

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL AT
PRINCIPAL BENCH , NEW DELHI**

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IN
AFFIDAVIT**

(ON BEHALF OF RESPONDENT NO.4)

ORIGINAL APPLICATION NO. 1088 OF 2024

IN THE MATTER OF :

Natural Social Services **Applicant.**

VERSUS

Director General
Directorate of Tourism & Ors. **Respondent(s).**

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Dated- 09.09.2025

Saurabh Tiwari

(Saurabh Tiwari) Advocate

Adv. Roll. No. D/966/2017

703 , Ratnakar Vihar Colony

Banaras Hindu University, Varanasi- 221005.Mob. No.- 9889282315

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S.No. 2400 Year 09 Sept 2015

1

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
AT PRINCIPAL BENCH, NEW DELHI

AFFIDAVIT

ORIGINAL APPLICATION NO. 1088 OF 2024



ATTESTED

IN THE MATTER OF :

Natural Social Services Applicant.

VERSUS

Director General

Directorate of Tourism & Ors. Respondent(s).

**AFFIDAVIT ON BEHALF OF RESPONDENT NO. 4, i.e
DIRECTOR GENERAL, DIRECTORATE OF TOURISM.**

MOST RESPECTFULLY SHOWETH AS UNDER : -

PRELIMINARY SUBMISSION :

1. That , present deponent named as Dinesh Kumar C/o Gajraj , aged about 51 years , presently posted as Joint Director Tourism Varanasi, Vindhyachal & Azamgarh division at Varanasi , in the Directorate of Tourism , Govt. of Uttar Pradesh and duly authorized to represent Respondent No. 4 in above noted mentioned matter, having my office at Office of Joint Director Tourism, Maqbool Alam Road, Chaukaghat, Varanasi - 221002.



2. That , a detailed project report on Proposed Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi has been prepared to enhance the potential of Varanasi's River edge infrastructure and future decade. The project area is spread over a length of 0.79 km of the water front. **Built Up Area- 6,264m²**. The proposed project is Constructional project, where Construction of Garhawa Ghat and Development of

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Destination Tourism at Left Bank of River Ganga in Varanasi is being done.

3. That , estimate of the project has been prepared by the Project Manager, Uttar Pradesh Project Corporation Ltd., Varanasi, which is countersigned by the Deputy Director, Tourism, Varanasi and Vindhyaachal Division and recommended by the Director, Tourism Department, Deputy Chairman and Director General, Tourism Department, Uttar Pradesh, Lucknow and the project proposal is approved by the administrative department. Project Proponent is U.P. Project Corporation Limited Unit-3 Varanasi, Uttar Pradesh.

4. That , it is proposed to do this project from the amount provided under item no. 46- tourism facilities and beautification in Varanasi in the budget for the financial year 2023-24. Project Corporation Ltd. has been named as the implementing agency for the project. Regarding the need of the project, it has been mentioned that Garhwa Ghat Ramnagar is a place located in Varanasi district of Uttar Pradesh state of India. There is an ashram located at Gadhwan Ghat here, where devotees keep coming to feed the cows, perform pooja-paath and bhajan-kirtan. Flowers are offered to the statue of Mahant Shri Shri 1008 Atma Vivekanand Ji Maharaj and he is saluted. People also participate in the Sant Samagam here. People go here to meet the head priest Sadguru Sharananand ji Maharaj and to have darshan and worship him. This ashram is of great importance from the historical, mythological, religious, legend, ecological, biological and natural point of view, which is of great importance to the people of the region, nationally and internationally.



5. That , As per the EIA Notification S.O. 1533(E) dated 14.09.2006 and subsequent amendments, including S.O. 3252(E) dated 22.12.2014 and S.O. 5736(E) dated 15.11.2018, only building and construction projects with a built-up area exceeding 20,000 square meters and less than 1,50,000 square meters fall under Category 8(a) of the EIA notification and are required to obtain prior Environmental Clearance (EC).
6. That , the “Construction of Gadwaghat” project does not exceed the threshold of 20,000 sq. m of built-up area, as “Construction of Gadwaghat, Varanasi, Uttar Pradesh. Total Construction area (78.3m x 80m = 6,264m²)” nor does it fall under any other category requiring mandatory EIA clearance. Therefore, as per the applicable statutory provisions and government notifications, this project does not require an EIA, and there is no obligation to conduct an Environmental Impact Assessment.
7. That , however a detail Environmental Impact Assessment & Environmental Management Plan for proposed construction of Garhwa Ghat and development of destination tourism at left bank of river Ganga, Varanasi has been done. **A report regarding EIA is being annexed and marked as Annexure No. 1 to this Affidavit.**
8. That , present respondent is not violating an environmental norms as falsely alleged by the petitioner/applicant. Hence , any stay or adverse order on the construction work will directly affect the larger public interest as work has been also substantially in progress and on the verge of completion.



Geo-Tagged photograph of the project is being annexed and marked as Annexure No.-2 to this Affidavit.

PRAYER CLAUSE :

The contents of the Prayer Clause of the OA are specifically and categorically denied as frivolous and misleading. Applicant is not entitled to any relief as prayed for before this Hon'ble Tribunal. In view of the same, it is submitted that Applicant claims ought to be dismissed. This affidavit may be read as part and parcel of the previous reply.

VERIFICATION

Verified at Varanasi on this 9th Day of September , 2025 that the contents of this affidavit are true and correct to my knowledge and no part of it is false and nothing material has been concealed there from.



So , Help Me God !

Dated: 09/09/2025

DEPONENT/Respondent No.4

Through

Saurabh Tiwari *Vikash Tiwari*
[SAURABH TIWARI] [VIKASH TIWARI]
Advocate(s)

A.O.R- D/966/2017 , D/283/2020

Ch. No.- Chamber of Adv. Saurabh Tiwari
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Notary's official stamp

पंजियन / Registration

क्र०सं०/Sr. No./3,450

दि०/Dt./०९.०९.२५

स्थान/Place/Varanasi

एड०/Adv. Saurabh Tiwari

By. Uday keshava

एड०/Adv. दि०क०या०

C.C.V. U.P.

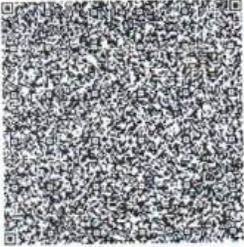



भारत सरकार
Government of India

भारतीय विशिष्ट पहचान प्राधिकरण
Unique Identification Authority of India

नामांकन क्रम/ Enrolment No.: 0636/53530/01459

To
दिनेश कुमार
Dinesh Kumar
C/O: Gajraj,
B-40, Ayodhya Road,
Dayal Residency,
Aaradhana Apartment,
VTC: Lucknow,
PO: Chinhat,
Sub District: Lucknow,
District: Lucknow,
State: Uttar Pradesh,
PIN Code: 226028,
Mobile: 9795368900



Signature valid
Digitally signed by Dinesh Kumar
Identity: Unique Identification Authority of India
Date: 2024.08.11 11:34:38
GMT+05:30

आपका आधार क्रमांक / Your Aadhaar No. :
30A1 8500 4713
VID : 9113 5202 6500 3761

मेरा आधार, मेरी पहचान




सूचना / INFORMATION

- आधार पहचान का प्रमाण है, नागरिकता या जन्मतिथि का नहीं। जन्मतिथि आधार नंबर धारक द्वारा प्रस्तुत सूचना और विनियमों में विनिर्दिष्ट जन्मतिथि के प्रमाण के दस्तावेज पर आधारित है।
- इस आधार पत्र को यूआईडीएआई द्वारा नियुक्त प्रमाणीकरण एजेंसी के जरिए ऑनलाइन प्रमाणीकरण के द्वारा सत्यापित किया जाना चाहिए या ऐप स्टोर में उपलब्ध एमआधार या आधार क्यूआर कोड स्कैनर ऐप से क्यूआर कोड को स्कैन करके या www.uidai.gov.in पर उपलब्ध सुरक्षित क्यूआर कोड रीडर का उपयोग करके सत्यापित किया जाना चाहिए।
- आधार विशिष्ट और सुरक्षित है।
- पहचान और पते के समर्थन में दस्तावेजों को आधार के लिए नामांकन की तारीख से प्रत्येक 10 वर्ष में कम से कम एक बार आधार में अपडेट कराना चाहिए।
- आधार विभिन्न सरकारी और गैर-सरकारी फायदों/सेवाओं का लाभ लेने में सहायता करता है।
- आधार में अपना मोबाइल नंबर और ईमेल आईडी अपडेट रखें।
- आधार सेवाओं का लाभ लेने के लिए एमआधार ऐप डाउनलोड करें।
- आधार/बायोमेट्रिक्स का उपयोग न करने के समय सुरक्षा सुनिश्चित करने के लिए आधार/बायोमेट्रिक्स लॉक/अनलॉक सुविधा का उपयोग करें।
- आधार की मांग करने वाले सहमति लेने के लिए बाध्य हैं।
- Aadhaar is proof of identity, not of citizenship or date of birth (DOB). DOB is based on information supported by proof of DOB document specified in regulations, submitted by Aadhaar number holder.
- This Aadhaar letter should be verified through either online authentication by UIDAI-appointed authentication agency or QR code scanning using mAadhaar or Aadhaar QR Scanner app available in app stores or using secure QR code reader app available on www.uidai.gov.in.
- Aadhaar is unique and secure.
- Documents to support identity and address should be updated in Aadhaar after every 10 years from date of enrolment for Aadhaar.
- Aadhaar helps you avail of various Government and Non-Government benefits/services.
- Keep your mobile number and email id updated in Aadhaar.
- Download mAadhaar app to avail of Aadhaar services.
- Use the feature of Lock/Unlock Aadhaar/biometrics to ensure security when not using Aadhaar/biometrics.
- Entities seeking Aadhaar are obligated to seek consent.



