J-11013/41/2006-IA.II(I) dated 4th August, 2009, which are available on the website of this Ministry, should be followed.
  - g) Changes, if any made in the basic scope and project parameters (as submitted in Form-I and the PFR for securing the TOR) should be brought to the attention of MoEF&CC with reasons for such changes and permission should be sought, as the TOR may also have to be altered. Post Public Hearing changes in structure and content of the draft EIA/EMP (other than modifications arising out of the P.H. process) will entail conducting the PH again with the revised documentation.
  - h) As per the circular no. J-11011/618/2010-IA.II(I) dated 30.5.2012, certified report of the status of compliance of the conditions stipulated in the environment clearance for the existing operations of the project, should be obtained from the Regional Office of Ministry of Environment, Forest and Climate Change, as may be applicable.
  - i) The EIA report should also include (i) surface plan of the area indicating contours of main topographic features, drainage and mining area, (ii) geological maps and sections and (iii) sections of the mine pit and external dumps, if any, clearly showing the land features of the adjoining area.

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**ANNEXURES – 3.1**  
**ON SITE (HOURLY)**  
**MICRO-**  
**METEOROLOGY DATA**





Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
10/01/23	1	22.9	66.2	0.4	1.4	135.0	SE	0.0	0.0
10/01/23	2	22.6	67.6	0.2	0.7	90.0	E	0.0	0.0
10/01/23	3	22.4	68.0	0.3	1.1	90.0	E	0.0	0.0
10/01/23	4	22.1	69.5	0.2	0.7	315.0	NW	0.0	0.0
10/01/23	5	22.5	66.2	0.2	0.7	315.0	NW	0.0	0.0
10/01/23	6	23.0	62.7	0.5	1.8	45.0	NE	0.0	0.0
10/01/23	7	24.4	61.0	0.5	1.8	315.0	NW	0.0	0.0
10/01/23	8	25.4	58.4	3.6	13.0	315.0	NW	0.0	0.0
10/01/23	9	26.2	56.5	0.5	1.8	315.0	NW	0.0	0.0
10/01/23	10	26.8	55.0	2.2	7.9	67.5	ENE	0.0	0.0
10/01/23	11	27.3	53.7	0.6	2.2	360.0	N	0.0	0.0
10/01/23	12	27.8	53.0	2.2	7.9	315.0	NW	0.0	0.0
10/01/23	13	28.6	53.0	2.2	7.9	315.0	NW	0.0	0.0
10/01/23	14	29.2	52.5	4.3	15.5	270.0	W	0.0	0.0
10/01/23	15	29.5	52.4	2.4	8.6	315.0	NW	0.0	0.0
10/01/23	16	29.7	53.6	4.2	15.1	360.0	N	0.0	0.0
10/01/23	17	28.4	56.8	4.7	16.9	157.5	SES	0.0	0.0
10/01/23	18	27.6	57.9	4.1	14.8	180.0	S	0.0	0.0
10/01/23	19	26.7	60.2	1.3	4.7	202.5	SSW	0.0	0.0
10/01/23	20	25.5	61.4	0.2	0.7	22.5	NNE	0.0	0.0
10/01/23	21	24.1	62.0	0.2	0.7	270.0	W	0.0	0.0
10/01/23	22	23.6	62.4	0.2	0.7	247.5	SWW	0.0	0.0
10/01/23	23	22.6	63.0	0.3	1.1	45.0	NE	0.0	0.0
10/01/23	24	22.2	64.0	0.4	1.4	292.5	WNW	0.0	0.0
10/02/23	1	21.7	64.5	0.3	1.1	225.0	SW	0.0	0.0
10/02/23	2	21.4	65.0	0.2	0.7	225.0	SW	0.0	0.0
10/02/23	3	21.1	66.0	0.2	0.7	90.0	E	0.0	0.0
10/02/23	4	20.7	66.5	0.5	1.8	315.0	NW	0.0	0.0
10/02/23	5	20.4	64.2	1.0	3.6	315.0	NW	0.0	0.0
10/02/23	6	22.2	63.1	1.0	3.6	90.0	E	0.0	0.0
10/02/23	7	23.4	62.4	0.5	1.8	135.0	SE	0.0	0.0
10/02/23	8	24.5	62.0	0.6	2.2	315.0	NW	0.0	0.0
10/02/23	9	25.5	61.0	0.9	3.2	45.0	NE	0.0	0.0
10/02/23	10	26.3	60.6	1.3	4.7	112.5	ESE	0.0	0.0
10/02/23	11	26.7	60.0	4.2	15.1	270.0	W	0.0	0.0
10/02/23	12	27.3	59.5	5.7	20.5	315.0	NW	0.0	0.0
10/02/23	13	27.7	60.0	5.4	19.4	315.0	NW	0.0	0.0
10/02/23	14	27.9	60.2	0.7	2.5	315.0	NW	0.0	0.0
10/02/23	15	28.2	62.0	2.2	7.9	315.0	NW	0.0	0.0
10/02/23	16	29.4	64.0	3.7	13.3	157.5	SES	0.0	0.0
10/02/23	17	30.1	63.5	2.2	7.9	180.0	S	0.0	0.0
10/02/23	18	29.0	65.3	2.3	8.3	180.0	S	0.0	0.0
10/02/23	19	27.8	65.3	0.5	1.8	202.5	SSW	0.0	0.0
10/02/23	20	26.6	69.0	0.3	1.1	210.0	SSW	0.0	0.0
10/02/23	21	25.4	67.3	0.1	0.4	22.5	NNE	0.0	0.0
10/02/23	22	24.3	63.5	0.2	0.7	22.5	NNE	0.0	0.0
10/02/23	23	23.2	64.0	0.2	0.7	247.5	SWW	0.0	0.0
10/02/23	24	23.1	66.0	0.4	1.4	247.5	SWW	0.0	0.0
10/03/23	1	22.9	64.0	0.3	1.1	45.0	NE	0.0	0.0
10/03/23	2	22.4	66.0	0.2	0.7	45.0	NE	0.0	0.0
10/03/23	3	22.1	68.0	0.6	2.2	45.0	NE	0.0	0.0
10/03/23	4	21.8	62.0	0.2	0.7	292.5	WNW	0.0	0.0
10/03/23	5	21.4	63.5	0.2	0.7	292.5	WNW	0.0	0.0
10/03/23	6	23.1	65.0	0.7	2.5	135.0	SE	0.0	0.0
10/03/23	7	24.2	62.0	0.5	1.8	90.0	E	0.0	0.0
10/03/23	8	25.1	61.7	0.7	2.5	315.0	NW	0.0	0.0
10/03/23	9	25.7	58.4	1.1	4.0	315.0	NW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
10/03/23	10	26.5	56.0	1.2	4.3	270.0	W	0.0	0.0
10/03/23	11	27.6	55.3	1.6	5.8	315.0	NW	0.0	0.0
10/03/23	12	28.2	55.0	2.3	8.3	90.0	E	0.0	0.0
10/03/23	13	29.4	58.4	2.4	8.6	315.0	NW	0.0	0.0
10/03/23	14	30.1	59.0	4.2	15.1	315.0	NW	0.0	0.0
10/03/23	15	31.1	60.0	3.7	13.3	157.5	SES	0.0	0.0
10/03/23	16	31.3	61.0	4.3	15.5	315.0	NW	0.0	0.0
10/03/23	17	30.4	62.0	4.5	16.2	45.0	NE	0.0	0.0
10/03/23	18	29.4	63.0	2.2	7.9	135.0	SE	0.0	0.0
10/03/23	19	28.3	63.5	2.2	7.9	112.5	ESE	0.0	0.0
10/03/23	20	27.9	64.0	0.2	0.7	180.0	S	0.0	0.0
10/03/23	21	26.5	65.0	0.5	1.8	202.5	SSW	0.0	0.0
10/03/23	22	25.1	64.0	0.4	1.4	22.5	NNE	0.0	0.0
10/03/23	23	24.2	66.5	0.2	0.7	22.5	NNE	0.0	0.0
10/03/23	24	23.8	66.0	0.4	1.4	90.0	E	0.0	0.0
10/04/23	1	23.4	65.0	0.4	1.4	315.0	NW	0.0	0.0
10/04/23	2	23.1	66.5	0.4	1.4	315.0	NW	0.0	0.0
10/04/23	3	22.7	67.0	0.5	1.8	315.0	NW	0.0	0.0
10/04/23	4	23.3	67.5	0.1	0.5	90.0	E	0.0	0.0
10/04/23	5	23.9	65.0	0.5	1.8	315.0	NW	0.0	0.0
10/04/23	6	24.7	63.0	0.6	2.2	315.0	NW	0.0	0.0
10/04/23	7	26.0	62.0	1.6	5.8	315.0	NW	0.0	0.0
10/04/23	8	26.7	61.5	1.8	6.5	225.0	SW	0.0	0.0
10/04/23	9	28.0	61.0	0.5	1.8	67.5	ENE	0.0	0.0
10/04/23	10	29.0	60.5	0.5	1.8	135.0	SE	0.0	0.0
10/04/23	11	30.1	60.0	2.3	8.3	360.0	N	0.0	0.0
10/04/23	12	30.6	59.5	3.7	13.3	225.0	SW	0.0	0.0
10/04/23	13	31.1	56.2	4.2	15.1	315.0	NW	0.0	0.0
10/04/23	14	32.1	53.0	1.2	4.3	225.0	SW	0.0	0.0
10/04/23	15	32.6	53.0	2.3	8.3	315.0	NW	0.0	0.0
10/04/23	16	33.1	52.4	2.1	7.6	315.0	NW	0.0	0.0
10/04/23	17	32.6	54.5	2.4	8.6	90.0	E	0.0	0.0
10/04/23	18	30.4	54.9	2.2	7.9	315.0	NW	0.0	0.0
10/04/23	19	29.1	57.3	0.6	2.2	180.0	S	0.0	0.0
10/04/23	20	27.8	58.2	0.6	2.2	202.5	SSW	0.0	0.0
10/04/23	21	26.4	61.0	0.3	1.1	210.0	SSW	0.0	0.0
10/04/23	22	25.4	62.0	0.4	1.4	22.5	NNE	0.0	0.0
10/04/23	23	24.7	63.0	0.3	1.1	22.5	NNE	0.0	0.0
10/04/23	24	24.1	65.0	0.2	0.7	247.5	SWW	0.0	0.0
10/05/23	1	23.8	66.0	0.2	0.7	247.5	SWW	0.0	0.0
10/05/23	2	23.7	67.5	0.5	1.8	45.0	NE	0.0	0.0
10/05/23	3	23.4	69.0	0.2	0.7	45.0	NE	0.0	0.0
10/05/23	4	23.2	70.5	0.5	1.8	292.5	WNW	0.0	0.0
10/05/23	5	23.2	71.0	0.1	0.4	315.0	NW	0.0	0.0
10/05/23	6	23.0	72.0	0.4	1.4	270.0	W	0.0	0.0
10/05/23	7	23.6	73.0	0.7	2.5	90.0	E	0.0	0.0
10/05/23	8	24.9	74.0	1.1	4.0	315.0	NW	0.0	0.0
10/05/23	9	25.7	73.0	2.0	7.2	270.0	W	0.0	0.0
10/05/23	10	26.2	72.5	0.5	1.8	270.0	W	0.0	0.0
10/05/23	11	26.9	71.0	1.4	5.0	67.5	ENE	0.0	0.0
10/05/23	12	27.6	67.5	2.3	8.3	315.0	NW	0.0	0.0
10/05/23	13	28.8	65.5	2.2	7.9	225.0	SW	0.0	0.0
10/05/23	14	29.6	64.0	4.2	15.1	315.0	NW	0.0	0.0
10/05/23	15	30.2	63.0	3.7	13.3	315.0	NW	0.0	0.0
10/05/23	16	30.7	61.5	2.2	7.9	90.0	E	0.0	0.0
10/05/23	17	31.1	60.5	6.0	21.6	270.0	W	0.0	0.0
10/05/23	18	31.4	64.0	7.2	25.9	45.0	NE	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
10/05/23	19	29.6	66.0	0.6	2.2	157.5	SES	0.0	0.0
10/05/23	20	28.6	65.0	0.5	1.8	180.0	S	0.0	0.0
10/05/23	21	27.3	63.5	0.4	1.4	202.5	SSW	0.0	0.0
10/05/23	22	26.3	62.0	0.2	0.7	22.5	NNE	0.0	0.0
10/05/23	23	25.3	60.5	0.4	1.4	247.5	SWW	0.0	0.0
10/05/23	24	25.2	61.0	0.2	0.7	45.0	NE	0.0	0.0
10/06/23	1	25.0	64.5	0.2	0.7	225.0	SW	0.0	0.0
10/06/23	2	24.7	67.5	0.4	1.4	225.0	SW	0.0	0.0
10/06/23	3	24.4	69.5	0.5	1.8	90.0	E	0.0	0.0
10/06/23	4	24.4	71.0	0.4	1.4	315.0	NW	0.0	0.0
10/06/23	5	24.1	69.5	0.6	2.1	315.0	NW	0.0	0.0
10/06/23	6	24.5	68.5	0.4	1.4	315.0	NW	0.0	0.0
10/06/23	7	25.6	70.5	0.8	2.8	90.0	E	0.0	0.0
10/06/23	8	27.7	71.5	2.2	7.9	90.0	E	0.0	0.0
10/06/23	9	28.9	72.0	2.5	9.0	45.0	NE	0.0	0.0
10/06/23	10	29.7	69.5	1.3	4.7	360.0	N	0.0	0.0
10/06/23	11	30.9	68.6	0.7	2.5	67.5	ENE	0.0	0.0
10/06/23	12	31.7	67.5	2.6	9.4	112.5	ESE	0.0	0.0
10/06/23	13	32.8	65.4	4.2	15.1	315.0	NW	0.0	0.0
10/06/23	14	33.9	66.0	5.7	20.5	315.0	NW	0.0	0.0
10/06/23	15	34.8	64.5	3.7	13.3	157.5	SES	0.0	0.0
10/06/23	16	35.6	63.5	2.3	8.3	180.0	S	0.0	0.0
10/06/23	17	35.7	62.5	2.2	7.9	202.5	SSW	0.0	0.0
10/06/23	18	33.3	61.0	2.1	7.6	210.0	SSW	0.0	0.0
10/06/23	19	31.2	64.0	3.7	13.3	315.0	NW	0.0	0.0
10/06/23	20	29.4	65.0	0.6	2.2	22.5	NNE	0.0	0.0
10/06/23	21	28.1	66.5	0.1	0.4	247.5	SWW	0.0	0.0
10/06/23	22	27.4	65.5	0.5	1.8	247.5	SWW	0.0	0.0
10/06/23	23	26.8	67.0	0.2	0.7	45.0	NE	0.0	0.0
10/06/23	24	26.3	68.5	0.4	1.4	45.0	NE	0.0	0.0
10/07/23	1	25.7	68.0	0.1	0.4	45.0	NE	0.0	0.0
10/07/23	2	25.3	67.5	0.2	0.7	45.0	NE	0.0	0.0
10/07/23	3	24.8	72.0	0.2	0.7	292.5	WNW	0.0	0.0
10/07/23	4	24.4	73.5	0.2	0.7	45.0	NE	0.0	0.0
10/07/23	5	23.6	74.5	0.5	1.8	225.0	SW	0.0	0.0
10/07/23	6	24.2	75.0	0.6	2.2	225.0	SW	0.0	0.0
10/07/23	7	24.8	73.0	1.2	4.2	90.0	E	0.0	0.0
10/07/23	8	25.4	71.0	1.2	4.3	90.0	E	0.0	0.0
10/07/23	9	26.7	69.0	1.1	4.0	315.0	NW	0.0	0.0
10/07/23	10	27.2	67.5	2.2	7.9	315.0	NW	0.0	0.0
10/07/23	11	27.7	66.0	2.2	7.9	270.0	W	0.0	0.0
10/07/23	12	28.2	64.5	4.4	15.8	270.0	W	0.0	0.0
10/07/23	13	28.8	63.5	3.7	13.3	315.0	NW	0.0	0.0
10/07/23	14	30.4	62.0	5.3	19.1	67.5	ENE	0.0	0.0
10/07/23	15	30.7	61.0	2.2	7.9	315.0	NW	0.0	0.0
10/07/23	16	30.2	60.5	2.2	7.9	315.0	NW	0.0	0.0
10/07/23	17	29.5	62.0	1.3	4.7	270.0	W	0.0	0.0
10/07/23	18	29.0	64.0	2.4	8.6	45.0	NE	0.0	0.0
10/07/23	19	28.9	66.0	2.1	7.6	135.0	SE	0.0	0.0
10/07/23	20	28.3	67.5	0.5	1.8	270.0	W	0.0	0.0
10/07/23	21	26.3	68.5	0.1	0.4	315.0	NW	0.0	0.0
10/07/23	22	25.8	67.0	0.5	1.8	315.0	NW	0.0	0.0
10/07/23	23	25.5	70.3	0.1	0.4	112.5	ESE	0.0	0.0
10/07/23	24	25.0	71.5	0.4	1.4	315.0	NW	0.0	0.0
10/08/23	1	24.7	72.5	0.2	0.7	157.5	SES	0.0	0.0
10/08/23	2	24.3	74.0	0.3	1.1	180.0	S	0.0	0.0
10/08/23	3	24.0	76.5	0.2	0.7	202.5	SSW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
10/08/23	4	23.7	74.5	0.6	2.2	22.5	NNE	0.0	0.0
10/08/23	5	23.5	72.0	0.5	1.8	247.5	SWW	0.0	0.0
10/08/23	6	23.0	70.0	1.2	4.3	247.5	SWW	0.0	0.0
10/08/23	7	23.5	68.5	0.5	1.8	45.0	NE	0.0	0.0
10/08/23	8	24.9	67.5	1.2	4.3	45.0	NE	0.0	0.0
10/08/23	9	25.2	66.5	1.3	4.7	292.5	WNW	0.0	0.0
10/08/23	10	26.4	65.0	2.7	9.7	292.5	WNW	0.0	0.0
10/08/23	11	26.8	63.5	1.7	6.1	225.0	SW	0.0	0.0
10/08/23	12	27.2	63.0	2.2	7.9	225.0	SW	0.0	0.0
10/08/23	13	28.8	62.0	3.7	13.3	90.0	E	0.0	0.0
10/08/23	14	28.4	61.0	2.3	8.3	270.0	W	0.0	0.0
10/08/23	15	28.6	58.5	2.4	8.6	315.0	NW	0.0	0.0
10/08/23	16	28.2	56.0	2.1	7.6	90.0	E	0.0	0.0
10/08/23	17	28.0	55.0	0.6	2.2	315.0	NW	0.0	0.0
10/08/23	18	27.5	54.0	2.4	8.6	315.0	NW	0.0	0.0
10/08/23	19	27.3	58.0	0.5	1.8	225.0	SW	0.0	0.0
10/08/23	20	27.0	61.0	0.5	1.8	112.5	ESE	0.0	0.0
10/08/23	21	26.7	62.5	0.7	2.5	67.5	ENE	0.0	0.0
10/08/23	22	25.7	64.0	0.2	0.7	315.0	NW	0.0	0.0
10/08/23	23	24.8	65.5	0.3	1.1	45.0	NE	0.0	0.0
10/08/23	24	24.4	66.0	0.4	1.4	157.5	SES	0.0	0.0
10/09/23	1	24.2	67.0	0.1	0.4	180.0	S	0.0	0.0
10/09/23	2	24.0	68.5	0.4	1.4	180.0	S	0.0	0.0
10/09/23	3	23.6	69.0	0.1	0.4	202.5	SSW	0.0	0.0
10/09/23	4	23.3	70.5	0.2	0.7	22.5	NNE	0.0	0.0
10/09/23	5	23.0	72.0	0.6	2.2	247.5	SWW	0.0	0.0
10/09/23	6	23.5	71.0	0.5	1.8	247.5	SWW	0.0	0.0
10/09/23	7	24.3	68.5	1.4	4.9	45.0	NE	0.0	0.0
10/09/23	8	25.7	67.5	0.7	2.5	315.0	NW	0.0	0.0
10/09/23	9	26.0	66.0	1.4	4.9	315.0	NW	0.0	0.0
10/09/23	10	26.7	69.0	1.4	4.9	270.0	W	0.0	0.0
10/09/23	11	27.6	70.5	1.7	6.3	270.0	W	0.0	0.0
10/09/23	12	28.5	69.0	3.6	13.0	67.5	ENE	0.0	0.0
10/09/23	13	29.2	68.5	2.2	7.9	315.0	NW	0.0	0.0
10/09/23	14	30.4	66.5	2.2	7.9	315.0	NW	0.0	0.0
10/09/23	15	30.8	65.0	2.2	7.9	225.0	SW	0.0	0.0
10/09/23	16	29.4	67.0	2.3	8.3	225.0	SW	0.0	0.0
10/09/23	17	29.0	68.5	2.2	7.9	90.0	E	0.0	0.0
10/09/23	18	28.2	70.0	2.4	8.6	315.0	NW	0.0	0.0
10/09/23	19	27.7	72.0	3.7	13.3	67.5	ENE	0.0	0.0
10/09/23	20	27.0	69.5	1.2	4.2	112.5	ESE	0.0	0.0
10/09/23	21	26.4	68.5	0.4	1.4	157.5	SES	0.0	0.0
10/09/23	22	25.1	67.5	0.5	1.8	202.5	SSW	0.0	0.0
10/09/23	23	24.8	70.5	0.4	1.4	180.0	S	0.0	0.0
10/09/23	24	24.4	71.5	0.2	0.7	22.5	NNE	0.0	0.0
10/10/23	1	24.0	72.0	0.4	1.4	22.5	NNE	0.0	0.0
10/10/23	2	23.5	69.5	0.3	1.1	247.5	SWW	0.0	0.0
10/10/23	3	23.5	68.5	0.2	0.7	247.5	SWW	0.0	0.0
10/10/23	4	23.3	69.5	0.5	1.8	45.0	NE	0.0	0.0
10/10/23	5	23.2	71.0	0.5	1.8	45.0	NE	0.0	0.0
10/10/23	6	23.7	71.5	0.7	2.5	292.5	WNW	0.0	0.0
10/10/23	7	24.1	72.0	1.2	4.3	225.0	SW	0.0	0.0
10/10/23	8	24.8	70.5	2.3	8.4	315.0	NW	0.0	0.0
10/10/23	9	25.2	69.5	1.7	6.1	90.0	E	0.0	0.0
10/10/23	10	25.6	68.0	2.2	7.9	270.0	W	0.0	0.0
10/10/23	11	27.3	67.5	0.8	2.9	315.0	NW	0.0	0.0
10/10/23	12	28.7	65.5	2.3	8.4	67.5	ENE	0.0	0.0



Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
10/10/23	13	29.4	64.0	2.3	8.4	315.0	NW	0.0	0.0
10/10/23	14	29.7	63.5	2.3	8.4	225.0	SW	0.0	0.0
10/10/23	15	30.0	61.6	3.3	11.9	315.0	NW	0.0	0.0
10/10/23	16	28.4	60.6	2.3	8.3	315.0	NW	0.0	0.0
10/10/23	17	28.0	59.5	2.2	7.9	315.0	NW	0.0	0.0
10/10/23	18	27.6	60.6	2.1	7.6	90.0	E	0.0	0.0
10/10/23	19	27.3	62.2	0.8	2.8	135.0	SE	0.0	0.0
10/10/23	20	26.8	63.0	0.2	0.7	67.5	ENE	0.0	0.0
10/10/23	21	26.4	64.5	0.5	1.8	112.5	ESE	0.0	0.0
10/10/23	22	26.1	66.0	0.2	0.7	157.5	SES	0.0	0.0
10/10/23	23	25.8	67.5	0.4	1.4	180.0	S	0.0	0.0
10/10/23	24	25.6	68.5	0.3	1.1	180.0	S	0.0	0.0
10/11/23	1	24.8	69.5	0.1	0.4	202.5	SSW	0.0	0.0
10/11/23	2	24.5	70.0	0.2	0.7	210.0	SSW	0.0	0.0
10/11/23	3	24.2	71.0	0.4	1.4	22.5	NNE	0.0	0.0
10/11/23	4	24.0	71.5	0.5	1.8	247.5	SWW	0.0	0.0
10/11/23	5	23.4	72.0	0.5	1.8	45.0	NE	0.0	0.0
10/11/23	6	23.7	72.5	0.6	2.2	45.0	NE	0.0	0.0
10/11/23	7	24.3	73.0	0.6	2.2	270.0	W	0.0	0.0
10/11/23	8	24.7	74.0	0.9	3.2	90.0	E	0.0	0.0
10/11/23	9	24.9	70.5	1.7	6.3	360.0	N	0.0	0.0
10/11/23	10	25.6	69.5	1.1	4.0	337.5	NWN	0.0	0.0
10/11/23	11	26.8	68.0	1.3	4.7	315.0	NW	0.0	0.0
10/11/23	12	27.3	67.5	2.3	8.3	315.0	NW	0.0	0.0
10/11/23	13	27.9	66.5	2.2	7.9	315.0	NW	0.0	0.0
10/11/23	14	27.5	65.0	2.2	7.9	67.5	ENE	0.0	0.0
10/11/23	15	27.2	64.5	2.2	7.9	315.0	NW	0.0	0.0
10/11/23	16	27.5	63.0	2.2	7.9	315.0	NW	0.0	0.0
10/11/23	17	27.0	62.0	3.8	13.7	315.0	NW	0.0	0.0
10/11/23	18	27.2	61.5	2.2	7.9	225.0	SW	0.0	0.0
10/11/23	19	26.7	63.0	2.2	7.9	315.0	NW	0.0	0.0
10/11/23	20	26.3	64.0	0.4	1.4	135.0	SE	0.0	0.0
10/11/23	21	26.0	65.5	0.2	0.7	225.0	SW	0.0	0.0
10/11/23	22	25.5	66.5	0.2	0.7	112.5	ESE	0.0	0.0
10/11/23	23	25.3	68.0	0.4	1.4	157.5	SES	0.0	0.0
10/11/23	24	25.1	69.0	0.5	1.8	180.0	S	0.0	0.0
10/12/23	1	24.7	70.5	0.2	0.7	180.0	S	0.0	0.0
10/12/23	2	24.3	71.0	0.4	1.4	202.5	SSW	0.0	0.0
10/12/23	3	23.7	71.5	0.3	1.1	210.0	SSW	0.0	0.0
10/12/23	4	23.6	72.0	0.5	1.8	22.5	NNE	0.0	0.0
10/12/23	5	23.3	74.0	0.7	2.5	22.5	NNE	0.0	0.0
10/12/23	6	23.2	73.0	0.5	1.8	247.5	SWW	0.0	0.0
10/12/23	7	23.8	74.0	0.8	2.9	247.5	SWW	0.0	0.0
10/12/23	8	24.3	72.5	2.3	8.4	67.5	ENE	0.0	0.0
10/12/23	9	24.9	70.5	2.3	8.3	135.0	SE	0.0	0.0
10/12/23	10	25.8	69.0	3.7	13.2	135.0	SE	0.0	0.0
10/12/23	11	26.7	68.5	1.3	4.7	315.0	NW	0.0	0.0
10/12/23	12	28.3	67.5	2.3	8.3	270.0	W	0.0	0.0
10/12/23	13	29.4	66.0	2.2	7.9	337.5	NWN	0.0	0.0
10/12/23	14	30.7	64.5	1.7	6.1	270.0	W	0.0	0.0
10/12/23	15	30.3	61.0	2.2	7.9	315.0	NW	0.0	0.0
10/12/23	16	30.0	58.5	2.2	7.9	315.0	NW	0.0	0.0
10/12/23	17	29.7	56.5	6.3	22.7	270.0	W	0.0	0.0
10/12/23	18	29.2	54.5	4.3	15.5	315.0	NW	0.0	0.0
10/12/23	19	28.0	53.0	1.4	5.0	225.0	SW	0.0	0.0
10/12/23	20	27.4	56.0	1.2	4.2	270.0	W	0.0	0.0
10/12/23	21	26.6	57.5	0.4	1.4	315.0	NW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
10/12/23	22	26.2	59.0	0.5	1.8	135.0	SE	0.0	0.0
10/12/23	23	25.8	61.5	0.4	1.4	315.0	NW	0.0	0.0
10/12/23	24	25.0	63.0	0.2	0.7	360.0	N	0.0	0.0
13/10/23	1	23.7	63.5	0.4	1.4	157.5	SES	0.0	0.0
13/10/23	2	23.1	64.5	0.2	0.7	157.5	SES	0.0	0.0
13/10/23	3	22.8	66.0	0.4	1.4	180.0	S	0.0	0.0
13/10/23	4	22.4	67.0	0.3	1.1	180.0	S	0.0	0.0
13/10/23	5	23.3	67.5	0.5	1.8	202.5	SSW	0.0	0.0
13/10/23	6	24.4	68.0	0.5	1.8	22.5	NNE	0.0	0.0
13/10/23	7	25.2	68.5	1.2	4.2	22.5	NNE	0.0	0.0
13/10/23	8	26.6	69.5	1.1	4.0	247.5	SWW	0.0	0.0
13/10/23	9	27.0	72.0	2.2	7.9	247.5	SWW	0.0	0.0
13/10/23	10	27.5	70.5	0.8	2.9	247.5	SWW	0.0	0.0
13/10/23	11	29.1	69.5	1.4	5.0	360.0	N	0.0	0.0
13/10/23	12	29.4	68.5	2.2	7.9	270.0	W	0.0	0.0
13/10/23	13	30.3	67.5	2.3	8.3	315.0	NW	0.0	0.0
13/10/23	14	30.7	69.5	5.6	20.2	112.5	ESE	0.0	0.0
13/10/23	15	31.1	71.5	3.7	13.3	315.0	NW	0.0	0.0
13/10/23	16	31.4	72.5	2.4	8.6	315.0	NW	0.0	0.0
13/10/23	17	30.7	73.4	1.9	7.0	157.5	SES	0.0	0.0
13/10/23	18	29.2	74.5	1.9	7.0	270.0	W	0.0	0.0
13/10/23	19	28.3	75.0	3.7	13.3	270.0	W	0.0	0.0
13/10/23	20	27.1	73.6	0.5	1.8	315.0	NW	0.0	0.0
13/10/23	21	25.7	72.5	0.4	1.4	360.0	N	0.0	0.0
13/10/23	22	25.3	73.5	0.2	0.7	180.0	S	0.0	0.0
13/10/23	23	24.8	74.0	0.4	1.4	202.5	SSW	0.0	0.0
13/10/23	24	24.5	73.5	0.3	1.1	45.0	NE	0.0	0.0
14/10/23	1	24.1	71.6	0.2	0.7	45.0	NE	0.0	0.0
14/10/23	2	23.4	70.6	0.4	1.4	45.0	NE	0.0	0.0
14/10/23	3	23.7	69.6	0.4	1.4	292.5	WNW	0.0	0.0
14/10/23	4	23.3	68.0	0.5	1.8	225.0	SW	0.0	0.0
14/10/23	5	23.3	71.9	0.2	0.7	270.0	W	0.0	0.0
14/10/23	6	22.4	73.5	0.5	1.8	360.0	N	0.0	0.0
14/10/23	7	22.7	72.5	0.5	1.8	315.0	NW	0.0	0.0
14/10/23	8	22.9	71.0	1.9	6.8	315.0	NW	0.0	0.0
14/10/23	9	23.5	70.5	0.6	2.2	315.0	NW	0.0	0.0
14/10/23	10	24.0	69.5	1.4	5.0	270.0	W	0.0	0.0
14/10/23	11	25.6	67.5	1.6	5.8	270.0	W	0.0	0.0
14/10/23	12	25.8	66.5	2.2	7.9	270.0	W	0.0	0.0
14/10/23	13	26.3	65.0	2.2	7.9	67.5	ENE	0.0	0.0
14/10/23	14	26.8	63.6	2.1	7.6	315.0	NW	0.0	0.0
14/10/23	15	26.9	62.5	2.7	9.7	315.0	NW	0.0	0.0
14/10/23	16	26.6	61.5	4.2	15.1	225.0	SW	0.0	0.0
14/10/23	17	26.3	60.6	3.7	13.3	112.5	ESE	0.0	0.0
14/10/23	18	26.1	62.5	4.4	15.8	315.0	NW	0.0	0.0
14/10/23	19	26.0	63.5	5.6	20.2	360.0	N	0.0	0.0
14/10/23	20	25.7	61.5	0.6	2.2	135.0	SE	0.0	0.0
14/10/23	21	25.4	60.5	0.4	1.4	315.0	NW	0.0	0.0
14/10/23	22	25.2	62.0	0.5	1.8	67.5	ENE	0.0	0.0
14/10/23	23	25.0	62.5	0.2	0.7	112.5	ESE	0.0	0.0
14/10/23	24	24.8	64.0	0.3	1.1	360.0	N	0.0	0.0
15/10/23	1	24.2	65.5	0.2	0.7	360.0	N	0.0	0.0
15/10/23	2	23.6	66.0	0.2	0.7	157.5	SES	0.0	0.0
15/10/23	3	22.1	67.4	0.4	1.4	180.0	S	0.0	0.0
15/10/23	4	21.7	68.5	0.5	1.8	180.0	S	0.0	0.0
15/10/23	5	21.3	69.0	0.5	1.8	202.5	SSW	0.0	0.0
15/10/23	6	21.7	70.5	0.4	1.4	210.0	SSW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
15/10/23	7	22.6	69.5	0.8	2.9	22.5	NNE	0.0	0.0
15/10/23	8	23.6	68.0	1.1	4.0	22.5	NNE	0.0	0.0
15/10/23	9	24.4	66.5	1.9	7.0	247.5	SWW	0.0	0.0
15/10/23	10	25.8	65.0	1.7	6.1	270.0	W	0.0	0.0
15/10/23	11	26.7	63.5	2.2	7.9	270.0	W	0.0	0.0
15/10/23	12	28.3	61.5	1.8	6.7	270.0	W	0.0	0.0
15/10/23	13	30.5	60.5	3.7	13.4	315.0	NW	0.0	0.0
15/10/23	14	30.0	59.5	2.6	9.4	315.0	NW	0.0	0.0
15/10/23	15	29.4	57.5	3.9	14.0	225.0	SW	0.0	0.0
15/10/23	16	29.0	55.8	4.2	15.1	225.0	SW	0.0	0.0
15/10/23	17	28.3	53.4	2.3	8.3	225.0	SW	0.0	0.0
15/10/23	18	28.1	54.7	0.7	2.5	337.5	NWN	0.0	0.0
15/10/23	19	27.5	55.6	1.4	5.0	315.0	NW	0.0	0.0
15/10/23	20	26.7	56.2	1.9	7.0	315.0	NW	0.0	0.0
15/10/23	21	26.3	56.8	0.5	1.8	315.0	NW	0.0	0.0
15/10/23	22	26.2	57.4	0.6	2.2	90.0	E	0.0	0.0
15/10/23	23	25.0	58.9	0.5	1.8	270.0	W	0.0	0.0
15/10/23	24	24.6	62.0	0.2	0.7	315.0	NW	0.0	0.0
16/10/23	1	24.4	64.5	0.3	1.1	315.0	NW	0.0	0.0
16/10/23	2	24.4	66.0	0.2	0.7	67.5	ENE	0.0	0.0
16/10/23	3	23.7	68.5	0.3	1.1	135.0	SE	0.0	0.0
16/10/23	4	23.3	69.0	0.4	1.4	225.0	SW	0.0	0.0
16/10/23	5	23.3	68.0	0.5	1.8	225.0	SW	0.0	0.0
16/10/23	6	23.7	66.5	0.6	2.2	135.0	SE	0.0	0.0
16/10/23	7	24.1	64.5	1.1	4.1	112.5	ESE	0.0	0.0
16/10/23	8	24.7	62.4	1.9	7.0	135.0	SE	0.0	0.0
16/10/23	9	24.9	60.2	0.5	1.8	315.0	NW	0.0	0.0
16/10/23	10	25.3	59.3	2.2	7.9	225.0	SW	0.0	0.0
16/10/23	11	26.7	58.5	2.7	9.7	157.5	SES	0.0	0.0
16/10/23	12	29.7	56.9	1.3	4.7	180.0	S	0.0	0.0
16/10/23	13	30.9	56.0	1.8	6.4	202.5	SSW	0.0	0.0
16/10/23	14	30.4	55.4	2.6	9.4	315.0	NW	0.0	0.0
16/10/23	15	30.0	54.7	2.2	7.9	247.5	SWW	0.0	0.0
16/10/23	16	29.5	53.0	4.3	15.5	270.0	W	0.0	0.0
16/10/23	17	29.2	53.8	4.0	14.4	315.0	NW	0.0	0.0
16/10/23	18	28.7	54.4	4.0	14.4	292.5	WNW	0.0	0.0
16/10/23	19	28.4	56.7	5.1	18.4	225.0	SW	0.0	0.0
16/10/23	20	28.3	57.8	1.1	4.0	270.0	W	0.0	0.0
16/10/23	21	27.0	58.3	0.5	1.8	225.0	SW	0.0	0.0
16/10/23	22	26.7	59.4	0.2	0.6	337.5	NWN	0.0	0.0
16/10/23	23	26.1	59.8	0.3	1.1	337.5	NWN	0.0	0.0
16/10/23	24	25.3	60.4	0.2	0.7	315.0	NW	0.0	0.0
17/10/23	1	24.4	61.5	0.2	0.7	315.0	NW	0.0	0.0
17/10/23	2	23.1	62.4	0.3	1.1	315.0	NW	0.0	0.0
17/10/23	3	22.7	62.7	0.2	0.6	315.0	NW	0.0	0.0
17/10/23	4	21.4	63.1	0.5	1.8	90.0	E	0.0	0.0
17/10/23	5	20.2	63.4	0.8	2.9	315.0	NW	0.0	0.0
17/10/23	6	20.7	62.8	0.5	1.8	270.0	W	0.0	0.0
17/10/23	7	21.3	62.3	1.1	4.0	135.0	SE	0.0	0.0
17/10/23	8	23.9	61.9	1.3	4.7	135.0	SE	0.0	0.0
17/10/23	9	25.7	61.7	1.8	6.4	270.0	W	0.0	0.0
17/10/23	10	27.5	60.2	0.5	1.8	360.0	N	0.0	0.0
17/10/23	11	28.3	59.3	1.9	6.8	315.0	NW	0.0	0.0
17/10/23	12	29.6	58.2	2.2	7.9	315.0	NW	0.0	0.0
17/10/23	13	30.5	56.3	2.2	7.9	112.5	ESE	0.0	0.0
17/10/23	14	30.0	54.3	2.5	9.0	225.0	SW	0.0	0.0
17/10/23	15	28.9	53.7	1.8	6.4	225.0	SW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
17/10/23	16	28.3	52.8	2.3	8.3	135.0	SE	0.0	0.0
17/10/23	17	29.0	52.4	1.9	7.0	157.5	SES	0.0	0.0
17/10/23	18	27.3	53.5	1.9	7.0	180.0	S	0.0	0.0
17/10/23	19	26.1	54.9	1.1	4.1	180.0	S	0.0	0.0
17/10/23	20	25.0	55.6	0.5	1.8	202.5	SSW	0.0	0.0
17/10/23	21	24.2	55.9	0.8	2.9	22.5	NNE	0.0	0.0
17/10/23	22	22.7	57.4	0.4	1.4	270.0	W	0.0	0.0
17/10/23	23	22.1	58.2	0.2	0.7	247.5	SWW	0.0	0.0
17/10/23	24	21.8	59.0	0.5	1.8	45.0	NE	0.0	0.0
18/10/23	1	21.2	60.0	0.2	0.7	45.0	NE	0.0	0.0
18/10/23	2	21.2	61.0	0.1	0.4	45.0	NE	0.0	0.0
18/10/23	3	20.7	62.5	0.5	1.8	45.0	NE	0.0	0.0
18/10/23	4	20.7	61.0	0.5	1.8	292.5	WNW	0.0	0.0
18/10/23	5	20.3	63.0	0.4	1.4	292.5	WNW	0.0	0.0
18/10/23	6	20.5	63.5	0.6	2.2	292.5	WNW	0.0	0.0
18/10/23	7	20.7	65.0	1.1	4.0	225.0	SW	0.0	0.0
18/10/23	8	21.4	66.0	1.9	7.0	225.0	SW	0.0	0.0
18/10/23	9	22.5	60.6	0.7	2.5	270.0	W	0.0	0.0
18/10/23	10	23.6	58.4	1.1	4.0	337.5	NWN	0.0	0.0
18/10/23	11	25.1	57.2	1.6	5.8	337.5	NWN	0.0	0.0
18/10/23	12	27.7	55.7	2.4	8.6	315.0	NW	0.0	0.0
18/10/23	13	29.4	56.4	1.6	5.8	315.0	NW	0.0	0.0
18/10/23	14	30.6	54.7	3.7	13.3	315.0	NW	0.0	0.0
18/10/23	15	30.2	53.7	2.2	7.9	315.0	NW	0.0	0.0
18/10/23	16	30.0	53.2	2.6	9.4	315.0	NW	0.0	0.0
18/10/23	17	29.6	52.8	3.6	13.0	315.0	NW	0.0	0.0
18/10/23	18	29.1	52.7	1.3	4.7	315.0	NW	0.0	0.0
18/10/23	19	28.5	53.2	2.1	7.6	315.0	NW	0.0	0.0
18/10/23	20	28.0	54.6	1.1	4.0	270.0	W	0.0	0.0
18/10/23	21	27.3	55.2	0.2	0.7	270.0	W	0.0	0.0
18/10/23	22	26.6	55.7	0.5	1.8	360.0	N	0.0	0.0
18/10/23	23	26.0	56.3	0.3	1.1	270.0	W	0.0	0.0
18/10/23	24	25.7	56.8	0.2	0.7	112.5	ESE	0.0	0.0
19/10/23	1	25.5	57.0	0.2	0.7	360.0	N	0.0	0.0
19/10/23	2	25.1	57.4	0.2	0.7	135.0	SE	0.0	0.0
19/10/23	3	25.0	57.9	0.5	1.8	315.0	NW	0.0	0.0
19/10/23	4	24.4	58.4	0.2	0.7	315.0	NW	0.0	0.0
19/10/23	5	22.1	59.2	0.7	2.5	135.0	SE	0.0	0.0
19/10/23	6	21.4	59.8	1.1	4.0	315.0	NW	0.0	0.0
19/10/23	7	21.8	58.7	1.7	6.1	135.0	SE	0.0	0.0
19/10/23	8	22.7	58.2	0.5	1.8	225.0	SW	0.0	0.0
19/10/23	9	23.3	56.3	2.2	7.9	45.0	NE	0.0	0.0
19/10/23	10	23.9	56.0	2.7	9.7	292.5	WNW	0.0	0.0
19/10/23	11	24.8	55.5	1.2	4.5	135.0	SE	0.0	0.0
19/10/23	12	26.5	54.9	0.6	2.0	360.0	N	0.0	0.0
19/10/23	13	29.4	54.5	3.7	13.3	315.0	NW	0.0	0.0
19/10/23	14	30.8	52.2	3.7	13.3	315.0	NW	0.0	0.0
19/10/23	15	29.7	51.7	2.2	7.9	210.0	SSW	0.0	0.0
19/10/23	16	29.0	53.9	2.2	7.9	247.5	SWW	0.0	0.0
19/10/23	17	28.4	55.0	1.7	6.0	247.5	SWW	0.0	0.0
19/10/23	18	27.8	57.2	1.2	4.3	270.0	W	0.0	0.0
19/10/23	19	27.5	58.8	2.4	8.6	45.0	NE	0.0	0.0
19/10/23	20	26.3	61.7	1.7	6.1	45.0	NE	0.0	0.0
19/10/23	21	25.3	62.8	0.2	0.7	45.0	NE	0.0	0.0
19/10/23	22	23.8	64.8	0.1	0.4	45.0	NE	0.0	0.0
19/10/23	23	22.8	68.3	0.6	2.2	292.5	WNW	0.0	0.0
19/10/23	24	21.4	68.0	0.4	1.4	292.5	WNW	0.0	0.0



Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
20/10/23	1	21.1	68.0	0.4	1.4	337.5	NWN	0.0	0.0
20/10/23	2	20.7	69.7	0.3	1.1	337.5	NWN	0.0	0.0
20/10/23	3	19.4	70.2	0.3	1.1	315.0	NW	0.0	0.0
20/10/23	4	19.0	69.3	0.4	1.4	90.0	E	0.0	0.0
20/10/23	5	19.3	67.3	0.5	1.8	315.0	NW	0.0	0.0
20/10/23	6	19.2	63.2	0.7	2.5	67.5	ENE	0.0	0.0
20/10/23	7	19.9	61.0	1.3	4.7	135.0	SE	0.0	0.0
20/10/23	8	21.2	60.5	1.2	4.3	135.0	SE	0.0	0.0
20/10/23	9	23.7	59.4	1.9	7.0	45.0	NE	0.0	0.0
20/10/23	10	24.9	59.1	1.7	6.0	225.0	SW	0.0	0.0
20/10/23	11	26.3	58.2	1.7	6.0	225.0	SW	0.0	0.0
20/10/23	12	28.3	57.4	2.1	7.6	135.0	SE	0.0	0.0
20/10/23	13	29.5	55.6	2.3	8.3	337.5	NWN	0.0	0.0
20/10/23	14	30.3	54.3	2.3	8.3	315.0	NW	0.0	0.0
20/10/23	15	30.8	53.9	1.9	7.0	315.0	NW	0.0	0.0
20/10/23	16	28.8	53.5	5.3	19.1	315.0	NW	0.0	0.0
20/10/23	17	28.2	53.1	3.7	13.3	315.0	NW	0.0	0.0
20/10/23	18	27.6	52.7	1.8	6.5	270.0	W	0.0	0.0
20/10/23	19	27.0	52.9	1.7	6.1	247.5	SWW	0.0	0.0
20/10/23	20	26.2	53.2	1.8	6.5	45.0	NE	0.0	0.0
20/10/23	21	25.0	53.7	0.8	2.9	45.0	NE	0.0	0.0
20/10/23	22	23.4	54.1	0.2	0.7	292.5	WNW	0.0	0.0
20/10/23	23	22.7	54.8	0.2	0.7	112.5	ESE	0.0	0.0
20/10/23	24	20.8	55.4	0.3	1.1	135.0	SE	0.0	0.0
21/10/23	1	20.1	56.9	0.4	1.4	135.0	SE	0.0	0.0
21/10/23	2	19.8	58.2	0.5	1.8	157.5	SES	0.0	0.0
21/10/23	3	19.3	59.0	0.2	0.7	180.0	S	0.0	0.0
21/10/23	4	19.0	59.6	0.4	1.4	180.0	S	0.0	0.0
21/10/23	5	19.3	61.2	0.4	1.4	202.5	SSW	0.0	0.0
21/10/23	6	19.2	61.8	0.7	2.5	210.0	SSW	0.0	0.0
21/10/23	7	20.7	61.0	1.1	4.0	22.5	NNE	0.0	0.0
21/10/23	8	22.1	60.4	0.6	2.2	247.5	SWW	0.0	0.0
21/10/23	9	23.4	59.0	1.1	4.0	45.0	NE	0.0	0.0
21/10/23	10	25.7	58.6	1.4	5.0	225.0	SW	0.0	0.0
21/10/23	11	27.3	58.3	1.3	4.7	292.5	WNW	0.0	0.0
21/10/23	12	28.7	56.7	2.2	7.9	225.0	SW	0.0	0.0
21/10/23	13	29.6	55.3	2.4	8.6	315.0	NW	0.0	0.0
21/10/23	14	30.2	54.8	2.4	8.6	270.0	W	0.0	0.0
21/10/23	15	30.0	54.0	2.5	9.0	315.0	NW	0.0	0.0
21/10/23	16	29.6	53.6	1.9	7.0	315.0	NW	0.0	0.0
21/10/23	17	29.1	53.3	3.7	13.3	315.0	NW	0.0	0.0
21/10/23	18	27.7	52.9	2.1	7.6	315.0	NW	0.0	0.0
21/10/23	19	26.2	53.4	2.2	7.9	67.5	ENE	0.0	0.0
21/10/23	20	24.7	53.8	1.3	4.7	135.0	SE	0.0	0.0
21/10/23	21	22.6	54.4	0.2	0.7	112.5	ESE	0.0	0.0
21/10/23	22	21.3	54.7	1.1	4.0	135.0	SE	0.0	0.0
21/10/23	23	20.7	55.1	0.2	0.7	135.0	SE	0.0	0.0
21/10/23	24	19.6	55.6	0.5	1.8	157.5	SES	0.0	0.0
22/10/23	1	18.3	57.2	0.3	1.1	180.0	S	0.0	0.0
22/10/23	2	16.8	58.4	0.2	0.7	180.0	S	0.0	0.0
22/10/23	3	16.1	59.3	0.3	1.1	202.5	SSW	0.0	0.0
22/10/23	4	14.7	60.4	0.5	1.8	22.5	NNE	0.0	0.0
22/10/23	5	14.9	62.7	0.7	2.5	247.5	SWW	0.0	0.0
22/10/23	6	16.4	63.9	0.9	3.2	45.0	NE	0.0	0.0
22/10/23	7	18.3	63.4	1.1	4.0	45.0	NE	0.0	0.0
22/10/23	8	19.7	62.7	1.4	5.0	45.0	NE	0.0	0.0
22/10/23	9	22.5	62.0	1.7	6.1	292.5	WNW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
22/10/23	10	24.4	61.3	2.2	7.9	225.0	SW	0.0	0.0
22/10/23	11	26.2	60.3	2.6	9.5	225.0	SW	0.0	0.0
22/10/23	12	28.1	59.6	1.4	5.0	225.0	SW	0.0	0.0
22/10/23	13	29.3	59.0	2.5	9.0	270.0	W	0.0	0.0
22/10/23	14	30.9	57.3	1.7	6.0	315.0	NW	0.0	0.0
22/10/23	15	30.0	55.2	3.7	13.3	315.0	NW	0.0	0.0
22/10/23	16	29.4	53.4	2.6	9.4	315.0	NW	0.0	0.0
22/10/23	17	28.7	52.7	1.1	4.0	315.0	NW	0.0	0.0
22/10/23	18	26.6	52.2	2.1	7.6	270.0	W	0.0	0.0
22/10/23	19	25.4	52.5	1.1	4.0	315.0	NW	0.0	0.0
22/10/23	20	24.8	52.9	1.1	4.0	90.0	E	0.0	0.0
22/10/23	21	23.9	53.4	0.1	0.4	270.0	W	0.0	0.0
22/10/23	22	23.1	53.8	0.4	1.4	67.5	ENE	0.0	0.0
22/10/23	23	22.4	55.0	0.6	2.2	135.0	SE	0.0	0.0
22/10/23	24	21.6	55.6	0.2	0.7	135.0	SE	0.0	0.0
23/10/23	1	20.4	68.9	0.5	1.8	135.0	SE	0.0	0.0
23/10/23	2	19.7	70.0	0.7	2.5	157.5	SES	0.0	0.0
23/10/23	3	19.2	66.7	0.7	2.5	180.0	S	0.0	0.0
23/10/23	4	19.3	65.8	1.3	4.7	202.5	SSW	0.0	0.0
23/10/23	5	19.3	62.3	0.4	1.4	210.0	SSW	0.0	0.0
23/10/23	6	19.0	62.5	1.2	4.3	22.5	NNE	0.0	0.0
23/10/23	7	19.8	62.1	1.1	4.0	180.0	S	0.0	0.0
23/10/23	8	21.6	61.6	0.7	2.5	22.5	NNE	0.0	0.0
23/10/23	9	23.2	60.8	1.2	4.5	22.5	NNE	0.0	0.0
23/10/23	10	24.4	59.5	1.4	5.0	270.0	W	0.0	0.0
23/10/23	11	25.7	59.3	1.4	5.0	45.0	NE	0.0	0.0
23/10/23	12	27.2	57.4	2.3	8.3	225.0	SW	0.0	0.0
23/10/23	13	28.1	56.4	1.8	6.5	337.5	NWN	0.0	0.0
23/10/23	14	28.8	58.0	2.2	7.9	315.0	NW	0.0	0.0
23/10/23	15	29.2	59.5	1.9	7.0	315.0	NW	0.0	0.0
23/10/23	16	27.7	57.0	2.5	9.0	315.0	NW	0.0	0.0
23/10/23	17	26.8	56.5	4.4	15.8	315.0	NW	0.0	0.0
23/10/23	18	25.8	54.0	2.4	8.6	315.0	NW	0.0	0.0
23/10/23	19	24.5	53.0	5.1	18.4	67.5	ENE	0.0	0.0
23/10/23	20	23.8	55.0	0.8	2.9	135.0	SE	0.0	0.0
23/10/23	21	23.4	56.0	0.5	1.8	112.5	ESE	0.0	0.0
23/10/23	22	22.8	58.0	0.4	1.4	135.0	SE	0.0	0.0
23/10/23	23	22.5	59.0	0.3	1.1	315.0	NW	0.0	0.0
23/10/23	24	22.2	60.5	0.5	1.8	157.5	SES	0.0	0.0
24/10/23	1	21.8	61.0	0.3	1.1	180.0	S	0.0	0.0
24/10/23	2	21.4	62.0	0.2	0.7	202.5	SSW	0.0	0.0
24/10/23	3	21.1	63.0	0.5	1.8	22.5	NNE	0.0	0.0
24/10/23	4	20.7	64.0	0.6	2.0	22.5	NNE	0.0	0.0
24/10/23	5	20.4	64.5	1.1	4.0	247.5	SWW	0.0	0.0
24/10/23	6	21.3	63.0	0.6	2.2	247.5	SWW	0.0	0.0
24/10/23	7	22.8	62.0	2.5	9.0	45.0	NE	0.0	0.0
24/10/23	8	24.0	60.4	2.3	8.3	45.0	NE	0.0	0.0
24/10/23	9	25.7	59.6	1.2	4.3	45.0	NE	0.0	0.0
24/10/23	10	26.0	58.3	2.2	7.9	270.0	W	0.0	0.0
24/10/23	11	26.7	57.7	3.7	13.3	180.0	S	0.0	0.0
24/10/23	12	27.4	57.2	1.7	6.1	270.0	W	0.0	0.0
24/10/23	13	27.8	56.3	4.2	15.1	315.0	NW	0.0	0.0
24/10/23	14	28.0	55.8	2.3	8.3	180.0	S	0.0	0.0
24/10/23	15	27.4	54.9	5.7	20.5	180.0	S	0.0	0.0
24/10/23	16	27.3	53.7	2.2	7.9	180.0	S	0.0	0.0
24/10/23	17	27.0	53.0	1.3	4.7	315.0	NW	0.0	0.0
24/10/23	18	26.8	52.6	1.1	4.0	315.0	NW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
24/10/23	19	26.4	52.9	4.4	15.8	180.0	S	0.0	0.0
24/10/23	20	25.0	53.4	0.2	0.7	202.5	SSW	0.0	0.0
24/10/23	21	24.4	53.8	0.2	0.7	90.0	E	0.0	0.0
24/10/23	22	24.0	54.2	0.2	0.7	270.0	W	0.0	0.0
24/10/23	23	23.7	54.7	0.8	3.0	67.5	ENE	0.0	0.0
24/10/23	24	23.3	55.6	0.4	1.4	112.5	ESE	0.0	0.0
25/10/23	1	23.0	57.3	0.2	0.7	135.0	SE	0.0	0.0
25/10/23	2	23.3	58.8	0.3	1.1	157.5	SES	0.0	0.0
25/10/23	3	23.0	59.5	0.3	1.1	157.5	SES	0.0	0.0
25/10/23	4	22.7	60.2	0.5	1.8	180.0	S	0.0	0.0
25/10/23	5	22.1	61.7	0.7	2.5	202.5	SSW	0.0	0.0
25/10/23	6	22.3	62.3	0.9	3.2	22.5	NNE	0.0	0.0
25/10/23	7	22.8	61.8	1.2	4.3	247.5	SWW	0.0	0.0
25/10/23	8	23.2	61.0	1.4	5.0	247.5	SWW	0.0	0.0
25/10/23	9	24.0	60.3	1.7	6.1	247.5	SWW	0.0	0.0
25/10/23	10	25.3	59.5	1.2	4.5	45.0	NE	0.0	0.0
25/10/23	11	26.8	58.8	1.8	6.5	315.0	NW	0.0	0.0
25/10/23	12	27.3	58.2	2.4	8.6	270.0	W	0.0	0.0
25/10/23	13	28.5	57.6	2.6	9.4	315.0	NW	0.0	0.0
25/10/23	14	28.9	55.4	3.7	13.3	292.5	WNW	0.0	0.0
25/10/23	15	29.0	53.9	1.9	7.0	292.5	WNW	0.0	0.0
25/10/23	16	28.4	53.0	3.7	13.3	45.0	NE	0.0	0.0
25/10/23	17	28.1	52.4	1.7	6.0	45.0	NE	0.0	0.0
25/10/23	18	27.7	52.3	2.5	9.0	292.5	WNW	0.0	0.0
25/10/23	19	27.4	52.8	2.1	7.6	270.0	W	0.0	0.0
25/10/23	20	27.2	53.7	0.7	2.5	90.0	E	0.0	0.0
25/10/23	21	26.5	54.2	0.4	1.4	270.0	W	0.0	0.0
25/10/23	22	25.7	54.8	0.2	0.7	337.5	NWN	0.0	0.0
25/10/23	23	25.0	55.5	0.5	1.8	337.5	NWN	0.0	0.0
25/10/23	24	24.7	56.1	0.3	1.1	315.0	NW	0.0	0.0
26/10/23	1	24.4	56.7	0.4	1.4	337.5	NWN	0.0	0.0
26/10/23	2	24.2	58.4	0.5	1.8	270.0	W	0.0	0.0
26/10/23	3	24.0	59.7	0.2	0.7	225.0	SW	0.0	0.0
26/10/23	4	23.6	60.3	0.3	1.1	337.5	NWN	0.0	0.0
26/10/23	5	23.2	61.1	0.8	3.0	315.0	NW	0.0	0.0
26/10/23	6	23.4	60.9	0.5	1.8	315.0	NW	0.0	0.0
26/10/23	7	23.7	60.3	1.1	4.0	315.0	NW	0.0	0.0
26/10/23	8	24.0	59.8	1.9	7.0	315.0	NW	0.0	0.0
26/10/23	9	24.8	59.2	1.9	7.0	315.0	NW	0.0	0.0
26/10/23	10	26.3	58.5	1.7	6.0	315.0	NW	0.0	0.0
26/10/23	11	27.5	56.7	2.6	9.5	315.0	NW	0.0	0.0
26/10/23	12	28.2	55.8	1.9	7.0	315.0	NW	0.0	0.0
26/10/23	13	28.7	55.3	3.7	13.3	315.0	NW	0.0	0.0
26/10/23	14	29.0	54.7	4.7	16.9	270.0	W	0.0	0.0
26/10/23	15	28.5	53.8	5.2	18.7	315.0	NW	0.0	0.0
26/10/23	16	28.3	53.0	3.9	14.0	315.0	NW	0.0	0.0
26/10/23	17	28.0	52.6	3.3	11.9	315.0	NW	0.0	0.0
26/10/23	18	27.7	51.6	2.2	7.9	67.5	ENE	0.0	0.0
26/10/23	19	27.5	51.8	1.3	4.7	360.0	N	0.0	0.0
26/10/23	20	27.1	52.4	0.6	2.0	135.0	SE	0.0	0.0
26/10/23	21	26.3	53.8	0.4	1.4	112.5	ESE	0.0	0.0
26/10/23	22	25.2	54.2	0.3	1.1	135.0	SE	0.0	0.0
26/10/23	23	24.0	54.7	0.6	2.2	315.0	NW	0.0	0.0
26/10/23	24	23.5	55.5	2.2	7.9	157.5	SES	0.0	0.0
27/10/23	1	23.0	55.9	0.4	1.4	180.0	S	0.0	0.0
27/10/23	2	22.3	56.7	0.6	2.2	180.0	S	0.0	0.0
27/10/23	3	22.0	58.6	0.2	0.7	202.5	SSW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
27/10/23	4	21.6	60.2	0.5	1.8	22.5	NNE	0.0	0.0
27/10/23	5	21.3	61.7	0.7	2.5	247.5	SWW	0.0	0.0
27/10/23	6	21.9	63.6	0.4	1.4	22.5	NNE	0.0	0.0
27/10/23	7	23.5	63.0	1.2	4.5	45.0	NE	0.0	0.0
27/10/23	8	24.5	62.5	0.9	3.2	45.0	NE	0.0	0.0
27/10/23	9	24.9	61.7	0.7	2.5	292.5	WNW	0.0	0.0
27/10/23	10	25.3	61.4	2.2	7.9	315.0	NW	0.0	0.0
27/10/23	11	26.4	60.6	1.1	4.0	315.0	NW	0.0	0.0
27/10/23	12	27.8	59.4	1.4	5.0	315.0	NW	0.0	0.0
27/10/23	13	28.2	58.4	2.3	8.3	270.0	W	0.0	0.0
27/10/23	14	28.8	56.4	2.3	8.3	315.0	NW	0.0	0.0
27/10/23	15	28.4	55.3	2.2	7.9	67.5	ENE	0.0	0.0
27/10/23	16	27.5	53.9	2.3	8.3	315.0	NW	0.0	0.0
27/10/23	17	27.0	52.7	2.8	10.1	315.0	NW	0.0	0.0
27/10/23	18	26.7	52.2	1.4	5.0	315.0	NW	0.0	0.0
27/10/23	19	26.2	52.5	1.6	5.8	112.5	ESE	0.0	0.0
27/10/23	20	26.4	53.1	0.8	3.0	135.0	SE	0.0	0.0
27/10/23	21	26.1	54.7	0.2	0.7	135.0	SE	0.0	0.0
27/10/23	22	25.8	55.8	0.5	1.8	157.5	SES	0.0	0.0
27/10/23	23	25.4	56.4	0.7	2.5	180.0	S	0.0	0.0
27/10/23	24	24.7	56.9	1.2	4.3	180.0	S	0.0	0.0
28/10/23	1	23.6	57.7	0.5	1.8	180.0	S	0.0	0.0
28/10/23	2	22.2	58.4	0.2	0.7	202.5	SSW	0.0	0.0
28/10/23	3	21.4	59.3	0.5	1.8	210.0	SSW	0.0	0.0
28/10/23	4	20.9	60.2	0.3	1.1	22.5	NNE	0.0	0.0
28/10/23	5	20.3	60.8	0.4	1.4	22.5	NNE	0.0	0.0
28/10/23	6	20.5	62.2	0.7	2.5	22.5	NNE	0.0	0.0
28/10/23	7	21.5	61.8	0.7	2.5	247.5	SWW	0.0	0.0
28/10/23	8	22.6	61.1	1.3	4.7	247.5	SWW	0.0	0.0
28/10/23	9	24.3	60.4	1.1	4.0	247.5	SWW	0.0	0.0
28/10/23	10	25.5	59.7	1.3	4.7	45.0	NE	0.0	0.0
28/10/23	11	26.1	58.3	1.9	6.8	45.0	NE	0.0	0.0
28/10/23	12	28.8	57.8	1.8	6.5	270.0	W	0.0	0.0
28/10/23	13	30.4	57.1	2.3	8.3	315.0	NW	0.0	0.0
28/10/23	14	30.8	56.3	1.9	7.0	292.5	WNW	0.0	0.0
28/10/23	15	30.2	55.3	3.7	13.3	292.5	WNW	0.0	0.0
28/10/23	16	30.7	53.2	2.6	9.5	45.0	NE	0.0	0.0
28/10/23	17	30.1	52.8	1.9	7.0	315.0	NW	0.0	0.0
28/10/23	18	29.4	51.7	2.1	7.6	225.0	SW	0.0	0.0
28/10/23	19	28.6	52.2	2.2	7.9	270.0	W	0.0	0.0
28/10/23	20	27.3	52.6	0.8	2.9	270.0	W	0.0	0.0
28/10/23	21	26.8	53.1	0.6	2.0	337.5	NWN	0.0	0.0
28/10/23	22	26.3	53.7	0.6	2.0	337.5	NWN	0.0	0.0
28/10/23	23	25.7	54.5	0.3	1.1	315.0	NW	0.0	0.0
28/10/23	24	25.0	55.5	0.4	1.4	315.0	NW	0.0	0.0
29/10/23	1	23.6	56.6	1.1	4.0	90.0	E	0.0	0.0
29/10/23	2	21.4	56.9	0.6	2.0	315.0	NW	0.0	0.0
29/10/23	3	19.7	58.3	0.4	1.4	67.5	ENE	0.0	0.0
29/10/23	4	18.4	60.1	0.5	1.8	135.0	SE	0.0	0.0
29/10/23	5	20.4	61.3	0.8	2.9	135.0	SE	0.0	0.0
29/10/23	6	20.9	63.5	1.1	4.0	112.5	ESE	0.0	0.0
29/10/23	7	21.2	63.0	1.4	5.0	135.0	SE	0.0	0.0
29/10/23	8	22.3	62.2	1.9	6.8	157.5	SES	0.0	0.0
29/10/23	9	23.1	60.8	1.7	6.0	180.0	S	0.0	0.0
29/10/23	10	23.7	59.8	2.3	8.3	315.0	NW	0.0	0.0
29/10/23	11	24.7	59.0	3.7	13.3	337.5	NWN	0.0	0.0
29/10/23	12	26.3	58.3	1.2	4.5	315.0	NW	0.0	0.0



Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
29/10/23	13	28.5	57.1	1.4	5.0	315.0	NW	0.0	0.0
29/10/23	14	30.7	55.7	2.3	8.3	315.0	NW	0.0	0.0
29/10/23	15	31.0	56.3	3.7	13.3	337.5	NWN	0.0	0.0
29/10/23	16	30.8	54.8	2.1	7.6	315.0	NW	0.0	0.0
29/10/23	17	30.2	52.3	1.4	5.0	315.0	NW	0.0	0.0
29/10/23	18	29.4	51.5	1.9	7.0	270.0	W	0.0	0.0
29/10/23	19	28.6	51.3	1.6	5.8	157.5	SES	0.0	0.0
29/10/23	20	26.8	51.9	0.2	0.7	180.0	S	0.0	0.0
29/10/23	21	25.3	52.6	0.2	0.7	315.0	NW	0.0	0.0
29/10/23	22	24.4	53.2	0.2	0.7	67.5	ENE	0.0	0.0
29/10/23	23	22.8	53.8	0.7	2.5	135.0	SE	0.0	0.0
29/10/23	24	21.6	54.1	0.2	0.7	112.5	ESE	0.0	0.0
30/10/23	1	20.4	54.9	0.2	0.7	112.5	ESE	0.0	0.0
30/10/23	2	18.9	56.4	0.5	1.8	135.0	SE	0.0	0.0
30/10/23	3	18.2	57.9	0.7	2.5	157.5	SES	0.0	0.0
30/10/23	4	17.5	59.6	0.2	0.7	180.0	S	0.0	0.0
30/10/23	5	18.1	61.5	0.9	3.2	202.5	SSW	0.0	0.0
30/10/23	6	19.3	62.7	0.3	1.1	210.0	SSW	0.0	0.0
30/10/23	7	20.2	62.0	2.2	7.9	22.5	NNE	0.0	0.0
30/10/23	8	21.7	61.5	1.7	6.0	247.5	SWW	0.0	0.0
30/10/23	9	22.8	60.5	1.2	4.3	247.5	SWW	0.0	0.0
30/10/23	10	24.7	59.7	1.6	5.8	45.0	NE	0.0	0.0
30/10/23	11	26.3	59.1	1.8	6.5	45.0	NE	0.0	0.0
30/10/23	12	27.6	58.4	2.5	9.0	45.0	NE	0.0	0.0
30/10/23	13	29.7	56.3	2.3	8.3	292.5	WNW	0.0	0.0
30/10/23	14	30.8	55.4	3.7	13.3	270.0	W	0.0	0.0
30/10/23	15	30.2	53.7	2.1	7.6	315.0	NW	0.0	0.0
30/10/23	16	29.8	52.1	2.5	9.0	45.0	NE	0.0	0.0
30/10/23	17	29.3	51.5	2.3	8.3	292.5	WNW	0.0	0.0
30/10/23	18	29.0	52.9	1.9	7.0	225.0	SW	0.0	0.0
30/10/23	19	28.9	52.9	2.5	9.0	225.0	SW	0.0	0.0
30/10/23	20	28.3	51.9	2.6	9.4	225.0	SW	0.0	0.0
30/10/23	21	27.7	51.5	1.4	5.0	337.5	NWN	0.0	0.0
30/10/23	22	26.5	52.4	0.2	0.7	337.5	NWN	0.0	0.0
30/10/23	23	25.0	53.7	0.7	2.5	315.0	NW	0.0	0.0
30/10/23	24	23.7	54.8	0.5	1.8	315.0	NW	0.0	0.0
31/10/23	1	22.7	55.6	0.4	1.4	270.0	W	0.0	0.0
31/10/23	2	22.3	57.7	0.2	0.7	315.0	NW	0.0	0.0
31/10/23	3	21.4	58.4	0.4	1.4	270.0	W	0.0	0.0
31/10/23	4	20.7	60.3	0.3	1.1	315.0	NW	0.0	0.0
31/10/23	5	19.4	61.5	1.1	4.0	315.0	NW	0.0	0.0
31/10/23	6	18.6	62.2	0.5	1.8	67.5	ENE	0.0	0.0
31/10/23	7	19.8	61.7	0.8	3.0	135.0	SE	0.0	0.0
31/10/23	8	20.7	60.3	1.7	6.0	112.5	ESE	0.0	0.0
31/10/23	9	21.2	58.7	1.9	7.0	135.0	SE	0.0	0.0
31/10/23	10	22.4	58.1	2.2	8.0	270.0	W	0.0	0.0
31/10/23	11	23.7	56.7	1.6	5.8	157.5	SES	0.0	0.0
31/10/23	12	25.2	55.0	1.8	6.5	180.0	S	0.0	0.0
31/10/23	13	26.8	53.4	2.2	7.9	225.0	SW	0.0	0.0
31/10/23	14	27.7	52.1	1.7	6.0	225.0	SW	0.0	0.0
31/10/23	15	28.6	51.7	3.7	13.3	225.0	SW	0.0	0.0
31/10/23	16	29.2	51.5	2.2	7.9	337.5	NWN	0.0	0.0
31/10/23	17	29.5	51.9	2.2	7.9	202.5	SSW	0.0	0.0
31/10/23	18	28.5	52.0	2.2	7.9	315.0	NW	0.0	0.0
31/10/23	19	26.8	51.5	2.2	7.9	247.5	SWW	0.0	0.0
31/10/23	20	25.6	53.7	0.7	2.5	45.0	NE	0.0	0.0
31/10/23	21	24.2	54.2	1.1	4.0	45.0	NE	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
31/10/23	22	23.2	56.8	0.5	1.8	292.5	WNW	0.0	0.0
31/10/23	23	22.6	57.0	0.4	1.4	270.0	W	0.0	0.0
31/10/23	24	21.8	57.4	0.5	1.8	270.0	W	0.0	0.0
11/01/23	1	21.3	57.9	0.3	1.1	315.0	NW	0.0	0.0
11/01/23	2	20.3	60.2	0.8	2.9	225.0	SW	0.0	0.0
11/01/23	3	19.8	63.1	1.1	4.0	135.0	SE	0.0	0.0
11/01/23	4	19.3	63.2	0.3	1.1	90.0	E	0.0	0.0
11/01/23	5	19.4	60.4	0.2	0.7	337.5	NWN	0.0	0.0
11/01/23	6	20.6	65.9	0.5	1.8	135.0	SE	0.0	0.0
11/01/23	7	21.4	66.7	0.7	2.5	270.0	W	0.0	0.0
11/01/23	8	23.1	67.7	2.2	7.9	270.0	W	0.0	0.0
11/01/23	9	24.6	69.4	1.1	4.0	135.0	SE	0.0	0.0
11/01/23	10	26.1	71.1	0.9	3.2	270.0	W	0.0	0.0
11/01/23	11	26.7	68.3	2.2	8.0	270.0	W	0.0	0.0
11/01/23	12	27.2	67.3	1.1	4.0	315.0	NW	0.0	0.0
11/01/23	13	27.7	65.5	2.2	7.9	270.0	W	0.0	0.0
11/01/23	14	28.1	63.3	2.2	7.9	315.0	NW	0.0	0.0
11/01/23	15	30.6	62.1	2.2	7.9	315.0	NW	0.0	0.0
11/01/23	16	29.7	63.2	2.4	8.6	315.0	NW	0.0	0.0
11/01/23	17	29.1	64.3	1.6	5.8	45.0	NE	0.0	0.0
11/01/23	18	27.4	66.6	2.3	8.3	45.0	NE	0.0	0.0
11/01/23	19	26.5	59.4	1.1	4.0	315.0	NW	0.0	0.0
11/01/23	20	26.1	61.6	0.4	1.4	135.0	SE	0.0	0.0
11/01/23	21	25.3	55.0	0.7	2.5	315.0	NW	0.0	0.0
11/01/23	22	23.6	59.7	0.4	1.4	135.0	SE	0.0	0.0
11/01/23	23	22.7	63.2	0.3	1.1	270.0	W	0.0	0.0
11/01/23	24	22.2	69.3	0.6	2.2	270.0	W	0.0	0.0
11/02/23	1	21.7	68.2	0.4	1.4	315.0	NW	0.0	0.0
11/02/23	2	21.3	65.1	0.1	0.4	315.0	NW	0.0	0.0
11/02/23	3	21.3	67.8	0.9	3.1	67.5	ENE	0.0	0.0
11/02/23	4	20.4	68.5	0.5	1.8	135.0	SE	0.0	0.0
11/02/23	5	19.6	69.5	0.3	1.2	112.5	ESE	0.0	0.0
11/02/23	6	21.3	63.0	0.8	2.9	247.5	SWW	0.0	0.0
11/02/23	7	24.1	57.0	1.1	4.0	157.5	SES	0.0	0.0
11/02/23	8	25.8	54.0	2.2	8.0	90.0	E	0.0	0.0
11/02/23	9	27.2	54.0	1.6	5.8	225.0	SW	0.0	0.0
11/02/23	10	27.7	59.0	1.9	6.8	225.0	SW	0.0	0.0
11/02/23	11	28.4	63.0	2.2	7.9	90.0	E	0.0	0.0
11/02/23	12	28.8	55.0	1.9	6.8	315.0	NW	0.0	0.0
11/02/23	13	29.2	61.0	2.2	7.9	315.0	NW	0.0	0.0
11/02/23	14	29.7	59.0	2.4	8.6	270.0	W	0.0	0.0
11/02/23	15	30.2	56.0	3.7	13.3	315.0	NW	0.0	0.0
11/02/23	16	30.6	57.0	5.1	18.4	315.0	NW	0.0	0.0
11/02/23	17	31.2	64.0	1.4	4.9	315.0	NW	0.0	0.0
11/02/23	18	29.3	53.0	1.2	4.3	315.0	NW	0.0	0.0
11/02/23	19	27.6	55.0	1.4	4.9	135.0	SE	0.0	0.0
11/02/23	20	26.1	54.0	1.9	6.8	135.0	SE	0.0	0.0
11/02/23	21	24.2	61.0	0.8	2.9	135.0	SE	0.0	0.0
11/02/23	22	22.7	56.0	0.6	2.2	315.0	NW	0.0	0.0
11/02/23	23	21.8	53.0	0.4	1.4	135.0	SE	0.0	0.0
11/02/23	24	21.4	64.0	0.5	1.9	315.0	NW	0.0	0.0
11/03/23	1	21.9	65.5	0.3	1.1	315.0	NW	0.0	0.0
11/03/23	2	21.5	66.0	0.5	1.8	315.0	NW	0.0	0.0
11/03/23	3	21.3	67.5	0.5	1.8	135.0	SE	0.0	0.0
11/03/23	4	20.3	68.5	0.7	2.5	45.0	NE	0.0	0.0
11/03/23	5	20.0	69.2	1.1	4.0	45.0	NE	0.0	0.0
11/03/23	6	20.8	70.1	1.4	5.0	45.0	NE	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
11/03/23	7	22.0	70.5	1.2	4.3	112.5	ESE	0.0	0.0
11/03/23	8	24.1	71.0	1.8	6.5	247.5	SWW	0.0	0.0
11/03/23	9	25.6	70.6	1.2	4.3	157.5	SES	0.0	0.0
11/03/23	10	26.4	68.5	2.1	7.6	360.0	N	0.0	0.0
11/03/23	11	27.2	64.5	2.2	7.9	67.5	ENE	0.0	0.0
11/03/23	12	28.5	61.4	2.2	7.9	202.5	SSW	0.0	0.0
11/03/23	13	29.2	59.5	2.2	7.9	315.0	NW	0.0	0.0
11/03/23	14	30.0	61.0	2.6	9.4	315.0	NW	0.0	0.0
11/03/23	15	29.4	60.0	1.6	5.8	315.0	NW	0.0	0.0
11/03/23	16	28.7	63.0	3.7	13.3	315.0	NW	0.0	0.0
11/03/23	17	28.0	60.5	0.9	3.2	225.0	SW	0.0	0.0
11/03/23	18	25.1	62.0	2.2	8.0	90.0	E	0.0	0.0
11/03/23	19	23.7	63.0	1.2	4.3	90.0	E	0.0	0.0
11/03/23	20	23.4	55.0	0.6	2.2	337.5	NWN	0.0	0.0
11/03/23	21	23.4	63.0	0.6	2.2	315.0	NW	0.0	0.0
11/03/23	22	22.8	63.0	0.3	1.1	315.0	NW	0.0	0.0
11/03/23	23	22.3	59.0	0.3	1.2	315.0	NW	0.0	0.0
11/03/23	24	21.7	67.0	0.5	1.8	45.0	NE	0.0	0.0
11/04/23	1	20.6	55.0	0.4	1.4	135.0	SE	0.0	0.0
11/04/23	2	19.1	55.0	0.1	0.4	135.0	SE	0.0	0.0
11/04/23	3	18.5	56.0	0.5	1.8	135.0	SE	0.0	0.0
11/04/23	4	17.7	63.0	0.7	2.5	135.0	SE	0.0	0.0
11/04/23	5	17.2	63.0	0.9	3.1	315.0	NW	0.0	0.0
11/04/23	6	19.1	63.0	1.1	4.0	135.0	SE	0.0	0.0
11/04/23	7	21.7	57.0	0.9	3.1	339.0	NWN	0.0	0.0
11/04/23	8	23.6	65.0	0.6	2.2	45.0	NE	0.0	0.0
11/04/23	9	24.7	71.7	1.1	4.0	45.0	NE	0.0	0.0
11/04/23	10	25.3	68.5	2.2	8.0	270.0	W	0.0	0.0
11/04/23	11	26.8	69.3	1.7	6.1	270.0	W	0.0	0.0
11/04/23	12	27.6	71.0	2.3	8.3	315.0	NW	0.0	0.0
11/04/23	13	28.0	61.0	1.5	5.4	315.0	NW	0.0	0.0
11/04/23	14	27.2	56.0	2.6	9.4	315.0	NW	0.0	0.0
11/04/23	15	26.7	61.0	2.3	8.3	315.0	NW	0.0	0.0
11/04/23	16	26.0	63.0	1.4	4.9	315.0	NW	0.0	0.0
11/04/23	17	25.5	65.0	2.2	7.9	315.0	NW	0.0	0.0
11/04/23	18	25.1	61.0	2.2	7.9	315.0	NW	0.0	0.0
11/04/23	19	24.6	64.0	1.1	4.0	22.5	NNE	0.0	0.0
11/04/23	20	24.2	61.0	0.2	0.6	180.0	S	0.0	0.0
11/04/23	21	23.9	63.0	0.1	0.4	67.5	ENE	0.0	0.0
11/04/23	22	23.1	64.0	0.2	0.7	135.0	SE	0.0	0.0
11/04/23	23	22.6	61.0	0.2	0.7	112.5	ESE	0.0	0.0
11/04/23	24	21.7	57.0	0.7	2.5	247.5	SWW	0.0	0.0
11/05/23	1	21.2	62.2	0.1	0.4	157.5	SES	0.0	0.0
11/05/23	2	20.0	64.4	0.5	1.8	360.0	N	0.0	0.0
11/05/23	3	19.1	66.5	0.7	2.5	225.0	SW	0.0	0.0
11/05/23	4	17.2	67.9	0.5	1.8	225.0	SW	0.0	0.0
11/05/23	5	15.5	71.3	0.1	0.4	90.0	E	0.0	0.0
11/05/23	6	16.4	68.4	0.8	2.9	90.0	E	0.0	0.0
11/05/23	7	19.7	65.4	0.9	3.1	337.5	NWN	0.0	0.0
11/05/23	8	21.6	62.7	1.1	4.0	270.0	W	0.0	0.0
11/05/23	9	24.4	60.6	2.2	7.9	270.0	W	0.0	0.0
11/05/23	10	24.8	67.2	2.2	7.9	270.0	W	0.0	0.0
11/05/23	11	25.4	69.2	1.4	5.0	270.0	W	0.0	0.0
11/05/23	12	26.7	55.0	2.2	7.9	270.0	W	0.0	0.0
11/05/23	13	27.5	53.0	2.6	9.4	315.0	NW	0.0	0.0
11/05/23	14	27.8	56.0	1.6	5.8	135.0	SE	0.0	0.0
11/05/23	15	28.3	61.0	2.6	9.4	315.0	NW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
11/05/23	16	28.1	54.0	1.9	6.8	315.0	NW	0.0	0.0
11/05/23	17	27.6	55.0	1.7	6.1	135.0	SE	0.0	0.0
11/05/23	18	27.1	65.0	1.3	4.7	315.0	NW	0.0	0.0
11/05/23	19	26.4	55.0	0.9	3.1	270.0	W	0.0	0.0
11/05/23	20	25.3	59.0	0.9	3.1	225.0	SW	0.0	0.0
11/05/23	21	24.0	65.0	0.5	1.9	45.0	NE	0.0	0.0
11/05/23	22	23.2	66.0	0.9	3.1	45.0	NE	0.0	0.0
11/05/23	23	22.2	61.0	0.5	1.8	45.0	NE	0.0	0.0
11/05/23	24	21.4	64.0	0.7	2.5	90.0	E	0.0	0.0
11/06/23	1	19.8	59.0	0.4	1.4	337.5	NWN	0.0	0.0
11/06/23	2	17.8	53.0	0.5	1.8	22.5	NNE	0.0	0.0
11/06/23	3	15.4	54.0	0.5	1.8	180.0	S	0.0	0.0
11/06/23	4	14.2	53.0	0.7	2.5	67.5	ENE	0.0	0.0
11/06/23	5	14.8	63.0	0.9	3.2	202.5	SSW	0.0	0.0
11/06/23	6	16.2	54.0	1.1	4.0	90.0	E	0.0	0.0
11/06/23	7	17.7	58.8	1.4	4.9	112.5	ESE	0.0	0.0
11/06/23	8	19.6	57.0	0.5	1.8	247.5	SWW	0.0	0.0
11/06/23	9	21.7	54.0	0.7	2.5	135.0	SE	0.0	0.0
11/06/23	10	23.3	64.0	2.2	7.9	360.0	N	0.0	0.0
11/06/23	11	24.1	54.0	1.6	5.8	135.0	SE	0.0	0.0
11/06/23	12	24.4	63.0	2.2	8.0	315.0	NW	0.0	0.0
11/06/23	13	25.6	63.0	1.9	6.8	315.0	NW	0.0	0.0
11/06/23	14	27.1	66.6	2.2	7.9	315.0	NW	0.0	0.0
11/06/23	15	27.8	68.5	2.4	8.6	315.0	NW	0.0	0.0
11/06/23	16	28.4	66.5	2.2	7.9	315.0	NW	0.0	0.0
11/06/23	17	27.7	63.7	2.2	7.9	315.0	NW	0.0	0.0
11/06/23	18	26.5	58.2	2.2	7.9	315.0	NW	0.0	0.0
11/06/23	19	26.0	58.7	2.3	8.3	315.0	NW	0.0	0.0
11/06/23	20	24.5	59.2	0.5	1.8	45.0	NE	0.0	0.0
11/06/23	21	23.2	59.8	1.4	4.9	45.0	NE	0.0	0.0
11/06/23	22	21.7	62.5	1.2	4.3	202.5	SSW	0.0	0.0
11/06/23	23	21.2	63.7	0.5	1.9	112.5	ESE	0.0	0.0
11/06/23	24	19.7	65.1	0.2	0.7	22.5	NNE	0.0	0.0
11/07/23	1	18.4	65.4	0.3	1.1	180.0	S	0.0	0.0
11/07/23	2	16.8	64.1	0.5	1.8	67.5	ENE	0.0	0.0
11/07/23	3	15.6	65.8	0.5	1.8	135.0	SE	0.0	0.0
11/07/23	4	14.4	66.2	0.4	1.4	315.0	NW	0.0	0.0
11/07/23	5	13.6	66.8	0.8	2.9	247.5	SWW	0.0	0.0
11/07/23	6	15.2	64.2	0.5	1.8	157.5	SES	0.0	0.0
11/07/23	7	16.6	62.3	1.1	4.0	360.0	N	0.0	0.0
11/07/23	8	18.3	61.8	2.2	8.0	135.0	SE	0.0	0.0
11/07/23	9	20.1	60.6	1.7	6.1	135.0	SE	0.0	0.0
11/07/23	10	21.7	59.9	1.9	6.8	315.0	NW	0.0	0.0
11/07/23	11	23.4	59.3	2.2	7.9	135.0	SE	0.0	0.0
11/07/23	12	25.2	58.4	2.7	9.7	270.0	W	0.0	0.0
11/07/23	13	26.4	56.3	2.2	7.9	315.0	NW	0.0	0.0
11/07/23	14	27.8	55.2	2.2	7.9	315.0	NW	0.0	0.0
11/07/23	15	28.8	53.6	2.2	7.9	315.0	NW	0.0	0.0
11/07/23	16	28.3	53.1	2.4	8.6	135.0	SE	0.0	0.0
11/07/23	17	28.0	52.8	2.1	7.6	315.0	NW	0.0	0.0
11/07/23	18	27.1	51.7	1.7	6.2	225.0	SW	0.0	0.0
11/07/23	19	25.7	52.5	2.2	7.9	90.0	E	0.0	0.0
11/07/23	20	24.2	53.7	1.4	4.9	90.0	E	0.0	0.0
11/07/23	21	23.5	54.2	0.5	1.8	337.5	NWN	0.0	0.0
11/07/23	22	22.6	55.6	0.9	3.1	315.0	NW	0.0	0.0
11/07/23	23	21.6	56.4	0.9	3.1	45.0	NE	0.0	0.0
11/07/23	24	20.7	56.9	0.1	0.4	45.0	NE	0.0	0.0



Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
11/07/23	1	19.6	57.8	0.2	0.7	45.0	NE	0.0	0.0
11/08/23	2	17.7	59.4	1.2	4.3	135.0	SE	0.0	0.0
11/08/23	3	16.3	61.7	0.5	1.8	135.0	SE	0.0	0.0
11/08/23	4	15.2	63.7	0.8	2.9	135.0	SE	0.0	0.0
11/08/23	5	14.6	65.2	1.2	4.3	225.0	SW	0.0	0.0
11/08/23	6	16.1	65.0	0.7	2.5	135.0	SE	0.0	0.0
11/08/23	7	17.5	64.8	0.9	3.1	315.0	NW	0.0	0.0
11/08/23	8	18.9	64.0	1.7	6.2	135.0	SE	0.0	0.0
11/08/23	9	20.6	62.7	1.1	4.0	315.0	NW	0.0	0.0
11/08/23	10	21.0	59.3	0.5	1.8	270.0	W	0.0	0.0
11/08/23	11	22.4	57.2	2.2	7.9	315.0	NW	0.0	0.0
11/08/23	12	24.3	56.8	2.3	8.3	270.0	W	0.0	0.0
11/08/23	13	25.3	54.5	2.2	8.0	315.0	NW	0.0	0.0
11/08/23	14	26.8	52.1	2.2	7.9	315.0	NW	0.0	0.0
11/08/23	15	27.8	50.6	2.2	7.9	315.0	NW	0.0	0.0
11/08/23	16	27.2	48.4	2.2	7.9	315.0	NW	0.0	0.0
11/08/23	17	26.6	49.7	3.7	13.3	315.0	NW	0.0	0.0
11/08/23	18	25.3	50.0	2.4	8.6	22.5	NNE	0.0	0.0
11/08/23	19	23.7	50.2	1.4	5.0	180.0	S	0.0	0.0
11/08/23	20	22.1	50.8	0.6	2.2	67.5	ENE	0.0	0.0
11/08/23	21	20.7	51.7	0.5	1.8	202.5	SSW	0.0	0.0
11/08/23	22	19.7	52.2	0.2	0.7	90.0	E	0.0	0.0
11/08/23	23	17.8	52.5	0.9	3.1	112.5	ESE	0.0	0.0
11/08/23	24	16.8	53.1	0.5	1.8	247.5	SWW	0.0	0.0
11/09/23	1	15.7	54.0	0.2	0.7	157.5	SES	0.0	0.0
11/09/23	2	14.4	57.8	1.4	4.9	360.0	N	0.0	0.0
11/09/23	3	13.3	58.5	0.7	2.5	225.0	SW	0.0	0.0
11/09/23	4	11.9	59.4	0.5	1.8	225.0	SW	0.0	0.0
11/09/23	5	10.9	62.7	0.5	1.8	90.0	E	0.0	0.0
11/09/23	6	11.4	63.5	1.2	4.3	90.0	E	0.0	0.0
11/09/23	7	13.6	61.4	0.9	3.1	337.5	NWN	0.0	0.0
11/09/23	8	15.4	60.2	0.6	2.2	135.0	SE	0.0	0.0
11/09/23	9	17.5	58.4	0.7	2.5	270.0	W	0.0	0.0
11/09/23	10	19.7	57.3	1.1	4.0	270.0	W	0.0	0.0
11/09/23	11	21.3	56.7	1.4	5.0	270.0	W	0.0	0.0
11/09/23	12	23.6	54.2	0.7	2.5	315.0	NW	0.0	0.0
11/09/23	13	25.2	52.7	2.2	7.9	315.0	NW	0.0	0.0
11/09/23	14	26.7	50.6	2.2	7.9	315.0	NW	0.0	0.0
11/09/23	15	27.6	48.2	2.2	8.0	315.0	NW	0.0	0.0
11/09/23	16	28.0	47.3	2.1	7.6	315.0	NW	0.0	0.0
11/09/23	17	27.7	47.0	2.2	8.0	315.0	NW	0.0	0.0
11/09/23	18	26.2	47.9	1.1	4.0	315.0	NW	0.0	0.0
11/09/23	19	25.5	48.6	0.6	2.2	315.0	NW	0.0	0.0
11/09/23	20	24.3	49.2	0.7	2.5	315.0	NW	0.0	0.0
11/09/23	21	22.6	51.5	0.2	0.7	270.0	W	0.0	0.0
11/09/23	22	21.2	52.7	0.5	1.9	270.0	W	0.0	0.0
11/09/23	23	20.2	54.3	0.3	1.1	45.0	NE	0.0	0.0
11/09/23	24	19.6	56.8	0.2	0.7	45.0	NE	0.0	0.0
11/10/23	1	18.6	57.2	0.2	0.7	45.0	NE	0.0	0.0
11/10/23	2	17.8	57.6	0.5	1.8	135.0	SE	0.0	0.0
11/10/23	3	16.6	58.4	0.2	0.7	135.0	SE	0.0	0.0
11/10/23	4	15.4	60.2	0.2	0.7	22.5	NNE	0.0	0.0
11/10/23	5	14.9	62.3	0.8	2.9	180.0	S	0.0	0.0
11/10/23	6	16.6	62.7	0.2	0.7	67.5	ENE	0.0	0.0
11/10/23	7	18.2	61.5	1.2	4.3	202.5	SSW	0.0	0.0
11/10/23	8	20.4	60.7	1.1	4.0	112.5	ESE	0.0	0.0
11/10/23	9	21.8	59.3	1.4	5.0	247.5	SWW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
11/10/23	10	22.5	57.4	1.9	6.8	157.5	SES	0.0	0.0
11/10/23	11	24.1	55.3	2.2	7.9	360.0	N	0.0	0.0
11/10/23	12	25.3	52.7	2.3	8.3	225.0	SW	0.0	0.0
11/10/23	13	25.7	50.5	1.9	6.8	202.5	SSW	0.0	0.0
11/10/23	14	26.2	48.2	1.1	4.0	202.5	SSW	0.0	0.0
11/10/23	15	26.7	47.6	2.2	7.9	337.5	NWN	0.0	0.0
11/10/23	16	26.4	47.2	2.2	7.9	315.0	NW	0.0	0.0
11/10/23	17	26.2	47.9	1.7	6.2	315.0	NW	0.0	0.0
11/10/23	18	25.0	48.5	1.9	6.8	315.0	NW	0.0	0.0
11/10/23	19	25.1	48.9	1.3	4.7	135.0	SE	0.0	0.0
11/10/23	20	24.7	49.3	0.7	2.5	270.0	W	0.0	0.0
11/10/23	21	23.7	50.1	0.5	1.8	270.0	W	0.0	0.0
11/10/23	22	21.6	50.8	0.5	1.8	135.0	SE	0.0	0.0
11/10/23	23	19.6	51.5	0.1	0.4	135.0	SE	0.0	0.0
11/10/23	24	18.2	52.7	0.1	0.4	135.0	SE	0.0	0.0
11/11/23	1	16.7	54.9	0.1	0.4	270.0	W	0.0	0.0
11/11/23	2	15.5	57.3	0.5	1.8	270.0	W	0.0	0.0
11/11/23	3	14.9	58.2	0.7	2.5	270.0	W	0.0	0.0
11/11/23	4	14.4	58.8	0.9	3.2	315.0	NW	0.0	0.0
11/11/23	5	14.8	59.9	0.1	0.4	45.0	NE	0.0	0.0
11/11/23	6	15.3	60.4	1.2	4.3	45.0	NE	0.0	0.0
11/11/23	7	16.3	59.5	0.6	2.2	45.0	NE	0.0	0.0
11/11/23	8	17.5	59.1	1.2	4.3	135.0	SE	0.0	0.0
11/11/23	9	19.4	58.4	1.9	6.8	135.0	SE	0.0	0.0
11/11/23	10	21.1	57.3	2.2	8.0	315.0	NW	0.0	0.0
11/11/23	11	22.8	56.7	2.2	7.9	135.0	SE	0.0	0.0
11/11/23	12	23.5	54.2	1.3	4.7	315.0	NW	0.0	0.0
11/11/23	13	24.7	53.1	2.2	7.9	315.0	NW	0.0	0.0
11/11/23	14	25.5	51.5	2.2	7.9	315.0	NW	0.0	0.0
11/11/23	15	25.8	48.9	1.9	6.8	315.0	NW	0.0	0.0
11/11/23	16	25.5	47.6	1.3	4.7	315.0	NW	0.0	0.0
11/11/23	17	25.1	47.1	4.2	15.1	315.0	NW	0.0	0.0
11/11/23	18	24.8	47.0	0.8	2.9	315.0	NW	0.0	0.0
11/11/23	19	23.7	48.3	1.2	4.3	225.0	SW	0.0	0.0
11/11/23	20	22.4	48.9	0.5	1.8	202.5	SSW	0.0	0.0
11/11/23	21	21.7	49.5	0.5	1.8	90.0	E	0.0	0.0
11/11/23	22	20.1	50.1	0.2	0.7	337.5	NWN	0.0	0.0
11/11/23	23	19.3	50.7	0.5	1.8	202.5	SSW	0.0	0.0
11/11/23	24	17.8	51.4	0.3	1.1	90.0	E	0.0	0.0
11/12/23	1	17.2	53.6	0.2	0.7	112.5	ESE	0.0	0.0
11/12/23	2	16.6	54.8	0.5	1.8	247.5	SWW	0.0	0.0
11/12/23	3	16.2	56.2	0.8	2.9	157.5	SES	0.0	0.0
11/12/23	4	15.7	57.6	0.2	0.7	360.0	N	0.0	0.0
11/12/23	5	15.4	58.9	0.2	0.7	135.0	SE	0.0	0.0
11/12/23	6	16.5	61.2	1.1	4.0	135.0	SE	0.0	0.0
11/12/23	7	17.6	60.5	0.8	2.9	225.0	SW	0.0	0.0
11/12/23	8	18.6	59.8	1.1	4.0	135.0	SE	0.0	0.0
11/12/23	9	19.9	57.7	1.4	5.0	270.0	W	0.0	0.0
11/12/23	10	21.7	57.0	1.8	6.5	315.0	NW	0.0	0.0
11/12/23	11	23.5	56.2	2.2	7.9	315.0	NW	0.0	0.0
11/12/23	12	24.7	53.4	1.9	6.8	315.0	NW	0.0	0.0
11/12/23	13	25.7	52.1	2.2	7.9	315.0	NW	0.0	0.0
11/12/23	14	26.3	50.5	2.2	7.9	135.0	SE	0.0	0.0
11/12/23	15	26.9	48.7	3.7	13.3	315.0	NW	0.0	0.0
11/12/23	16	27.3	48.0	2.3	8.3	315.0	NW	0.0	0.0
11/12/23	17	27.7	47.7	2.2	7.9	270.0	W	0.0	0.0
11/12/23	18	26.3	47.8	1.4	5.0	315.0	NW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
11/12/23	19	25.1	48.1	0.7	2.5	135.0	SE	0.0	0.0
11/12/23	20	23.7	48.7	0.5	1.9	225.0	SW	0.0	0.0
11/12/23	21	22.6	49.3	2.2	7.9	67.5	ENE	0.0	0.0
11/12/23	22	22.1	50.5	0.5	1.8	202.5	SSW	0.0	0.0
11/12/23	23	21.2	50.9	0.2	0.7	112.5	ESE	0.0	0.0
11/12/23	24	20.3	51.3	0.5	1.8	247.5	SWW	0.0	0.0
13/11/23	1	19.4	53.7	0.2	0.7	157.5	SES	0.0	0.0
13/11/23	2	17.6	54.9	0.2	0.7	360.0	N	0.0	0.0
13/11/23	3	15.3	56.3	0.5	1.8	225.0	SW	0.0	0.0
13/11/23	4	13.9	58.5	0.8	2.9	225.0	SW	0.0	0.0
13/11/23	5	13.5	59.4	0.9	3.1	90.0	E	0.0	0.0
13/11/23	6	13.8	59.0	1.2	4.3	90.0	E	0.0	0.0
13/11/23	7	14.5	58.2	1.1	4.0	337.5	NWN	0.0	0.0
13/11/23	8	16.0	57.7	0.7	2.5	270.0	W	0.0	0.0
13/11/23	9	17.9	56.3	1.4	5.0	270.0	W	0.0	0.0
13/11/23	10	18.3	56.0	1.9	6.8	270.0	W	0.0	0.0
13/11/23	11	20.2	55.8	2.2	7.9	270.0	W	0.0	0.0
13/11/23	12	23.3	55.2	1.8	6.5	315.0	NW	0.0	0.0
13/11/23	13	25.8	54.4	3.7	13.3	315.0	NW	0.0	0.0
13/11/23	14	26.0	51.9	2.6	9.4	270.0	W	0.0	0.0
13/11/23	15	25.5	48.5	2.4	8.6	135.0	SE	0.0	0.0
13/11/23	16	25.2	48.1	1.2	4.3	315.0	NW	0.0	0.0
13/11/23	17	25.0	47.8	0.9	3.2	135.0	SE	0.0	0.0
13/11/23	18	24.7	47.1	2.2	7.9	270.0	W	0.0	0.0
13/11/23	19	23.7	47.7	1.2	4.3	135.0	SE	0.0	0.0
13/11/23	20	22.4	48.4	0.9	3.1	315.0	NW	0.0	0.0
13/11/23	21	21.2	48.8	0.4	1.4	315.0	NW	0.0	0.0
13/11/23	22	20.7	49.3	0.5	1.8	315.0	NW	0.0	0.0
13/11/23	23	20.3	49.0	0.2	0.7	315.0	NW	0.0	0.0
13/11/23	24	19.7	50.3	0.5	1.8	270.0	W	0.0	0.0
14/11/23	1	19.4	52.7	0.2	0.6	45.0	NE	0.0	0.0
14/11/23	2	17.7	53.9	0.4	1.4	45.0	NE	0.0	0.0
14/11/23	3	16.3	56.3	1.2	4.3	45.0	NE	0.0	0.0
14/11/23	4	13.8	57.8	0.7	2.5	157.5	SES	0.0	0.0
14/11/23	5	13.1	59.2	1.2	4.3	360.0	N	0.0	0.0
14/11/23	6	14.2	59.7	0.9	3.1	22.5	NNE	0.0	0.0
14/11/23	7	16.3	59.0	1.4	4.9	180.0	S	0.0	0.0
14/11/23	8	18.7	58.5	1.1	4.0	67.5	ENE	0.0	0.0
14/11/23	9	20.6	58.1	1.2	4.3	225.0	SW	0.0	0.0
14/11/23	10	21.6	56.9	1.2	4.3	270.0	W	0.0	0.0
14/11/23	11	23.8	55.7	1.7	6.1	270.0	W	0.0	0.0
14/11/23	12	24.4	53.1	2.2	7.9	270.0	W	0.0	0.0
14/11/23	13	24.8	51.5	2.2	8.0	315.0	NW	0.0	0.0
14/11/23	14	24.5	50.2	2.3	8.3	315.0	NW	0.0	0.0
14/11/23	15	24.2	48.6	2.5	9.0	90.0	E	0.0	0.0
14/11/23	16	24.0	47.5	1.9	6.8	90.0	E	0.0	0.0
14/11/23	17	23.6	46.8	3.7	13.3	337.5	NWN	0.0	0.0
14/11/23	18	23.3	46.1	2.2	8.0	315.0	NW	0.0	0.0
14/11/23	19	23.0	46.7	4.2	15.1	135.0	SE	0.0	0.0
14/11/23	20	22.3	47.3	1.6	5.8	135.0	SE	0.0	0.0
14/11/23	21	21.7	48.8	0.1	0.4	135.0	SE	0.0	0.0
14/11/23	22	20.5	49.4	0.7	2.5	135.0	SE	0.0	0.0
14/11/23	23	19.3	50.2	0.5	1.9	315.0	NW	0.0	0.0
14/11/23	24	18.4	50.7	0.2	0.6	225.0	SW	0.0	0.0
15/11/23	1	17.2	51.5	0.4	1.4	135.0	SE	0.0	0.0
15/11/23	2	15.4	53.6	0.7	2.5	135.0	SE	0.0	0.0
15/11/23	3	14.6	55.2	0.9	3.2	270.0	W	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
15/11/23	4	13.7	57.7	0.2	0.7	270.0	W	0.0	0.0
15/11/23	5	13.3	58.3	0.5	1.8	270.0	W	0.0	0.0
15/11/23	6	13.1	59.9	0.6	2.2	270.0	W	0.0	0.0
15/11/23	7	13.6	59.5	0.7	2.5	315.0	NW	0.0	0.0
15/11/23	8	15.5	58.2	2.2	7.9	135.0	SE	0.0	0.0
15/11/23	9	17.6	57.6	1.4	4.9	135.0	SE	0.0	0.0
15/11/23	10	20.2	55.7	1.2	4.3	270.0	W	0.0	0.0
15/11/23	11	22.7	53.4	1.1	4.0	270.0	W	0.0	0.0
15/11/23	12	24.2	52.8	2.2	7.9	315.0	NW	0.0	0.0
15/11/23	13	24.8	50.8	2.2	7.9	22.5	NNE	0.0	0.0
15/11/23	14	25.1	49.4	2.2	7.9	180.0	S	0.0	0.0
15/11/23	15	25.7	47.8	2.2	7.9	67.5	ENE	0.0	0.0
15/11/23	16	26.0	47.3	2.2	7.9	315.0	NW	0.0	0.0
15/11/23	17	25.4	46.6	2.5	9.0	112.5	ESE	0.0	0.0
15/11/23	18	24.8	46.2	1.2	4.3	247.5	SWW	0.0	0.0
15/11/23	19	24.0	47.5	1.1	4.0	157.5	SES	0.0	0.0
15/11/23	20	23.3	47.9	0.6	2.2	360.0	N	0.0	0.0
15/11/23	21	21.4	48.3	0.5	1.8	225.0	SW	0.0	0.0
15/11/23	22	20.9	48.7	0.4	1.4	270.0	W	0.0	0.0
15/11/23	23	20.3	49.2	0.3	1.1	135.0	SE	0.0	0.0
15/11/23	24	18.4	49.9	0.5	1.8	45.0	NE	0.0	0.0
16/11/23	1	17.3	51.7	0.2	0.7	270.0	W	0.0	0.0
16/11/23	2	17.0	53.8	0.4	1.4	270.0	W	0.0	0.0
16/11/23	3	16.3	55.4	0.5	1.8	315.0	NW	0.0	0.0
16/11/23	4	15.6	58.2	0.7	2.5	337.5	NWN	0.0	0.0
16/11/23	5	14.8	59.6	0.3	1.1	270.0	W	0.0	0.0
16/11/23	6	15.0	60.7	0.9	3.2	270.0	W	0.0	0.0
16/11/23	7	15.2	60.2	1.2	4.3	270.0	W	0.0	0.0
16/11/23	8	17.2	59.7	1.1	4.0	315.0	NW	0.0	0.0
16/11/23	9	17.9	58.6	1.4	5.0	270.0	W	0.0	0.0
16/11/23	10	18.4	56.4	1.8	6.5	270.0	W	0.0	0.0
16/11/23	11	20.5	53.7	1.3	4.7	270.0	W	0.0	0.0
16/11/23	12	22.3	52.1	2.2	8.0	270.0	W	0.0	0.0
16/11/23	13	25.7	50.4	2.6	9.4	315.0	NW	0.0	0.0
16/11/23	14	26.5	48.5	2.2	7.9	315.0	NW	0.0	0.0
16/11/23	15	26.8	47.7	2.2	7.9	315.0	NW	0.0	0.0
16/11/23	16	26.3	47.2	1.9	6.8	315.0	NW	0.0	0.0
16/11/23	17	26.0	46.8	1.4	4.9	315.0	NW	0.0	0.0
16/11/23	18	25.7	47.4	1.4	4.9	270.0	W	0.0	0.0
16/11/23	19	25.4	47.9	1.4	4.9	315.0	NW	0.0	0.0
16/11/23	20	25.0	48.2	0.7	2.5	135.0	SE	0.0	0.0
16/11/23	21	24.2	48.5	0.5	1.8	22.5	NNE	0.0	0.0
16/11/23	22	23.5	49.8	0.3	1.1	180.0	S	0.0	0.0
16/11/23	23	23.0	50.5	0.9	3.1	135.0	SE	0.0	0.0
16/11/23	24	21.7	51.4	0.3	1.1	67.5	ENE	0.0	0.0
17/11/23	1	20.5	53.7	0.2	0.6	202.5	SSW	0.0	0.0
17/11/23	2	18.4	55.5	0.9	3.1	112.5	ESE	0.0	0.0
17/11/23	3	20.3	56.9	1.1	4.0	247.5	SWW	0.0	0.0
17/11/23	4	13.9	58.8	0.5	1.8	157.5	SES	0.0	0.0
17/11/23	5	13.2	61.4	0.3	1.1	360.0	N	0.0	0.0
17/11/23	6	13.8	60.7	1.4	4.9	225.0	SW	0.0	0.0
17/11/23	7	15.1	60.2	1.4	4.9	225.0	SW	0.0	0.0
17/11/23	8	16.1	59.6	0.9	3.1	90.0	E	0.0	0.0
17/11/23	9	17.7	58.6	0.5	1.8	90.0	E	0.0	0.0
17/11/23	10	19.5	58.2	1.7	6.2	337.5	NWN	0.0	0.0
17/11/23	11	21.2	56.2	1.7	6.2	270.0	W	0.0	0.0
17/11/23	12	24.5	53.7	3.7	13.3	135.0	SE	0.0	0.0



Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
17/11/23	13	25.7	51.5	2.2	8.0	315.0	NW	0.0	0.0
17/11/23	14	26.6	50.4	1.9	6.8	315.0	NW	0.0	0.0
17/11/23	15	26.9	48.8	2.2	7.9	315.0	NW	0.0	0.0
17/11/23	16	27.1	47.3	1.9	6.8	315.0	NW	0.0	0.0
17/11/23	17	26.2	46.7	2.2	7.9	315.0	NW	0.0	0.0
17/11/23	18	25.8	46.2	0.5	1.8	315.0	NW	0.0	0.0
17/11/23	19	25.3	46.5	0.7	2.5	135.0	SE	0.0	0.0
17/11/23	20	25.2	46.9	0.5	1.8	225.0	SW	0.0	0.0
17/11/23	21	24.6	47.6	0.5	1.8	270.0	W	0.0	0.0
17/11/23	22	23.2	48.2	0.2	0.7	270.0	W	0.0	0.0
17/11/23	23	22.9	48.9	0.5	1.8	315.0	NW	0.0	0.0
17/11/23	24	20.5	49.7	0.4	1.4	315.0	NW	0.0	0.0
18/11/23	1	18.6	50.9	0.3	1.1	45.0	NE	0.0	0.0
18/11/23	2	15.4	52.4	0.2	0.7	45.0	NE	0.0	0.0
18/11/23	3	13.5	54.8	0.5	1.8	45.0	NE	0.0	0.0
18/11/23	4	13.5	57.9	0.5	1.8	135.0	SE	0.0	0.0
18/11/23	5	13.4	59.3	0.2	0.7	135.0	SE	0.0	0.0
18/11/23	6	13.9	60.2	0.8	2.9	135.0	SE	0.0	0.0
18/11/23	7	14.2	60.0	1.1	4.0	135.0	SE	0.0	0.0
18/11/23	8	15.1	59.4	1.4	5.0	315.0	NW	0.0	0.0
18/11/23	9	16.4	58.5	1.2	4.3	315.0	NW	0.0	0.0
18/11/23	10	18.2	57.6	2.2	7.9	225.0	SW	0.0	0.0
18/11/23	11	20.4	55.7	2.2	7.9	135.0	SE	0.0	0.0
18/11/23	12	23.8	54.1	2.2	7.9	135.0	SE	0.0	0.0
18/11/23	13	25.9	51.8	2.3	8.3	270.0	W	0.0	0.0
18/11/23	14	26.6	50.7	2.2	7.9	270.0	W	0.0	0.0
18/11/23	15	27.1	48.2	3.7	13.3	315.0	NW	0.0	0.0
18/11/23	16	27.3	47.4	2.2	7.9	337.5	NWN	0.0	0.0
18/11/23	17	25.8	47.0	2.2	7.9	90.0	E	0.0	0.0
18/11/23	18	25.3	47.9	2.2	7.9	360.0	N	0.0	0.0
18/11/23	19	25.0	48.3	1.7	6.1	225.0	SW	0.0	0.0
18/11/23	20	24.7	49.1	0.5	1.8	90.0	E	0.0	0.0
18/11/23	21	22.5	49.9	0.5	1.8	135.0	SE	0.0	0.0
18/11/23	22	21.4	50.2	0.1	0.4	225.0	SW	0.0	0.0
18/11/23	23	20.3	50.7	0.5	1.8	135.0	SE	0.0	0.0
18/11/23	24	18.4	51.9	0.2	0.7	135.0	SE	0.0	0.0
19/11/23	1	17.2	53.4	1.4	4.9	135.0	SE	0.0	0.0
19/11/23	2	15.0	54.9	0.3	1.1	135.0	SE	0.0	0.0
19/11/23	3	13.7	56.8	0.1	0.4	135.0	SE	0.0	0.0
19/11/23	4	13.3	59.1	0.4	1.4	315.0	NW	0.0	0.0
19/11/23	5	13.1	60.7	0.5	1.8	315.0	NW	0.0	0.0
19/11/23	6	13.2	61.1	0.5	1.8	315.0	NW	0.0	0.0
19/11/23	7	16.5	60.6	0.7	2.5	270.0	W	0.0	0.0
19/11/23	8	18.5	60.0	1.2	4.3	45.0	NE	0.0	0.0
19/11/23	9	19.2	59.5	0.9	3.1	45.0	NE	0.0	0.0
19/11/23	10	21.6	57.5	1.4	5.0	45.0	NE	0.0	0.0
19/11/23	11	24.3	54.9	2.2	8.0	270.0	W	0.0	0.0
19/11/23	12	25.4	53.3	1.8	6.5	135.0	SE	0.0	0.0
19/11/23	13	25.9	51.7	2.2	7.9	135.0	SE	0.0	0.0
19/11/23	14	26.7	49.6	3.7	13.3	315.0	NW	0.0	0.0
19/11/23	15	26.2	48.1	2.2	7.9	315.0	NW	0.0	0.0
19/11/23	16	25.7	46.6	2.2	7.9	135.0	SE	0.0	0.0
19/11/23	17	25.3	46.2	1.5	5.4	135.0	SE	0.0	0.0
19/11/23	18	24.3	45.8	2.2	7.9	135.0	SE	0.0	0.0
19/11/23	19	23.9	46.4	0.8	2.9	135.0	SE	0.0	0.0
19/11/23	20	22.6	47.4	0.5	1.8	135.0	SE	0.0	0.0
19/11/23	21	22.2	48.2	0.3	1.1	360.0	N	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
19/11/23	22	21.8	49.3	0.2	0.7	225.0	SW	0.0	0.0
19/11/23	23	21.3	50.3	0.1	0.4	225.0	SW	0.0	0.0
19/11/23	24	20.6	51.8	0.7	2.5	90.0	E	0.0	0.0
20/11/23	1	19.8	53.7	0.3	1.1	90.0	E	0.0	0.0
20/11/23	2	18.3	55.6	1.2	4.3	90.0	E	0.0	0.0
20/11/23	3	17.5	57.3	0.5	1.8	337.5	NWN	0.0	0.0
20/11/23	4	15.5	59.7	0.2	0.7	270.0	W	0.0	0.0
20/11/23	5	14.4	60.2	0.9	3.1	270.0	W	0.0	0.0
20/11/23	6	13.4	61.4	0.5	1.8	315.0	NW	0.0	0.0
20/11/23	7	15.3	61.0	0.7	2.5	135.0	SE	0.0	0.0
20/11/23	8	17.4	60.3	2.2	7.9	135.0	SE	0.0	0.0
20/11/23	9	19.9	59.8	1.2	4.3	135.0	SE	0.0	0.0
20/11/23	10	21.5	59.1	1.1	4.0	135.0	SE	0.0	0.0
20/11/23	11	23.4	57.6	2.2	7.9	135.0	SE	0.0	0.0
20/11/23	12	24.2	55.3	1.8	6.5	315.0	NW	0.0	0.0
20/11/23	13	24.9	52.8	2.2	7.9	315.0	NW	0.0	0.0
20/11/23	14	25.4	50.4	2.2	8.0	315.0	NW	0.0	0.0
20/11/23	15	26.8	48.5	2.6	9.4	315.0	NW	0.0	0.0
20/11/23	16	26.3	48.0	2.4	8.6	315.0	NW	0.0	0.0
20/11/23	17	26.0	48.2	2.2	7.9	225.0	SW	0.0	0.0
20/11/23	18	25.7	48.8	1.7	6.2	270.0	W	0.0	0.0
20/11/23	19	25.4	49.6	2.2	7.9	270.0	W	0.0	0.0
20/11/23	20	25.1	50.3	0.6	2.2	270.0	W	0.0	0.0
20/11/23	21	24.6	51.7	0.3	1.1	45.0	NE	0.0	0.0
20/11/23	22	24.0	51.9	0.5	1.8	180.0	S	0.0	0.0
20/11/23	23	23.8	53.2	0.9	3.1	67.5	ENE	0.0	0.0
20/11/23	24	21.0	54.8	0.5	1.8	202.5	SSW	0.0	0.0
21/11/23	1	20.4	55.5	0.4	1.4	135.0	SE	0.0	0.0
21/11/23	2	18.2	57.1	0.3	1.1	247.5	SWW	0.0	0.0
21/11/23	3	16.4	58.7	0.5	1.8	135.0	SE	0.0	0.0
21/11/23	4	14.4	59.3	0.5	1.8	360.0	N	0.0	0.0
21/11/23	5	13.7	60.1	0.6	2.2	225.0	SW	0.0	0.0
21/11/23	6	14.2	59.7	0.8	2.9	225.0	SW	0.0	0.0
21/11/23	7	16.8	58.4	0.9	3.1	90.0	E	0.0	0.0
21/11/23	8	19.5	57.9	1.2	4.3	337.5	NWN	0.0	0.0
21/11/23	9	20.4	57.2	1.1	4.0	270.0	W	0.0	0.0
21/11/23	10	21.7	55.3	1.4	5.0	270.0	W	0.0	0.0
21/11/23	11	23.5	52.8	1.7	6.1	270.0	W	0.0	0.0
21/11/23	12	24.8	51.2	2.2	8.0	135.0	SE	0.0	0.0
21/11/23	13	25.1	50.0	2.2	7.9	315.0	NW	0.0	0.0
21/11/23	14	25.8	49.7	2.6	9.4	315.0	NW	0.0	0.0
21/11/23	15	26.7	49.3	2.6	9.4	315.0	NW	0.0	0.0
21/11/23	16	26.4	49.0	2.2	7.9	315.0	NW	0.0	0.0
21/11/23	17	25.8	49.6	1.2	4.3	315.0	NW	0.0	0.0
21/11/23	18	25.3	50.3	0.8	2.9	315.0	NW	0.0	0.0
21/11/23	19	25.0	51.1	0.9	3.1	135.0	SE	0.0	0.0
21/11/23	20	24.7	51.7	0.2	0.6	315.0	NW	0.0	0.0
21/11/23	21	24.3	52.4	0.7	2.5	315.0	NW	0.0	0.0
21/11/23	22	24.1	52.9	1.1	4.0	315.0	NW	0.0	0.0
21/11/23	23	23.6	53.6	0.1	0.4	45.0	NE	0.0	0.0
21/11/23	24	21.4	54.9	0.2	0.7	45.0	NE	0.0	0.0
22/11/23	1	19.3	55.3	0.3	1.1	45.0	NE	0.0	0.0
22/11/23	2	16.2	57.8	0.7	2.5	135.0	SE	0.0	0.0
22/11/23	3	14.4	59.4	0.1	0.4	135.0	SE	0.0	0.0
22/11/23	4	13.9	60.4	0.3	1.1	22.5	NNE	0.0	0.0
22/11/23	5	13.4	61.3	0.5	1.8	180.0	S	0.0	0.0
22/11/23	6	13.7	61.6	0.8	2.9	67.5	ENE	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
22/11/23	7	16.6	61.1	1.9	6.8	202.5	SSW	0.0	0.0
22/11/23	8	19.5	60.6	1.2	4.3	112.5	ESE	0.0	0.0
22/11/23	9	21.7	59.4	1.4	5.0	247.5	SWW	0.0	0.0
22/11/23	10	23.8	58.8	2.2	7.9	157.5	SES	0.0	0.0
22/11/23	11	26.1	58.2	2.2	7.9	360.0	N	0.0	0.0
22/11/23	12	27.9	57.7	1.9	6.8	225.0	SW	0.0	0.0
22/11/23	13	28.3	56.3	2.3	8.3	90.0	E	0.0	0.0
22/11/23	14	28.4	54.7	2.4	8.6	90.0	E	0.0	0.0
22/11/23	15	29.2	53.1	1.7	6.2	135.0	SE	0.0	0.0
22/11/23	16	28.6	51.6	3.7	13.3	315.0	NW	0.0	0.0
22/11/23	17	28.1	48.9	1.7	6.2	270.0	W	0.0	0.0
22/11/23	18	28.0	47.3	2.6	9.4	315.0	NW	0.0	0.0
22/11/23	19	27.7	46.8	1.3	4.7	135.0	SE	0.0	0.0
22/11/23	20	27.5	47.5	0.7	2.5	270.0	W	0.0	0.0
22/11/23	21	27.1	48.2	0.7	2.5	270.0	W	0.0	0.0
22/11/23	22	25.3	49.4	0.1	0.4	135.0	SE	0.0	0.0
22/11/23	23	24.1	50.8	0.5	1.8	315.0	NW	0.0	0.0
22/11/23	24	23.8	52.6	0.4	1.4	135.0	SE	0.0	0.0
23/11/23	1	23.2	54.8	0.3	1.1	135.0	SE	0.0	0.0
23/11/23	2	21.1	57.9	0.9	3.1	270.0	W	0.0	0.0
23/11/23	3	19.5	58.4	0.5	1.8	270.0	W	0.0	0.0
23/11/23	4	18.5	60.3	0.3	1.1	315.0	NW	0.0	0.0
23/11/23	5	14.4	61.8	0.5	1.8	45.0	NE	0.0	0.0
23/11/23	6	13.6	62.7	0.6	2.2	45.0	NE	0.0	0.0
23/11/23	7	15.2	62.2	0.8	2.9	67.5	ENE	0.0	0.0
23/11/23	8	18.5	61.8	1.1	4.0	202.5	SSW	0.0	0.0
23/11/23	9	20.3	61.3	1.9	6.8	45.0	NE	0.0	0.0
23/11/23	10	22.5	60.4	1.4	5.0	22.5	NNE	0.0	0.0
23/11/23	11	25.7	57.9	1.1	4.0	180.0	S	0.0	0.0
23/11/23	12	27.7	55.2	1.4	5.0	135.0	SE	0.0	0.0
23/11/23	13	29.5	54.1	2.1	7.6	135.0	SE	0.0	0.0
23/11/23	14	28.6	52.5	2.4	8.6	315.0	NW	0.0	0.0
23/11/23	15	28.9	51.3	2.2	7.9	315.0	NW	0.0	0.0
23/11/23	16	28.4	50.7	2.7	9.7	135.0	SE	0.0	0.0
23/11/23	17	30.2	49.3	3.8	13.7	315.0	NW	0.0	0.0
23/11/23	18	29.5	48.6	4.2	15.1	225.0	SW	0.0	0.0
23/11/23	19	29.1	47.3	3.6	13.0	225.0	SW	0.0	0.0
23/11/23	20	28.7	48.1	1.5	5.4	90.0	E	0.0	0.0
23/11/23	21	28.4	48.8	0.8	2.9	90.0	E	0.0	0.0
23/11/23	22	27.9	49.3	1.4	4.9	337.5	NWN	0.0	0.0
23/11/23	23	27.3	49.9	0.2	0.7	112.5	ESE	0.0	0.0
23/11/23	24	25.7	50.5	0.2	0.7	247.5	SWW	0.0	0.0
24/11/23	1	23.2	52.8	0.6	2.2	157.5	SES	0.0	0.0
24/11/23	2	20.4	54.7	0.4	1.4	360.0	N	0.0	0.0
24/11/23	3	17.5	57.3	0.5	1.8	135.0	SE	0.0	0.0
24/11/23	4	15.2	59.4	0.7	2.5	135.0	SE	0.0	0.0
24/11/23	5	15.2	60.4	0.5	1.8	135.0	SE	0.0	0.0
24/11/23	6	15.8	61.1	0.7	2.5	135.0	SE	0.0	0.0
24/11/23	7	16.3	60.7	0.6	2.2	135.0	SE	0.0	0.0
24/11/23	8	17.9	59.4	0.7	2.5	225.0	SW	0.0	0.0
24/11/23	9	19.3	58.7	0.9	3.2	270.0	W	0.0	0.0
24/11/23	10	20.0	56.4	1.1	4.0	270.0	W	0.0	0.0
24/11/23	11	21.6	53.8	1.4	5.0	270.0	W	0.0	0.0
24/11/23	12	23.5	52.1	2.2	8.0	315.0	NW	0.0	0.0
24/11/23	13	26.4	50.4	2.3	8.3	315.0	NW	0.0	0.0
24/11/23	14	28.9	48.7	2.7	9.7	315.0	NW	0.0	0.0
24/11/23	15	29.0	48.2	2.2	7.9	315.0	NW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
24/11/23	16	28.4	47.7	1.3	4.7	315.0	NW	0.0	0.0
24/11/23	17	28.0	47.5	1.4	4.9	315.0	NW	0.0	0.0
24/11/23	18	27.8	47.9	0.8	2.9	22.5	NNE	0.0	0.0
24/11/23	19	27.4	48.4	0.6	2.2	180.0	S	0.0	0.0
24/11/23	20	27.0	49.1	0.1	0.4	67.5	ENE	0.0	0.0
24/11/23	21	26.5	49.8	0.2	0.7	202.5	SSW	0.0	0.0
24/11/23	22	26.0	50.7	0.4	1.4	112.5	ESE	0.0	0.0
24/11/23	23	25.5	52.7	0.2	0.7	247.5	SWW	0.0	0.0
24/11/23	24	25.0	53.9	0.5	1.8	157.5	SES	0.0	0.0
25/11/23	1	23.7	55.2	0.3	1.1	360.0	N	0.0	0.0
25/11/23	2	21.5	57.5	0.9	3.1	225.0	SW	0.0	0.0
25/11/23	3	20.8	58.4	0.2	0.7	225.0	SW	0.0	0.0
25/11/23	4	17.3	59.9	0.3	1.1	90.0	E	0.0	0.0
25/11/23	5	14.2	60.7	0.5	1.8	90.0	E	0.0	0.0
25/11/23	6	13.5	61.0	0.5	1.8	337.5	NWN	0.0	0.0
25/11/23	7	16.4	60.2	0.7	2.5	270.0	W	0.0	0.0
25/11/23	8	18.7	59.8	0.9	3.2	135.0	SE	0.0	0.0
25/11/23	9	21.4	59.2	1.2	4.3	135.0	SE	0.0	0.0
25/11/23	10	23.5	57.4	1.4	5.0	225.0	SW	0.0	0.0
25/11/23	11	25.3	55.4	2.2	8.0	135.0	SE	0.0	0.0
25/11/23	12	26.8	54.3	1.8	6.5	135.0	SE	0.0	0.0
25/11/23	13	28.8	52.8	2.2	7.9	315.0	NW	0.0	0.0
25/11/23	14	28.9	51.3	2.3	8.3	315.0	NW	0.0	0.0
25/11/23	15	28.4	49.6	2.6	9.4	315.0	NW	0.0	0.0
25/11/23	16	28.1	47.2	1.3	4.7	315.0	NW	0.0	0.0
25/11/23	17	27.7	46.8	4.2	15.1	315.0	NW	0.0	0.0
25/11/23	18	27.3	46.3	1.6	5.8	315.0	NW	0.0	0.0
25/11/23	19	26.6	46.9	0.9	3.2	135.0	SE	0.0	0.0
25/11/23	20	25.6	47.4	0.6	2.2	45.0	NE	0.0	0.0
25/11/23	21	24.4	48.2	0.2	0.7	45.0	NE	0.0	0.0
25/11/23	22	23.8	48.8	0.4	1.4	135.0	SE	0.0	0.0
25/11/23	23	23.4	49.5	0.1	0.4	225.0	SW	0.0	0.0
25/11/23	24	23.1	51.8	0.2	0.7	22.5	NNE	0.0	0.0
26/11/23	1	21.7	53.5	0.3	1.1	22.5	NNE	0.0	0.0
26/11/23	2	19.7	54.6	1.2	4.3	180.0	S	0.0	0.0
26/11/23	3	17.6	56.2	0.9	3.1	67.5	ENE	0.0	0.0
26/11/23	4	14.7	58.7	0.4	1.4	202.5	SSW	0.0	0.0
26/11/23	5	13.6	59.2	1.4	4.9	112.5	ESE	0.0	0.0
26/11/23	6	15.2	60.2	0.9	3.1	247.5	SWW	0.0	0.0
26/11/23	7	16.9	59.7	1.2	4.3	157.5	SES	0.0	0.0
26/11/23	8	17.8	57.4	0.5	1.8	360.0	N	0.0	0.0
26/11/23	9	20.4	54.6	0.7	2.5	225.0	SW	0.0	0.0
26/11/23	10	21.7	52.9	0.6	2.2	202.5	SSW	0.0	0.0
26/11/23	11	24.8	51.4	1.3	4.7	202.5	SSW	0.0	0.0
26/11/23	12	27.3	50.3	2.2	7.9	337.5	NWN	0.0	0.0
26/11/23	13	28.8	47.7	2.2	7.9	225.0	SW	0.0	0.0
26/11/23	14	29.0	45.5	2.7	9.7	45.0	NE	0.0	0.0
26/11/23	15	28.4	43.9	1.5	5.4	315.0	NW	0.0	0.0
26/11/23	16	28.0	44.0	0.6	2.2	45.0	NE	0.0	0.0
26/11/23	17	27.7	44.3	1.4	4.9	45.0	NE	0.0	0.0
26/11/23	18	27.4	43.6	0.5	1.8	112.5	ESE	0.0	0.0
26/11/23	19	27.0	43.9	2.2	7.9	247.5	SWW	0.0	0.0
26/11/23	20	26.5	45.0	0.7	2.5	157.5	SES	0.0	0.0
26/11/23	21	26.2	44.4	0.1	0.4	360.0	N	0.0	0.0
26/11/23	22	25.6	45.5	0.2	0.7	225.0	SW	0.0	0.0
26/11/23	23	24.7	47.9	0.9	3.1	202.5	SSW	0.0	0.0
26/11/23	24	22.4	48.0	0.1	0.4	337.5	NWN	0.0	0.0



Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
27/11/23	1	20.6	49.5	0.2	0.6	22.5	NNE	0.0	0.0
27/11/23	2	19.1	52.8	0.9	3.1	180.0	S	0.0	0.0
27/11/23	3	18.4	56.3	0.9	3.1	60.0	ENE	0.0	0.0
27/11/23	4	16.5	58.6	0.4	1.4	67.5	ENE	0.0	0.0
27/11/23	5	14.8	59.2	0.5	1.8	202.5	SSW	0.0	0.0
27/11/23	6	13.7	60.4	1.4	4.9	135.0	SE	0.0	0.0
27/11/23	7	14.9	59.9	1.4	4.9	270.0	W	0.0	0.0
27/11/23	8	15.3	57.3	0.6	2.2	270.0	W	0.0	0.0
27/11/23	9	16.4	52.5	0.6	2.2	270.0	W	0.0	0.0
27/11/23	10	17.9	51.4	1.7	6.2	270.0	W	0.0	0.0
27/11/23	11	20.5	49.7	1.7	6.2	270.0	W	0.0	0.0
27/11/23	12	23.7	47.0	2.1	7.6	270.0	W	0.0	0.0
27/11/23	13	26.9	45.6	2.2	8.0	315.0	NW	0.0	0.0
27/11/23	14	27.8	45.3	2.6	9.4	315.0	NW	0.0	0.0
27/11/23	15	28.2	43.7	2.3	8.3	135.0	SE	0.0	0.0
27/11/23	16	28.5	45.0	1.9	6.8	315.0	NW	0.0	0.0
27/11/23	17	27.9	44.2	1.4	5.0	270.0	W	0.0	0.0
27/11/23	18	27.0	46.8	1.7	6.1	270.0	W	0.0	0.0
27/11/23	19	25.6	48.5	1.5	5.4	135.0	SE	0.0	0.0
27/11/23	20	24.3	51.2	0.1	0.4	135.0	SE	0.0	0.0
27/11/23	21	23.2	50.3	0.2	0.7	135.0	SE	0.0	0.0
27/11/23	22	21.6	51.6	0.2	0.7	225.0	SW	0.0	0.0
27/11/23	23	20.8	52.6	0.2	0.7	270.0	W	0.0	0.0
27/11/23	24	20.3	53.5	0.2	0.7	270.0	W	0.0	0.0
28/11/23	1	19.5	55.3	0.3	1.1	270.0	W	0.0	0.0
28/11/23	2	17.7	55.7	0.3	1.1	270.0	W	0.0	0.0
28/11/23	3	15.6	53.9	0.4	1.4	135.0	SE	0.0	0.0
28/11/23	4	14.4	58.4	1.3	4.7	135.0	SE	0.0	0.0
28/11/23	5	13.7	59.3	0.9	3.1	135.0	SE	0.0	0.0
28/11/23	6	13.8	57.6	1.2	4.3	135.0	SE	0.0	0.0
28/11/23	7	14.9	56.3	0.5	1.8	135.0	SE	0.0	0.0
28/11/23	8	16.5	54.7	0.7	2.5	270.0	W	0.0	0.0
28/11/23	9	18.4	53.8	0.7	2.5	315.0	NW	0.0	0.0
28/11/23	10	20.5	50.6	2.2	7.9	315.0	NW	0.0	0.0
28/11/23	11	23.1	52.9	2.6	9.4	270.0	W	0.0	0.0
28/11/23	12	25.2	49.5	2.3	8.3	270.0	W	0.0	0.0
28/11/23	13	26.4	46.4	1.3	4.7	315.0	NW	0.0	0.0
28/11/23	14	26.9	44.4	0.9	3.2	270.0	W	0.0	0.0
28/11/23	15	26.6	44.6	2.4	8.6	315.0	NW	0.0	0.0
28/11/23	16	26.1	45.5	1.1	4.0	315.0	NW	0.0	0.0
28/11/23	17	25.4	43.6	2.7	9.7	315.0	NW	0.0	0.0
28/11/23	18	24.7	43.6	1.4	5.0	22.5	NNE	0.0	0.0
28/11/23	19	24.2	43.9	1.9	6.8	180.0	S	0.0	0.0
28/11/23	20	23.6	43.9	0.6	2.2	67.5	ENE	0.0	0.0
28/11/23	21	22.8	46.8	0.9	3.1	202.5	SSW	0.0	0.0
28/11/23	22	22.3	46.8	0.1	0.4	112.5	ESE	0.0	0.0
28/11/23	23	21.7	49.3	0.5	1.8	247.5	SWW	0.0	0.0
28/11/23	24	21.4	50.2	0.4	1.4	157.5	SES	0.0	0.0
29/11/23	1	20.7	51.9	0.4	1.4	360.0	N	0.0	0.0
29/11/23	2	19.6	53.5	0.9	3.1	225.0	SW	0.0	0.0
29/11/23	3	17.4	56.5	0.3	1.1	202.5	SSW	0.0	0.0
29/11/23	4	14.6	58.0	1.2	4.3	337.5	NWN	0.0	0.0
29/11/23	5	13.6	59.3	0.5	1.8	90.0	E	0.0	0.0
29/11/23	6	15.7	58.2	1.2	4.3	135.0	SE	0.0	0.0
29/11/23	7	17.2	57.6	0.7	2.5	135.0	SE	0.0	0.0
29/11/23	8	17.8	56.3	1.2	4.3	135.0	SE	0.0	0.0
29/11/23	9	18.9	54.7	1.1	4.0	315.0	NW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
29/11/23	10	20.3	54.0	2.2	7.9	315.0	NW	0.0	0.0
29/11/23	11	22.6	53.8	1.4	5.0	270.0	W	0.0	0.0
29/11/23	12	24.2	53.5	2.2	7.9	270.0	W	0.0	0.0
29/11/23	13	25.8	51.5	2.2	7.9	270.0	W	0.0	0.0
29/11/23	14	27.2	49.7	2.2	7.9	315.0	NW	0.0	0.0
29/11/23	15	27.6	47.5	2.7	9.7	315.0	NW	0.0	0.0
29/11/23	16	27.3	45.2	3.7	13.3	315.0	NW	0.0	0.0
29/11/23	17	27.0	45.0	4.2	15.1	270.0	W	0.0	0.0
29/11/23	18	26.2	45.4	2.1	7.6	270.0	W	0.0	0.0
29/11/23	19	25.1	45.8	1.2	4.3	315.0	NW	0.0	0.0
29/11/23	20	24.3	47.0	0.7	2.5	135.0	SE	0.0	0.0
29/11/23	21	23.2	46.5	0.1	0.4	270.0	W	0.0	0.0
29/11/23	22	22.4	48.2	0.2	0.6	45.0	NE	0.0	0.0
29/11/23	23	21.7	48.5	0.2	0.7	45.0	NE	0.0	0.0
29/11/23	24	21.4	48.0	0.6	2.2	45.0	NE	0.0	0.0
30/11/23	1	20.2	49.1	0.2	0.7	135.0	SE	0.0	0.0
30/11/23	2	18.7	48.9	0.4	1.4	135.0	SE	0.0	0.0
30/11/23	3	17.1	50.6	0.2	0.6	22.5	NNE	0.0	0.0
30/11/23	4	15.3	52.1	0.4	1.4	180.0	S	0.0	0.0
30/11/23	5	13.7	55.8	0.9	3.1	67.5	ENE	0.0	0.0
30/11/23	6	14.6	53.7	1.2	4.3	202.5	SSW	0.0	0.0
30/11/23	7	16.1	54.3	0.6	2.2	112.5	ESE	0.0	0.0
30/11/23	8	17.2	53.5	1.1	4.0	247.5	SWW	0.0	0.0
30/11/23	9	18.4	52.0	1.9	6.8	360.0	N	0.0	0.0
30/11/23	10	20.5	48.7	2.2	8.0	157.5	SES	0.0	0.0
30/11/23	11	22.4	46.2	2.2	7.9	225.0	SW	0.0	0.0
30/11/23	12	24.4	43.8	0.8	2.9	202.5	SSW	0.0	0.0
30/11/23	13	25.3	44.0	2.2	7.9	90.0	E	0.0	0.0
30/11/23	14	26.5	43.9	1.7	6.1	360.0	N	0.0	0.0
30/11/23	15	27.4	43.6	1.9	6.8	337.5	NWN	0.0	0.0
30/11/23	16	28.1	45.0	2.1	7.6	270.0	W	0.0	0.0
30/11/23	17	27.0	43.6	1.3	4.7	270.0	W	0.0	0.0
30/11/23	18	27.3	45.1	0.8	2.9	270.0	W	0.0	0.0
30/11/23	19	25.7	45.8	1.2	4.3	270.0	W	0.0	0.0
30/11/23	20	25.1	46.5	0.6	2.2	135.0	SE	0.0	0.0
30/11/23	21	24.3	47.2	0.9	3.1	202.5	SSW	0.0	0.0
30/11/23	22	22.2	48.5	0.7	2.5	112.5	ESE	0.0	0.0
30/11/23	23	20.6	49.0	0.2	0.7	247.5	SWW	0.0	0.0
30/11/23	24	19.6	50.3	0.5	1.8	157.5	SES	0.0	0.0
12/01/23	1	18.8	52.5	0.9	3.3	135.0	SE	0.0	0.0
12/01/23	2	18.3	54.6	0.9	3.1	45.0	NE	0.0	0.0
12/01/23	3	16.6	56.2	0.3	1.1	45.0	NE	0.0	0.0
12/01/23	4	14.7	56.7	0.2	0.8	157.5	SES	0.0	0.0
12/01/23	5	13.6	57.4	1.2	4.3	315.0	NW	0.0	0.0
12/01/23	6	14.5	56.9	0.6	2.2	225.0	SW	0.0	0.0
12/01/23	7	15.7	56.0	0.7	2.5	315.0	NW	0.0	0.0
12/01/23	8	17.1	54.6	1.3	4.7	225.0	SW	0.0	0.0
12/01/23	9	18.8	54.1	2.2	7.9	270.0	W	0.0	0.0
12/01/23	10	20.4	53.3	1.6	5.8	67.5	ENE	0.0	0.0
12/01/23	11	22.2	50.0	2.4	8.6	135.0	SE	0.0	0.0
12/01/23	12	23.6	48.3	1.1	4.0	270.0	W	0.0	0.0
12/01/23	13	24.3	47.6	2.2	7.8	315.0	NW	0.0	0.0
12/01/23	14	25.1	47.0	2.7	9.7	315.0	NW	0.0	0.0
12/01/23	15	25.7	46.7	1.3	4.7	315.0	NW	0.0	0.0
12/01/23	16	26.2	46.4	1.1	4.0	315.0	NW	0.0	0.0
12/01/23	17	26.3	47.3	1.4	5.0	315.0	NW	0.0	0.0
12/01/23	18	25.3	46.8	4.2	15.1	135.0	SE	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
12/01/23	19	24.3	47.9	1.1	4.0	202.5	SSW	0.0	0.0
12/01/23	20	23.6	48.4	0.7	2.4	22.5	NNE	0.0	0.0
12/01/23	21	23.2	48.9	1.3	4.7	270.0	W	0.0	0.0
12/01/23	22	21.6	49.6	0.2	0.8	247.5	SWW	0.0	0.0
12/01/23	23	20.5	50.2	1.1	3.9	225.0	SW	0.0	0.0
12/01/23	24	19.0	51.4	0.7	2.4	292.5	WNW	0.0	0.0
12/02/23	1	17.7	53.3	1.7	6.3	45.0	NE	0.0	0.0
12/02/23	2	16.3	55.6	1.1	4.0	45.0	NE	0.0	0.0
12/02/23	3	14.7	58.3	0.7	2.4	45.0	NE	0.0	0.0
12/02/23	4	13.8	59.2	0.7	2.4	157.5	SES	0.0	0.0
12/02/23	5	13.5	58.7	1.1	3.9	45.0	NE	0.0	0.0
12/02/23	6	14.9	56.6	0.6	2.2	270.0	W	0.0	0.0
12/02/23	7	16.7	57.9	1.1	3.9	180.0	S	0.0	0.0
12/02/23	8	18.3	56.4	1.4	5.0	225.0	SW	0.0	0.0
12/02/23	9	20.2	55.2	1.7	6.1	112.5	ESE	0.0	0.0
12/02/23	10	21.7	52.8	1.1	4.0	270.0	W	0.0	0.0
12/02/23	11	23.1	51.4	2.3	8.3	270.0	W	0.0	0.0
12/02/23	12	23.7	49.7	4.2	15.1	270.0	W	0.0	0.0
12/02/23	13	24.4	47.3	2.4	8.6	315.0	NW	0.0	0.0
12/02/23	14	24.8	46.8	1.8	6.5	315.0	NW	0.0	0.0
12/02/23	15	25.3	44.9	2.7	9.7	315.0	NW	0.0	0.0
12/02/23	16	25.6	45.7	2.2	7.9	315.0	NW	0.0	0.0
12/02/23	17	24.8	45.3	2.3	8.3	135.0	SE	0.0	0.0
12/02/23	18	24.3	45.8	2.2	7.9	315.0	NW	0.0	0.0
12/02/23	19	23.1	46.4	0.7	2.5	315.0	NW	0.0	0.0
12/02/23	20	22.6	46.6	1.1	3.9	210.0	SSW	0.0	0.0
12/02/23	21	21.8	47.5	0.5	1.8	22.5	NNE	0.0	0.0
12/02/23	22	21.4	48.8	0.7	2.4	22.5	NNE	0.0	0.0
12/02/23	23	21.1	49.3	1.3	4.7	247.5	SWW	0.0	0.0
12/02/23	24	19.7	49.9	1.3	4.7	247.5	SWW	0.0	0.0
12/03/23	1	19.3	51.2	0.2	0.8	225.0	SW	0.0	0.0
12/03/23	2	18.4	53.8	0.5	1.8	225.0	SW	0.0	0.0
12/03/23	3	17.2	56.2	0.1	0.4	225.0	SW	0.0	0.0
12/03/23	4	15.3	56.9	0.5	1.8	292.5	WNW	0.0	0.0
12/03/23	5	15.5	54.2	0.5	1.8	292.5	WNW	0.0	0.0
12/03/23	6	17.2	57.8	0.5	1.8	180.0	S	0.0	0.0
12/03/23	7	19.2	55.5	1.7	6.3	45.0	NE	0.0	0.0
12/03/23	8	21.3	54.9	2.0	7.2	315.0	NW	0.0	0.0
12/03/23	9	21.7	52.1	0.6	2.2	360.0	N	0.0	0.0
12/03/23	10	22.6	50.7	1.1	4.0	157.5	SES	0.0	0.0
12/03/23	11	23.3	48.3	1.3	4.7	270.0	W	0.0	0.0
12/03/23	12	24.1	47.9	1.4	5.0	315.0	NW	0.0	0.0
12/03/23	13	24.5	47.0	2.2	7.9	315.0	NW	0.0	0.0
12/03/23	14	25.2	46.8	1.6	5.8	270.0	W	0.0	0.0
12/03/23	15	25.7	46.4	2.3	8.3	315.0	NW	0.0	0.0
12/03/23	16	26.1	46.1	1.2	4.3	135.0	SE	0.0	0.0
12/03/23	17	25.4	45.7	1.3	4.7	315.0	NW	0.0	0.0
12/03/23	18	24.4	45.5	1.2	4.3	315.0	NW	0.0	0.0
12/03/23	19	23.2	45.9	0.9	3.1	225.0	SW	0.0	0.0
12/03/23	20	21.7	46.6	1.3	4.7	22.5	NNE	0.0	0.0
12/03/23	21	20.6	48.2	0.4	1.4	45.0	NE	0.0	0.0
12/03/23	22	19.6	47.3	0.7	2.4	315.0	NW	0.0	0.0
12/03/23	23	18.7	48.6	0.7	2.4	315.0	NW	0.0	0.0
12/03/23	24	18.2	49.6	0.2	0.8	112.5	ESE	0.0	0.0
12/04/23	1	17.6	50.1	0.5	1.8	135.0	SE	0.0	0.0
12/04/23	2	16.6	53.8	0.9	3.1	202.5	SSW	0.0	0.0
12/04/23	3	15.2	54.5	0.9	3.1	22.5	NNE	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
12/04/23	4	14.3	56.7	1.7	6.3	270.0	W	0.0	0.0
12/04/23	5	12.9	58.3	0.7	2.4	315.0	NW	0.0	0.0
12/04/23	6	13.8	57.9	0.5	1.8	67.5	ENE	0.0	0.0
12/04/23	7	15.3	57.2	0.7	2.4	45.0	NE	0.0	0.0
12/04/23	8	17.2	56.5	1.3	4.7	45.0	NE	0.0	0.0
12/04/23	9	18.5	55.9	1.7	6.3	180.0	S	0.0	0.0
12/04/23	10	21.3	53.6	1.1	3.9	225.0	SW	0.0	0.0
12/04/23	11	22.5	51.7	2.1	7.6	225.0	SW	0.0	0.0
12/04/23	12	23.2	50.4	1.3	4.7	315.0	NW	0.0	0.0
12/04/23	13	23.7	48.9	1.6	5.8	315.0	NW	0.0	0.0
12/04/23	14	24.1	48.2	2.3	8.3	315.0	NW	0.0	0.0
12/04/23	15	24.4	46.2	2.2	7.9	270.0	W	0.0	0.0
12/04/23	16	24.7	44.8	2.3	8.3	315.0	NW	0.0	0.0
12/04/23	17	25.1	46.9	1.1	4.0	315.0	NW	0.0	0.0
12/04/23	18	24.3	46.9	0.7	2.5	270.0	W	0.0	0.0
12/04/23	19	22.4	42.6	0.5	1.8	135.0	SE	0.0	0.0
12/04/23	20	21.6	43.1	0.2	0.7	202.5	SSW	0.0	0.0
12/04/23	21	20.6	45.9	0.9	3.1	210.0	SSW	0.0	0.0
12/04/23	22	18.7	46.6	1.1	3.9	22.5	NNE	0.0	0.0
12/04/23	23	16.6	47.0	0.3	1.1	22.5	NNE	0.0	0.0
12/04/23	24	15.2	48.2	0.5	1.8	247.5	SWW	0.0	0.0
12/05/23	1	13.7	49.3	1.1	3.9	247.5	SWW	0.0	0.0
12/05/23	2	12.6	50.5	0.4	1.4	225.0	SW	0.0	0.0
12/05/23	3	11.4	52.7	0.9	3.1	225.0	SW	0.0	0.0
12/05/23	4	9.7	55.3	0.5	1.8	292.5	WNW	0.0	0.0
12/05/23	5	9.1	58.9	1.7	6.3	315.0	NW	0.0	0.0
12/05/23	6	11.1	59.2	0.5	1.8	270.0	W	0.0	0.0
12/05/23	7	12.9	59.0	1.1	3.9	45.0	NE	0.0	0.0
12/05/23	8	14.7	58.5	1.3	4.7	315.0	NW	0.0	0.0
12/05/23	9	16.2	57.9	0.5	1.8	225.0	SW	0.0	0.0
12/05/23	10	18.3	57.0	1.2	4.3	270.0	W	0.0	0.0
12/05/23	11	20.7	55.3	0.6	2.2	270.0	W	0.0	0.0
12/05/23	12	22.8	53.1	0.9	3.1	270.0	W	0.0	0.0
12/05/23	13	24.1	50.6	2.7	9.7	270.0	W	0.0	0.0
12/05/23	14	25.4	48.7	1.3	4.7	270.0	W	0.0	0.0
12/05/23	15	25.3	47.2	2.1	7.6	360.0	N	0.0	0.0
12/05/23	16	24.7	45.8	0.5	1.8	315.0	NW	0.0	0.0
12/05/23	17	24.2	42.7	1.6	5.8	270.0	W	0.0	0.0
12/05/23	18	23.1	43.9	2.2	7.9	270.0	W	0.0	0.0
12/05/23	19	22.2	46.7	0.7	2.5	67.5	ENE	0.0	0.0
12/05/23	20	21.0	47.3	1.1	3.9	180.0	S	0.0	0.0
12/05/23	21	19.3	48.5	0.5	1.8	202.5	SSW	0.0	0.0
12/05/23	22	17.7	49.2	0.2	0.7	22.5	NNE	0.0	0.0
12/05/23	23	16.2	50.5	1.3	4.7	247.5	SWW	0.0	0.0
12/05/23	24	14.6	52.7	0.2	0.7	225.0	SW	0.0	0.0
12/06/23	1	13.3	51.6	0.3	1.1	202.5	SSW	0.0	0.0
12/06/23	2	11.9	52.9	0.4	1.4	210.0	SSW	0.0	0.0
12/06/23	3	10.2	54.4	0.5	1.8	270.0	W	0.0	0.0
12/06/23	4	8.9	57.6	0.9	3.1	22.5	NNE	0.0	0.0
12/06/23	5	8.2	59.3	0.2	0.7	247.5	SWW	0.0	0.0
12/06/23	6	10.4	59.1	0.5	1.8	247.5	SWW	0.0	0.0
12/06/23	7	13.3	58.5	0.5	1.8	225.0	SW	0.0	0.0
12/06/23	8	15.5	57.8	1.6	5.8	225.0	SW	0.0	0.0
12/06/23	9	17.6	57.2	0.6	2.2	135.0	SE	0.0	0.0
12/06/23	10	19.9	56.4	1.1	4.0	225.0	SW	0.0	0.0
12/06/23	11	22.6	54.8	0.7	2.5	67.5	ENE	0.0	0.0
12/06/23	12	24.5	54.0	1.4	5.0	112.5	ESE	0.0	0.0



Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
12/06/23	13	24.7	58.3	2.6	9.4	270.0	W	0.0	0.0
12/06/23	14	24.8	62.8	4.2	15.1	270.0	W	0.0	0.0
12/06/23	15	25.2	68.4	2.2	7.9	157.5	SES	0.0	0.0
12/06/23	16	25.0	64.3	0.9	3.2	315.0	NW	0.0	0.0
12/06/23	17	23.1	70.2	2.2	7.9	45.0	NE	0.0	0.0
12/06/23	18	20.2	68.4	0.5	1.8	45.0	NE	0.0	0.0
12/06/23	19	18.6	60.0	1.3	4.7	45.0	NE	0.0	0.0
12/06/23	20	17.1	55.5	1.3	4.7	315.0	NW	0.0	0.0
12/06/23	21	16.3	71.3	0.2	0.7	315.0	NW	0.0	0.0
12/06/23	22	15.1	69.3	0.7	2.4	315.0	NW	0.0	0.0
12/06/23	23	13.6	69.3	0.7	2.4	45.0	NE	0.0	0.0
12/06/23	24	13.2	66.3	0.3	1.1	45.0	NE	0.0	0.0
12/07/23	1	12.6	64.5	0.2	0.8	225.0	SW	0.0	0.0
12/07/23	2	11.6	68.2	0.9	3.1	225.0	SW	0.0	0.0
12/07/23	3	10.4	62.2	0.9	3.1	292.5	WNW	0.0	0.0
12/07/23	4	9.9	65.4	1.7	6.3	225.0	SW	0.0	0.0
12/07/23	5	9.4	66.4	0.7	2.4	45.0	NE	0.0	0.0
12/07/23	6	11.1	68.5	1.3	4.7	45.0	NE	0.0	0.0
12/07/23	7	13.6	68.4	0.7	2.4	45.0	NE	0.0	0.0
12/07/23	8	15.8	65.3	0.8	2.9	135.0	SE	0.0	0.0
12/07/23	9	17.8	62.7	1.7	6.3	225.0	SW	0.0	0.0
12/07/23	10	20.1	58.3	1.1	3.9	360.0	N	0.0	0.0
12/07/23	11	22.1	54.2	1.4	5.0	270.0	W	0.0	0.0
12/07/23	12	23.8	51.8	1.3	4.7	270.0	W	0.0	0.0
12/07/23	13	25.6	49.7	2.3	8.3	270.0	W	0.0	0.0
12/07/23	14	26.1	48.2	2.3	8.3	67.5	ENE	0.0	0.0
12/07/23	15	25.7	47.8	2.2	7.9	270.0	W	0.0	0.0
12/07/23	16	25.2	47.3	2.2	7.9	270.0	W	0.0	0.0
12/07/23	17	24.9	46.9	2.2	7.9	270.0	W	0.0	0.0
12/07/23	18	23.7	46.5	1.2	4.3	90.0	E	0.0	0.0
12/07/23	19	22.4	46.0	2.2	8.1	315.0	NW	0.0	0.0
12/07/23	20	21.3	46.7	2.2	7.9	270.0	W	0.0	0.0
12/07/23	21	20.2	47.4	0.4	1.4	315.0	NW	0.0	0.0
12/07/23	22	18.8	47.9	0.1	0.4	315.0	NW	0.0	0.0
12/07/23	23	18.2	48.6	0.4	1.4	112.5	ESE	0.0	0.0
12/07/23	24	16.7	49.3	0.1	0.4	315.0	NW	0.0	0.0
12/08/23	1	15.6	51.7	0.6	2.2	157.5	SES	0.0	0.0
12/08/23	2	14.4	52.8	0.3	1.1	180.0	S	0.0	0.0
12/08/23	3	13.3	55.7	0.9	3.1	202.5	SSW	0.0	0.0
12/08/23	4	12.4	57.3	0.4	1.4	22.5	NNE	0.0	0.0
12/08/23	5	11.6	57.4	1.7	6.3	247.5	SWW	0.0	0.0
12/08/23	6	13.1	58.0	0.5	1.8	247.5	SWW	0.0	0.0
12/08/23	7	14.4	57.7	0.5	1.8	225.0	SW	0.0	0.0
12/08/23	8	15.8	56.3	2.2	7.9	225.0	SW	0.0	0.0
12/08/23	9	17.6	54.2	0.9	3.1	292.5	WNW	0.0	0.0
12/08/23	10	19.6	52.7	0.5	1.8	90.0	E	0.0	0.0
12/08/23	11	21.2	50.2	0.6	2.2	292.5	WNW	0.0	0.0
12/08/23	12	23.2	48.4	1.7	6.1	45.0	NE	0.0	0.0
12/08/23	13	23.8	47.3	2.2	7.9	45.0	NE	0.0	0.0
12/08/23	14	24.7	45.6	2.1	7.6	270.0	W	0.0	0.0
12/08/23	15	25.2	45.2	2.7	9.7	270.0	W	0.0	0.0
12/08/23	16	25.7	44.7	1.4	5.0	45.0	NE	0.0	0.0
12/08/23	17	25.1	45.4	1.7	6.3	270.0	W	0.0	0.0
12/08/23	18	24.3	46.2	1.3	4.7	315.0	NW	0.0	0.0
12/08/23	19	23.4	46.9	1.7	6.3	45.0	NE	0.0	0.0
12/08/23	20	22.2	47.4	0.9	3.1	112.5	ESE	0.0	0.0
12/08/23	21	21.3	48.6	0.2	0.7	67.5	ENE	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
12/08/23	22	19.2	48.9	0.2	0.7	315.0	NW	0.0	0.0
12/08/23	23	18.7	49.5	0.4	1.4	225.0	SW	0.0	0.0
12/08/23	24	17.7	51.7	0.2	0.7	157.5	SES	0.0	0.0
12/09/23	1	16.6	53.6	0.3	1.1	180.0	S	0.0	0.0
12/09/23	2	15.2	56.2	1.1	3.9	135.0	SE	0.0	0.0
12/09/23	3	13.6	58.3	1.1	3.9	202.5	SSW	0.0	0.0
12/09/23	4	11.7	59.9	0.7	2.4	22.5	NNE	0.0	0.0
12/09/23	5	11.2	61.5	0.5	1.8	247.5	SWW	0.0	0.0
12/09/23	6	13.2	63.0	1.7	6.3	247.5	SWW	0.0	0.0
12/09/23	7	15.1	62.3	1.7	6.3	225.0	SW	0.0	0.0
12/09/23	8	16.2	61.1	1.6	5.8	315.0	NW	0.0	0.0
12/09/23	9	17.8	60.3	2.2	7.9	315.0	NW	0.0	0.0
12/09/23	10	20.4	59.8	2.2	7.9	270.0	W	0.0	0.0
12/09/23	11	22.0	57.6	2.2	7.9	270.0	W	0.0	0.0
12/09/23	12	24.4	54.3	2.2	7.9	67.5	ENE	0.0	0.0
12/09/23	13	25.1	53.7	2.2	7.9	315.0	NW	0.0	0.0
12/09/23	14	25.5	51.4	2.6	9.4	270.0	W	0.0	0.0
12/09/23	15	26.2	49.6	0.7	2.5	45.0	NE	0.0	0.0
12/09/23	16	26.7	48.3	0.6	2.2	45.0	NE	0.0	0.0
12/09/23	17	25.7	47.7	2.2	7.9	45.0	NE	0.0	0.0
12/09/23	18	24.2	47.3	1.3	4.7	270.0	W	0.0	0.0
12/09/23	19	23.1	47.8	0.7	2.5	67.5	ENE	0.0	0.0
12/09/23	20	21.4	48.4	0.4	1.4	112.5	ESE	0.0	0.0
12/09/23	21	20.6	48.9	0.3	1.1	157.5	SES	0.0	0.0
12/09/23	22	19.3	49.7	0.1	0.4	202.5	SSW	0.0	0.0
12/09/23	23	17.8	51.8	0.7	2.4	135.0	SE	0.0	0.0
12/09/23	24	16.6	52.5	0.4	1.4	22.5	NNE	0.0	0.0
12/10/23	1	15.4	54.7	0.2	0.8	22.5	NNE	0.0	0.0
12/10/23	2	13.1	56.2	0.2	0.8	247.5	SWW	0.0	0.0
12/10/23	3	12.8	58.6	0.3	1.1	247.5	SWW	0.0	0.0
12/10/23	4	12.1	59.4	0.9	3.1	225.0	SW	0.0	0.0
12/10/23	5	11.7	60.4	1.1	3.9	135.0	SE	0.0	0.0
12/10/23	6	12.8	61.7	0.5	1.8	292.5	WNW	0.0	0.0
12/10/23	7	14.7	61.3	0.7	2.4	45.0	NE	0.0	0.0
12/10/23	8	16.6	60.8	0.9	3.1	315.0	NW	0.0	0.0
12/10/23	9	19.1	58.2	0.7	2.5	45.0	NE	0.0	0.0
12/10/23	10	20.9	55.3	1.2	4.3	270.0	W	0.0	0.0
12/10/23	11	22.5	53.7	1.1	4.0	315.0	NW	0.0	0.0
12/10/23	12	23.6	51.3	2.2	7.9	67.5	ENE	0.0	0.0
12/10/23	13	24.2	50.3	1.2	4.3	270.0	W	0.0	0.0
12/10/23	14	24.8	48.6	2.3	8.3	45.0	NE	0.0	0.0
12/10/23	15	25.0	48.1	1.1	4.0	270.0	W	0.0	0.0
12/10/23	16	24.5	47.6	2.2	7.9	270.0	W	0.0	0.0
12/10/23	17	24.2	46.9	2.2	7.9	315.0	NW	0.0	0.0
12/10/23	18	23.4	47.2	3.7	13.3	45.0	NE	0.0	0.0
12/10/23	19	22.2	47.8	2.2	7.9	270.0	W	0.0	0.0
12/10/23	20	20.7	48.9	0.5	1.8	67.5	ENE	0.0	0.0
12/10/23	21	19.6	50.2	0.3	1.1	112.5	ESE	0.0	0.0
12/10/23	22	17.8	51.7	0.1	0.4	157.5	SES	0.0	0.0
12/10/23	23	16.7	53.3	0.2	0.7	135.0	SE	0.0	0.0
12/10/23	24	15.8	54.4	0.7	2.4	135.0	SE	0.0	0.0
12/11/23	1	14.6	56.9	0.4	1.4	202.5	SSW	0.0	0.0
12/11/23	2	13.2	58.8	0.3	1.1	210.0	SSW	0.0	0.0
12/11/23	3	12.3	60.3	0.2	0.7	22.5	NNE	0.0	0.0
12/11/23	4	11.7	61.8	0.3	1.1	247.5	SWW	0.0	0.0
12/11/23	5	11.4	62.2	0.5	1.8	225.0	SW	0.0	0.0
12/11/23	6	11.1	63.5	0.7	2.5	225.0	SW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
12/11/23	7	10.7	62.7	0.9	3.1	270.0	W	0.0	0.0
12/11/23	8	13.1	58.8	0.5	1.8	45.0	NE	0.0	0.0
12/11/23	9	15.7	57.7	0.7	2.5	360.0	N	0.0	0.0
12/11/23	10	17.6	54.8	1.6	5.8	337.5	NWN	0.0	0.0
12/11/23	11	20.2	52.6	1.1	4.0	315.0	NW	0.0	0.0
12/11/23	12	22.5	51.1	2.2	7.8	315.0	NW	0.0	0.0
12/11/23	13	24.4	49.6	2.4	8.6	270.0	W	0.0	0.0
12/11/23	14	24.9	47.0	2.2	7.9	67.5	ENE	0.0	0.0
12/11/23	15	24.4	45.2	2.6	9.4	270.0	W	0.0	0.0
12/11/23	16	24.0	45.1	2.1	7.6	270.0	W	0.0	0.0
12/11/23	17	23.7	44.6	1.1	4.0	270.0	W	0.0	0.0
12/11/23	18	22.4	44.2	2.2	7.9	45.0	NE	0.0	0.0
12/11/23	19	21.3	45.8	2.2	7.8	135.0	SE	0.0	0.0
12/11/23	20	20.2	46.3	0.9	3.1	180.0	S	0.0	0.0
12/11/23	21	19.4	46.1	0.2	0.7	45.0	NE	0.0	0.0
12/11/23	22	17.7	47.0	0.3	1.1	112.5	ESE	0.0	0.0
12/11/23	23	16.6	48.5	0.1	0.4	157.5	SES	0.0	0.0
12/11/23	24	15.7	49.5	0.9	3.1	135.0	SE	0.0	0.0
12/12/23	1	14.3	52.0	0.9	3.1	225.0	SW	0.0	0.0
12/12/23	2	13.2	54.4	0.4	1.4	202.5	SSW	0.0	0.0
12/12/23	3	12.2	55.7	0.2	0.7	210.0	SSW	0.0	0.0
12/12/23	4	11.1	57.3	0.5	1.8	22.5	NNE	0.0	0.0
12/12/23	5	10.4	58.8	0.5	1.8	22.5	NNE	0.0	0.0
12/12/23	6	11.8	60.0	0.7	2.4	247.5	SWW	0.0	0.0
12/12/23	7	14.3	58.5	0.5	1.8	247.5	SWW	0.0	0.0
12/12/23	8	16.2	58.1	0.7	2.5	67.5	ENE	0.0	0.0
12/12/23	9	18.4	56.7	2.2	7.9	180.0	S	0.0	0.0
12/12/23	10	21.3	55.3	0.5	1.8	135.0	SE	0.0	0.0
12/12/23	11	22.9	52.7	2.2	7.9	315.0	NW	0.0	0.0
12/12/23	12	24.4	50.2	2.2	7.9	270.0	W	0.0	0.0
12/12/23	13	24.6	48.7	1.2	4.3	337.5	NWN	0.0	0.0
12/12/23	14	24.8	46.9	2.2	7.9	270.0	W	0.0	0.0
12/12/23	15	25.2	46.4	0.8	2.9	270.0	W	0.0	0.0
12/12/23	16	24.4	45.9	0.5	1.8	270.0	W	0.0	0.0
12/12/23	17	23.7	45.5	2.2	7.9	270.0	W	0.0	0.0
12/12/23	18	23.2	45.1	2.2	7.8	270.0	W	0.0	0.0
12/12/23	19	21.6	47.0	1.1	3.9	45.0	NE	0.0	0.0
12/12/23	20	20.4	49.0	1.3	4.7	270.0	W	0.0	0.0
12/12/23	21	19.1	52.5	0.2	0.7	315.0	NW	0.0	0.0
12/12/23	22	18.3	55.0	0.3	1.1	135.0	SE	0.0	0.0
12/12/23	23	16.7	56.0	0.2	0.7	315.0	NW	0.0	0.0
12/12/23	24	16.2	58.5	0.7	2.4	360.0	N	0.0	0.0
13/12/23	1	14.7	63.0	0.1	0.4	157.5	SES	0.0	0.0
13/12/23	2	14.2	65.0	0.2	0.7	157.5	SES	0.0	0.0
13/12/23	3	13.3	68.0	0.5	1.8	135.0	SE	0.0	0.0
13/12/23	4	12.2	69.0	0.4	1.4	180.0	S	0.0	0.0
13/12/23	5	11.6	73.0	0.5	1.8	202.5	SSW	0.0	0.0
13/12/23	6	13.1	74.0	0.6	2.2	22.5	NNE	0.0	0.0
13/12/23	7	14.7	72.5	1.1	3.9	22.5	NNE	0.0	0.0
13/12/23	8	16.6	73.0	1.1	3.9	247.5	SWW	0.0	0.0
13/12/23	9	18.2	74.0	0.9	3.2	247.5	SWW	0.0	0.0
13/12/23	10	20.3	72.5	1.2	4.3	247.5	SWW	0.0	0.0
13/12/23	11	22.1	70.6	1.3	4.7	135.0	SE	0.0	0.0
13/12/23	12	23.8	68.5	1.3	4.7	135.0	SE	0.0	0.0
13/12/23	13	25.3	63.5	2.2	7.9	270.0	W	0.0	0.0
13/12/23	14	25.9	61.0	2.4	8.6	270.0	W	0.0	0.0
13/12/23	15	26.1	60.5	0.5	1.8	135.0	SE	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
13/12/23	16	26.4	58.4	0.6	2.2	315.0	NW	0.0	0.0
13/12/23	17	25.3	57.5	1.1	4.0	270.0	W	0.0	0.0
13/12/23	18	24.2	55.0	0.9	3.2	270.0	W	0.0	0.0
13/12/23	19	22.6	54.5	2.2	7.9	157.5	SES	0.0	0.0
13/12/23	20	21.3	58.4	0.5	1.8	112.5	ESE	0.0	0.0
13/12/23	21	19.9	56.0	0.5	1.8	360.0	N	0.0	0.0
13/12/23	22	18.6	55.5	0.2	0.7	135.0	SE	0.0	0.0
13/12/23	23	17.4	54.5	0.4	1.4	202.5	SSW	0.0	0.0
13/12/23	24	16.3	53.5	0.3	1.1	225.0	SW	0.0	0.0
14/12/23	1	15.1	55.0	0.2	0.7	225.0	SW	0.0	0.0
14/12/23	2	13.7	56.7	0.5	1.8	225.0	SW	0.0	0.0
14/12/23	3	12.6	56.6	0.2	0.7	292.5	WNW	0.0	0.0
14/12/23	4	11.7	60.5	0.5	1.8	45.0	NE	0.0	0.0
14/12/23	5	10.3	62.5	0.5	1.8	270.0	W	0.0	0.0
14/12/23	6	12.2	63.0	0.5	1.8	360.0	N	0.0	0.0
14/12/23	7	14.1	66.5	0.5	1.8	67.5	ENE	0.0	0.0
14/12/23	8	16.4	68.5	1.6	5.8	135.0	SE	0.0	0.0
14/12/23	9	18.8	70.5	0.6	2.2	270.0	W	0.0	0.0
14/12/23	10	21.2	72.0	0.7	2.5	45.0	NE	0.0	0.0
14/12/23	11	23.2	71.5	0.9	3.1	270.0	W	0.0	0.0
14/12/23	12	24.7	72.5	1.3	4.8	315.0	NW	0.0	0.0
14/12/23	13	25.2	73.0	2.5	9.0	270.0	W	0.0	0.0
14/12/23	14	25.6	73.5	2.2	7.8	270.0	W	0.0	0.0
14/12/23	15	26.1	72.5	2.2	7.8	270.0	W	0.0	0.0
14/12/23	16	26.6	73.0	2.2	7.9	315.0	NW	0.0	0.0
14/12/23	17	25.0	74.0	2.2	7.8	315.0	NW	0.0	0.0
14/12/23	18	24.3	72.5	3.7	13.3	315.0	NW	0.0	0.0
14/12/23	19	21.7	71.5	1.3	4.7	135.0	SE	0.0	0.0
14/12/23	20	18.0	73.5	0.7	2.4	45.0	NE	0.0	0.0
14/12/23	21	16.6	71.5	0.9	3.1	112.5	ESE	0.0	0.0
14/12/23	22	15.5	69.6	0.2	0.7	67.5	ENE	0.0	0.0
14/12/23	23	14.3	67.5	0.1	0.4	112.5	ESE	0.0	0.0
14/12/23	24	14.0	66.0	0.3	1.1	360.0	N	0.0	0.0
15/12/23	1	13.6	68.0	0.2	0.7	360.0	N	0.0	0.0
15/12/23	2	13.2	69.5	1.1	3.9	157.5	SES	0.0	0.0
15/12/23	3	12.8	70.5	0.3	1.1	210.0	SSW	0.0	0.0
15/12/23	4	12.4	72.0	0.4	1.4	247.5	SWW	0.0	0.0
15/12/23	5	11.0	73.0	0.5	1.8	202.5	SSW	0.0	0.0
15/12/23	6	10.7	74.0	0.5	1.8	22.5	NNE	0.0	0.0
15/12/23	7	12.9	72.5	0.5	1.8	22.5	NNE	0.0	0.0
15/12/23	8	15.4	71.5	0.6	2.2	180.0	S	0.0	0.0
15/12/23	9	17.1	73.0	0.9	3.2	180.0	S	0.0	0.0
15/12/23	10	20.2	74.5	3.7	13.3	270.0	W	0.0	0.0
15/12/23	11	21.8	75.0	1.2	4.3	270.0	W	0.0	0.0
15/12/23	12	23.5	74.5	1.6	5.8	270.0	W	0.0	0.0
15/12/23	13	24.2	72.5	2.2	7.9	270.0	W	0.0	0.0
15/12/23	14	24.7	74.5	3.7	13.3	270.0	W	0.0	0.0
15/12/23	15	25.1	72.5	2.4	8.6	45.0	NE	0.0	0.0
15/12/23	16	25.6	73.0	1.4	5.0	45.0	NE	0.0	0.0
15/12/23	17	24.2	73.5	0.8	2.9	45.0	NE	0.0	0.0
15/12/23	18	23.3	74.0	0.6	2.2	337.5	NWN	0.0	0.0
15/12/23	19	22.1	72.6	0.5	1.8	315.0	NW	0.0	0.0
15/12/23	20	20.7	71.5	1.3	4.7	315.0	NW	0.0	0.0
15/12/23	21	19.4	71.0	0.9	3.1	315.0	NW	0.0	0.0
15/12/23	22	17.7	70.5	0.4	1.4	45.0	NE	0.0	0.0
15/12/23	23	16.7	72.0	1.1	3.9	270.0	W	0.0	0.0
15/12/23	24	15.6	73.5	0.2	0.7	315.0	NW	0.0	0.0



Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
16/12/23	1	14.5	71.3	0.4	1.4	315.0	NW	0.0	0.0
16/12/23	2	13.8	70.0	0.7	2.4	67.5	ENE	0.0	0.0
16/12/23	3	13.2	68.5	0.2	0.8	135.0	SE	0.0	0.0
16/12/23	4	12.2	66.5	0.9	3.1	45.0	NE	0.0	0.0
16/12/23	5	11.6	64.5	1.7	6.3	135.0	SE	0.0	0.0
16/12/23	6	12.8	63.5	0.9	3.1	135.0	SE	0.0	0.0
16/12/23	7	14.7	63.1	1.3	4.7	112.5	ESE	0.0	0.0
16/12/23	8	17.3	62.0	0.9	3.2	135.0	SE	0.0	0.0
16/12/23	9	20.4	60.2	1.2	4.3	157.5	SES	0.0	0.0
16/12/23	10	22.1	57.9	0.5	1.8	90.0	E	0.0	0.0
16/12/23	11	24.2	55.2	1.7	6.1	135.0	SE	0.0	0.0
16/12/23	12	25.3	53.4	2.4	8.6	45.0	NE	0.0	0.0
16/12/23	13	25.8	52.7	2.4	8.6	202.5	SSW	0.0	0.0
16/12/23	14	25.9	50.4	1.1	4.0	270.0	W	0.0	0.0
16/12/23	15	25.4	49.0	3.8	13.7	315.0	NW	0.0	0.0
16/12/23	16	25.0	47.8	3.7	13.3	315.0	NW	0.0	0.0
16/12/23	17	24.2	48.5	2.2	7.9	315.0	NW	0.0	0.0
16/12/23	18	23.1	49.4	1.3	4.7	315.0	NW	0.0	0.0
16/12/23	19	21.7	50.8	0.8	2.9	270.0	W	0.0	0.0
16/12/23	20	20.6	52.2	1.1	3.9	45.0	NE	0.0	0.0
16/12/23	21	19.7	53.7	1.7	6.3	225.0	SW	0.0	0.0
16/12/23	22	17.6	54.6	1.3	4.7	225.0	SW	0.0	0.0
16/12/23	23	16.6	56.3	0.7	2.4	292.5	WNW	0.0	0.0
16/12/23	24	15.4	58.8	0.7	2.4	45.0	NE	0.0	0.0
17/12/23	1	14.6	59.4	0.4	1.4	247.5	SWW	0.0	0.0
17/12/23	2	13.6	60.3	1.1	3.9	337.5	NWN	0.0	0.0
17/12/23	3	12.4	62.7	0.4	1.4	337.5	NWN	0.0	0.0
17/12/23	4	11.8	63.0	0.4	1.4	45.0	NE	0.0	0.0
17/12/23	5	11.3	63.8	1.3	4.7	270.0	W	0.0	0.0
17/12/23	6	12.7	63.5	0.5	1.8	112.5	ESE	0.0	0.0
17/12/23	7	14.3	62.1	1.3	4.7	45.0	NE	0.0	0.0
17/12/23	8	16.1	60.5	0.6	2.2	135.0	SE	0.0	0.0
17/12/23	9	18.2	59.2	1.1	4.0	135.0	SE	0.0	0.0
17/12/23	10	20.4	57.7	2.2	7.9	135.0	SE	0.0	0.0
17/12/23	11	22.1	55.2	0.9	3.2	270.0	W	0.0	0.0
17/12/23	12	23.8	53.0	1.3	4.7	270.0	W	0.0	0.0
17/12/23	13	24.6	51.5	2.2	7.9	315.0	NW	0.0	0.0
17/12/23	14	24.8	49.8	1.3	4.7	45.0	NE	0.0	0.0
17/12/23	15	25.1	48.4	2.1	7.6	45.0	NE	0.0	0.0
17/12/23	16	25.6	46.2	2.2	7.9	315.0	NW	0.0	0.0
17/12/23	17	24.3	45.4	1.3	4.7	270.0	W	0.0	0.0
17/12/23	18	23.2	45.9	2.2	7.9	135.0	SE	0.0	0.0
17/12/23	19	21.4	46.3	1.3	4.7	180.0	S	0.0	0.0
17/12/23	20	20.3	46.8	1.3	4.7	202.5	SSW	0.0	0.0
17/12/23	21	18.8	48.3	0.7	2.4	22.5	NNE	0.0	0.0
17/12/23	22	17.6	49.6	0.2	0.7	157.5	SES	0.0	0.0
17/12/23	23	16.7	50.4	0.4	1.4	247.5	SWW	0.0	0.0
17/12/23	24	16.2	52.4	0.9	3.1	225.0	SW	0.0	0.0
18/12/23	1	15.2	53.9	0.3	1.1	135.0	SE	0.0	0.0
18/12/23	2	14.6	55.0	0.3	1.1	45.0	NE	0.0	0.0
18/12/23	3	13.4	57.4	1.1	3.9	337.5	NWN	0.0	0.0
18/12/23	4	12.2	59.5	0.1	0.4	315.0	NW	0.0	0.0
18/12/23	5	11.7	61.6	1.7	6.3	270.0	W	0.0	0.0
18/12/23	6	11.3	62.2	1.1	3.9	225.0	SW	0.0	0.0
18/12/23	7	14.7	61.6	0.5	1.8	225.0	SW	0.0	0.0
18/12/23	8	17.3	60.4	2.2	7.9	45.0	NE	0.0	0.0
18/12/23	9	20.8	58.4	0.9	3.1	270.0	W	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
18/12/23	10	22.3	56.3	2.2	7.9	337.5	NWN	0.0	0.0
18/12/23	11	23.3	55.0	2.2	7.9	360.0	N	0.0	0.0
18/12/23	12	23.8	52.7	1.2	4.3	292.5	WNW	0.0	0.0
18/12/23	13	24.6	50.5	2.2	7.9	270.0	W	0.0	0.0
18/12/23	14	24.9	48.7	3.7	13.3	270.0	W	0.0	0.0
18/12/23	15	25.0	45.5	2.4	8.6	270.0	W	0.0	0.0
18/12/23	16	24.6	43.8	2.3	8.3	270.0	W	0.0	0.0
18/12/23	17	24.4	43.2	1.7	6.3	270.0	W	0.0	0.0
18/12/23	18	24.2	43.7	1.7	6.3	270.0	W	0.0	0.0
18/12/23	19	23.2	44.6	2.7	9.7	135.0	SE	0.0	0.0
18/12/23	20	22.1	46.9	1.3	4.7	270.0	W	0.0	0.0
18/12/23	21	20.8	48.3	0.1	0.4	270.0	W	0.0	0.0
18/12/23	22	19.7	50.3	0.2	0.7	292.5	WNW	0.0	0.0
18/12/23	23	19.1	53.3	0.3	1.1	292.5	WNW	0.0	0.0
18/12/23	24	18.2	55.7	0.3	1.1	112.5	ESE	0.0	0.0
19/12/23	1	17.4	56.9	0.2	0.8	360.0	N	0.0	0.0
19/12/23	2	16.5	58.4	1.1	3.9	135.0	SE	0.0	0.0
19/12/23	3	14.2	60.4	1.1	3.9	315.0	NW	0.0	0.0
19/12/23	4	13.4	61.7	1.4	5.2	225.0	SW	0.0	0.0
19/12/23	5	11.3	62.5	0.5	1.8	292.5	WNW	0.0	0.0
19/12/23	6	12.7	63.0	0.5	1.8	315.0	NW	0.0	0.0
19/12/23	7	14.6	62.4	1.1	4.0	135.0	SE	0.0	0.0
19/12/23	8	17.1	61.8	1.6	5.8	135.0	SE	0.0	0.0
19/12/23	9	19.3	59.4	0.9	3.2	180.0	S	0.0	0.0
19/12/23	10	21.4	57.2	1.1	4.0	45.0	NE	0.0	0.0
19/12/23	11	22.9	56.1	1.1	4.0	135.0	SE	0.0	0.0
19/12/23	12	24.4	54.7	2.2	7.8	315.0	NW	0.0	0.0
19/12/23	13	25.7	53.0	2.4	8.6	270.0	W	0.0	0.0
19/12/23	14	26.2	50.7	2.2	7.9	270.0	W	0.0	0.0
19/12/23	15	26.4	48.3	2.2	7.9	270.0	W	0.0	0.0
19/12/23	16	26.3	46.4	2.2	7.9	315.0	NW	0.0	0.0
19/12/23	17	25.0	44.9	2.2	7.9	247.5	SWW	0.0	0.0
19/12/23	18	24.2	44.3	1.1	4.0	225.0	SW	0.0	0.0
19/12/23	19	22.4	43.8	1.8	6.5	225.0	SW	0.0	0.0
19/12/23	20	21.3	44.6	0.4	1.4	135.0	SE	0.0	0.0
19/12/23	21	19.7	46.8	0.2	0.7	225.0	SW	0.0	0.0
19/12/23	22	18.8	48.2	0.1	0.4	225.0	SW	0.0	0.0
19/12/23	23	17.4	49.7	0.7	2.4	292.5	WNW	0.0	0.0
19/12/23	24	16.8	51.3	0.4	1.4	292.5	WNW	0.0	0.0
20/12/23	1	16.2	53.6	0.2	0.7	337.5	NWN	0.0	0.0
20/12/23	2	15.3	56.1	1.1	3.9	337.5	NWN	0.0	0.0
20/12/23	3	13.4	58.2	0.2	0.7	270.0	W	0.0	0.0
20/12/23	4	12.2	59.8	0.2	0.7	45.0	NE	0.0	0.0
20/12/23	5	12.5	61.4	1.3	4.7	270.0	W	0.0	0.0
20/12/23	6	13.2	62.0	0.5	1.8	67.5	ENE	0.0	0.0
20/12/23	7	14.7	61.5	1.3	4.7	180.0	S	0.0	0.0
20/12/23	8	17.3	59.8	0.5	1.8	135.0	SE	0.0	0.0
20/12/23	9	20.8	57.4	0.8	2.9	225.0	SW	0.0	0.0
20/12/23	10	22.3	55.2	1.2	4.3	45.0	NE	0.0	0.0
20/12/23	11	24.7	53.5	1.6	5.8	315.0	NW	0.0	0.0
20/12/23	12	25.3	50.5	1.9	6.8	315.0	NW	0.0	0.0
20/12/23	13	25.8	48.7	2.3	8.3	315.0	NW	0.0	0.0
20/12/23	14	25.9	47.3	2.6	9.4	270.0	W	0.0	0.0
20/12/23	15	25.4	45.8	1.5	5.4	270.0	W	0.0	0.0
20/12/23	16	25.0	44.2	1.1	4.0	270.0	W	0.0	0.0
20/12/23	17	23.7	44.6	2.6	9.4	270.0	W	0.0	0.0
20/12/23	18	22.6	45.5	2.2	7.9	337.5	NWN	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
20/12/23	19	21.1	47.2	1.3	4.7	225.0	SW	0.0	0.0
20/12/23	20	19.7	48.7	1.3	4.7	247.5	SWW	0.0	0.0
20/12/23	21	19.2	49.2	0.7	2.4	225.0	SW	0.0	0.0
20/12/23	22	17.8	49.8	0.1	0.4	292.5	WNW	0.0	0.0
20/12/23	23	17.2	50.7	0.4	1.4	112.5	ESE	0.0	0.0
20/12/23	24	16.6	52.4	0.9	3.1	180.0	S	0.0	0.0
21/12/23	1	15.7	53.8	0.4	1.4	157.5	SES	0.0	0.0
21/12/23	2	15.2	55.2	0.6	2.2	210.0	SSW	0.0	0.0
21/12/23	3	14.2	56.7	1.1	3.9	247.5	SWW	0.0	0.0
21/12/23	4	13.4	57.3	0.3	1.1	292.5	WNW	0.0	0.0
21/12/23	5	11.3	58.8	0.5	1.8	135.0	SE	0.0	0.0
21/12/23	6	12.7	60.5	1.1	3.9	135.0	SE	0.0	0.0
21/12/23	7	14.2	57.8	0.6	2.2	202.5	SSW	0.0	0.0
21/12/23	8	16.6	56.3	0.8	2.9	180.0	S	0.0	0.0
21/12/23	9	18.8	56.2	1.9	6.9	22.5	NNE	0.0	0.0
21/12/23	10	21.6	54.4	1.1	4.0	225.0	SW	0.0	0.0
21/12/23	11	23.2	52.1	2.2	7.9	45.0	NE	0.0	0.0
21/12/23	12	23.8	50.7	1.6	5.8	135.0	SE	0.0	0.0
21/12/23	13	24.3	48.9	2.2	7.9	315.0	NW	0.0	0.0
21/12/23	14	24.8	48.2	2.3	8.3	270.0	W	0.0	0.0
21/12/23	15	25.3	45.5	2.3	8.3	270.0	W	0.0	0.0
21/12/23	16	25.6	44.2	2.2	7.9	315.0	NW	0.0	0.0
21/12/23	17	25.3	46.7	1.7	6.3	315.0	NW	0.0	0.0
21/12/23	18	24.1	47.7	2.1	7.6	315.0	NW	0.0	0.0
21/12/23	19	22.4	48.4	1.7	6.3	90.0	E	0.0	0.0
21/12/23	20	20.7	49.1	0.9	3.1	135.0	SE	0.0	0.0
21/12/23	21	19.2	49.8	0.1	0.4	112.5	ESE	0.0	0.0
21/12/23	22	17.7	50.4	0.2	0.7	315.0	NW	0.0	0.0
21/12/23	23	16.6	50.7	1.1	3.9	292.5	WNW	0.0	0.0
21/12/23	24	15.4	50.9	0.2	0.7	157.5	SES	0.0	0.0
22/12/23	1	14.7	51.7	0.2	0.8	135.0	SE	0.0	0.0
22/12/23	2	13.6	54.8	1.1	3.9	225.0	SW	0.0	0.0
22/12/23	3	12.7	57.3	0.2	0.7	202.5	SSW	0.0	0.0
22/12/23	4	12.2	60.2	0.7	2.4	270.0	W	0.0	0.0
22/12/23	5	11.7	62.7	0.5	1.8	247.5	SWW	0.0	0.0
22/12/23	6	13.2	63.3	1.7	6.3	225.0	SW	0.0	0.0
22/12/23	7	15.2	63.1	2.1	7.6	22.5	NNE	0.0	0.0
22/12/23	8	17.4	62.7	1.1	3.9	225.0	SW	0.0	0.0
22/12/23	9	19.1	69.4	0.6	2.2	135.0	SE	0.0	0.0
22/12/23	10	21.4	58.2	2.2	7.8	45.0	NE	0.0	0.0
22/12/23	11	22.9	56.5	2.2	7.8	45.0	NE	0.0	0.0
22/12/23	12	24.4	53.2	2.2	7.8	45.0	NE	0.0	0.0
22/12/23	13	24.6	50.9	1.1	4.0	315.0	NW	0.0	0.0
22/12/23	14	25.7	48.6	2.2	7.9	315.0	NW	0.0	0.0
22/12/23	15	26.8	47.3	2.3	8.3	270.0	W	0.0	0.0
22/12/23	16	25.0	46.8	1.9	6.8	270.0	W	0.0	0.0
22/12/23	17	24.2	46.2	2.2	7.9	315.0	NW	0.0	0.0
22/12/23	18	23.1	43.8	1.3	4.7	270.0	W	0.0	0.0
22/12/23	19	21.3	44.3	0.5	1.8	135.0	SE	0.0	0.0
22/12/23	20	20.1	44.8	0.2	0.7	45.0	NE	0.0	0.0
22/12/23	21	18.7	45.5	0.2	0.7	270.0	W	0.0	0.0
22/12/23	22	17.4	45.7	0.5	1.8	67.5	ENE	0.0	0.0
22/12/23	23	16.7	47.2	0.7	2.4	135.0	SE	0.0	0.0
22/12/23	24	15.5	49.3	0.4	1.4	135.0	SE	0.0	0.0
23/12/23	1	14.3	50.9	0.2	0.8	225.0	SW	0.0	0.0
23/12/23	2	13.7	52.5	0.2	0.8	157.5	SES	0.0	0.0
23/12/23	3	12.4	55.8	0.2	0.7	135.0	SE	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
23/12/23	4	11.6	57.6	0.9	3.1	202.5	SSW	0.0	0.0
23/12/23	5	11.1	59.3	1.1	3.9	210.0	SSW	0.0	0.0
23/12/23	6	12.9	61.3	0.5	1.8	22.5	NNE	0.0	0.0
23/12/23	7	15.2	60.6	0.7	2.4	22.5	NNE	0.0	0.0
23/12/23	8	17.7	60.1	0.9	3.1	135.0	SE	0.0	0.0
23/12/23	9	20.2	58.6	2.2	7.9	22.5	NNE	0.0	0.0
23/12/23	10	22.2	57.2	2.2	7.9	270.0	W	0.0	0.0
23/12/23	11	23.2	55.4	2.2	7.9	225.0	SW	0.0	0.0
23/12/23	12	23.6	52.7	0.7	2.5	45.0	NE	0.0	0.0
23/12/23	13	24.1	50.6	2.2	7.9	337.5	NWN	0.0	0.0
23/12/23	14	24.5	47.3	3.7	13.5	270.0	W	0.0	0.0
23/12/23	15	24.8	42.7	2.2	7.9	315.0	NW	0.0	0.0
23/12/23	16	24.5	46.7	2.2	7.9	270.0	W	0.0	0.0
23/12/23	17	24.2	46.7	2.2	7.9	270.0	W	0.0	0.0
23/12/23	18	24.1	43.6	2.4	8.6	270.0	W	0.0	0.0
23/12/23	19	22.6	45.0	1.1	4.0	315.0	NW	0.0	0.0
23/12/23	20	21.1	47.4	0.7	2.5	135.0	SE	0.0	0.0
23/12/23	21	19.6	46.9	1.1	3.9	112.5	ESE	0.0	0.0
23/12/23	22	18.2	47.3	0.2	0.7	135.0	SE	0.0	0.0
23/12/23	23	16.8	49.2	0.1	0.4	135.0	SE	0.0	0.0
23/12/23	24	16.2	50.8	0.7	2.4	157.5	SES	0.0	0.0
24/12/23	1	15.7	52.4	0.2	0.7	135.0	SE	0.0	0.0
24/12/23	2	15.2	53.7	0.1	0.4	202.5	SSW	0.0	0.0
24/12/23	3	14.3	56.9	0.2	0.7	22.5	NNE	0.0	0.0
24/12/23	4	13.7	60.5	0.2	0.7	22.5	NNE	0.0	0.0
24/12/23	5	13.3	62.1	1.3	4.7	247.5	SWW	0.0	0.0
24/12/23	6	12.8	63.7	0.5	1.8	247.5	SWW	0.0	0.0
24/12/23	7	14.1	63.4	0.9	3.1	225.0	SW	0.0	0.0
24/12/23	8	16.2	62.8	0.5	1.8	225.0	SW	0.0	0.0
24/12/23	9	17.9	60.4	1.1	3.9	225.0	SW	0.0	0.0
24/12/23	10	20.3	58.5	0.9	3.2	270.0	W	0.0	0.0
24/12/23	11	22.2	55.2	2.3	8.3	135.0	SE	0.0	0.0
24/12/23	12	23.2	53.8	3.7	13.3	270.0	W	0.0	0.0
24/12/23	13	23.6	52.0	2.1	7.6	270.0	W	0.0	0.0
24/12/23	14	23.8	50.7	2.2	7.8	315.0	NW	0.0	0.0
24/12/23	15	23.9	48.3	4.2	15.1	270.0	W	0.0	0.0
24/12/23	16	23.5	47.2	2.4	8.6	270.0	W	0.0	0.0
24/12/23	17	23.0	45.6	1.3	4.7	270.0	W	0.0	0.0
24/12/23	18	22.1	44.2	0.7	2.5	270.0	W	0.0	0.0
24/12/23	19	20.4	44.9	0.5	1.8	270.0	W	0.0	0.0
24/12/23	20	19.8	45.5	0.1	0.4	202.5	SSW	0.0	0.0
24/12/23	21	19.2	47.8	0.2	0.8	45.0	NE	0.0	0.0
24/12/23	22	18.3	48.3	0.2	0.8	270.0	W	0.0	0.0
24/12/23	23	17.6	50.7	0.1	0.4	67.5	ENE	0.0	0.0
24/12/23	24	16.7	53.3	0.2	0.7	112.5	ESE	0.0	0.0
25/12/23	1	15.8	55.6	0.4	1.4	135.0	SE	0.0	0.0
25/12/23	2	15.3	56.9	0.2	0.8	157.5	SES	0.0	0.0
25/12/23	3	14.4	59.2	0.2	0.8	157.5	SES	0.0	0.0
25/12/23	4	13.9	60.4	0.2	0.8	135.0	SE	0.0	0.0
25/12/23	5	13.4	62.6	0.5	1.8	202.5	SSW	0.0	0.0
25/12/23	6	12.8	63.5	0.5	1.8	22.5	NNE	0.0	0.0
25/12/23	7	13.5	62.9	0.6	2.2	247.5	SWW	0.0	0.0
25/12/23	8	15.7	60.4	1.1	4.0	247.5	SWW	0.0	0.0
25/12/23	9	18.2	58.4	1.2	4.3	247.5	SWW	0.0	0.0
25/12/23	10	20.6	56.2	0.9	3.2	225.0	SW	0.0	0.0
25/12/23	11	22.2	52.7	2.2	7.9	225.0	SW	0.0	0.0
25/12/23	12	23.8	48.9	1.1	4.0	135.0	SE	0.0	0.0



Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
25/12/23	13	24.0	46.7	2.3	8.3	270.0	W	0.0	0.0
25/12/23	14	24.0	45.0	1.2	4.3	270.0	W	0.0	0.0
25/12/23	15	23.8	43.8	3.7	13.3	45.0	NE	0.0	0.0
25/12/23	16	23.5	43.2	1.4	5.0	315.0	NW	0.0	0.0
25/12/23	17	23.3	42.6	1.1	4.0	315.0	NW	0.0	0.0
25/12/23	18	23.2	42.8	1.1	4.0	315.0	NW	0.0	0.0
25/12/23	19	22.7	43.0	1.4	5.0	315.0	NW	0.0	0.0
25/12/23	20	21.4	44.6	1.1	4.0	292.5	WNW	0.0	0.0
25/12/23	21	20.4	44.9	1.1	3.9	292.5	WNW	0.0	0.0
25/12/23	22	19.8	45.3	0.9	3.1	225.0	SW	0.0	0.0
25/12/23	23	19.3	47.7	1.3	4.7	225.0	SW	0.0	0.0
25/12/23	24	18.2	49.2	0.3	1.1	292.5	WNW	0.0	0.0
26/12/23	1	16.7	52.8	0.5	1.8	270.0	W	0.0	0.0
26/12/23	2	16.2	55.4	0.9	3.1	45.0	NE	0.0	0.0
26/12/23	3	14.6	57.0	0.1	0.4	270.0	W	0.0	0.0
26/12/23	4	13.4	58.6	0.2	0.8	337.5	NWN	0.0	0.0
26/12/23	5	12.2	60.3	0.6	2.2	337.5	NWN	0.0	0.0
26/12/23	6	12.7	62.2	0.5	1.8	315.0	NW	0.0	0.0
26/12/23	7	15.1	61.7	0.5	1.8	337.5	NWN	0.0	0.0
26/12/23	8	18.1	60.0	2.2	7.9	337.5	NWN	0.0	0.0
26/12/23	9	20.2	58.3	2.2	7.9	315.0	NW	0.0	0.0
26/12/23	10	22.7	56.6	0.8	2.9	315.0	NW	0.0	0.0
26/12/23	11	22.9	53.5	1.3	4.7	315.0	NW	0.0	0.0
26/12/23	12	23.3	52.7	1.1	4.0	315.0	NW	0.0	0.0
26/12/23	13	23.7	49.6	2.2	7.8	315.0	NW	0.0	0.0
26/12/23	14	23.9	46.3	2.2	7.9	270.0	W	0.0	0.0
26/12/23	15	24.0	45.2	2.3	8.3	270.0	W	0.0	0.0
26/12/23	16	23.5	43.6	2.4	8.6	315.0	NW	0.0	0.0
26/12/23	17	23.2	44.5	4.2	15.1	270.0	W	0.0	0.0
26/12/23	18	23.0	42.7	1.1	4.0	67.5	ENE	0.0	0.0
26/12/23	19	22.0	43.9	0.9	3.1	135.0	SE	0.0	0.0
26/12/23	20	20.2	45.1	0.7	2.4	180.0	S	0.0	0.0
26/12/23	21	19.1	46.5	0.5	1.8	112.5	ESE	0.0	0.0
26/12/23	22	18.2	47.2	0.4	1.4	135.0	SE	0.0	0.0
26/12/23	23	16.7	47.8	1.1	3.9	135.0	SE	0.0	0.0
26/12/23	24	15.6	50.3	0.4	1.4	157.5	SES	0.0	0.0
27/12/23	1	15.2	52.7	0.6	2.2	135.0	SE	0.0	0.0
27/12/23	2	14.4	55.1	0.9	3.1	180.0	S	0.0	0.0
27/12/23	3	13.3	56.8	0.7	2.4	202.5	SSW	0.0	0.0
27/12/23	4	12.2	58.4	0.7	2.4	22.5	NNE	0.0	0.0
27/12/23	5	12.5	59.2	1.1	3.9	247.5	SWW	0.0	0.0
27/12/23	6	13.2	61.6	0.6	2.2	22.5	NNE	0.0	0.0
27/12/23	7	14.6	60.5	1.1	3.9	225.0	SW	0.0	0.0
27/12/23	8	16.5	59.8	1.0	3.6	225.0	SW	0.0	0.0
27/12/23	9	19.1	59.1	0.6	2.2	292.5	WNW	0.0	0.0
27/12/23	10	22.2	58.6	0.7	2.5	315.0	NW	0.0	0.0
27/12/23	11	24.3	56.4	1.2	4.3	315.0	NW	0.0	0.0
27/12/23	12	25.3	54.2	1.6	5.8	315.0	NW	0.0	0.0
27/12/23	13	25.8	51.7	2.6	9.4	270.0	W	0.0	0.0
27/12/23	14	25.9	49.3	3.7	13.3	270.0	W	0.0	0.0
27/12/23	15	26.7	46.2	2.3	8.3	67.5	ENE	0.0	0.0
27/12/23	16	26.0	45.5	2.1	7.6	315.0	NW	0.0	0.0
27/12/23	17	25.2	46.8	1.8	6.5	315.0	NW	0.0	0.0
27/12/23	18	24.2	47.9	2.2	7.9	135.0	SE	0.0	0.0
27/12/23	19	23.1	48.5	1.2	4.3	112.5	ESE	0.0	0.0
27/12/23	20	21.6	49.3	1.1	3.9	135.0	SE	0.0	0.0
27/12/23	21	20.4	50.6	0.9	3.2	135.0	SE	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
27/12/23	22	19.5	52.2	0.7	2.4	157.5	SES	0.0	0.0
27/12/23	23	18.2	53.8	1.3	4.7	135.0	SE	0.0	0.0
27/12/23	24	16.7	54.0	1.3	4.7	135.0	SE	0.0	0.0
28/12/23	1	15.4	56.3	0.2	0.8	135.0	SE	0.0	0.0
28/12/23	2	14.7	58.7	0.2	0.8	202.5	SSW	0.0	0.0
28/12/23	3	14.2	59.5	0.6	2.2	210.0	SSW	0.0	0.0
28/12/23	4	13.6	61.4	0.9	3.1	225.0	SW	0.0	0.0
28/12/23	5	13.1	63.7	0.5	1.8	247.5	SWW	0.0	0.0
28/12/23	6	14.2	64.6	0.8	2.9	247.5	SWW	0.0	0.0
28/12/23	7	16.3	63.2	1.7	6.3	22.5	NNE	0.0	0.0
28/12/23	8	18.2	62.5	1.1	4.0	22.5	NNE	0.0	0.0
28/12/23	9	20.2	59.6	1.3	4.7	22.5	NNE	0.0	0.0
28/12/23	10	22.4	56.7	1.6	5.8	247.5	SWW	0.0	0.0
28/12/23	11	23.8	54.2	2.3	8.3	225.0	SW	0.0	0.0
28/12/23	12	25.4	53.7	0.9	3.2	135.0	SE	0.0	0.0
28/12/23	13	25.5	50.8	2.6	9.4	225.0	SW	0.0	0.0
28/12/23	14	26.0	48.6	2.4	8.6	292.5	WNW	0.0	0.0
28/12/23	15	25.7	47.3	3.7	13.3	292.5	WNW	0.0	0.0
28/12/23	16	25.2	45.5	1.8	6.5	225.0	SW	0.0	0.0
28/12/23	17	25.0	44.0	2.2	7.9	270.0	W	0.0	0.0
28/12/23	18	24.3	42.9	0.7	2.5	315.0	NW	0.0	0.0
28/12/23	19	21.7	43.7	0.9	3.1	270.0	W	0.0	0.0
28/12/23	20	20.5	45.3	1.3	4.7	270.0	W	0.0	0.0
28/12/23	21	19.9	46.8	0.4	1.4	337.5	NWN	0.0	0.0
28/12/23	22	18.4	48.2	0.7	2.4	337.5	NWN	0.0	0.0
28/12/23	23	17.6	50.1	0.7	2.4	315.0	NW	0.0	0.0
28/12/23	24	16.6	51.9	0.2	0.8	315.0	NW	0.0	0.0
29/12/23	1	15.5	53.6	0.2	0.8	45.0	NE	0.0	0.0
29/12/23	2	14.4	56.2	0.9	3.1	315.0	NW	0.0	0.0
29/12/23	3	14.2	58.9	0.9	3.1	67.5	ENE	0.0	0.0
29/12/23	4	12.7	60.4	1.7	6.3	135.0	SE	0.0	0.0
29/12/23	5	13.3	61.7	0.7	2.4	135.0	SE	0.0	0.0
29/12/23	6	15.4	62.6	1.3	4.7	112.5	ESE	0.0	0.0
29/12/23	7	16.2	61.3	0.7	2.4	135.0	SE	0.0	0.0
29/12/23	8	17.4	60.8	0.7	2.5	157.5	SES	0.0	0.0
29/12/23	9	18.4	59.5	1.7	6.3	135.0	SE	0.0	0.0
29/12/23	10	20.4	58.0	1.1	3.9	315.0	NW	0.0	0.0
29/12/23	11	21.2	56.4	0.7	2.4	337.5	NWN	0.0	0.0
29/12/23	12	21.9	53.7	2.3	8.3	315.0	NW	0.0	0.0
29/12/23	13	22.2	50.4	2.2	7.9	270.0	W	0.0	0.0
29/12/23	14	22.5	48.6	3.7	13.3	315.0	NW	0.0	0.0
29/12/23	15	22.9	45.8	2.2	7.9	337.5	NWN	0.0	0.0
29/12/23	16	22.4	45.2	4.2	15.1	315.0	NW	0.0	0.0
29/12/23	17	21.2	44.5	1.3	4.7	270.0	W	0.0	0.0
29/12/23	18	20.3	43.6	1.3	4.7	270.0	W	0.0	0.0
29/12/23	19	19.7	43.8	1.8	6.5	157.5	SES	0.0	0.0
29/12/23	20	19.2	44.3	1.3	4.7	135.0	SE	0.0	0.0
29/12/23	21	18.4	44.7	0.9	3.1	315.0	NW	0.0	0.0
29/12/23	22	18.1	46.5	1.1	3.9	67.5	ENE	0.0	0.0
29/12/23	23	17.7	48.8	0.4	1.4	135.0	SE	0.0	0.0
29/12/23	24	17.3	49.2	0.4	1.4	112.5	ESE	0.0	0.0
30/12/23	1	16.6	51.9	1.1	3.9	135.0	SE	0.0	0.0
30/12/23	2	16.2	53.6	0.6	2.2	45.0	NE	0.0	0.0
30/12/23	3	15.5	56.2	0.1	0.4	45.0	NE	0.0	0.0
30/12/23	4	14.7	58.7	0.4	1.4	157.5	SES	0.0	0.0
30/12/23	5	14.2	60.0	1.7	6.3	315.0	NW	0.0	0.0
30/12/23	6	15.2	62.4	1.1	3.9	225.0	SW	0.0	0.0

Date	Time	Temperature (°C)	Relative Humidity (%)	Wind Speed		Wind Direction (Angle)	Wind Direction (Letter)	Cloud Cover	Hourly Precipitation (mm)
				m/s	km/hr				
30/12/23	7	16.4	61.8	1.1	3.9	315.0	NW	0.0	0.0
30/12/23	8	17.9	60.5	1.3	4.7	225.0	SW	0.0	0.0
30/12/23	9	19.4	57.8	0.7	2.5	270.0	W	0.0	0.0
30/12/23	10	20.5	55.2	1.1	4.0	67.5	ENE	0.0	0.0
30/12/23	11	21.6	52.7	0.6	2.2	135.0	SE	0.0	0.0
30/12/23	12	22.6	51.1	0.9	3.1	270.0	W	0.0	0.0
30/12/23	13	23.4	48.7	2.3	8.3	315.0	NW	0.0	0.0
30/12/23	14	24.2	46.3	2.9	10.4	315.0	NW	0.0	0.0
30/12/23	15	24.7	43.9	2.3	8.3	315.0	NW	0.0	0.0
30/12/23	16	25.1	46.9	3.7	13.3	315.0	NW	0.0	0.0
30/12/23	17	24.6	43.5	1.5	5.4	315.0	NW	0.0	0.0
30/12/23	18	23.0	44.8	2.2	7.9	135.0	SE	0.0	0.0
30/12/23	19	21.8	45.0	0.5	1.8	202.5	SSW	0.0	0.0
30/12/23	20	20.4	47.2	1.1	3.9	22.5	NNE	0.0	0.0
30/12/23	21	19.1	47.9	0.6	2.2	270.0	W	0.0	0.0
30/12/23	22	17.8	49.3	0.7	2.4	247.5	SWW	0.0	0.0
30/12/23	23	16.7	51.4	1.3	4.7	225.0	SW	0.0	0.0
30/12/23	24	15.6	52.6	1.3	4.7	292.5	WNW	0.0	0.0
31/12/23	1	15.2	54.4	0.2	0.8	135.0	SE	0.0	0.0
31/12/23	2	14.6	57.3	0.3	1.1	45.0	NE	0.0	0.0
31/12/23	3	14.2	59.5	0.4	1.4	45.0	NE	0.0	0.0
31/12/23	4	13.7	60.8	0.9	3.1	157.5	SES	0.0	0.0
31/12/23	5	13.2	63.1	0.6	2.2	315.0	NW	0.0	0.0
31/12/23	6	15.2	64.8	2.2	7.9	225.0	SW	0.0	0.0
31/12/23	7	17.4	65.0	2.2	7.9	315.0	NW	0.0	0.0
31/12/23	8	19.3	64.1	0.5	1.8	225.0	SW	0.0	0.0
31/12/23	9	20.7	62.5	0.6	2.2	270.0	W	0.0	0.0
31/12/23	10	22.1	60.7	0.7	2.5	67.5	ENE	0.0	0.0
31/12/23	11	23.4	59.4	1.3	4.7	135.0	SE	0.0	0.0
31/12/23	12	24.7	56.4	1.8	6.5	270.0	W	0.0	0.0
31/12/23	13	25.3	54.1	2.3	8.3	315.0	NW	0.0	0.0
31/12/23	14	25.6	52.5	2.7	9.7	315.0	NW	0.0	0.0
31/12/23	15	26.1	49.7	2.2	7.9	315.0	NW	0.0	0.0
31/12/23	16	25.3	47.9	4.2	15.1	315.0	NW	0.0	0.0
31/12/23	17	23.8	47.2	3.7	13.3	315.0	NW	0.0	0.0
31/12/23	18	22.2	46.6	1.4	5.0	135.0	SE	0.0	0.0
31/12/23	19	20.6	45.8	2.2	7.9	202.5	SSW	0.0	0.0
31/12/23	20	19.6	46.6	0.5	1.8	22.5	NNE	0.0	0.0
31/12/23	21	18.4	47.2	0.5	1.8	270.0	W	0.0	0.0
31/12/23	22	17.6	48.8	0.7	2.4	247.5	SWW	0.0	0.0
31/12/23	23	17.2	50.2	0.5	1.8	225.0	SW	0.0	0.0
31/12/23	24	16.3	53.7	0.3	1.1	292.5	WNW	0.0	0.0





**ANNEXURES – 3.2**

**AIR QUALITY DAILY  
RESULTS &  
MONITORING  
PHOTOGRAPHS**



Project Name: Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

**STUDY PERIOD: OCTOBER 2023 TO DECEMBER 2023**

Thantri - AAQ-1						
S. No.	Date	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	01/10/2023	52	24	7.9	11.6	0.84
2	02/10/2023	70	33	8.2	12.1	0.69
3	08/10/2023	62	29	9.1	13.8	0.71
4	09/10/2023	58	27	7.2	10.6	0.92
5	15/10/2023	62	29	8.2	12.1	0.75
6	16/10/2023	54	25	9.3	13.7	0.59
7	22/10/2023	69	32	7.1	10.4	0.81
8	23/10/2023	62	29	<5	12.6	0.78
9	01/11/2023	71	33	6.4	11.7	0.82
10	02/11/2023	57	27	6.9	10.1	0.71
11	08/11/2023	64	30	7.8	11.5	0.69
12	09/11/2023	71	33	8.9	13.1	0.94
13	15/11/2023	59	28	6.9	10.1	0.58
14	16/11/2023	51	24	8.4	12.3	0.61
15	22/11/2023	64	30	7.9	11.6	0.94
16	23/11/2023	70	33	6.8	10.1	0.89
17	01/12/2023	65	31	9.1	13.4	1.04
18	02/12/2023	71	33	8.7	14.0	0.98
19	08/12/2023	56	26	7.8	11.5	0.64
20	09/12/2023	43	20	<5	13.2	0.99
21	15/12/2023	69	32	8.7	12.8	0.87
22	16/12/2023	61	29	9.1	13.4	0.98
23	22/12/2023	57	27	6.8	10.1	0.74
24	23/12/2023	48	23	7.8	11.5	0.69

Amarpur - AAQ-2						
S. No.	Date	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	01/10/2023	54	25	7.8	11.5	0.74
2	02/10/2023	62	29	<5	12.8	0.65
3	08/10/2023	75	35	6.9	10.1	0.87
4	09/10/2023	74	35	8.7	12.8	0.95
5	15/10/2023	69	32	7.2	10.6	0.68
6	16/10/2023	62	29	9.4	13.8	0.74
7	22/10/2023	54	25	6.8	10.1	0.59
8	23/10/2023	58	27	7.4	10.9	0.88
9	01/11/2023	72	34	9.5	14.0	0.71

Project Name: Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

Amarpur - AAQ-2						
S. No.	Date	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
10	02/11/2023	63	30	6.4	10.1	0.69
11	08/11/2023	49	23	9.4	13.8	0.82
12	09/11/2023	57	27	6.9	10.1	0.58
13	15/11/2023	68	32	8.1	11.9	0.85
14	16/11/2023	74	35	9.1	13.4	0.69
15	22/11/2023	69	32	7.8	11.5	0.74
16	23/11/2023	52	24	8.1	11.9	0.59
17	01/12/2023	68	32	6.9	10.1	0.82
18	02/12/2023	61	29	<5	13.9	0.67
19	08/12/2023	69	32	8.5	12.5	0.58
20	09/12/2023	47	22	9.8	14.4	0.72
21	15/12/2023	63	30	7.1	10.4	0.78
22	16/12/2023	71	33	6.8	10.1	0.92
23	22/12/2023	68	32	7.9	11.6	0.84
24	23/12/2023	55	26	9.9	14.6	0.69

Bagpur - AAQ-3						
S. No.	Date	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	01/10/2023	51	24	9.5	13.8	0.94
2	02/10/2023	57	27	7.3	10.6	0.61
3	08/10/2023	63	30	8.4	12.2	0.78
4	09/10/2023	69	33	9.5	13.8	0.52
5	15/10/2023	78	37	10.1	14.3	0.66
6	16/10/2023	67	32	<5	13.4	0.58
7	22/10/2023	46	22	8.4	12.2	0.61
8	23/10/2023	62	30	6.2	10.1	0.54
9	01/11/2023	57	27	8.7	12.6	0.98
10	02/11/2023	79	38	6.9	10.0	0.91
11	08/11/2023	64	31	7.8	11.3	1.01
12	09/11/2023	59	28	9.5	13.8	0.94
13	15/11/2023	63	30	10.1	14.3	0.87
14	16/11/2023	74	36	8.4	12.2	0.81
15	22/11/2023	69	33	7.6	11.0	0.69
16	23/11/2023	52	25	<5	13.2	0.81
17	01/12/2023	49	24	8.4	12.2	0.98
18	02/12/2023	63	30	6.5	10.1	1.01
19	08/12/2023	68	33	7.9	11.5	0.94
20	09/12/2023	75	36	9.6	13.9	0.88



Project Name: Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

Bagpur - AAQ-3						
S. No.	Date	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
21	15/12/2023	53	25	7.1	10.3	0.81
22	16/12/2023	71	34	8.8	12.8	0.72
23	22/12/2023	56	27	7.6	11.0	1.01
24	23/12/2023	49	24	6.9	10.0	0.98

Solhra - AAQ-4						
S. No.	Date	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	03/10/2023	59	28	8.6	12.7	0.67
2	04/10/2023	54	25	7.4	11.0	0.71
3	10/10/2023	73	34	6.9	10.2	0.84
4	11/10/2023	66	31	8.1	12.0	0.69
5	17/10/2023	73	34	9.6	14.2	0.82
6	18/10/2023	64	30	8.2	12.1	0.59
7	24/10/2023	71	33	<5	11.0	0.94
8	25/10/2023	59	28	8.6	12.7	0.91
9	03/11/2023	61	29	9.6	14.2	1.02
10	04/11/2023	68	32	8.4	12.4	0.87
11	10/11/2023	56	26	7.6	11.2	0.66
12	11/11/2023	49	23	6.9	10.2	0.74
13	17/11/2023	55	26	7.8	11.5	1.01
14	18/11/2023	67	31	8.9	13.2	0.87
15	24/11/2023	58	27	<5	12.8	0.58
16	25/11/2023	52	24	7.8	11.5	0.81
17	03/12/2023	73	34	8.6	12.7	0.78
18	04/12/2023	51	24	9.4	13.9	0.92
19	10/12/2023	57	27	7.8	11.5	0.68
20	12/12/2023	66	31	6.8	10.1	0.87
21	17/12/2023	65	31	7.1	10.5	0.99
22	18/12/2023	73	34	8.7	12.9	0.78
23	24/12/2023	64	30	9.9	14.7	0.91
24	25/12/2023	59	28	7.8	11.5	0.82

Mirpur Kachh - AAQ-5						
S. No.	Date	PM <sub>10</sub> (µg/m <sup>3</sup> )	PM <sub>2.5</sub> (µg/m <sup>3</sup> )	SO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )	CO (mg/m <sup>3</sup> )
1	03/10/2023	55	25	8.6	12.0	0.74
2	04/10/2023	47	21	7.6	10.6	0.69
3	10/10/2023	56	25	10.1	13.9	0.81

Project Name: Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

<b>Mirpur Kachh - AAQ-5</b>						
<b>S. No.</b>	<b>Date</b>	<b>PM<sub>10</sub> (µg/m<sup>3</sup>)</b>	<b>PM<sub>2.5</sub> (µg/m<sup>3</sup>)</b>	<b>SO<sub>2</sub> (µg/m<sup>3</sup>)</b>	<b>NO<sub>x</sub> (µg/m<sup>3</sup>)</b>	<b>CO (mg/m<sup>3</sup>)</b>
4	11/10/2023	70	32	8.6	12.0	1.07
5	17/10/2023	51	23	7.9	11.1	0.92
6	18/10/2023	67	30	8.9	12.5	0.81
7	24/10/2023	70	32	7.2	10.1	0.74
8	25/10/2023	65	29	8.1	11.3	0.69
9	03/11/2023	56	25	6.9	10.1	0.61
10	04/11/2023	49	22	7.4	10.4	0.84
11	10/11/2023	70	32	6.9	10.5	0.99
12	11/11/2023	59	27	8.2	11.5	0.89
13	17/11/2023	67	30	<5	12.5	0.95
14	18/11/2023	44	20	6.4	10.1	0.85
15	24/11/2023	48	22	8.5	11.9	0.74
16	25/11/2023	58	26	6.9	10.1	0.65
17	03/12/2023	54	24	7.4	10.4	0.78
18	04/12/2023	70	32	8.6	12.0	1.03
19	10/12/2023	49	22	7.4	10.4	0.84
20	12/12/2023	64	29	6.9	10.1	0.69
21	17/12/2023	54	24	7.1	11.4	0.82
22	18/12/2023	62	28	<5	13.5	0.76
23	24/12/2023	54	24	8.4	11.8	0.81
24	25/12/2023	58	26	7.6	10.6	0.99

<b>Gori- AAQ-6</b>						
<b>S. No.</b>	<b>Date</b>	<b>PM<sub>10</sub> (µg/m<sup>3</sup>)</b>	<b>PM<sub>2.5</sub> (µg/m<sup>3</sup>)</b>	<b>SO<sub>2</sub> (µg/m<sup>3</sup>)</b>	<b>NO<sub>x</sub> (µg/m<sup>3</sup>)</b>	<b>CO (mg/m<sup>3</sup>)</b>
1	03/10/2023	45	21	9.6	13.9	0.51
2	04/10/2023	68	32	8.4	12.2	0.69
3	10/10/2023	61	29	7.6	11.0	0.61
4	11/10/2023	54	25	8.1	11.7	0.77
5	17/10/2023	59	28	8.9	12.9	0.82
6	18/10/2023	63	30	9.4	13.6	0.61
7	24/10/2023	57	27	8.2	11.9	0.69
8	25/10/2023	69	32	<5	11.7	0.74
9	03/11/2023	66	31	9.6	13.9	0.98
10	04/11/2023	77	36	7.8	11.3	1.05
11	10/11/2023	65	31	8.3	12.0	0.98
12	11/11/2023	61	29	6.8	10.1	0.85
13	17/11/2023	50	24	7.4	10.7	0.64
14	18/11/2023	72	34	8.3	12.0	0.76

Project Name: Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

<b>Gori- AAQ-6</b>						
<b>S. No.</b>	<b>Date</b>	<b>PM<sub>10</sub> (µg/m<sup>3</sup>)</b>	<b>PM<sub>2.5</sub> (µg/m<sup>3</sup>)</b>	<b>SO<sub>2</sub> (µg/m<sup>3</sup>)</b>	<b>NO<sub>x</sub> (µg/m<sup>3</sup>)</b>	<b>CO (mg/m<sup>3</sup>)</b>
15	24/11/2023	64	30	8.6	12.5	0.82
16	25/11/2023	51	24	10.7	15.5	0.99
17	03/12/2023	67	31	9.6	13.9	0.74
18	04/12/2023	54	25	8.7	12.6	1.02
19	10/12/2023	48	23	7.9	11.5	1.09
20	12/12/2023	59	28	<5	10.8	0.98
21	17/12/2023	75	35	8.6	12.5	0.65
22	18/12/2023	72	34	7.9	11.5	0.99
23	24/12/2023	66	31	8.6	12.5	1.01
24	25/12/2023	52	24	7.9	11.5	0.87

### AMBIANT AIR QUALITY





**Ambient Noise**



**Ground Water**







**Surface Water**



Soil Quality





**ANNEXURES – 10.1**

**CA CERTIFICATE FOR  
PROJECT COST**



**KATHPALIA & ASSOCIATES**  
Chartered Accountants



43, Sector 14, Market  
Karnal-132001 MOBILE NO: 9416032197  
E-mail: gandhidinesha@gmail.com

**Certificate for Project Cost**

Based on the books of account, documents and other information provided to us of M/S Minerio Mining Pvt. Ltd., having office at MCD no.1, First Floor, Samman Bazaar Road, Bhogal, South Delhi, Delhi-110014, We hereby confirm that department of mines & Geology, Haryana has awarded Contract in respect of "Mining of Sand (Minor Mineral) from the Thantari Unit over an area of 248.46 hectares located at Village Thanturi and Rajapur Khaddar, Distt. Palwal, State Haryana to the firm.

Further, we hereby confirm that the total estimated project cost for 1st year of river sand mine project is INR 19.00 Crores (INR Nineteen Crores Only) considering plant & machinery and other equipment will be hired basis for the purpose of project operation.

Breakup of Project cost estimation on Plant & Machinery, Construction of site office & workshop, Utility vehicles and other miscellaneous assets is given below: -

S. No.	Particulars	Amount (In Rs. Lakhs)
1	Land Cost	0.00
2	Annual Contract Money (Lease)	1318.00
3	Security	329.50
4	Mines and Minerals Development, Restoration and Rehabilitation Fund & District Mineral Fund	131.80
5	Projected Working Capital	100.00
6	Miscellaneous	20.70
<b>TOTAL PROJECT COST</b>		<b>1900.00</b>

The above statement is true and correct as per records, documents produced, and other information provided by the management for verification.

This certificate has been provided at the request of the firm.

For Kathpalia & Associates  
Chartered Accountants

Dinesh Gandhi 30/10/23  
M. No. 094964







**ANNEXURES – 12.1**  
**QCI NABET**  
**CERTIFICATE**  
**(ENVIRONMENT**  
**CONSULTANT)**





## National Accreditation Board for Education and Training



### Certificate of Accreditation

#### Parivesh Environmental Engineering Services

5/916, Viram Khand, Gomti Nagar, Lucknow, Uttar Pradesh-226010

The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organizations, Version 3: for preparing EIA-EMP reports in the following Sectors –

S. No	Sector Description	Sector (as per)		Cat.
		NABET	MoEFCC	
1	Mining of minerals- opencast mining only	1	1 (a) (i)	B
2	Metallurgical industries (ferrous & non-ferrous)	8	3 (a)	A
3	Cement plants	9	3 (b)	A
4	Synthetic organic chemicals industry	21	5 (f)	A
5	Ports, harbours, break waters and dredging	33	7 (e)	B
6	Highways,	34	7 (f)	B
7	Building and construction projects	38	8 (a)	B
8	Townships and Area development projects	39	8 (b)	B

**Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in IAAC minutes dated January 4, 2022, Supplementary assessment minutes dated April 22, 2022 and November 1, 2022 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/22/2404 dated June 23, 2022. The accreditation needs to be renewed before the expiry date by Parivesh Environmental Engineering Services, Lucknow following due process of assessment.

**NABET**

Sr. Director, NABET  
Dated: April 3, 2023

Certificate No.  
NABET/EIA/2124/IA 0092(Rev.02)

Valid up to  
November 11, 2024

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





**ANNEXURES – 12.2**

**NABL CERTIFICATE**

**(LABORATORY)**





National Accreditation Board for  
Testing and Calibration Laboratories

**CERTIFICATE OF ACCREDITATION**

**ASIA ENVIRO LAB**

has been assessed and accredited in accordance with the standard

**ISO/IEC 17025:2017**

**"General Requirements for the Competence of Testing &  
Calibration Laboratories"**

for its facilities at

H1-837, PHASE-2, RIICO INDUSTRIAL AREA, BHIWADI, ALWAR, RAJASTHAN, INDIA

in the field of  
**TESTING**

Certificate Number: TC-6004

Issue Date: 16/03/2023

Valid Until: 15/03/2025

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.

(To see the scope of accreditation of this laboratory, you may also visit NABL website [www.nabl-india.org](http://www.nabl-india.org))

Name of Legal Identity : ASIA ENVIRO LAB

Signed for and on behalf of NABL



N. Venkateswaran  
Chief Executive Officer





# **ADDITIONAL ANNEXURES**



**ADDITIONAL ANNEXURES – 1**  
**UNDERTAKING OF**  
**CONSULTANT**  
**ENGAGEMENT**





**Indian-Non Judicial Stamp  
Haryana Government**

Date: 27/10/2023

Certificate No: E0272023J1366      Stamp Duty Paid: ₹ 101

QRN No: 106635375      Penalty: ₹ 0

**Deponent**

Name: Vipin Sharma  
 H.No/Floor: 0      Sector/Ward: 0      Landmark: 0  
 City/Village: Palwal      District: Palwal      State: Haryana  
 Phone: 94\*\*\*\*\*76

Purpose: AFFIDAVIT OF MINERIO MINING PVT LTD to be submitted at Minerio mining pvt ltd

Authenticity of this document can be verified by scanning this QR Code Through smart phone or on the website <https://agashrya.hic.in>



### AFFIDAVIT CUM UNDERTAKING

I, Mr. Vipin, Authorized Signatory of M/s Minerio Mining Private Limited, having its registered office at A-1, First Floor, Samman Bazar Road, Bhogal, New Delhi 110014, for the for the project - Proposed Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana, hereby solemnly affirm, declare, and undertake.