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Government of India





भारतीय विशिष्ट पहचान प्राधिकरण
Unique Identification Authority of India

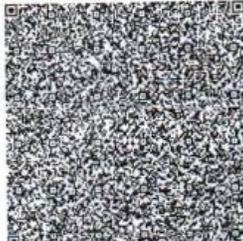


Aadhaar no. issued: 19/05/2015



दिनेश कुमार
Dinesh Kumar
जन्म तिथि/DOB: 15/01/1974
पुरुष/ MALE

आधार पहचान का प्रमाण है, नागरिकता या जन्मतिथि का नहीं। इसका उपयोग सत्यापन (ऑनलाइन प्रमाणीकरण, या क्यूआर कोड/ऑफलाइन एक्सएमएल की स्कैनिंग) के साथ किया जाना चाहिए।
Aadhaar is proof of identity, not of citizenship or date of birth. It should be used with verification (online authentication, or scanning of QR code / offline XML).



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VID : 9113 5202 6500 3761

मेरा आधार, मेरी पहचान

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(दिनेश कुमार)
संयुक्त निदेशक पर्यटन
वाराणसी, विन्ध्याचल एवं आजमगढ़ मण्डल
वाराणसी

**BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
AT PRINCIPAL BENCH , NEW DELHI**

AFFIDAVIT

(On behalf of respondent no. 4)

ORIGINAL APPLICATION NO. 1088 OF 2024

IN THE MATTER OF :

Natural Social Services Applicant.

VERSUS

Director General

Directorate of Tourism & Ors. Respondent(s).

Annexure -1



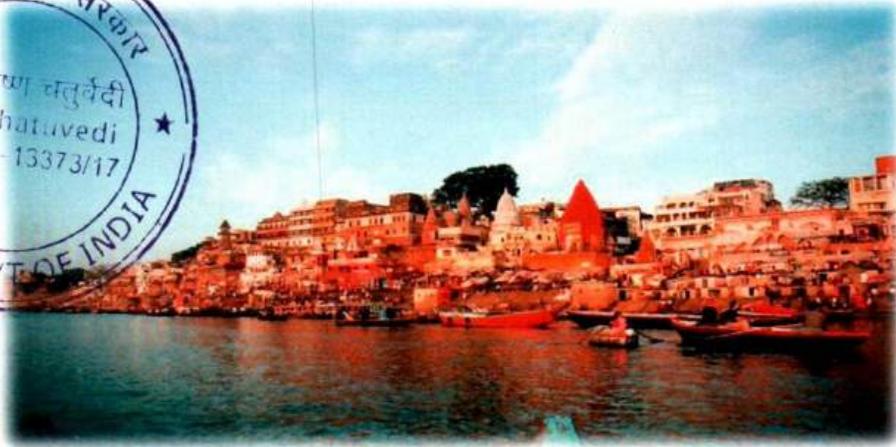
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**ENVIRONMENTAL IMPACT ASSESSMENT &
ENVIRONMENTAL MANAGEMENT PLAN**

FOR

***PROPOSED CONSTRUCTION OF GARHAWA GHAT
AND DEVELOPMENT OF DESTINATION TOURISM
AT LEFT BANK OF RIVER GANGA IN VARANASI.***

TOTAL CONSTRUCTION AREA- 6,264 m²



APPLICANT



**PROJECT MANAGER
U.P. PROJECTS CORPORATION LTD.
Unit-3, Varanasi.**

ENVIRONMENT CONSULTANT



**AEGIS ENVIRONMENT RESEARCH PVT LTD
(Accredited by QCI/NABET)
Suite -B04, Block-H-61, Sector-63, Noida, U.P
Email: aerpl.info@gmail.com**

UPPCL /EIA /EMP- RIV/2024-25/08/01 Rev 08 August, 2025

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CHAPTER – I

INTRODUCTION



1.0 PREAMBLE

Environment Impact Assessment (EIA) is a process used to identify the environmental, social & economic impacts of a project prior to decision making. It guides the decision makers in taking appropriate decisions for proposed projects. It aims predicting environmental impacts at an early stage of project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision makers. By using EIA, both environmental & economic benefits can be achieved. By considering environmental effects prediction & mitigation, early benefits in project planning, protection of environment, optimum utilization of resources, thus saving overall time & cost of the project.

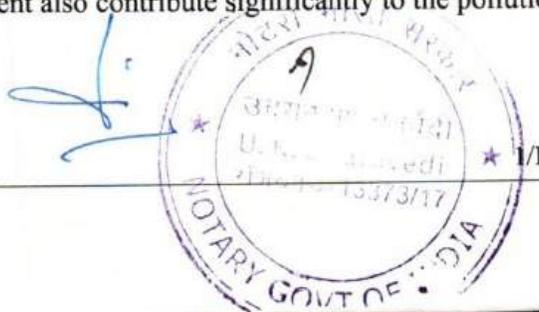
Environmental Impact Assessment report is prepared to comply under EIA Notification of the MoEF dated 14th September 2006, and its subsequent amendments and EIA Guidance Manual for Constructional projects of MoEF, Govt. of India.

As per the EIA Notification S.O. 1533(E) dated 14.09.2006 and subsequent amendments, including S.O. 3252(E) dated 22.12.2014 and S.O. 5736(E) dated 15.11.2018, only building and construction projects with a built-up area exceeding 20,000 square meters and less than 1,50,000 square meters fall under Category 8(a) of the EIA notification and are required to obtain prior Environmental Clearance (EC).

After review, it is confirmed that the "Construction of Gadwaghat" project does not exceed the threshold of 20,000 sq. m of built-up area, as "Construction of Gadwaghat, Varanasi, Uttar Pradesh. Total Construction area (78.3m x 80m = 6,264m²)" nor does it fall under any other category requiring mandatory EIA clearance. Therefore, as per the applicable statutory provisions and government notifications, this project does not require an EIA, and there is no obligation to conduct an Environmental Impact Assessment.

1.1 INTRODUCTION

River Ganga has a significant economic, environmental and cultural value in India. Rising from the Himalayas and flowing into the Bay of Bengal, the river traverses through a course of more than 2500 km in the plains of north and eastern India. Increasing population in the basin and haphazard urbanization and industrial growth has significantly impacted the water quality of river Ganga, particularly during the dry season. The primary sources of pollution are untreated sewage and industrial wastewater, also non-point pollution sources from agriculture and livestock, religious activities and poor solid waste management also contribute significantly to the pollution.



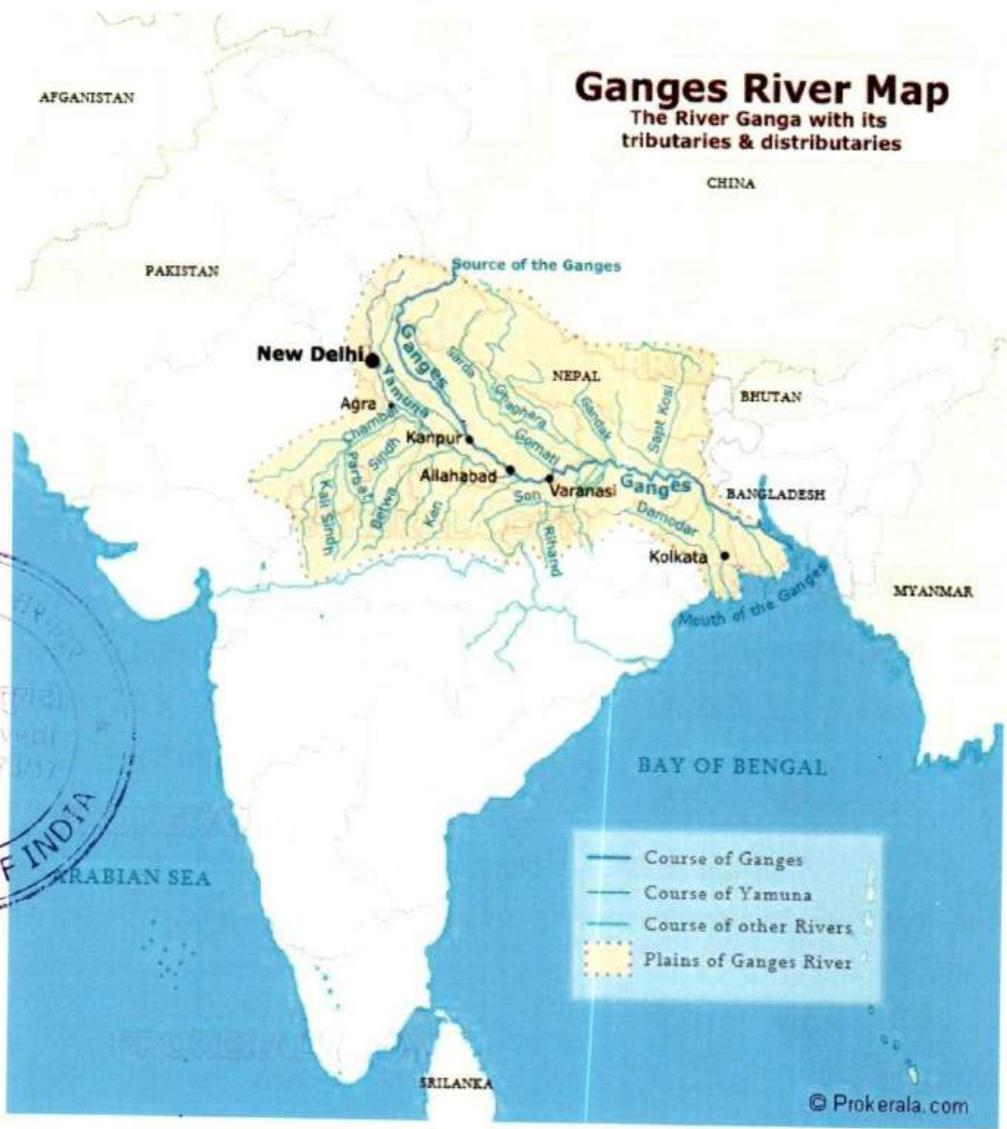


Fig 1.1 The Ganga River – from Himalayan Mountains to Ganga Sagar Bay of Bengal

1.1 (a) Morphology of Ganga River

The Ganga River's morphology, relevant for UPSC exams, encompasses its origin in the Himalayas, its course through the plains, its delta formation, and the influence of tributaries. The river's morphology is shaped by its Himalayan source, the plains it flows through, and the extensive delta it forms in Bangladesh. Here's a more detailed breakdown:

i. Origin and Upper Course:

- The Ganga originates as the Bhagirathi River from the Gangotri Glacier in Uttarakhand.



- It is joined by the Alaknanda River at Devprayag, after which it is known as the Ganga.
- The upper course is characterized by a V-shaped valley and steep slopes in the Himalayas.
- Numerous tributaries like the Dhauliganga, Pindar, and Mandakini join the Alaknanda before Devprayag.
- The river flows through mountainous terrain, carving its path through valleys and gorges.

ii. The Plains:

- The Ganga enters the plains at Haridwar, where it begins to flow in a southerly and southeasterly direction.
- The plains are characterized by a broader, meandering river channel with a gentle gradient.
- Major tributaries like the Yamuna, Ghaghara, Gandak, and Kosi join the Ganga in the plains.
- The Ganga's floodplain widens in the plains, and the river becomes more sinuous, with the formation of oxbow lakes and meanders.

iii. The Delta and Lower Course:

- The Ganga, along with the Brahmaputra, forms the world's largest delta before entering the Bay of Bengal.
- The delta is a low-lying area characterized by a complex network of distributaries and islands.
- The Sundarbans mangrove forest is a significant feature of the delta.
- The delta coastline is indented and prone to flooding during high tides.
- The Padma river (Ganga in Bangladesh) splits into numerous distributaries, eventually joining the Meghna before entering the bay.

iv. Drainage Patterns:

- The Ganga and its tributaries exhibit a dendritic drainage pattern, resembling the branches of a tree, according to Vedantu.
- This pattern is typical of areas with uniform rock structure and gentle slopes.
- The Ganga's tributaries from the Himalayan region (Alaknanda, Mandakini, Dhauliganga, Pindar) also contribute to the dendritic pattern.
- The river's course is influenced by the underlying geological structure and topography.

v. Morphology Changes and Human Impact:

- The construction of dams and barrages, along with bank alteration, agriculture, and sand mining, has altered the river's morphology and reduced biodiversity.



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- Changes in the river's flow and sediment transport have impacted the delta's shape and health.
- Flooding, influenced by monsoon rains and glacier melt, is a regular feature of the Ganga's course, particularly in the plains.
- The river's morphology is also affected by seasonal variations in discharge, with increased flow during the monsoon season.

1.1 (b) Spirituality Ganga River

The Ganga River is deeply revered in Hindu spirituality as a goddess, Ganga Maa, believed to possess purifying and healing powers. Hindus consider a dip in the Ganges to cleanse sins, connect with the divine, and achieve liberation. The river is a central element in Hindu rituals, festivals like Kumbh Mela, and daily worship practices such as Ganga Aarti.

- Hindus view the Ganges as a divine being, Ganga Maa (Mother Ganges), not just a river.
- A bath in the Ganges is believed to wash away sins and negative karma, leading to spiritual cleansing.
- Many believe that immersing oneself in the Ganges can help one attain moksha (liberation from the cycle of birth and death).
- The Ganges is central to numerous rituals and ceremonies, including Ganga Aarti (a ceremony of worship) and the immersion of ashes after cremation.
- The Kumbh Mela, a major Hindu festival, involves millions of people bathing in the Ganges, further highlighting its spiritual importance.
- The city of Varanasi, situated on the Ganges, is considered particularly sacred, with many believing that dying there ensures liberation.
- Despite its spiritual significance, the Ganges faces significant pollution challenges, highlighting a conflict between its sacred status and the impact of human activity.



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Fig 1.2 Spirituality of The Ganga River in India

1.2 VARANASI RIVER FRONT DEVELOPMENT

The city of Varanasi, as manifested in its iconic riverfront, holds sacred and spiritual value through time immemorial. Its Outstanding Universal Value lies in the fact that it is one of the most ancient continuously inhabited cities of the world since atleast 1200 BCE. The unique confluence of history, geography, mythology, intangible heritage, cultural institutions and urban forms is expressed in the



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

**EIA/EMP
CHAPTER I - INTRODUCTION**

riverfront of this eternal city. It is distinctive on account of its position as a scholastic and philosophic centre.

The riverfront, that is the interface of the river with the land, encompasses the *ghats* (the steps leading to the river bank), the magnificent edifices towering above them, and the quaint alleys behind flanked with temples, mosques, palaces, havelis (traditional courtyard houses), kunds, akharas, gardens and gateways. The *ghats* portray a considerable part of the city's cultural traditions and religious symbolism, thus being especially significant to Hindu religion.



The Varanasi Riverfront Development project is a large-scale initiative aimed at revitalizing the ghats and riverfront area of Varanasi, India, with a focus on improving the city's relationship with the Ganges River. This development includes the construction of a 6.5 km promenade, public buildings, recreational spaces, and ecological landscaping. The project also incorporates sustainable design elements, such as solar power, porous stone for flooring, and locally sourced materials.

The Varanasi (Ganga) Riverfront Management project, implemented under the Namami Gange Programme, aims to clean the Ganga River while preserving its cultural significance. Key strategies include sewage treatment plant improvements, river surface cleaning, and ghat renovations. Challenges persist with aging infrastructure, governance issues, and balancing development with religious practices. The project's impact includes improved water quality in some areas, but further efforts are needed to meet environmental standards and address ongoing pollution.




Details of the development are presented in Chapter-2. The total project cost proposed for Varanasi Riverfront Development project is INR 1154.16 Lakhs.

1.3 PURPOSE AND SCOPE OF EIA

Environmental Impact Assessment (EIA) evaluates the potential environmental consequences of development projects. It ensures sustainable planning for riverfront projects. Monitors pollution risks and ensures water management practices

The scope of the EIA study has been finalized based upon the project and is given below:

- Detailed assessment of natural habitats in the river and its riparian areas;
- Assessment of water quality along the river stretch both through secondary and primary data generation;
- Preparation of study area maps for an immediate vicinity of 200m-500m from either side of the river through satellite imagery to understand the details of vegetation and potential of siltation.
- Aquatic Ecological assessment of the river stretch of ghat development program;
- Assessment of existing sewage disposal and proposed improvement mechanism for restricting sewage and other trade effluent disposal (if any) in to the ghat development section;
- Assessment of proposed Solid Waste Management System as part of the proposed development;
- Assessment of possible impact on river bed due to the proposed engineering measures for ghat development and possible management measures (if any);
- Assessment of physical and cultural Resources along the project stretch and assessment of potential beneficial and adverse impact on such resources from the project;
- Assessment of possible Environmental Quality measures and monitoring mechanism;
- Assessment of possible Environment Management measures and cost;

1.4 PROJECT PROPONENT

U.P. Project Corporation Limited Unit-3 Varanasi, Uttar Pradesh

1.5 EIA CONSULTANT AND ARCHITECT

M/s Aegis Environment Research Pvt Ltd. Is the technical consultant for this project and Paradise Designers is the architect consultant for the Proposed project of Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi.



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1.6 STRUCTURE OF EIA

In terms of EIA notification, the generic structure of EIA should be as per the MoEF dated 14th September 2006 (Appendix III). Hence, this EIA Report is structured accordingly. Various chapters of the EIA Report are as follows:

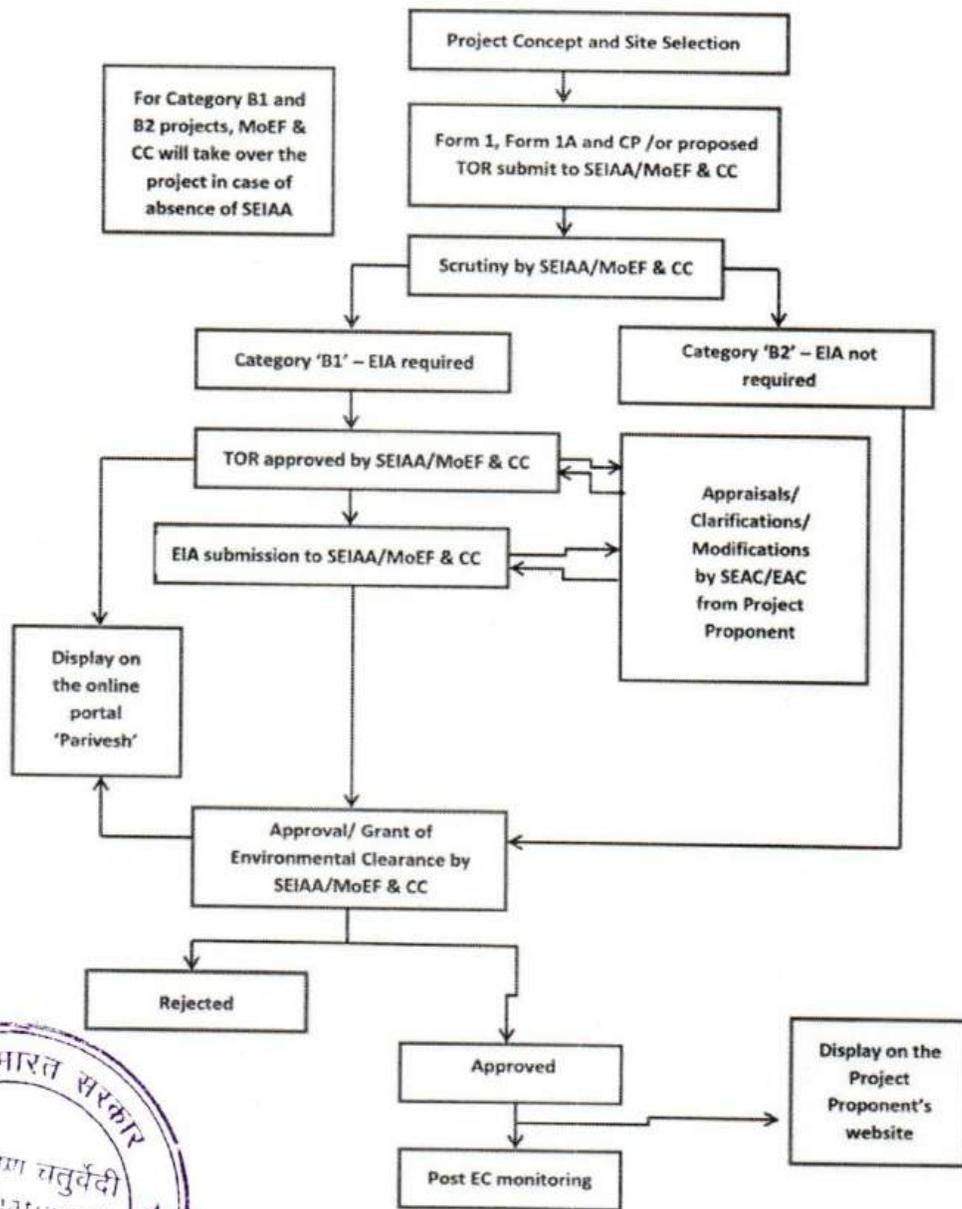


Fig 1.3 Flow Chart of Environment Clearance Process



- **Chapter 1- Introduction:** This chapter contains the general information on the project.
- **Chapter 2- Project Description:** This chapter contains detailed description of the proposed project, such as the type of the project, need of the project, project location, land availability, utilities and infrastructure facilities such as roads and other requirement.
- **Chapter 3- Description of the Environment:** This chapter covers baseline data in the project area.
- **Chapter 4- Anticipated Environmental Impacts & Mitigation Measures:** Anticipated positive and negative impacts as a result of the construction and operation of the proposed project are covered as a part of this section. The section attempts to forecast the future environmental conditions of the project area that might be expected to occur as a result of the construction and operation of the project.
- **Chapter 5- Analysis of Alternatives (Technology and site):** This chapter includes the options, details of the alternatives of materials that are to be used in building construction and energy conservation methods to be adopted.
- **Chapter 6- Environmental Monitoring Program:** This chapter covers the technical aspects of monitoring the effectiveness of mitigation measures (including measurement methodologies, data analysis, reporting schedules, emergency procedures, detailed budget and procurement schedules) both during the construction and operational phase and also includes details of the post monitoring scheme. This chapter also gives technical aspects of monitoring the effectiveness of mitigation measures.
- **Chapter 7- Additional Studies:** This chapter covers the details of the additional studies required, which are necessary for specific issues applicable to the project.
- **Chapter 8- Project Benefits:** This chapter covers the benefits accruing to the locality, neighborhood. It also brings out details of benefits by way of improvement in the physical infrastructure, social infrastructure, employment potential and other tangible benefits.
- **Chapter 9- Environmental Cost Benefit Analysis:** This chapter covers the environmental cost benefit analysis, if recommended at the scoping stage.
- **Chapter 10- Environmental Management Plan:** This chapter covers comprehensively present the Environment 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.



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- **Chapter 11- Summary & Conclusion:** The overall justification for implementation of the project and explain how the adverse effects have been mitigated.
- **Chapter 12- Disclosure of Consultants engaged:** This chapter includes the name of the consultant engaged with their brief resume and nature of consultancy rendered.

✦ Objective of EIA Study

In order to ensure that development is sustainable it is essential to integrate environmental concerns into development activities. Environmental impact assessment and management have been recognized as effective tools for facilitating the inclusion of the principles of sustainable development processes or projects. It is also universally accepted that natural resource development and environmental protection should go hand in hand. This is in-line with the national policy that the developments of infrastructure as well as other developmental activities have to follow the principle of development without destruction, and measures must be adopted to have environmentally sound and sustainable environment.

In order to avoid or reduce the possible ill effects, it is essential that all the development projects should be subjected to the requirement of an Environmental Impact Assessment (EIA). EIA shall point out potential environmental impacts of the proposed project and to recommend appropriate mitigation measures for the possible adverse impacts. Recommendations are also made for an environmental management plan. The EIA report is prepared as per Appendix-III, EIA Notification, 2006, EIA guidance manual of Building Construction and standard TOR issued by SEAC/SEIAA.

Standard Terms of References: -

S. No.	TOR Point	Reply	Citation in Chapters of EIA Report
1.	PROJECT DETAILS:		
1.1	Need and benefits of the project.	Benefit of the project: The Project will generate jobs that related to un- skilled, semi-skilled as well skilled labour category. Supervisory positions will also open up for which local candidates will be considered based on merit.	Refer Chapter 2.



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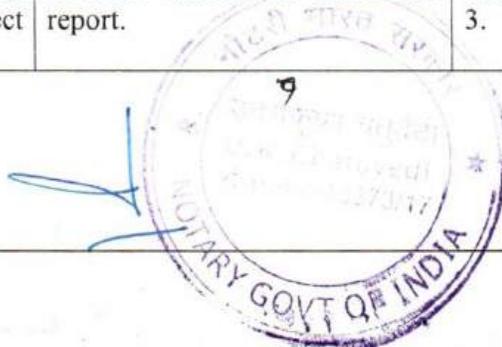


**PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM
AT LEFT BANK OF RIVER GANGA IN VARANASI.**

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CHAPTER I - INTRODUCTION

1.2	Submit data for built-up area for each building, the use and occupancy classification in line with NBC 2016 also to be indicated. [for differential functional requirement]	The built-up area details of the project are given in Chapter 1 and 2.	Refer to Chapter 1 and Chapter 2.
1.3	The cost of the Project (capital cost and recurring cost) as well as the cost toward implementation of EMP should be clearly spelt out.	Total Project cost of will be approx. Rs 1154.16 lakhs for Environmental Management Plan is given in EIA/EMP report. Environmental Monitoring Plan with cost and parameters are discussed in EIA/EMP report.	For details of EMP refer chapter 10.
2.0	LAND ENVIRONMENT:		
2.1	Examine details of land use as per Master Plan and land use around 10 km radius of the project site. Analysis should be made based on latest satellite imagery for land use with raw images. Check on flood plain of any river.	Land use map and details are given in the chapter 3 of the EIA/EMP Report. Major river Ganga is flowing within 10km radius of project site, and the construction of the project site is at the bank of river Ganga, availability of any flood plan is negligible.	The details are given in chapter 3 of the report.
3.	LAND ACQUISITION AND R&R:		
3.1	Submit details of environmentally sensitive places, land acquisition status, rehabilitation of communities / villages and present status of such activities.	Environmentally sensitive places are listed in Chapter 2. There is no rehabilitation of communities / villages in the project.	Details are given in Chapter-1, 2 and 3.
4.	ENVIRONMENTAL MONITORING AND MANAGEMENT:		
4.1	Examine baseline environmental quality along With projected incremental load due to the project.	Summary of baseline data has been given in Chapter-3 of EIA/EMP Report. Analysis report of laboratory is enclosed in Annexure in the EIA/EMP report. The incremental value of emission of pollutant due to activity has been analyzed and mentioned in EIA/EMP Report.	Monitoring period is pre monsoon March to May 2025. Details of the same is given in chapter 3. Air modelling details are incorporated in chapter 4 of the report.
4.2	Environmental data to be considered in relation to the project development would be	The following points have been covered under the EIA/EMP report.	Details of environmental data is given in Chapter-3.



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM
AT LEFT BANK OF RIVER GANGA IN VARANASI.

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	be felled for the project, if any.		
6.2	Submit the present land use and permission required for any conversion such as forest, agriculture etc.	The project site is river bank of the ganga river. There is no forest land involved in project.	No forest area involved in project. Details of the same is given in chapter 3.
7.	WATER ENVIRONMENT:		
7.1	Ground water classification as per the Central Ground Water Authority.	There will be no extraction of Ground Water at project site.	-
8	WATER MANAGEMENT:		
8.1	Examine the details of Source of water, water requirement, use of treated waste water and prepare a water balance chart.	Total water requirement is approx. 18 KLD. Fresh water requirement is approx. 8 KLD. & recycled water 5 KLD.	Details are given in chapter 2.
8.2	Rain water harvesting proposals should be made with due safeguards for ground water quality.	There is no Rain harvesting Proposed for the Ghat	Details are given in chapter 2.
8.3	Maximize recycling of water and utilization of rain water. Examine details.	NA	Details are given in Chapter 4
8.4	Examine soil characteristics and depth of ground water table for rainwater harvesting.	During the baseline study 3 soil samples are collected and their physicochemical analysis data are given in the EIA/EMP report. Soil found at site and surrounding study area has Sandy Loam texture and is brownish color.	Details are given in Chapter-3.
8.5	Permission from CGWA for abstraction of groundwater, if any, including dewatering during basement excavation.	There will be no extraction of Ground Water at project site. The water will be supplied through Private Water tanker supply.	Details are given in chapter 2.
9.	WASTE MANAGEMENT:		
9.1	Examine details of solid waste generation treatment and its disposal.	Total 81.25 kg/day of solid waste is generated during operation phase in which biodegradable waste will be Collected by the Municipal Authority.	Details are given in Chapter-2.
9.2	Construction & Demolition Waste Management Plan shall be prepared as part of EMP	As the site is clear there is no Construction & Demolition waste found at the site during	EMP for the same is given in chapter 10.