- That all the information in the proposal is being given are correct.
- Any activity at site will be started only after grant of EC/Consent/ Statuary NOCs from the concerned departments.
- All the mining activity will be done only as per approved mining plan.

Date & Place

Deponent

Verification:

The consent of the above undertaking is true and correct to the best of my knowledge as per record & nothing has been concealed.

Date & Place

Deponent

Attested  
 SHAMSHER SINGH KAMBOJ  
 Notary  
 Yamuna Nagar District



**ADDITIONAL ANNEXURES – 2**  
**AFFIDAVIT BY**  
**CONSULTANT**





# MINERIO MINING PRIVATE LIMITED

H OFFICE : 1<sup>st</sup> floor, MCD office – 1A  
Samman Bazar Road, Bhogal,  
New Delhi -110014



SITE ADDRESS :  
1st floor, MCD office – 1A  
Samman Bazar Road, Bhogal,  
New Delhi -110014

## UNDERTAKING

I, Mr. Vipin, Authorized Signatory of M/s Minerio Mining Private Limited, having its registered office at A-1, First Floor, Samman Bazar Road, Bhogal, New Delhi 110014, for the for the Proposed Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana, hereby authorize **Mr. Vikas Tripathi**, Managing Partner of **PARIVESH ENVIRONMENTAL ENGINEERING SERVICES** having it`s office at 5/916, Viram Khand, Gomti Nagar, Lucknow, Uttar Pradesh-226010, as Environment Consultant for the project.

Thanking You,

Minerio Mining Pvt. Ltd.

Date: \_\_\_/\_\_\_/2023

Signature of the applicant



**ADDITIONAL ANNEXURES – 3**  
**AFFIDAVIT BY**  
**PROPONENT**





**Indian-Non Judicial Stamp  
Haryana Government**

Date : 27/10/2023

Certificate No. E0272023J1406  Stamp Duty Paid : ₹ 101

GRN No. 108836272  Penally : ₹ 0

**Deponent**

Name : Vikas Tripathi  
 H.No/Floor : 0 Sector/Ward : 0 Landmark : 0  
 City/Village : Palwal District : Palwal State : Haryana  
 Phone : 94\*\*\*\*\*76



Purpose : AFFIDAVIT OF PARIVESH ENVIRONMENTAL ENGINEERING SERVICES to be submitted at Parivesh environmental engineering services

The authenticity of this document can be verified by scanning this QR Code Through smart phone or on the website <https://egreshry.nic.in>



### AFFIDAVIT CUM UNDERTAKING

I, **Mr. Vikas Tripathi**, Managing Partner of **PARIVESH ENVIRONMENTAL ENGINEERING SERVICES** having its office at 5/916, Viram Khand, Gomti Nagar, Lucknow, Uttar Pradesh-226010, as Environment Consultant of **M/s Minerio Mining Private Limited** for the Proposed Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana, do hereby solemnly affirm, declare and undertake that all the information in the proposal are being given are correct.

27/10/2023  
Date & Place  
Lucknow

*Vikas*  
Deponent



Verification:

The consent of the above undertaking is true and correct to the best of my knowledge as per record & nothing has been concealed.

27/10/2023  
Date & Place  
Lucknow

*[Signature]*  
Attested  
**SHAMSHER SINGH KAMBOJ**  
M.A.L.L.B  
Advocate  
27/10/23  
NOTARY JAGADHRI  
PALWAL NAGAR

*Vikas*  
Deponent





**ADDITIONAL ANNEXURES – 4**  
**UNDERTAKING FOR**  
**NO MINING**  
**ACTIVITY**





# MINERIO MINING PRIVATE LIMITED

H OFFICE : 1<sup>st</sup> floor, MCD office – 1A  
Samman Bazar Road, Bhogal,  
New Delhi -110014



SITE ADDRESS :  
1st floor, MCD office – 1A  
Samman Bazar Road, Bhogal,  
New Delhi -110014

## UNDERTAKING

I, Mr. Vipin, Authorized Signatory of M/s Minerio Mining Private Limited, having its registered office at A-1, First Floor, Samman Bazar Road, Bhogal, New Delhi 110014, for the for the project - Proposed Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana, hereby confirms that no mining activity have been done on lease area, all the mining activity will be done after obtaining environmental clearance/ consent from consent authorities.

Thanking You,

Minerio Mining Pvt. Ltd.

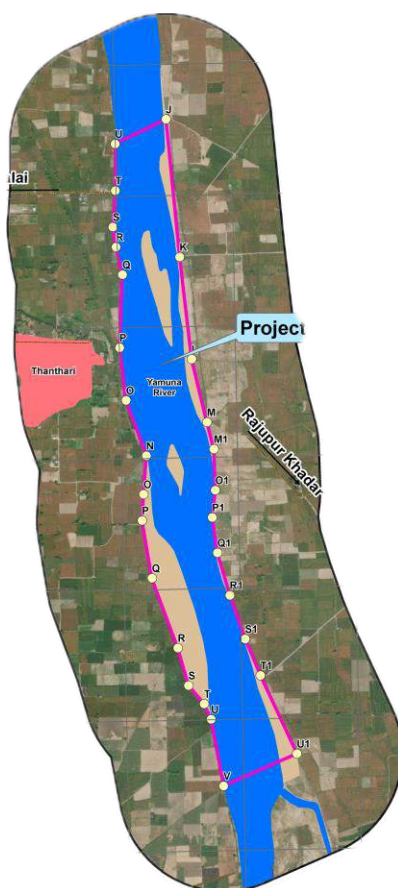
Date: \_\_\_/\_\_\_/2023

Signature of the applicant

# EXECUTIVE SUMMARY

**Mining of Sand (Minor Mineral) from the  
Riverbed of Yamuna River (Thanthri Unit)  
Production Capacity - 37,80,000 MT/ year  
Area - 99.384 ha**

**Village Thanthri & Rajupur Khadar, Tehsil &  
District Palwal and State Haryana.**



PROPONENT	:	<b>M/S MINERIO MINING PRIVATE LIMITED</b>
ENVIRONMENT CONSULTANT	:	<b>PARIVESH ENVIRONMENTAL ENGINEERING SERVICES</b> Nabet Certificate No. - NABET /EIA/2124/IA 0092 (Rev.01)
STUDY PERIOD	:	<b>POST-MONSOON (OCTOBER 2023 TO DECEMBER 2023)</b>

**JANUARY 2024**

506

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

## Executive Summary

### Project Introduction

This is the sand mine project on riverbed of Yamuna River. Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River with 37,80,000 MT/ year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

- A Letter of Intent (LOI) has been issued by the Director Mines & Geology Haryana vide letter no. DMG/HY/Thantri Unit/Palwal/2023/4199 dated 21-07-2023 to M/s Minerio Mining Private Limited for Mining of Sand (Minor Mineral) in Thanthri Unit, comprising Thantri & Rajupur Khadar villages over an area of 248.46 acres (99.384 hectares) in district Palwal, Haryana for a period of 10 years.
- The cluster NOC has been obtained from the Department of Mines and Geology, Faridabad vide letter MO/FBD/2449 dated 01.08.2023 confirms there is no other mining activity within 500m from project lease boundary to form mining cluster. So, it is individual project in the area.
- The mining plan was submitted to department and mining plan was approved vide reference no. DMG/HY/MP/THANTHRI SAND UNIT/ 2023/ 6111 DATED 26.10.2023.
- Forest NOC has been issued by the Office of Divisional Forest Officer, Palwal Forest Division, Palwal vide reference no. 1783 dated 24.08.2023 which confirms project site is not part of any reserve forest or protected forest.
- The water requirement will be fulfilled by private water tankers. Electrical supply is available in all nearby villages. The permission will be taken from concerned department for the electricity use.

### Project Description

**Table 1: Salient Features of Mine**

S. No.	Parameters	Description
1.	Name of the project	Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) by M/s Minerio Mining Private Limited.
2.	Nature & category of Mine	Non-Coal Mining Category 'B' of Activity 1(B)
3.	Project Proponent	M/s Minerio Mining Private Limited
4.	Khasra No.	<b>For Mining</b> 3// 11 min, 20/1, 20/2 min, 21 min, 4// 7, 8 min, 13/1 min, 13/2, 14, 15/1, 15/2, 16/1 min, 16/2 min, 17/1, 17/2, 18/1 min, 23 min, 24/1, 24/2, 25/1, 25/2, 10// 3 min, 4/1, 4/2, 5, 6/1, 6/2, 7/1, 7/2, 8/1, 8/2 min, 13/1 min, 13/2, 13/3, 14, 15/1, 15/2, 15/3, 15/4, 16/1, 16/2, 17, 18/1, 18/2 min, 23 min, 24, 25, 11// 1 min, 10 min, 11 min, 20 min, 21/1, 21/2, 22 min, 15// 1, 2 min, 9 min, 10/1, 10/2, 11, 12/1 min, 12/2 min, 19 min, 20/1, 20/2, 21, 22 min,

PROPONENT: M/S MINERIO MINING PRIVATE LIMITED

CONSULTANT: PARIVESH ENVIRONMENTAL ENGINEERING SERVICES (NABET / EA/2124/IA 0092(Rev.01))

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Parameters	Description
		<p>16// 3/2, 4, 5, 6, 7, 8/1, 13/1 min, 13/2 min, 14, 15, 16/1, 16/2, 17, 18/1 min, 23/2 min, 24, 25, 23// 3/2 min, 4/1, 4/2, 5/1, 5/2, 7, 8/1 min, 13/3 min, 14/1, 14/2, 15, 16/1, 16/2, 17/1, 17/2, 18/1 min, 23 min, 24, 25/1, 25/2, 24// 1, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20, 21, 22 min, 28//, 1, 2 min, 9/1 min, 9/2 min, 10, 11, 12 min, 19 min, 20, 21/1, 21/2, 29//, 3 min, 4, 5/1, 5/2, 6/1, 6/2, 7/1, 7/2, 8 min, 13/2 min, 14/1, 14/2, 15/1, 15/2, 15/3, 16, 17/1, 17/2, 18/1 min, 23/2 min, 24/1, 24/2, 25, 38//, 3/2 min, 4/1, 4/2, 5/1, 5/2, 6, 7/1, 7/2, 8/1 min, 13/2 min, 14/1, 14/2, 15, 16, 17 min, 18/1 min, 24 min, 25, 39//, 1, 2 min, 3 min, 8 min, 9, 10, 11/1, 11/2, 12, 13/1 min, 13/2 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min, 41//, 1, 2, 3 min, 9, 10, 11, 42//, 4 min, 5, 6/1, 6/2, 6/3, 7 min, 14 min, 15, 17 min.</p> <p><b>For Ancillary area</b> 24// 4, 5/1, 5/2, 6, 7, 14, 15, 25// 1/ 1, 1/2, 10, 11.</p> <p><b>For Mining</b> 7//, 3/1, 3/2, 8/1 min, 8/2, 9, 11/2, 11/1, 12, 13 min, 14 min, 17 min, 18, 19, 20, 21, 22, 23, 24 min, 8// 16 min, 25/1 min, 25/2, 10// 5/1 min, 5/2, 6/1, 6/2, 7 min, 14 min, 15/1, 15/2, 16, 17 min, 24/2 min, 25, 11// 1, 2, 3, 4 min, 7 min, 8/1, 8/2, 9, 10/1, 10/2, 11, 12, 13/1, 13/2, 14 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min, 24// 1, 2/1, 2/2, 3/1, 3/2, 7 min, 8 min, 9, 10, 11, 12, 13, 14 min, 17/1 min, 17/2 min, 18, 19, 20, 21, 22/1, 22/2, 23, 24/1,2,3 min, 25// 4/2 min, 5, 6, 7 min, 15 min, 16 min, 25 min, 29//, 5 min, 6/1 min, 6/2 min, 15 min, 30// 1, 2/1, 2/2, 3/1, 3/2, 4 min, 7 min, 8, 9/1, 9/2, 10, 11, 12, 13, 14, 15 min, 16 min, 17, 30// 18, 19, 20 min, 21/1,2 min, 22/1, 22/2, 23, 24, 25 min, 44//, 10/2 min, 11/1 min, 20/1 min, 20/2 min, 21 min, 45// 1 min, 2, 3, 4, 5 min, 6 min, 7, 8, 9/1 min, 9/2 min, 10 min, 11 min, 12 min, 13, 14, 15, 16, 17, 18, 19 min, 22 min, 23, 24, 25/1, 25/2, 52// 2 min, 3, 4, 5, 6/1, 6/2, 7, 8 min, 13 min, 14, 15, 16, 17 min, 18 min, 23 min, 24, 25, 53// 1/1, 1/2 min, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20/1, 20/2, 21, 22, 23 min, 61// 1, 2/1, 2/2, 3/1, 8 min, 9, 10, 11, 62// 3 min, 4 min, 5, 6.</p> <p><b>For Ancillary area</b> 31// 6, 7, 8, 13, 14, 15, 16, 17, 18, 23, 24, 25/1</p>
5.	Total Lease area	99.384 Ha (248.46 Acre) - Riverbed of Yamuna River



Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Parameters	Description		
6.	Location of the project	Village- Thanthri & Rajupur Khadar, Tehsil & District- Palwal, Haryana		
7.	Toposheet No.	H43X7 - Project Site & H43X7, H43X8, H43X11 & H43X12 - Study Area.		
8.	Maximum Production Capacity	37,80,000 Metric Tonne / Year		
9.	Geological Mineral Reserve	49,21,776 Metric Tonne		
10.	Blocked Mineral Reserve	11,34,000 Metric Tonne		
11.	Mineable Reserve	37,87,776 Metric Tonne		
12.	Geographical co-ordinates	<b>Point</b>	<b>Longitude</b>	<b>Latitude</b>
		<b>THANTRI</b>		
		J	28°11'11.62"N	77°28'28.66"E
		K	28°10'50.58"N	77°28'30.54"E
		L	28°10'35.01"N	77°28'32.27"E
		M	28°10'25.35"N	77°28'34.66"E
		N	28°10'20.42"N	77°28'24.11"E
		O	28°10'28.93"N	77°28'20.77"E
		P	28°10'36.97"N	77°28'19.87"E
		Q	28°10'48.08"N	77°28'20.60"E
		R	28°10'52.30"N	77°28'19.59"E
		S	28°10'55.35"N	77°28'19.11"E
		T	28°11'0.91"N	77°28'19.65"E
		U	28°11'8.03"N	77°28'19.79"E
		<b>RAJUPUR KHURD</b>		
		M	28°10'25.35"N	77°28'34.66"E
		M1	28°10'21.22"N	77°28'35.74"E
		N	28°10'20.42"N	77°28'24.11"E
		O	28°10'14.55"N	77°28'23.46"E
		O1	28°10'14.95"N	77°28'35.86"E
		P	28°10'10.57"N	77°28'23.13"E
		P1	28°10'10.80"N	77°28'35.24"E
		Q	28°10'1.74"N	77°28'24.64"E
		Q1	28°10'5.40"N	77°28'36.00"E
		R	28° 9'51.05"N	77°28'28.86"E
		R1	28° 9'58.90"N	77°28'38.00"E
		S	28° 9'45.29"N	77°28'30.54"E
		S1	28° 9'52.20"N	77°28'40.50"E
		T	28° 9'42.44"N	77°28'33.19"E
T1	28° 9'46.60"N	77°28'43.00"E		
U	28° 9'40.08"N	77°28'34.35"E		
U1	28° 9'34.56"N	77°28'49.01"E		
V	28° 9'29.87"N	77°28'36.25"E		
13.	Name of Rivers/ Nallahs/ Tanks/ Spring/ Lakes etc	<b>Description</b>	<b>Distance</b>	<b>Direction</b>
		Yamuna River	Project Site	
		Canal	8.6	NNW

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Parameters	Description		
		Chhansa Distributary	7.6	NW
		Rampur Distributary	11.3	W
		Alawalpur Polwa Minor	8.5	WNW
		Palak Minor	6.1	W
		Rampur Distributary	3.4	W
		Raunija Drain	11.3	WSW
		Kithwari Drain	11.1	WSW
		Palwal Drain	12.9	WSW
		Hoshangabad Minor	12.2	SW
		Rasulpur Minor	10.9	SW
		Hasanpur Distributary	9.4	SW
		Nandabara Minor	11.1	SW
		Left Bata Drain	12.5	SSW
		Amrauli Minor	11.9	SSW
		Bata Escape	14.6	SSW
		Kharis Nala	13.1	SE
		Gopalgadh Minor	12.2	SE
		Waina Minor	13.7	SE
		Siwara Minor	9.3	ESE
		Kishorpur Minor	13.1	ESE
		Karoli Minor	10.9	E
		Dinayatpur Minor	7.9	ENE
		Jewar Distributary	9.3	NE
		Right Phaleda Minor	7.5	ENE
		Ranehra Minor	11.4	ENE
		Birampur Minor	11.9	ENE
		Tirthili Drain	12.7	NE
		Rabupura Minor	12.1	NE
		Kund Nala	10.5	NNE
14.	Reserve Forest(s), Wildlife Sanctuary/ National parks etc.	Sultanpur RF	14.7	S
		Karauli Khadar PF	4.9	NE
15.	Topography of ML area	Highest elevation in riverbed at extreme north end is 132.9 mRL and bank top level is 135.3 mRL whereas the levels at the extreme south end in riverbed is 129.5 mRL and Riverbank top is 133.0 mRL. The Yamuna River flows from N to S direction in Thanthri & Rajupur khadar revenue village.		
16.	Mining Method & Technology	Opencast manual method will be adopted. No specific method of exploration is required as the river borne sediments are deposited all along the riverbed and are very well exposed on the surface. Moreover, these sediments are accumulated/ replenished every year during rainy season by flood waters to almost the same level depending on the intensity of rains on		

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

S. No.	Parameters	Description															
		the upstream side. Adequate quantity of sand reserves is available for meeting consumer demand.															
17.	Ultimate depth of Mining	3 m from the riverbed of Yamuna River															
18.	Ground water level	05 - 10 m from the surface level															
19.	GWT intersection	Mining will be done only up to 3m from surface. So, ground water table will not be intersected.															
20.	Drainage pattern/ water courses	Mining will be done in dry riverbed; stream will not be touched and will be done only during non-monsoon period.															
21.	Water requirement & source	The source of water is private water tankers. The break-up of water requirement is as follows:															
		<table border="1"> <thead> <tr> <th>S. No.</th> <th>Description</th> <th>Demand</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Dust Suppression</td> <td>31.0 KLD</td> </tr> <tr> <td>2</td> <td>Greenbelt Development</td> <td>13.0 KLD</td> </tr> <tr> <td>3</td> <td>Domestic Requirement</td> <td>6.5 KLD</td> </tr> <tr> <td colspan="2"><b>Total</b></td> <td><b>50.5 KLD</b></td> </tr> </tbody> </table>	S. No.	Description	Demand	1	Dust Suppression	31.0 KLD	2	Greenbelt Development	13.0 KLD	3	Domestic Requirement	6.5 KLD	<b>Total</b>		<b>50.5 KLD</b>
		S. No.	Description	Demand													
		1	Dust Suppression	31.0 KLD													
		2	Greenbelt Development	13.0 KLD													
3	Domestic Requirement	6.5 KLD															
<b>Total</b>		<b>50.5 KLD</b>															
22.	Cost of project	The capital cost for the project will be Rs. 19 Crores including proposed lease area and machinery will be hired on contract bases.															

Source: Approved Mining Plan

## Analysis of Alternative

It is case of fresh quarry lease. The mineral is site specific, so no alternative site was identified. Lease approval from concerned authority has been obtained and enclosed in report.

## Description of Baseline Environment

Environmental data has been collected during post-monsoon season i.e., October 2023 to December 2023 in accordance with the guidelines for preparation of EIA studies.

**Table 2: Baseline Status**

Parameters	Baseline Status
Ambient Air Quality	<p><b>Particulate Matter:</b> PM<sub>10</sub> varying from 43 µg/m<sup>3</sup> to 79 µg/m<sup>3</sup>. PM<sub>2.5</sub> was observed 20 µg/m<sup>3</sup> to 38 µg/m<sup>3</sup>.</p> <p><b>Gaseous Pollutants:</b> SO<sub>2</sub> was varying from 6.2 µg/m<sup>3</sup> to 10.7 µg/m<sup>3</sup>. NO<sub>x</sub> was observed 10.0 µg/m<sup>3</sup> to 15.5 µg/m<sup>3</sup> in study area. CO was observed from 0.51 mg/m<sup>3</sup> to 1.09 mg/m<sup>3</sup> in study area.</p>
Noise Level	The Sound Pressure Level recorded during the daytime on all locations varies from 39.3 dB(A) to 54.9 dB(A) & in nighttime it varies between 28.5 dB(A) to 40.2 dB(A).
Ground Water	All the parameters were observed mostly exceeding the acceptable limits but well within permissible limits for drinking water standard 10500:2012. pH (7.1 to 7.8), TDS (776 mg/l to 792 mg/l), alkalinity (214.9 mg/l to 254.8 mg/l), Total Hardness (266.0 mg/l to 295.5 mg/l), Calcium as Ca (58.6 mg/l to 72.4

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

Parameters	Baseline Status
	mg/l), Magnesium as Mg (26.5 mg/l to 29.7 mg/l), Chloride (219.5 mg/l to 249.6 mg/l) & Sulphate (51.7 mg/l to 58.4 mg/l) parameters were analysed.
Surface Water	The pH was varying between 7.0 to 7.5. Dissolved Oxygen of the sources was varying between 6.1 mg/l to 6.9 mg/l. BOD was observed 4.9 mg/l to 37.8 mg/l. Total Coliform were observed varying between 300 MPN/100ml to 1500 MPN/100ml. Water was not usable due to bad quality.
Soil Quality	The soil was predominantly Loamy in the study area. The pH was ranges 7.1 to 7.8. The conductivity was varying from 339 µmhos/cm to 428 µmhos/cm. Organic Carbon was varying from 0.39% to 0.57%. Nitrogen was varying from 142 kg/ha to 173 kg/ha. Phosphorous was varying from 16 kg/ha to 22 kg/ha. Potassium was varying from 114 kg/ha to 131 kg/ha. Overall, the soil quality was good having the good bulk density & good moisture content which may be due to the basin of river Yamuna.
Meteorology	The maximum temperature recorded during the study period was 35.7°C in the month of October and the minimum temperature was 8.2°C in the month of December. The highest RH found in the study area was 76.5% in the month of October, while minimum monthly average RH found 42.6% in the month of December. The average wind speed recorded was 1.3 m/sec. Predominant wind direction during the study period was mainly South-West to North-East followed by North- East to South-West.

## Anticipated Environmental Impact and Mitigation Measures

The proposed mining operations are not anticipated to raise the concentration of the pollutants beyond prescribed limits. The identified impacts and mitigation measures are detailed below.

- ✓ Total 1,680 PCU/ day will increase in the existing traffic due to this mining activity hence vehicle collation may occur unwanted sound and can also cause impact on human health of villagers near to transportation route like effect on breathing and respiratory issues. Accidents may occur due to fast movement of vehicles. The truck movement will be from suggested transportation route only. It is proposed to plant 13,000 nos. of plants in plan period and water sprinkling will be done twice in a day to reduce the impact.
- ✓ The machinery will be maintained in good running condition so that noise will be reduced to minimum possible level. Vehicles with PUC certificate will be hired. Regular maintenance of vehicles will be done to ensure smooth running of vehicle. Awareness will be imparted to the workers about the permissible noise level and effect of maximum exposure to those levels. In addition, truck drivers will be instructed to make minimum use of horns in the village area and sensitive zones.
- ✓ There will be no impact on ground water table as the mining will be limited to 3m only and the water level of project site is 5-10m from the surface. So, no impact on water was identified. Only 1.3 KLD sanitary wastewater will be generated from the proposed mining activity which will be treated in septic tanks and will be used for plantation purpose.
- ✓ The mine worker will generate municipal solid waste of about 35 Kg per day, which will have an adverse impact on human health. There will be 10 Nos. of garbage bins, provided



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for domestic waste collection. There will be no overburden due to mining in the riverbed area.

- ✓ The mining activities will be done in a systematic manner by maintaining the road infrastructure and vehicle transport, which will be a protective measure for preserving the topography and drainage in the area.
- ✓ No human settlement is proposed in mining or ancillary area. Local manpower will be preferred.
- ✓ No mining will be carried out during the rainy season to minimize impact on aquatic life.
- ✓ According to field survey, interviews of residents and authenticated checklist from forest department indicates the presence of 06 Schedule-I species in the buffer area of study area of proposed mine lease area. Hence, for the protection of these schedule-I species, a detailed conservation plan is proposed with futuristic approach. The species are Varanus benghalensis (Common Indian Monitor lizard), Naja naja (Indian Cobra), Ptyas mucosa (Rat Snake), Pavo cristatus (Indian Peafowl), Herpestes edwardsii (Common Mongoose) & Felis chaus (Jungle Cat), for the same conservation plan was prepared. Subsequently, a budget of Rs. 25 Lakhs has allotted for the conservation of wildlife species.
- ✓ The mining of Sand is likely to increase the per capita income of local people by which the socioeconomic status of the people will be improved. The local people have been provided with either direct employments or indirect employment such as business, contract works and development work like roads, etc. and other welfare amenities such as medical facilities, conveyance, free education, drinking water supply etc.
- ✓ Except dust generation, there is no source which can show a probability for health-related diseases. Regular water sprinkling will be done with sprinkles mounted tankers and dust masks will be provided to the workers.
- ✓ Personal protective equipment will provide to prevent the noise exposure. Personal Protective Equipment will be provided during mining activity. Regular Health check-up camps will be organized. All the workers will be insured by employer.

## Environmental Monitoring Program

To maintain the environmental quality within the stipulated standards, regular monitoring of various environmental components is necessary which will have complied as per conditions. For this the lessee has taken decision to formulate an Environment Policy of the mine and constitute an Environmental Management Cell and committed to operate the proposed mine with the objectives mentioned in approved Environment Policy. A budget for monitoring of Air, water, Noise and Soil will be Rs. 60.0 thousand annual which is to be incurred by the project proponent for undertaking pollution prevention measures during the mining activity.

## Additional Studies

As per proposal made under the mining plan the area will be developed by means of opencast mining method. Water table will not be touched during the mining process. No high-risk accidents like landslides, subsidence flood etc. have been apprehended.

Mining of Sand (Minor Mineral) from the Riverbed of Yamuna River (Thanthri Unit) with 37,80,000 MT/year production over an area of 99.384 ha located at Village Thanthri & Rajupur Khadar, Tehsil & District Palwal and State Haryana.

The Safety Health and Environmental (SHE) policy is existing and accessible to all at site and to other stakeholders. The policy has been framed considering legislative compliance, stakeholder involvement, continual improvement, and management by objectives.

To minimize the health impacts PPE like dust masks, ear plugs/ muffs and other equipment will be provided for use by the work personnel. All workers will be subjected to Initial Medical Examination as per Mines Rule 1955 at the time of appointment. Periodical Medical Examination will be conducted at least once in five years. Medical camps will be organized Six Monthly by proponent.

There is no displacement of the population within the project area and adjacent nearby area. This working of mine will offer more employment, chances to some of the nearby population, it is always obvious that the safe mining activity will help to improve socio-economic conditions of the inhabitants.

## Project Benefit

The project proponent is conscious of its social responsibility and as any good corporate citizen; it is proposed to undertake the need specific (skilled & non-skilled) employment. This Project will provide employment to local people directly and indirectly. Indirect employers are shopkeepers, mechanic, drivers, transporters etc. About 145 persons will get direct employment and 20 persons will get indirect employment form nearby villages. The workers will be mostly skilled.

The developer will also adopt the ESR program as per norms and will provide vary facilities the nearby villages. The salient features of the programme are as follows:

- ✓ Social welfare program like provision of medical facilities educational facilities, water supply for the employees as well as for nearby villagers will be taken.
- ✓ A well laid plan for employment of the local people has been prepared by giving priority to local people.
- ✓ Supplementing Govt. efforts in health monitoring camps, social welfare, and various awareness programs among the rural population.
- ✓ Assisting social plantation program.
- ✓ Development of facilities within villages like roads, etc.

## Cost of Environment Management Plan

For the environment Management, detailed activitis has been calculated which are INR 17.0 Lakhs as a Capital Cost and INR 5.80 Lakhs per annum as a Recurring cost, respectively. Total budget of INR 46.0 Lakh for environmental measurements has been ensured by the developer for plan period.

## Conclusion

As per above discussion there is no major impact on the environment due to mining except fugitive emission during loading, unloading of mineral & transportation. The adequate preventive measures will be adopted to contain the various pollutants within permissible limits. It is proposed to plant about 13,000 saplings and gap plantation considering 1000 / plant including maintenance and fencing. It will prove an effective pollution mitigate technique and help avoid soil erosion

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during monsoon season. Employment opportunities will be provided to the locals only as providing extraction of minerals from the mine site is the only prevailing occupation for them for their livelihood. Plantation development will be carried out in the mine premises, along the approach roads, around Govt. buildings, schools approx.

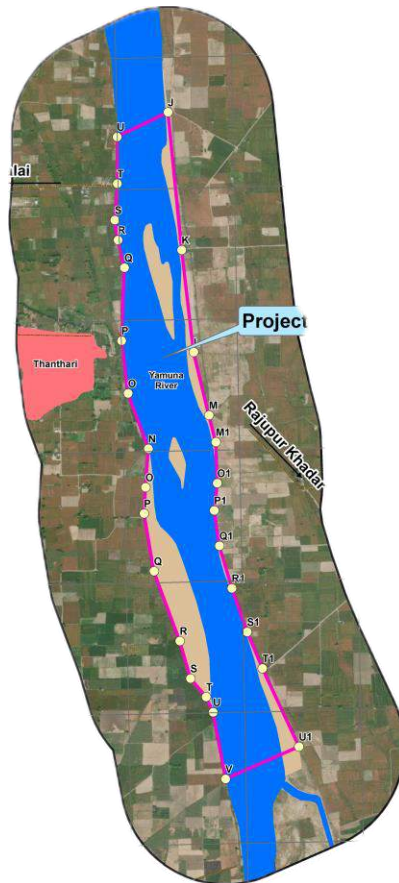
# कार्यकारी सारांश

यमुना नदी के तल से रेत (लघु खनिज) की खनन परियोजना  
(थंथरी इकाई)

उत्पादन क्षमता - 37,80,000 मीट्रिक टन/वर्ष

क्षेत्रफल - 99.384 हेक्टेयर

गांव थंथरी और राजूपुर खादर, तहसील और जिला पलवल और  
राज्य हरियाणा।



PROPONENT	:	<b>M/S MINERIO MINING PRIVATE LIMITED</b>
ENVIRONMENT CONSULTANT	:	<b>PARIVESH ENVIRONMENTAL ENGINEERING SERVICES</b> Nabet Certificate No. - NABET /EIA/2124/IA 0092 (Rev.01)
STUDY PERIOD	:	<b>POST-MONSOON (OCTOBER 2023 TO DECEMBER 2023)</b>

JANUARY 2024

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यमुना नदी (थंथरी यूनिट) के नदी तल से रेत (लघु खनिज) का खनन, क्षेत्रफल - 99.384 हेक्टेयर, उत्पादन क्षमता - 37,80,000 मीट्रिक टन प्रति वर्ष, स्थान - गांव थंथरी और राजपुर खादर, तहसील और जिला पलवल और राज्य हरियाणा।

## कार्यकारी सारांश।

### परियोजना का परिचय

यह यमुना नदी के बेड पर रेत खदान परियोजना है। यमुना नदी के किनारे से रेत (लघु खनिज) की खदानी क्रिया को 37,80,000 मीट्रिक टन प्रति वर्ष उत्पाद के साथ 99.384 हेक्टेयर क्षेत्र पर स्थित गाँव ठांथरी और राजपुर खादर, तहसील और जिला पलवल, और हरियाणा राज्य में किया जा रहा है।

- एक पत्रक (Letter of Intent - LOI) को 21-07-2023 को डायरेक्टर खदान और भूगर्भ हरियाणा के द्वारा जारी किया गया है, जिसमें डीएमजी/एचवाई/ठांथरी यूनिट/पलवल/2023/4199 डेटेड 21-07-2023 दिखाई देता है, एम/एस माइनेरियो माइनिंग प्राइवेट लिमिटेड को ठांथरी यूनिट में रेत (लघु खनिज) की खदानी के लिए, जिसमें ठांथरी और राजपुर खादर गाँवों को 248.46 एकड़ (99.384 हेक्टेयर) क्षेत्र में शामिल किया गया है, पलवल जिले, हरियाणा के लिए 10 वर्षों के लिए।
- खनिज और भूगर्भ विभाग, फरीदाबाद से प्राप्त क्लस्टर एनओसी (NOC) द्वारा 01.08.2023 को डेटेड MO/FBD/2449 अनुसार पुष्टि हो गई है, जिससे प्रक्रिया क्षेत्र की परिसीमा से 500 मीटर की दूरी पर कोई अन्य खदानी गतिविधि नहीं है और इसे खदानी क्लस्टर बनाने के लिए। इसलिए, यह क्षेत्र में व्यक्तिगत परियोजना है।
- खनिज योजना विभाग को प्रस्तुत की गई थी और इसे स्वीकृति प्राप्त हुई थी, जिसमें संदर्भ संख्या DMG/HY/MP/THANTHRI SAND UNIT/2023/6111 डेटेड 26.10.2023 था।
- वन एनओसी को पलवल वन डिवीजन के क्षेत्रीय वन अधिकारी के कार्यालय ने 24.08.2023 को डेटेड 1783 संदर्भ से जारी किया गया है, जिससे पुष्टि होती है कि परियोजना स्थल कोई संरक्षित वन या संरक्षित वन का हिस्सा नहीं है।
- निजी जल टैंकर्स द्वारा जल आवश्यकता पूरी की जाएगी। सभी पास के गाँवों में इलेक्ट्रिकल सप्लाई उपलब्ध है। विद्युत उपयोग के लिए संबंधित विभाग से इसकी अनुमति ली जाएगी।

### परियोजना का विवरण

#### सारणी 1: मेरी मुख्य विशेषताएं

एस. नं.	पैरामीटर	विवरण
एक.	परियोजना का नाम	मैसर्स मिनेरियो माइनिंग प्राइवेट लिमिटेड द्वारा यमुना नदी (थंथरी यूनिट) के नदी तल से रेत (लघु खनिज) का खनन।
दो.	मेरी प्रकृति और श्रेणी	गतिविधि की गैर-कोयला खनन श्रेणी 'बी' 1 (बी)
तीन.	परियोजना प्रस्तावक	मैसर्स मिनेरियो माइनिंग प्राइवेट लिमिटेड
चार.	खसरा नं.	For Mining

प्रस्तावक: मैसर्स मिनेरियो माइनिंग प्राइवेट लिमिटेड

सलाहकार: परिवेश पर्यावरण इंजीनियरिंग सेवाएं (एनएबीईटी / ईआईए / 2124 / आईए 0092 (रेव.01) 7

पृष्ठ 1

यमुना नदी (थंथरी यूनिट) के नदी तल से रेत (लघु खनिज) का खनन, क्षेत्रफल - 99.384 हेक्टेयर, उत्पादन क्षमता - 37,80,000 मीट्रिक टन प्रति वर्ष, स्थान - गांव थंथरी और राजपुर खादर, तहसील और जिला पलवल और राज्य हरियाणा।

एस. नं.	पैरामीटर	विवरण
		<p>3// 11 min, 20/1, 20/2 min, 21 min, 4// 7, 8 min, 13/1 min, 13/2, 14, 15/1, 15/2, 16/1 min, 16/2 min, 17/1, 17/2, 18/1 min, 23 min, 24/1, 24/2, 25/1, 25/2, 10// 3 min, 4/1, 4/2, 5, 6/1, 6/2, 7/1, 7/2, 8/1, 8/2 min, 13/1 min, 13/2, 13/3, 14, 15/1, 15/2, 15/3, 15/4, 16/1, 16/2, 17, 18/1, 18/2 min, 23 min, 24, 25, 11// 1 min, 10 min, 11 min, 20 min, 21/1, 21/2, 22 min, 15// 1, 2 min, 9 min, 10/1, 10/2, 11, 12/1 min, 12/2 min, 19 min, 20/1, 20/2, 21, 22 min, 16// 3/2, 4, 5, 6, 7, 8/1, 13/1 min, 13/2 min, 14, 15, 16/1, 16/2, 17, 18/1 min, 23/2 min, 24, 25, 23// 3/2 min, 4/1, 4/2, 5/1, 5/2, 7, 8/1 min, 13/3 min, 14/1, 14/2, 15, 16/1, 16/2, 17/1, 17/2, 18/1 min, 23 min, 24, 25/1, 25/2, 24// 1, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20, 21, 22 min, 28//, 1, 2 min, 9/1 min, 9/2 min, 10, 11, 12 min, 19 min, 20, 21/1, 21/2, 29//, 3 min, 4, 5/1, 5/2, 6/1, 6/2, 7/1, 7/2, 8 min, 13/2 min, 14/1, 14/2, 15/1, 15/2, 15/3, 16, 17/1, 17/2, 18/1 min, 23/2 min, 24/1, 24/2, 25, 38//, 3/2 min, 4/1, 4/2, 5/1, 5/2, 6, 7/1, 7/2, 8/1 min, 13/2 min, 14/1, 14/2, 15, 16, 17 min, 18/1 min, 24 min, 25, 39//, 1, 2 min, 3 min, 8 min, 9, 10, 11/1, 11/2, 12, 13/1 min, 13/2 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min, 41//, 1, 2, 3 min, 9, 10, 11, 42//, 4 min, 5, 6/1, 6/2, 6/3, 7 min, 14 min, 15, 17 min.</p> <p>For Ancillary area 24// 4, 5/1, 5/2, 6, 7, 14, 15, 25// 1/ 1, 1/2, 10, 11.</p> <p>For Mining 7//, 3/1, 3/2, 8/1 min, 8/2, 9, 11/2, 11/1, 12, 13 min, 14 min, 17 min, 18, 19, 20, 21, 22, 23, 24 min, 8// 16 min, 25/1 min, 25/2, 10// 5/1 min, 5/2, 6/1, 6/2, 7 min, 14 min, 15/1, 15/2, 16, 17 min, 24/2 min, 25, 11// 1, 2, 3, 4 min, 7 min, 8/1, 8/2, 9, 10/1, 10/2, 11, 12, 13/1, 13/2, 14 min, 18 min, 19/1, 19/2, 20, 21, 22, 23 min, 24// 1, 2/1, 2/2, 3/1, 3/2, 7 min, 8 min, 9, 10, 11, 12, 13, 14 min, 17/1 min, 17/2 min, 18, 19, 20, 21, 22/1, 22/2, 23, 24/1,2,3 min, 25// 4/2 min, 5, 6, 7 min, 15 min, 16 min, 25 min, 29//, 5 min, 6/1 min, 6/2 min, 15 min, 30// 1, 2/1, 2/2, 3/1, 3/2, 4 min, 7 min, 8, 9/1, 9/2, 10, 11, 12, 13, 14, 15 min, 16 min, 17, 30// 18, 19, 20 min, 21/1,2 min, 22/1, 22/2, 23, 24, 25 min, 44//, 10/2 min, 11/1 min, 20/1 min, 20/2 min, 21 min, 45// 1 min, 2, 3, 4, 5 min, 6 min, 7, 8, 9/1 min, 9/2 min, 10 min, 11 min, 12 min, 13, 14, 15, 16, 17, 18, 19</p>