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM
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	providing details of demolition activities involved along with quantification and disposal mechanism.	construction and operation phase.	
10.	ENERGY REQUIREMENTS:		
10.1	A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project.	2 KW Source: Renewable Energy. All the electricity supply will be of Renewable energy, for which High Mast Solar Street Lights will be installed at the site.	Details are given in Chapter-2.
10.2	Examine and submit details of use of solar energy and alternative source of energy to reduce the fossil energy consumption. Energy conservation and energy efficiency.	We will provide the Solar PV panels which will reduce energy drawn from grid. Details of use of solar energy and alternative source of energy given in the EIA/EMP report.	Details are given in Chapter-2
10.3	DG sets are likely to be used during construction and operational phase of the project. Emissions from DG sets must be taken into consideration while estimating the impacts on air environment.	There is no provision of DG Sets for the construction project as this is a small project.	-
11.	ROAD AND TRAFFIC:		
11.1	Examine road / rail connectivity to the project site and impact on the traffic due to the proposed project. Present and future traffic and transport facilities for the region should be analyzed with measures for preventing traffic congestion and providing faster trouble-free system to reach different destinations in the city.	Detailed Traffic study was carried out during baseline monitoring and The LOS value from the project change i.e. LOS value for Dwarka Expressway, NH-248A, SH-15A will remain same as 'Excellent' So the additional load on the carrying capacity of the concern roads is not likely to have major affect. Detail of Traffic study is given in EIA report.	Details are given in Chapter-4.
11.2	A detailed traffic and transportation study should be made for existing and projected passenger and cargo traffic.	The detailed traffic and transportation study have been included in Chapter 4.	Details are given in Chapter-4
11.3	Examine the details of transport of materials for construction which should include source	Construction materials will be source from the nearby Market and transported at the	Details are given in Chapter-4.



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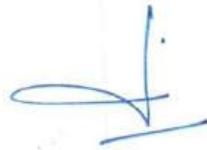
PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM
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	and availability.	project site via trucks /trolley/tractors.	
12.	DISASTER MANAGEMENT PLAN:		
12.1	Submit details of a comprehensive Disaster Management Plan including emergency evacuation during natural and man-made disaster. This should cover details of vulnerabilities due to natural and manmade hazards (earthquake, flooding, cyclone, landslides, fire etc.) and details of disaster mitigation efforts for buildings and infrastructure through structural sufficiency and Fire and Life Safety compliance in line with National Building Code NBC, 2016.	Disaster Management Plan including emergency evacuation during natural and man-made disaster is given in EIA/EMP report.	Details are given in Chapter-7.
13.	COURT CASES:		
13.1	Details of litigation pending against the project, if any, with direction /order passed by any Court of Law against the Project should be given.	There is no litigation pending against our project.	-
14.	MISCELLANEOUS:		
14.1	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure, project proponent can refer to the model ToR available on Ministry website " http://moef.nic.in/Manual/Townships ".	No additional impacts are anticipated from project.	-



CHAPTER – II
DESCRIPTION OF THE
PROJECT



2.0 PROJECT DESCRIPTION

A detailed project report on Proposed Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi has been prepared to enhance the potential of Varanasi's River edge infrastructure and future decade. This is an unprecedented opportunity to create new public realm facing towards the river that is strongly connected to the city's urban fabric. The report outlines a set of urban strategies that form the larger civic vision to the water front in the city and illustrates the detail proposal in ghat precincts. The main aim of the project is to attempt with a proposal that works collaboratively with Architecture and Engineering, Urban design and Ecology and Landscape Design. The project area is spread over a length of 0.79 km of the water front.

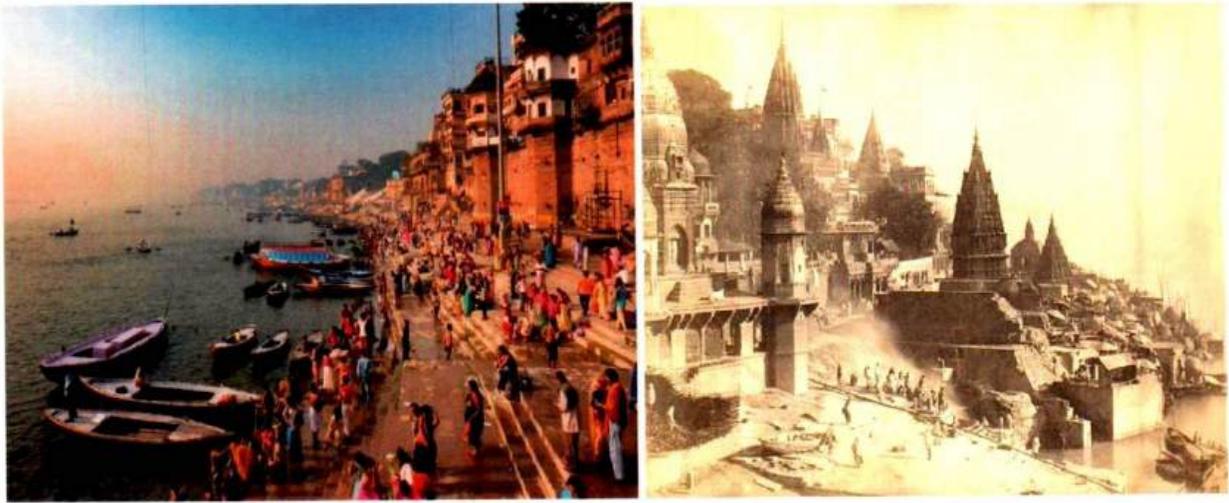


Fig 2.1 Artists view of Varanasi Ghat

The ghats of Varanasi, steps leading down to the Ganges River, have a rich history deeply intertwined with religious and cultural significance. Most ghats were rebuilt or renovated after 1700 AD, largely due to the patronage of the Maratha rulers and other regional dynasties. These dynasties, including the Marathas, Scindias, Holkars, Bhonsles, and Peshwas, played a vital role in shaping the ghats' present form and architectural style.

- **Ancient Origins:**

While the exact origins of the ghats are difficult to pinpoint precisely, it's clear that Varanasi, also known as Kashi, has been a sacred city for millennia. The ghats, as we see them today, evolved over centuries, with different rulers and dynasties contributing to their development.



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- **Maratha and Post-Maratha Patronage:**

The 18th century saw a significant period of construction and renovation, particularly under the Maratha rulers. Many ghats were rebuilt after the city was under Maratha control, with various Maratha and other regional dynasties playing a key role.

- **Architectural Styles and Evolution:**

The ghats showcase a blend of architectural styles, reflecting the city's historical and cultural shifts. The Maratha period left a lasting impact, while subsequent influences, including those from the British colonial era and modern times, have also shaped their appearance.

- **Religious and Cultural Significance:**

Each ghat holds its own unique history and significance, often linked to legends, myths, or prominent figures. Some ghats are associated with rituals of life, others with death (cremation), and many serve as spaces for prayer, meditation, or public gatherings.

- **Notable Ghats and their Histories:**

- ✚ **Dashashwamedh Ghat:** This is one of the oldest and most prominent ghats, believed to be where Brahma performed a yajna (Vedic ritual) involving ten horses.
- ✚ **Manikarnika Ghat:** A cremation ghat of great importance, believed to be where Lord Shiva consoled Parvati.
- ✚ **Harishchandra Ghat:** Another significant cremation ghat, named after King Harishchandra, known for his truthfulness and morality.
- ✚ **Assi Ghat:** Located at the confluence of the Assi and Ganges rivers, this is a major ghat for religious activities and is known for its association with the sage Tulsidas.

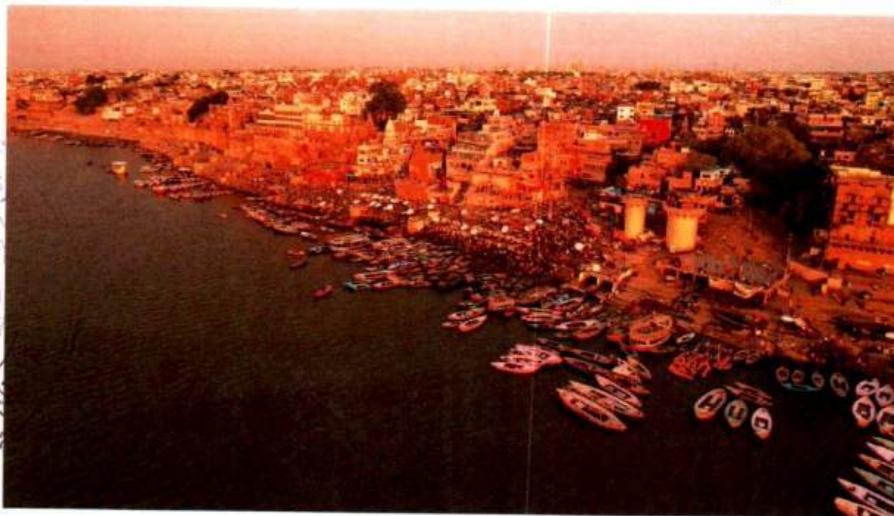


Fig 2.2 The spread of Varanasi along river Ganga



b) Beyond Rituals:

The ghats are not just places for religious rituals. They are also vibrant spaces for daily life, with fishermen, boatmen, and laundry workers all contributing to the scene.

• **Tourism and Modern Developments:**

The ghats are a major tourist attraction, drawing visitors from around the world. Modern developments have also taken place to accommodate growing tourism while preserving the cultural heritage.

2.1 DESCRIPTION OF THE PROJECT LOCATION

The proposed project is Constructional project, where Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi will be done.

Built Up Area- 6,264m²

a) Project Coordinates: -

S. No.	Latitude	Longitude
1.	25°14'50.30"N	83° 1'38.56"E
2.	25°14'53.37"N	83° 1'38.06"E
3.	25°14'53.74"N	83° 1'39.90"E
4.	25°14'50.93"N	83° 1'40.26"E
5.	25°14'50.75"N	83° 1'39.98"E
6.	25°14'50.62"N	83° 1'39.98"E



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

EIA/EMP

CHAPTER II- DESCRIPTION OF THE PROJECT

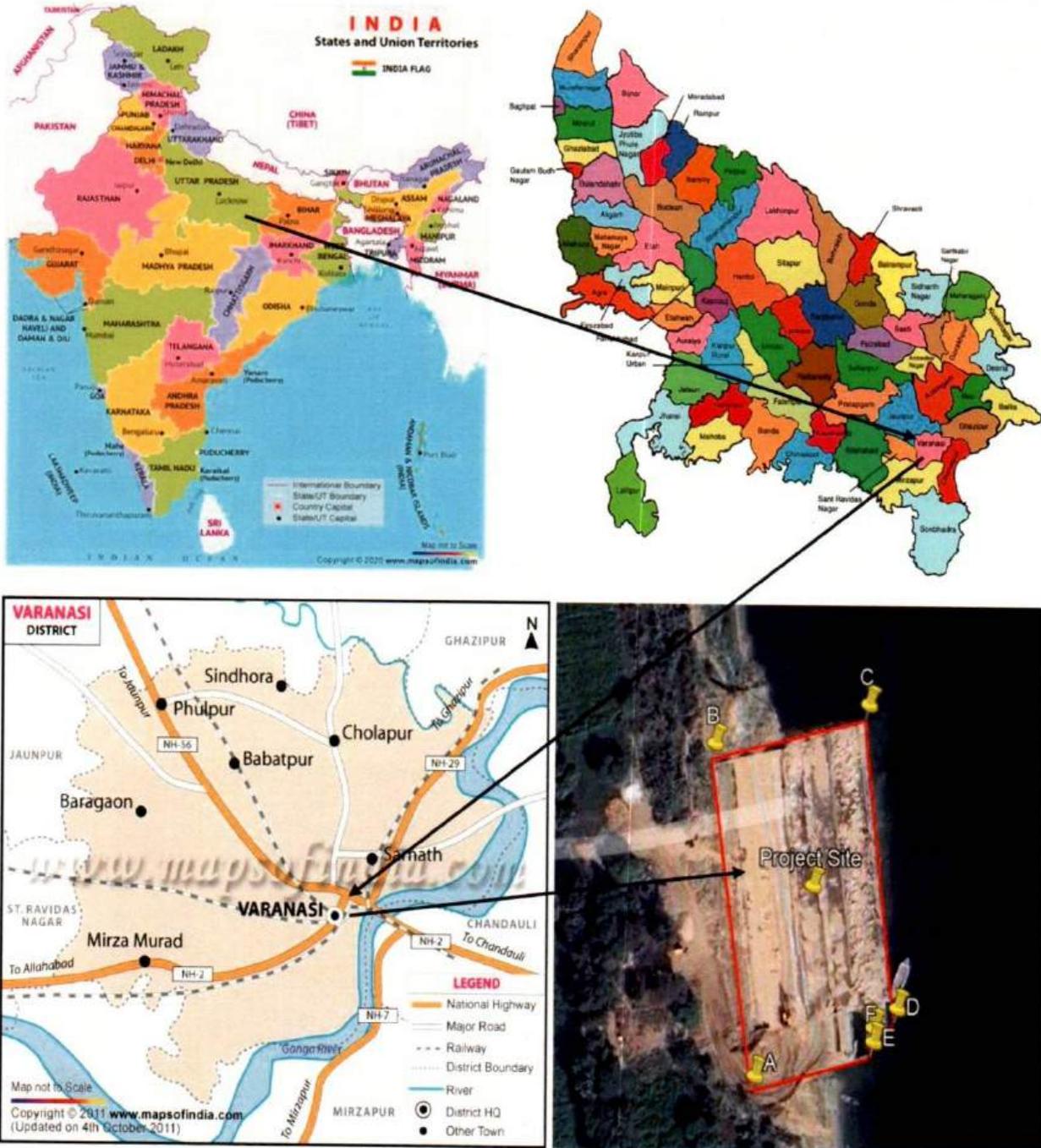


Figure-2.1 Location of the Project



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PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

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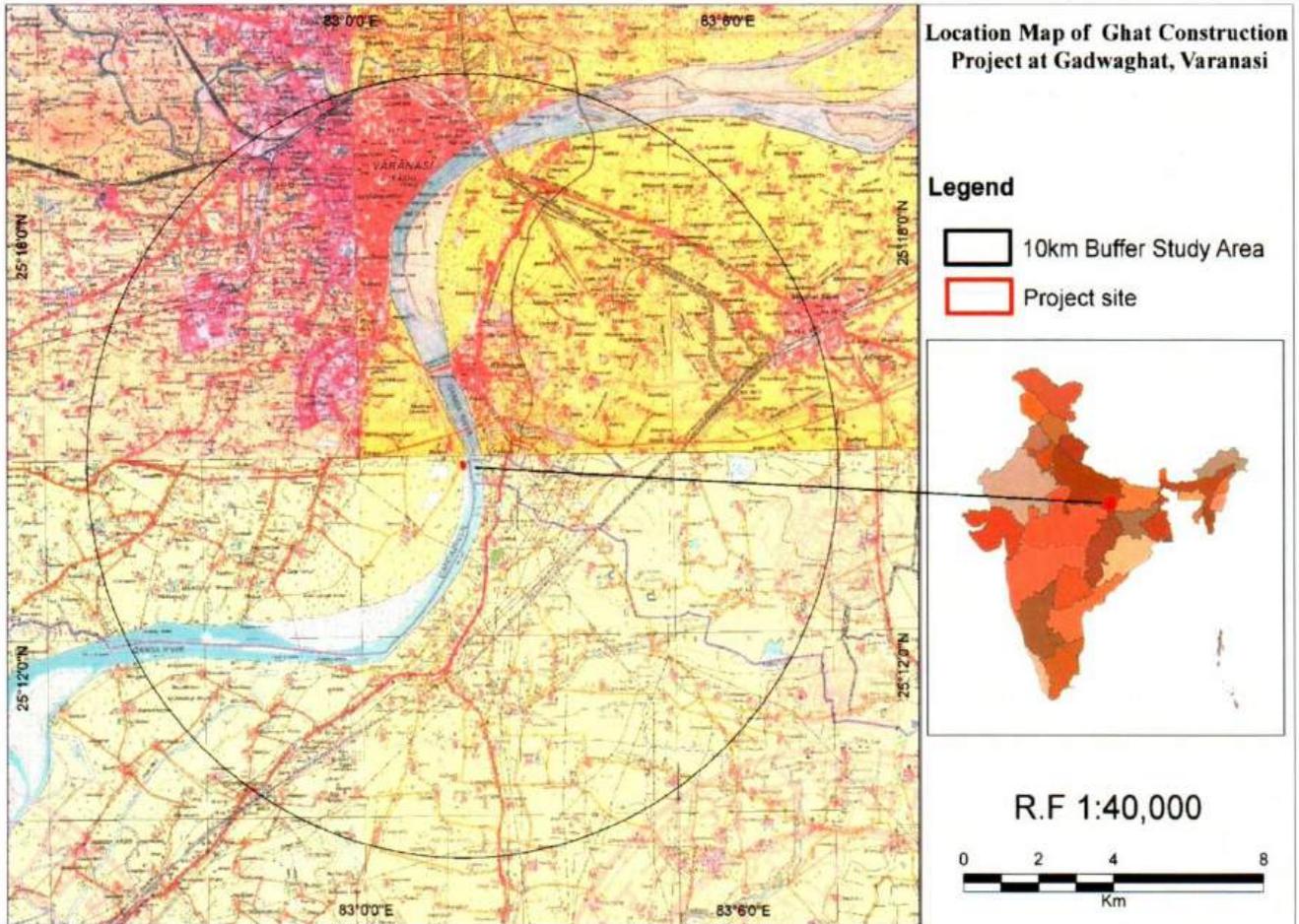
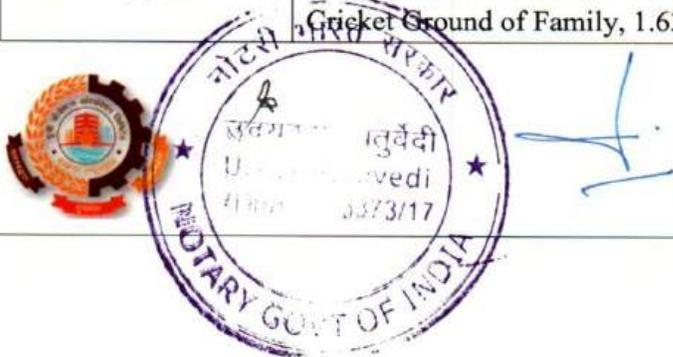


Figure-2.2 10 km Buffer Map of the Study Area

Table 2.1 Site and Surrounding of the Project Site

Nearest Habitation	Milkipur (Right Bank of River Ganga), 0.82 km in SE direction Ramna, Varanasi, Uttar Pradesh, 0.53 km in W direction
Nearest Town	Chittupur Town, 2.57 km in NW direction Salhupur, 0.56 km in NW direction
Nearest Railway Station	Banaras Railway Station, 7.80 km in NW direction Jeonathpur Railway Station, 3.90 km in SE direction
Nearest Airport	Port Inland Helipad (Inland Waterways Authority of India), 0.41 km in NE direction UP Air Sqn NCC (Hangar), 3.38 km in NW direction
Nearest Park/Playground	Vagishwari Park, 0.62 km in NW direction Botanical Garden BHU, 4.31 km in NW direction Cricket Ground of Family, 1.63 km in NW direction