प्रस्तावक: मैसर्स मिनेरियो माइनिंग प्राइवेट लिमिटेड

सलाहकार: परिवेश पर्यावरण इंजीनियरिंग सेवाएं (एनएबीईटी / ईआईए / 2124 / आईए 0092 (रेव.01))

पृष्ठ 2

यमुना नदी (थंथरी यूनिट) के नदी तल से रेत (लघु खनिज) का खनन, क्षेत्रफल - 99.384 हेक्टेयर, उत्पादन क्षमता - 37,80,000 मीट्रिक टन प्रति वर्ष, स्थान - गांव थंथरी और राजपुर खादर, तहसील और जिला पलवल और राज्य हरियाणा।

एस. नं.	पैरामीटर	विवरण																																																																		
		min, 22 min, 23, 24, 25/1, 25/2, 52// 2 min, 3, 4, 5, 6/1, 6/2, 7, 8 min, 13 min, 14, 15, 16, 17 min, 18 min, 23 min, 24, 25, 53// 1/1, 1/2 min, 2/1 min, 2/2 min, 9 min, 10, 11/1, 11/2, 12 min, 19 min, 20/1, 20/2, 21, 22, 23 min, 61// 1, 2/1, 2/2, 3/1, 8 min, 9, 10, 11, 62// 3 min, 4 min, 5, 6. For Ancillary area 31// 6, 7, 8, 13, 14, 15, 16, 17, 18, 23, 24, 25/1																																																																		
पांच.	कुल पट्टा क्षेत्र	99.384 हेक्टेयर (248.46 एकड़) - यमुना नदी का नदी तल																																																																		
छः.	परियोजना का स्थान	गाँव - ठंथरी और राजपुर खादर, तहसील और जिला - पलवल, हरियाणा																																																																		
सात.	टॉपशीट नं.	H43X7 - परियोजना साइट और H43X7, H43X8, H43X11 & H43X12 - अध्ययन क्षेत्र.																																																																		
आठ.	अधिकतम उत्पादन क्षमता	37,80,000 मीट्रिक टन प्रति वर्ष																																																																		
नौ.	भूवैज्ञानिक खनिज भंडार	49,21,776 मीट्रिक टन																																																																		
दस.	अवरुद्ध खनिज भंडार	11,34,000 मीट्रिक टन																																																																		
ग्यारह.	खनन योग्य रिजर्व	37,87,776 मीट्रिक टन																																																																		
बारह.	भौगोलिक समन्वय	<table border="1"> <thead> <tr> <th>बिन्दु</th> <th>देशान्तर</th> <th>अक्षांश</th> </tr> </thead> <tbody> <tr> <td colspan="3" style="text-align: center;"><b>थांत्री</b></td> </tr> <tr> <td>J</td> <td>28°11'11.62"N</td> <td>77°28'28.66"E</td> </tr> <tr> <td>K</td> <td>28°10'50.58"N</td> <td>77°28'30.54"E</td> </tr> <tr> <td>L</td> <td>28°10'35.01"N</td> <td>77°28'32.27"E</td> </tr> <tr> <td>M</td> <td>28°10'25.35"N</td> <td>77°28'34.66"E</td> </tr> <tr> <td>N</td> <td>28°10'20.42"N</td> <td>77°28'24.11"E</td> </tr> <tr> <td>O</td> <td>28°10'28.93"N</td> <td>77°28'20.77"E</td> </tr> <tr> <td>P</td> <td>28°10'36.97"N</td> <td>77°28'19.87"E</td> </tr> <tr> <td>Q</td> <td>28°10'48.08"N</td> <td>77°28'20.60"E</td> </tr> <tr> <td>R</td> <td>28°10'52.30"N</td> <td>77°28'19.59"E</td> </tr> <tr> <td>S</td> <td>28°10'55.35"N</td> <td>77°28'19.11"E</td> </tr> <tr> <td>T</td> <td>28°11'0.91"N</td> <td>77°28'19.65"E</td> </tr> <tr> <td>U</td> <td>28°11'8.03"N</td> <td>77°28'19.79"E</td> </tr> <tr> <td colspan="3" style="text-align: center;"><b>राजपुर खुर्द</b></td> </tr> <tr> <td>M</td> <td>28°10'25.35"N</td> <td>77°28'34.66"E</td> </tr> <tr> <td>M1</td> <td>28°10'21.22"N</td> <td>77°28'35.74"E</td> </tr> <tr> <td>N</td> <td>28°10'20.42"N</td> <td>77°28'24.11"E</td> </tr> <tr> <td>O</td> <td>28°10'14.55"N</td> <td>77°28'23.46"E</td> </tr> <tr> <td>O1</td> <td>28°10'14.95"N</td> <td>77°28'35.86"E</td> </tr> <tr> <td>P</td> <td>28°10'10.57"N</td> <td>77°28'23.13"E</td> </tr> <tr> <td>P1</td> <td>28°10'10.80"N</td> <td>77°28'35.24"E</td> </tr> </tbody> </table>	बिन्दु	देशान्तर	अक्षांश	<b>थांत्री</b>			J	28°11'11.62"N	77°28'28.66"E	K	28°10'50.58"N	77°28'30.54"E	L	28°10'35.01"N	77°28'32.27"E	M	28°10'25.35"N	77°28'34.66"E	N	28°10'20.42"N	77°28'24.11"E	O	28°10'28.93"N	77°28'20.77"E	P	28°10'36.97"N	77°28'19.87"E	Q	28°10'48.08"N	77°28'20.60"E	R	28°10'52.30"N	77°28'19.59"E	S	28°10'55.35"N	77°28'19.11"E	T	28°11'0.91"N	77°28'19.65"E	U	28°11'8.03"N	77°28'19.79"E	<b>राजपुर खुर्द</b>			M	28°10'25.35"N	77°28'34.66"E	M1	28°10'21.22"N	77°28'35.74"E	N	28°10'20.42"N	77°28'24.11"E	O	28°10'14.55"N	77°28'23.46"E	O1	28°10'14.95"N	77°28'35.86"E	P	28°10'10.57"N	77°28'23.13"E	P1	28°10'10.80"N	77°28'35.24"E
बिन्दु	देशान्तर	अक्षांश																																																																		
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प्रस्तावक: मैसर्स मिनेरियो माइनिंग प्राइवेट लिमिटेड

सलाहकार: परिवेश पर्यावरण इंजीनियरिंग सेवाएं (एनएबीईटी / ईआईए / 2124 / आईए 0092 (रेव.01) )

पृष्ठ 3

यमुना नदी (थंथरी यूनिट) के नदी तल से रेत (लघु खनिज) का खनन, क्षेत्रफल - 99.384 हेक्टेयर, उत्पादन क्षमता - 37,80,000 मीट्रिक टन प्रति वर्ष, स्थान - गांव थंथरी और राजपुर खादर, तहसील और जिला पलवल और राज्य हरियाणा।

एस. नं.	पैरामीटर	विवरण		
		Q	28°10'1.74"N	77°28'24.64"E
		Q1	28°10'5.40"N	77°28'36.00"E
		R	28° 9'51.05"N	77°28'28.86"E
		R1	28° 9'58.90"N	77°28'38.00"E
		S	28° 9'45.29"N	77°28'30.54"E
		S1	28° 9'52.20"N	77°28'40.50"E
		T	28° 9'42.44"N	77°28'33.19"E
		T1	28° 9'46.60"N	77°28'43.00"E
		U	28° 9'40.08"N	77°28'34.35"E
		U1	28° 9'34.56"N	77°28'49.01"E
		V	28° 9'29.87"N	77°28'36.25"E
तेरह.	नदियों/नालों/टैंकों/झरने/झीलों आदि के नाम	विवरण	दूरी	दिशा
		यमुना नदी	परियोजना स्थल	
		नहर	8.6 किमी	NNW
		छँसा नहर	7.6 किमी	उत्तर- पश्चिमी
		रामपुर वितरिका	11.3 किमी	पश्चिमी
		Alawalpur Polwa Minor	8.5 किमी	WNW
		पलक माइनर	6.1 किमी	पश्चिमी
		रामपुर वितरिका	3.4 किमी	पश्चिमी
		रौनिया नाला	11.3 किमी	WSW
		किठवारी नाला	11.1 किमी	WSW
		पलवल नाला	12.9 किमी	WSW
		होशंगाबाद नहर	12.2 किमी	दक्षिण-पश्चिम
		रसूलपुर नहर	10.9 किमी	दक्षिण-पश्चिम
		हसनपुर वितरिका	9.4 किमी	दक्षिण-पश्चिम
		नंदाबारा माइनर	11.1 किमी	दक्षिण-पश्चिम
		बाएं बाटा नाली	12.5 किमी	SSW
		Amrauli Minor	11.9 किमी	SSW
		बाटा एस्केप	14.6 किमी	SSW
		खारिस नाला	13.1 किमी	दक्षिण-पूर्वी
		गोपालगढ़ माइनर	12.2 किमी	दक्षिण-पूर्वी
		वैना माइनर	13.7 किमी	दक्षिण-पूर्वी
		सिवारा माइनर	9.3 किमी	ESE
		Kishorpur Minor	13.1 किमी	ESE

प्रस्तावक: मैसर्स मिनेरियो माइनिंग प्राइवेट लिमिटेड

सलाहकार: परिवेश पर्यावरण इंजीनियरिंग सेवाएं (एनएबीईटी / ईआईए / 2124 / आईए 0092 (रेव.01))

पृष्ठ 4



यमुना नदी (थंथरी यूनिट) के नदी तल से रेत (लघु खनिज) का खनन, क्षेत्रफल - 99.384 हेक्टेयर, उत्पादन क्षमता - 37,80,000 मीट्रिक टन प्रति वर्ष, स्थान - गांव थंथरी और राजपुर खादर, तहसील और जिला पलवल और राज्य हरियाणा।

एस. नं.	पैरामीटर	विवरण																											
		<table border="1"> <tr> <td>करोली माइनर</td> <td>10.9 किमी</td> <td>ई</td> </tr> <tr> <td>Dinayatpur Minor</td> <td>7.9 किमी</td> <td>ENE</td> </tr> <tr> <td>जेवर वितरिका</td> <td>9.3 किमी</td> <td>उत्तर-पूर्व</td> </tr> <tr> <td>दाहिना फलेदा माइनर</td> <td>7.5 किमी</td> <td>ENE</td> </tr> <tr> <td>Ranehra Minor</td> <td>11.4 किमी</td> <td>ENE</td> </tr> <tr> <td>Birampur Minor</td> <td>11.9 किमी</td> <td>ENE</td> </tr> <tr> <td>तीर्थिली नाली</td> <td>12.7 किमी</td> <td>उत्तर-पूर्व</td> </tr> <tr> <td>रबपुरा माइनर</td> <td>12.1 किमी</td> <td>उत्तर-पूर्व</td> </tr> <tr> <td>ग्राहक नाला</td> <td>10.5 किमी</td> <td>NNE</td> </tr> </table>	करोली माइनर	10.9 किमी	ई	Dinayatpur Minor	7.9 किमी	ENE	जेवर वितरिका	9.3 किमी	उत्तर-पूर्व	दाहिना फलेदा माइनर	7.5 किमी	ENE	Ranehra Minor	11.4 किमी	ENE	Birampur Minor	11.9 किमी	ENE	तीर्थिली नाली	12.7 किमी	उत्तर-पूर्व	रबपुरा माइनर	12.1 किमी	उत्तर-पूर्व	ग्राहक नाला	10.5 किमी	NNE
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ग्राहक नाला	10.5 किमी	NNE																											
चौदह.	आरक्षित वन, वन्यजीव अभयारण्य/राष्ट्रीय उद्यान आदि।	<table border="1"> <tr> <td>सुल्तानपुर आरएफ</td> <td>14.7 किमी</td> <td>दक्षिणी</td> </tr> <tr> <td>करोली खादर पीएफ</td> <td>4.9 किमी</td> <td>उत्तर-पूर्व</td> </tr> </table>	सुल्तानपुर आरएफ	14.7 किमी	दक्षिणी	करोली खादर पीएफ	4.9 किमी	उत्तर-पूर्व																					
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करोली खादर पीएफ	4.9 किमी	उत्तर-पूर्व																											
पंद्रह.	एमएल क्षेत्र की स्थलाकृति	<p>नदी बेड की सर्वोच्च ऊंचाई अत्यंत उत्तर अंत में 132.9 मीटर आरएल और तट शीर्ष स्तर 135.3 मीटर आरएल है, जबकि नदी बेड के अत्यंत दक्षिण अंत में स्तर 129.5 मीटर आरएल है और नदी का तट शीर्ष स्तर 133.0 मीटर आरएल है।</p> <p>ठांथरी और राजपुर खादर राजस्व गाँव में यमुना नदी उत्तर से दक्षिण की दिशा में बहती है।</p>																											
सोलह.	खनन विधि और प्रौद्योगिकी	<p>ओपनकास्ट मैनुअल पद्धति अपनाई जाएगी। अन्वेषण की किसी विशिष्ट विधि की आवश्यकता नहीं है क्योंकि नदी जनित तलछट नदी के किनारे जमा होते हैं और सतह पर बहुत अच्छी तरह से उजागर होते हैं। इसके अलावा, इन तलछटों को हर साल बरसात के मौसम के दौरान बाढ़ के पानी द्वारा लगभग उसी स्तर तक जमा / फिर से भर दिया जाता है जो अपस्ट्रीम साइड पर बारिश की तीव्रता पर निर्भर करता है। उपभोक्ता मांग को पूरा करने के लिए पर्याप्त मात्रा में रेत भंडार उपलब्ध है।</p>																											
सत्रह.	खनन की अंतिम गहराई	यमुना नदी के किनारे से 3 मीटर की दूरी पर																											
अठारह.	भूजल स्तर	सतह तल से 05 - 10 मीटर																											
उन्नीस.	भूजल स्तर प्रतिच्छेदन	खनन सतह से केवल 3 मीटर तक किया जाएगा। इसलिए, भूजल स्तर को प्रतिच्छेद नहीं किया जाएगा।																											
बीस.	जल निकासी पैटर्न/	खनन सूखी नदी के तल में किया जाएगा; धारा को छुआ नहीं जाएगा और केवल गैर-मानसून अवधि के दौरान किया जाएगा।																											

प्रस्तावक: मैसर्स मिनेरियो माइनिंग प्राइवेट लिमिटेड

सलाहकार: परिवेश पर्यावरण इंजीनियरिंग सेवाएं (एनएबीईटी / ईआईए / 2124 / आईए 0092 (रेव.01)२१

पृष्ठ 5

यमुना नदी (थंथरी यूनिट) के नदी तल से रेत (लघु खनिज) का खनन, क्षेत्रफल - 99.384 हेक्टेयर, उत्पादन क्षमता - 37,80,000 मीट्रिक टन प्रति वर्ष, स्थान - गांव थंथरी और राजपुर खादर, तहसील और जिला पलवल और राज्य हरियाणा।

एस. नं.	पैरामीटर	विवरण		
इक्कीस.	पानी की आवश्यकता और स्रोत	पानी का स्रोत निजी पानी के टैंकर हैं। पानी की आवश्यकता का विवरण इस प्रकार है:		
		एस. नं.	विवरण	अपेक्षा होना
		1	धूल का दमन	31.0 KLD
		2	ग्रीनबेल्ट विकास	13.0 KLD
		3	घरेलू आवश्यकता	6.5 KLD
	कुल	50.5 KLD		
बाईस.	परियोजना की लागत	परियोजना के लिए पूंजीगत लागत 19 करोड़ रुपये होगी, जिसमें प्रस्तावित पट्टा क्षेत्र और मशीनरी को अनुबंध आधार पर किराए पर लिया जाएगा।		

स्रोत: अनुमोदित खनन योजना

## विकल्प का विश्लेषण

यह नए खदान पट्टे का मामला है। खनिज साइट विशिष्ट है, इसलिए कोई वैकल्पिक साइट की पहचान नहीं की गई थी। संबंधित प्राधिकारी से पट्टा अनुमोदन प्राप्त कर लिया गया है और रिपोर्ट में संलग्न कर दिया गया है।

## आधारभूत वातावरण का विवरण

ईआईए अध्ययन तैयार करने के लिए दिशानिर्देशों के अनुसार मानसून के बाद के मौसम यानी अक्टूबर 2023 से दिसंबर 2023 के दौरान पर्यावरणीय डेटा एकत्र किया गया है।

### सारणी 2: आधारभूत स्थिति

पैरामीटर	आधारभूत स्थिति
परिवेशी वायु गुणवत्ता	<b>पार्टिकुलेट मैटर:</b> पीएम 10 43 $\mu\text{g} / \text{m}^3$ से 79 $\mu\text{g} / \text{m}^3$ तक भिन्न होता है। PM2.5 20 $\mu\text{g}/\text{m}^3$ से 38 $\mu\text{g}/\text{m}^3$ देखा गया। <b>गैसीय प्रदूषक:</b> SO2 6.2 $\mu\text{g}/\text{m}^3$ से 10.7 $\mu\text{g} / \text{m}^3$ तक भिन्न था। अध्ययन क्षेत्र में NOx 10.0 $\mu\text{g}/\text{m}^3$ से 15.5 $\mu\text{g}/\text{m}^3$ देखा गया। अध्ययन क्षेत्र में सीओ 0.51 मिलीग्राम / एम <sup>3</sup> से 1.09 मिलीग्राम / एम <sup>3</sup> तक देखा गया था।
शोर का स्तर	सभी स्थानों पर दिन के दौरान दर्ज किया गया ध्वनि स्तर 39.3 डीबी (ए) से 54.9 डीबी (ए) तक भिन्न होता है और रात के समय में यह 28.5 डीबी (ए) से 40.2 डीबी (ए) के बीच भिन्न होता है।
भूजल	सभी मानकों को अधिकांशतः स्वीकार्य सीमा से अधिक पाया गया लेकिन पेयजल मानक 10500:2012 के लिए अनुमेय सीमा के भीतर पाया गया। पीएच (7.1 से 7.8), टीडीएस (776 मिलीग्राम/लीटर से 792 मिलीग्राम/लीटर), क्षारीयता (214.9 मिलीग्राम/लीटर से 254.8 मिलीग्राम/लीटर), कुल कठोरता

प्रस्तावक: मैसर्स मिनेरियो माइनिंग प्राइवेट लिमिटेड

सलाहकार: परिवेश पर्यावरण इंजीनियरिंग सेवाएं (एनएबीईटी / ईआईए / 2124 / आईए 0092 (रेव.01))<sub>22</sub>

पृष्ठ 6

यमुना नदी (थंथरी यूनिट) के नदी तल से रेत (लघु खनिज) का खनन, क्षेत्रफल - 99.384 हेक्टेयर, उत्पादन क्षमता - 37,80,000 मीट्रिक टन प्रति वर्ष, स्थान - गांव थंथरी और राजपुर खादर, तहसील और जिला पलवल और राज्य हरियाणा।

पैरामीटर	आधारभूत स्थिति
	(266.0 मिलीग्राम/लीटर से 295.5 मिलीग्राम/लीटर), कैल्शियम के रूप में सीए (58.6 मिलीग्राम/लीटर से 72.4 मिलीग्राम/लीटर), मैग्नीशियम (26.5 मिलीग्राम/लीटर से 29.7 मिलीग्राम/लीटर) का विश्लेषण किया गया।
सतही जल	पीएच 7.0 से 7.5 के बीच भिन्न था। स्रोतों की घुलित ऑक्सीजन 6.1 मिलीग्राम/लीटर से 6.9 मिलीग्राम/लीटर के बीच भिन्न थी। बीओडी 4.9 मिलीग्राम/लीटर से 37.8 मिलीग्राम/लीटर के बीच देखा गया। कुल कोलीफॉर्म 300 एमपीएन/100 मिलीलीटर से 1500 एमपीएन/100 मिलीलीटर के बीच देखा गया। खराब गुणवत्ता के कारण पानी उपयोग करने योग्य नहीं था।
मिट्टी की गुणवत्ता	अध्ययन क्षेत्र में मिट्टी मुख्य रूप से दोमट थी। पीएच 7.1 से 7.8 के बीच था। चालकता 339 $\mu\text{mhos/cm}$ से 428 $\mu\text{mhos/cm}$ तक भिन्न थी। कार्बनिक कार्बन 0.39% से 0.57% तक भिन्न था। नाइट्रोजन 142 किलोग्राम प्रति हेक्टेयर से लेकर 173 किलोग्राम प्रति हेक्टेयर तक था। फॉस्फोरस 16 किलोग्राम प्रति हेक्टेयर से 22 किलोग्राम प्रति हेक्टेयर तक भिन्न था। पोटेशियम 114 किलोग्राम प्रति हेक्टेयर से लेकर 131 किलोग्राम प्रति हेक्टेयर तक था। कुल मिलाकर, मिट्टी की गुणवत्ता अच्छी थी, जिसमें अच्छा थोक घनत्व और अच्छी नमी सामग्री थी जो यमुना नदी के बेसिन के कारण हो सकती है।
मौसम-विज्ञान	अध्ययन अवधि के दौरान दर्ज किया गया अधिकतम तापमान अक्टूबर के महीने में 35.7 डिग्री सेल्सियस और दिसंबर के महीने में न्यूनतम तापमान 8.2 डिग्री सेल्सियस था। अध्ययन क्षेत्र में पाया गया उच्चतम आरएच अक्टूबर के महीने में 76.5% था, जबकि न्यूनतम मासिक औसत आरएच दिसंबर के महीने में 42.6% पाया गया। हवा की औसत गति 1.3 मीटर प्रति सेकंड दर्ज की गई। अध्ययन अवधि के दौरान हवा की प्रमुख दिशा मुख्य रूप से दक्षिण-पश्चिम से उत्तर-पूर्व थी, इसके बाद उत्तर-पूर्व से दक्षिण-पश्चिम थी।

## प्रत्याशित पर्यावरणीय प्रभाव और शमन उपाय

प्रस्तावित खनन प्रचालनों से प्रदूषकों की सघनता निर्धारित सीमा से अधिक बढ़ने का अनुमान नहीं है। पहचाने गए प्रभाव और शमन उपाय नीचे दिए गए हैं।

- ✓ इस खनन गतिविधि के कारण मौजूदा यातायात में कुल 1,680 पीसीयू / दिन की वृद्धि होगी, इसलिए वाहनों से ध्वनि हो सकती है और परिवहन मार्ग के पास ग्रामीणों के मानव स्वास्थ्य पर भी प्रभाव डाल सकती है जैसे कि सांस लेने और श्वसन संबंधी मुद्दों पर प्रभाव। वाहनों की तेज गति के कारण दुर्घटनाएं हो सकती हैं। ट्रक की आवाजाही सुझाए गए परिवहन मार्ग से ही होगी। 13,000 पौधे लगाने का प्रस्ताव है। योजना अवधि में संयंत्रों की संख्या और प्रभाव को कम करने के लिए दिन में दो बार पानी का छिड़काव किया जाएगा।
- ✓ मशीनरी को अच्छी चलने की स्थिति में बनाए रखा जाएगा ताकि शोर को न्यूनतम संभव स्तर तक कम किया जा सके। पीयूसी सर्टिफिकेट वाले वाहनों को किराए पर लिया जाएगा। वाहनों के सुचारु संचालन को सुनिश्चित करने के लिए

प्रस्तावक: मैसर्स मिनेरियो माइनिंग प्राइवेट लिमिटेड

सलाहकार: परिवेश पर्यावरण इंजीनियरिंग सेवाएं (एनएबीईटी / ईआईए / 2124 / आईए 0092 (रेव.01))<sup>23</sup>

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यमुना नदी (थंथरी यूनिट) के नदी तल से रेत (लघु खनिज) का खनन, क्षेत्रफल - 99.384 हेक्टेयर, उत्पादन क्षमता - 37,80,000 मीट्रिक टन प्रति वर्ष, स्थान - गांव थंथरी और राजपुर खादर, तहसील और जिला पलवल और राज्य हरियाणा।

वाहनों का नियमित रखरखाव किया जाएगा। कामगारों को अनुमेय ध्वनि स्तर और उन स्तरों के अधिकतम संपर्क के प्रभाव के बारे में जागरूकता प्रदान की जाएगी। इसके साथ ही ट्रक चालकों को निर्देश दिए जाएंगे कि वे गांव क्षेत्र और संवेदनशील क्षेत्रों में हॉर्न का कम से कम इस्तेमाल करें।

- ✓ भूजल स्तर पर कोई प्रभाव नहीं पड़ेगा क्योंकि खनन केवल 3 मीटर तक सीमित होगा और परियोजना स्थल का जल स्तर सतह से 5-10 मीटर है। इसलिए, पानी पर किसी प्रभाव की पहचान नहीं की गई थी। प्रस्तावित खनन गतिविधि से केवल 1.3 केएलडी सैनिटरी अपशिष्ट जल उत्पन्न किया जाएगा जिसे सेप्टिक टैंकों में उपचारित किया जाएगा और वृक्षारोपण उद्देश्य के लिए उपयोग किया जाएगा।
- ✓ खदान श्रमिक प्रति दिन लगभग 35 किलोग्राम नगरपालिका ठोस अपशिष्ट उत्पन्न करेगा, जिसका मानव स्वास्थ्य पर प्रतिकूल प्रभाव पड़ेगा। घरेलू कचरा संग्रह के लिए 10 कूड़ेदान उपलब्ध कराए जाएंगे। नदी के किनारे के क्षेत्र में खनन के कारण कोई बोज़ नहीं होगा।
- ✓ खनन गतिविधियों को सड़क के बुनियादी ढांचे और वाहन परिवहन को बनाए रखते हुए व्यवस्थित तरीके से किया जाएगा, जो क्षेत्र में स्थलाकृति और जल निकासी के संरक्षण के लिए एक सुरक्षात्मक उपाय होगा।
- ✓ खनन या सहायक क्षेत्र में कोई मानव बस्ती प्रस्तावित नहीं है। स्थानीय जनशक्ति को प्राथमिकता दी जाएगी।
- ✓ जलीय जीवन पर प्रभाव को कम करने के लिए बरसात के मौसम के दौरान कोई खनन नहीं किया जाएगा।
- ✓ फील्ड सर्वेक्षण के अनुसार, निवासियों के साक्षात्कार और वन विभाग से अधिप्रमाणित चेकलिस्ट प्रस्तावित खान पट्टा क्षेत्र के अध्ययन क्षेत्र के बफर क्षेत्र में 06 अनुसूची-I प्रजातियों की उपस्थिति को इंगित करती है। इसलिए, इन अनुसूची-I प्रजातियों के संरक्षण के लिए, भविष्य के दृष्टिकोण के साथ एक विस्तृत संरक्षण योजना प्रस्तावित है। इसी संरक्षण योजना के लिए वारनस बेंगालेंसिस (कॉमन इंडियन मॉनिटर छिपकली), नजा नाजा (इंडियन कोबरा), प्टियास म्यूकोसा (रैट स्नेक), पावो क्रिस्टेटस (भारतीय मोर), हर्पीसएडवर्सी (कॉमन नेवला) और फेलिस चौस (जंगल कैट) हैं। इसके बाद, वन्यजीव प्रजातियों के संरक्षण के लिए 25 लाख रुपये का बजट आवंटित किया गया है।
- ✓ रेत के खनन से स्थानीय लोगों की प्रति व्यक्ति आय में वृद्धि होने की संभावना है जिसके द्वारा लोगों की सामाजिक आर्थिक स्थिति में सुधार होगा। स्थानीय लोगों को या तो प्रत्यक्ष रोजगार या अप्रत्यक्ष रोजगार जैसे व्यवसाय, ठेका कार्य और विकास कार्य जैसे सड़क आदि और अन्य कल्याणकारी सुविधाएं जैसे चिकित्सा सुविधाएं, वाहन, मुफ्त शिक्षा, पेयजल आपूर्ति आदि प्रदान की गई हैं।
- ✓ धूल उत्पादन को छोड़कर, ऐसा कोई स्रोत नहीं है जो स्वास्थ्य संबंधी बीमारियों की संभावना दिखा सके। स्प्रींकलर माउंटेड टैंकरों के साथ नियमित रूप से पानी का छिड़काव किया जाएगा और श्रमिकों को डस्ट मास्क प्रदान किए जाएंगे।
- ✓ व्यक्तिगत सुरक्षा उपकरण शोर जोखिम को रोकने के लिए प्रदान करेंगे। खनन गतिविधि के दौरान व्यक्तिगत सुरक्षा उपकरण प्रदान किए जाएंगे। नियमित स्वास्थ्य जांच शिविरों का आयोजन किया जाएगा। सभी श्रमिकों का नियोजन द्वारा बीमा किया जाएगा।



यमुना नदी (थंथरी यूनिट) के नदी तल से रेत (लघु खनिज) का खनन, क्षेत्रफल - 99.384 हेक्टेयर, उत्पादन क्षमता - 37,80,000 मीट्रिक टन प्रति वर्ष, स्थान - गांव थंथरी और राजपुर खादर, तहसील और जिला पलवल और राज्य हरियाणा।

## पर्यावरण निगरानी कार्यक्रम

निर्धारित मानकों के भीतर पर्यावरणीय गुणवत्ता बनाए रखने के लिए, विभिन्न पर्यावरणीय घटकों की नियमित निगरानी आवश्यक है जो शर्तों के अनुसार अनुपालन किया जाएगा। इसके लिए पट्टेदार ने खान की पर्यावरण नीति बनाने और एक पर्यावरण प्रबंधन प्रकोष्ठ का गठन करने का निर्णय लिया है और अनुमोदित पर्यावरण नीति में उल्लिखित उद्देश्यों के साथ प्रस्तावित खान को संचालित करने के लिए प्रतिबद्ध है। वायु, जल, शोर और मिट्टी की निगरानी के लिए 60.0 हजार रुपये वार्षिक बजट होगा जो खनन गतिविधि के दौरान प्रदूषण की रोकथाम के उपायों को शुरू करने के लिए परियोजना प्रस्तावक द्वारा वहन किया जाना है।

## अतिरिक्त अध्ययन

खनन योजना के तहत किए गए प्रस्ताव के अनुसार इस क्षेत्र को ओपनकास्ट खनन विधि के माध्यम से विकसित किया जाएगा। खनन प्रक्रिया के दौरान जल स्तर को नहीं छुआ जाएगा। भूस्खलन, धंसाव, बाढ़ आदि जैसी किसी उच्च जोखिम वाली दुर्घटना की आशंका नहीं है।

सुरक्षा, स्वास्थ्य और पर्यावरण (एसएचई) नीति मौजूदा है और साइट पर सभी और अन्य हितधारकों के लिए सुलभ है। नीति विधायी अनुपालन, हितधारक भागीदारी, निरंतर सुधार और उद्देश्यों द्वारा प्रबंधन पर विचार करते हुए तैयार की गई है।

स्वास्थ्य पर पड़ने वाले प्रभावों को कम करने के लिए पीपीई जैसे डस्ट मास्क, ईयर प्लग/मफ और अन्य उपकरण कर्मियों द्वारा उपयोग के लिए प्रदान किए जाएंगे। नियुक्ति के समय खान नियम 1955 के अनुसार सभी श्रमिकों की प्रारंभिक चिकित्सा जांच की जाएगी। आवधिक चिकित्सा परीक्षा पांच साल में कम से कम एक बार आयोजित की जाएगी। प्रस्तावक द्वारा छः मासिक चिकित्सा शिविरों का आयोजन किया जाएगा।

परियोजना क्षेत्र के भीतर और आस-पास के क्षेत्र में आबादी का कोई विस्थापन नहीं है। मेरा यह काम अधिक रोजगार प्रदान करेगा, आस-पास की कुछ आबादी को मौका देगा, यह हमेशा स्पष्ट है कि सुरक्षित खनन गतिविधि निवासियों की सामाजिक-आर्थिक स्थितियों में सुधार करने में मदद करेगी।

## परियोजना का लाभ

परियोजना प्रस्तावक अपनी सामाजिक जिम्मेदारी के प्रति जागरूक है और किसी भी अच्छे कॉर्पोरेट नागरिक के रूप में; आवश्यकता विशिष्ट (कुशल और गैर-कुशल) रोजगार शुरू करने का प्रस्ताव है। यह परियोजना स्थानीय लोगों को प्रत्यक्ष और अप्रत्यक्ष रूप से रोजगार प्रदान करेगी। अप्रत्यक्ष नियोक्ता दुकानदार, मैकेनिक, ड्राइवर, ट्रांसपोर्टर आदि हैं। लगभग 145 व्यक्तियों को प्रत्यक्ष रोजगार और 20 व्यक्तियों को आस-पास के गांवों से अप्रत्यक्ष रोजगार मिलेगा। श्रमिक ज्यादातर कुशल होंगे। डेवलपर मानदंडों के अनुसार ईएसआर कार्यक्रम को भी अपनाएगा और आस-पास के गांवों को अलग-अलग सुविधाएं प्रदान करेगा। कार्यक्रम की मुख्य विशेषताएं इस प्रकार हैं:

- ✓ सामाजिक कल्याण कार्यक्रम जैसे चिकित्सा सुविधाओं, शैक्षिक सुविधाओं, कर्मचारियों के साथ-साथ आस-पास के ग्रामीणों के लिए पानी की आपूर्ति की जाएगी।

प्रस्तावक: मैसर्स मिनेरियो माइनिंग प्राइवेट लिमिटेड

सलाहकार: परिवेश पर्यावरण इंजीनियरिंग सेवाएं (एनएबीईटी / ईआईए / 2124 / आईए 0092 (रेव.01)25

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- ✓ स्थानीय लोगों को प्राथमिकता देते हुए उनके रोजगार के लिए एक अच्छी तरह से निर्धारित योजना तैयार की गई है।
- ✓ ग्रामीण आबादी के बीच स्वास्थ्य निगरानी शिविरों, सामाजिक कल्याण और विभिन्न जागरूकता कार्यक्रमों में सरकार के प्रयासों को पूरा करना।
- ✓ सामाजिक वृक्षारोपण कार्यक्रम में सहायता करना।
- ✓ गांवों के भीतर सड़कों आदि जैसी सुविधाओं का विकास।

## पर्यावरण प्रबंधन योजना की लागत

पर्यावरण प्रबंधन के लिए विस्तृत गतिविधि-वार गणना की गई है जो क्रमशः पूंजीगत लागत के रूप में INR 17.0 लाख और आवर्ती लागत के रूप में INR 5.80 लाख प्रति वर्ष है। योजना अवधि के लिए डेवलपर द्वारा पर्यावरण माप के लिए 46.0 लाख रुपये का कुल बजट सुनिश्चित किया गया है।

## समाप्ति

उपर्युक्त चर्चा के अनुसार खनिज और परिवहन के लदान, उत्तराई के दौरान उत्सर्जन को छोड़कर खनन के कारण पर्यावरण पर कोई बड़ा प्रभाव नहीं पड़ता है। विभिन्न प्रदूषकों को अनुमेय सीमा के भीतर रखने के लिए पर्याप्त निवारक उपाय अपनाए जाएंगे। रखरखाव और बाड़ लगाने सहित लगभग 13,000 पौधे लगाने और 1000/पौधे को ध्यान में रखते हुए गैप प्लांटेशन का प्रस्ताव है। यह एक प्रभावी प्रदूषण कम करने वाली तकनीक साबित होगी और मानसून के मौसम के दौरान मिट्टी के क्षरण से बचने में मदद करेगी। स्थानीय लोगों को रोजगार के अवसर केवल प्रदान किए जाएंगे क्योंकि खदान स्थल से खनिजों का निष्कर्षण प्रदान करना उनके लिए उनकी आजीविका के लिए एकमात्र प्रचलित व्यवसाय है। खदान परिसर, संपर्क मार्गों, सरकारी भवनों, स्कूलों के आसपास लगभग पौधारोपण विकास किया जाएगा।