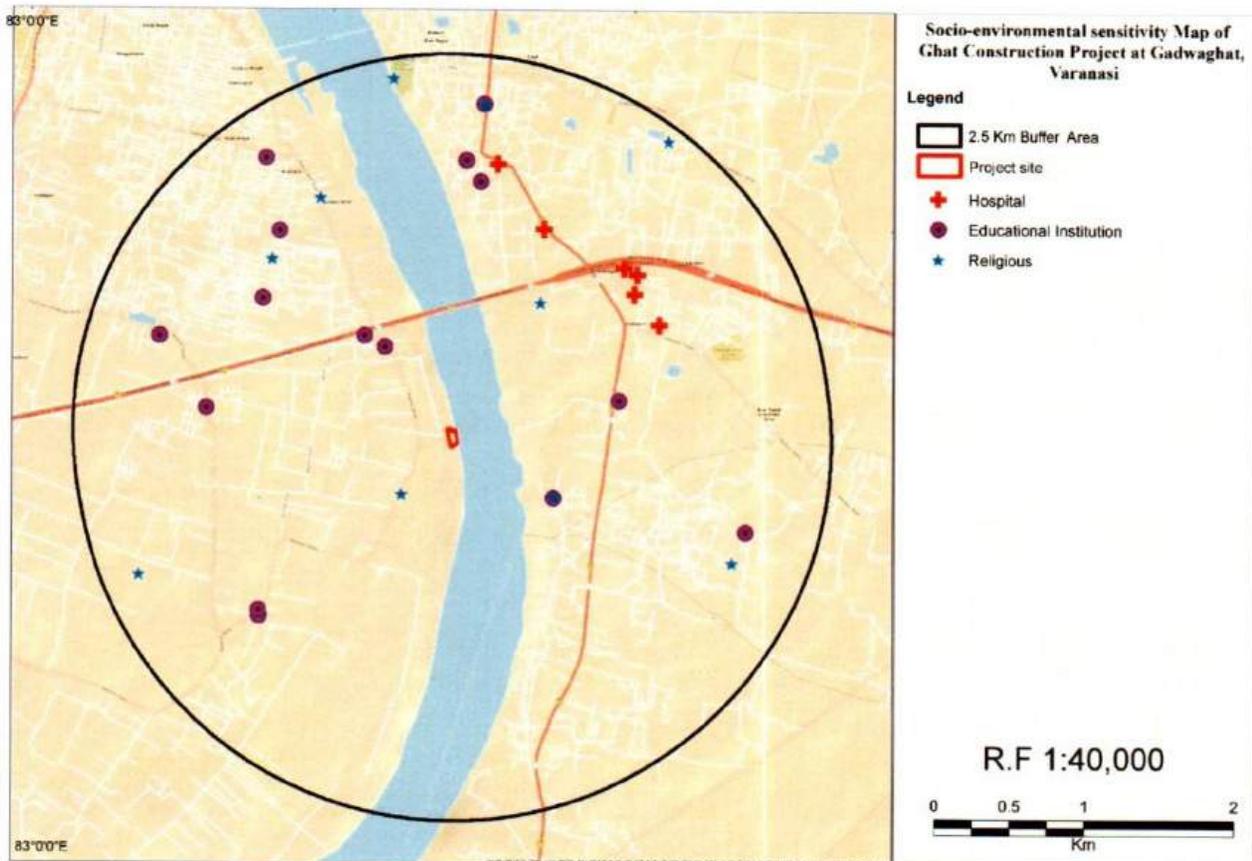


PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

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Nearest School/College	Malahiya Primary Govt School, 0.70 km in NW direction Upper Primary School, Tahirpur, Niyamtabad, Chandauli, 1.11 km in E direction Swami Harsewanand Public School (SHPS) Varanasi, 0.85 km in NW direction Shri Shiv Kumar Singh Inter College, 1.60 km in W direction Banaras Hindu University, 3.46 km in NW direction
Nearest Hospital	Shivganga Hospital Pvt Ltd, 3.17 km in NW direction Sharda Hospital, 3.53 km in NW direction Surbhi Hospital & Trauma Center, 1.35 km in NE direction
Nearest Post Office	Tahirpur BO Post Office, 1.30 km in E direction India Post Ramnagar Sub Post Office, 2.39 km in N direction
Nearest Temple	Durga Temple, 0.74 km in SE direction Shital Mata Temple, 1.78 km in NW direction



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Activity Levels: The ghats vary in their level of activity and popularity. Dasaswamedh Ghat is a major attraction and a focal point for activities like the Ganga Aarti. Other ghats, like Manikarnika, are known for their association with death and cremation.

Historical Significance: Many ghats, like Manikarnika, have deep historical and religious significance, particularly in Hindu traditions. They are not just riverfront structures but are deeply intertwined with religious and cultural practices.

Development: Recent developments, such as Namo Ghat, have added new modern ghats, while older ones are undergoing renovations and maintenance. These developments aim to enhance the visitor experience and preserve the heritage of the ghats.

Climate Change: Studies suggest that climate change could further exacerbate water resource issues in Varanasi, impacting the ghats and the river.



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

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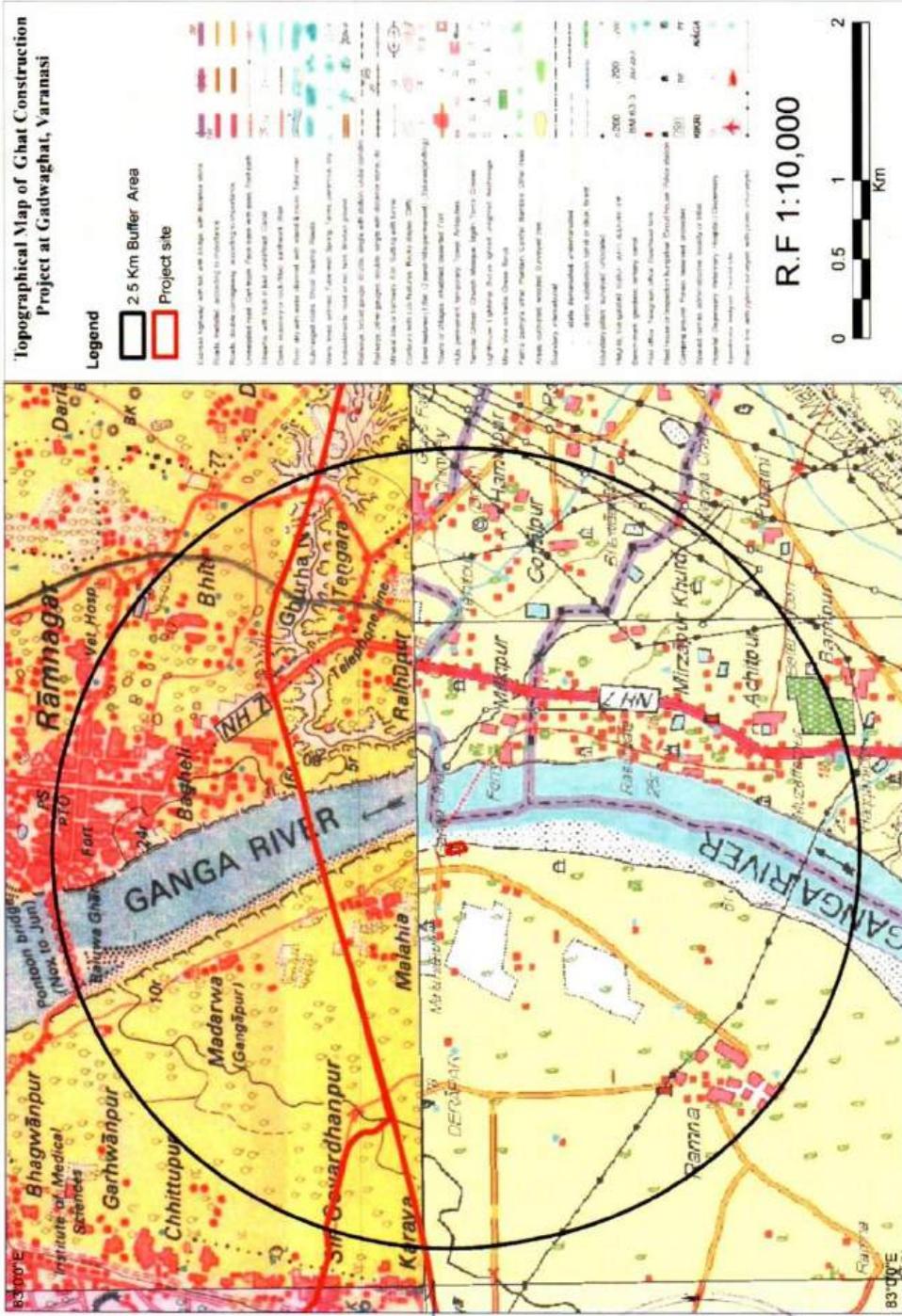


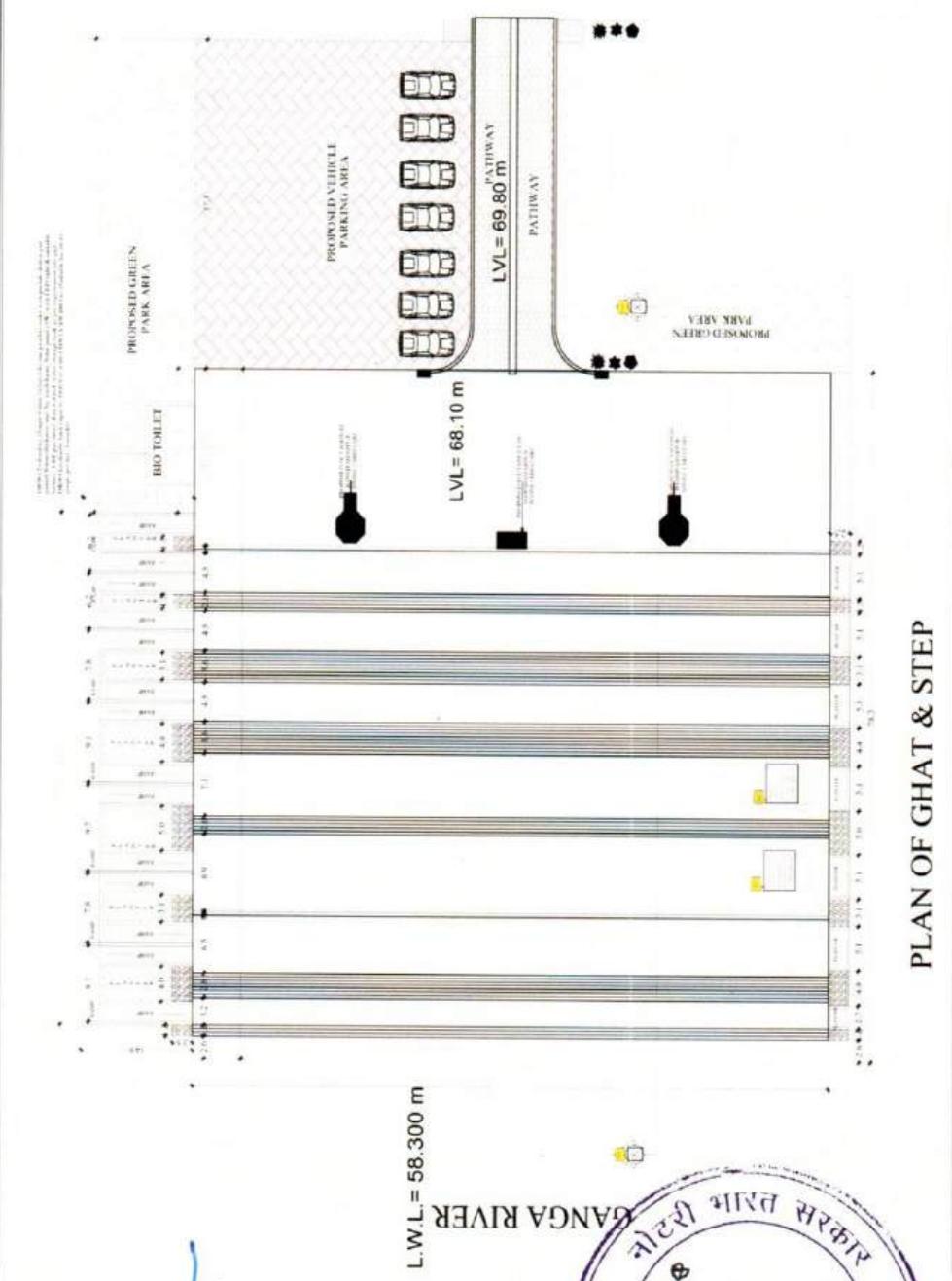
Fig 2.4 Topographical Map of Ghat Construction Project at Gadwaghat, Varanasi



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

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CHAPTER II- DESCRIPTION OF THE PROJECT

NAME OF PROJECT :-	PROPOSED CONSTRUCTION OF GARHAWA GHAT & DEVELOPMENT AT DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN DISTT-VARANASI (U.P.)
BUILDING:-	GARHAWA GHAT
DRG. TITLE:-	PLAN OF GHAT & STEP
SCALE:-	1 ALL DIMENSIONS ARE IN MM AND ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED 2 THE PROPORTION OF SCS PARADISE DESIGNERS IS NOT ALLOWED TO BE PRODUCED 3 ANY DISCREPANCY IN THE DRG. SHALL BE BROUGHT TO THE NOTICE OF ARCHITECT BEFORE EXECUTION OF THIS DRAWING SHOULD BE EXECUTED IN COORDINATION WITH STRUCTURAL DRAWING
CONSTRUCTION AGENCY :-	U.P.PROJECT CORPORATION LTD. UNIT-03,VARANASI (U.P.)
CLIENT ORPPT :-	PROJECT MANAGER :-
APM :-	
J.E. :-	
DATE :-	SCALE :- DRG NO. 1
MAY-2024	
ARCHITECT :-	PARADISE DESIGNERS ARCHITECTS/PLANNERS/ENGINEERS VARANASI NEAR ARYU UNIVERSITY, PH. 0522613486 E Mail: architect.paradise192@gmail.com



PLAN OF GHAT & STEP

Fig 2.4 Plan of Ghat & Steps

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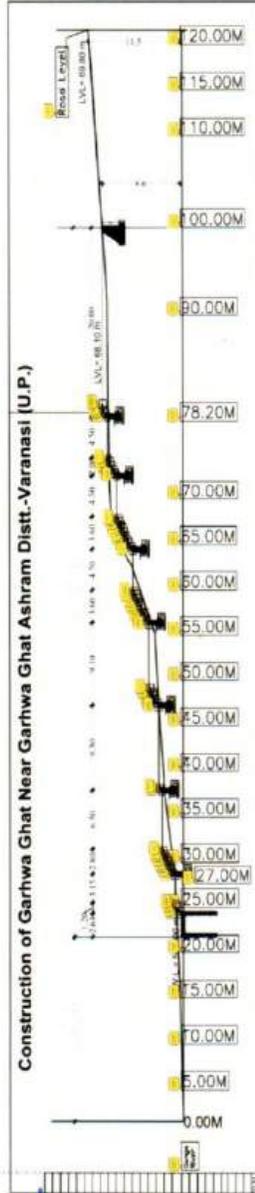
PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

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S.No.	Particulars	Detail	Unit
1	H.F.L.	=	73.900 m
2	L.W.L.	=	58.300 m
3	Lacy's Silt factor (f)	=	0.600 m
4	Velocity	=	3.500 m/second
5	Width of L.A.	=	22.000 m
6	Scour Depth below H.F.L.	=	43.640 m
7	Scour depth below L.W.L. (D max).	=	14.660 m
8	Thickness of Geo bag	=	0.960 m

NOTES:-

- All Dimensions are in mm unless specified.
- Base concrete shall be in M-10 (1:1.5:6) with 20-40 mm stone ballast & coarse sand.
- Concrete shall be in M-20 (1:1.5:3) with 10-20 mm stone ballast & coarse sand.
- Stone Masonry for retaining wall and toe wall shall be in 1:3 C.M. with coarse sand.
- Stone Masonry for RCC shall be in 1:3 C.M. with coarse sand.
- Reinforcement for RCC shall be Fe 500 grade as per IS:1786.
- PVC casing pipe shall be 300mm diameter and 2.5kg/m² cm rating.
- Overlap length in reinforcement should be 40 dia of used steel.
- Struck sheet piling in reinforcement should be 1:3 C.M. with coarse sand on all faces of exposed stone masonry.
- 50 mm clear cover shall be provided to main reinforcements.



SECTION AT X-X

NAME OF PROJECT :-
PROPOSED CONSTRUCTION OF GARHAWA GHAT & DEVELOPMENT AT DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN DISTT.-VARANASI (U.P.)

BUILDING:-
GARHAWA GHAT

DWG. TITLE:-
SECTION AT X-X

SCALE:-

CONSTRUCTION AGENCY :-
U.P. PROJECT CORPORATION LTD.
UNIT-03,VARANASI (U.P.)

CLIENT DEPT.:-
PROJECT MANAGER :-

A.P.M. :-

J.E. :-

DATE :- JULY -2023

STATE :-

DWG. NO. :- 2

ARCHITECT :-

PARADISE DESIGNERS
PLOT NO. 10, ANAND VIHAR, GATE NO. 1, DISTT. VARANASI, U.P. PIN-221001
NEELAMITI UNIVERSITY, P.O. 901803VAR.



Fig 2.5 Garhwa Ghat



2.3 NEED FOR VARANASI GHAT CONSTRUCTION

The construction of ghats in Varanasi is primarily needed to improve accessibility to the Ganges River, facilitate religious rituals, and enhance the overall experience for pilgrims and tourists. Ghats are essential for various Hindu practices, including cremation, bathing, and prayer, and their construction or renovation addresses issues like erosion, overcrowding, and lack of proper infrastructure.

The construction of ghats in Varanasi is primarily needed to improve accessibility to the Ganges River, facilitate religious rituals, and enhance the overall experience for pilgrims and tourists. Ghats are essential for various Hindu practices, including cremation, bathing, and prayer, and their construction or renovation addresses issues like erosion, overcrowding, and lack of proper infrastructure.

Here's a more detailed look:

- **Accessibility:**

Ghats, with their steps leading down to the river, provide crucial access points for pilgrims and tourists to perform rituals, take holy dips, and participate in religious ceremonies.

- **Religious Significance:**

Varanasi is a deeply religious city, and the ghats are integral to Hindu beliefs and practices. The ghats are considered sacred places for cremation and other rituals, and their presence enhances the spiritual atmosphere of the city.

- **Infrastructure and Maintenance:**

Many ghats have been rebuilt or renovated over time, particularly in the 18th century, often under the patronage of various rulers. However, ongoing construction and maintenance are necessary to address issues like erosion, damage from the river, and the need for improved facilities.

- **Tourist Experience:**

The ghats are major tourist attractions, and improved infrastructure can enhance the overall experience. This includes better pathways, seating, and amenities for visitors.

- **Kashi Vishwanath Corridor:**

The recent Kashi Vishwanath Corridor project, connecting the temple directly to the Ganges, is a prime example of how construction can revitalize a religious site and make it more accessible.

- **Architectural Styles:**

The ghats of Varanasi are known for their unique architectural style, often incorporating sandstone, limestone, and marble. This reflects the city's rich history and cultural heritage.




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2.4 CLIMATIC CONDITIONS OF VARANASI

Varanasi experiences a humid subtropical climate (Koppen climate classification Cwa) with large variations between summer and winter temperatures. The dry summer starts in April and lasts until June, followed by the monsoon season from July to October. The temperature ranges between 22 and 46 °C (72 and 115 °F) in the summers. Winters in Varanasi see very large diurnal variations, with warm days and downright cold nights. Cold waves from the Himalayan region cause temperatures to dip across the city in the winter from December to February and temperatures below 5°C (41 °F) are not uncommon. The average annual rainfall is 1036.00 mm. Fog is common in the winters, while hot dry winds, called loo, blow in the summers. In recent years, the water level of the Ganges has decreased significantly; upstream dams, unregulated water extraction, and dwindling glacial sources due to global warming may be to blame.

Rainfall & Humidity-

The average annual rainfall is 1036.00 mm. Climate is sub humid and is characterized by hot summer and pleasant monsoon and cold season. About 90% of rainfall takes place from June to September. During monsoon surplus water flows into rivers and streams un-arrested due to hilly topographic features in northern part of the district. In February there is increase in temperature, May is the hottest month with the mean daily maximum temperature is 41.5°C and mean daily minimum temperature is 9.5°C. The average temperature ranges from 14.15°C to 39.80 °C. The average temperatures from March to June do not fluctuate much. 7 The average relative humidity is 82%. The average monthly relative humidity of the district is 42%.

2.5 TOPOGRAPHY

To the north of Chakia is a plain country, but to the east and west of it there are many, small isolated hillocks and ridges rising to a maximum height of 800 ft. (243.8 m.) above m. s.l. To the south of Chakia lies the Vindhyan plateau. Standing on one of the hillocks, one gets a beautiful landscape of this area. The hillocks are aligned in an almost NS direction. On the Chakia plateau there are numerous thickly forested isolated small hillocks. The maximum altitude in this region is about 1200 ft. above m. s.l.



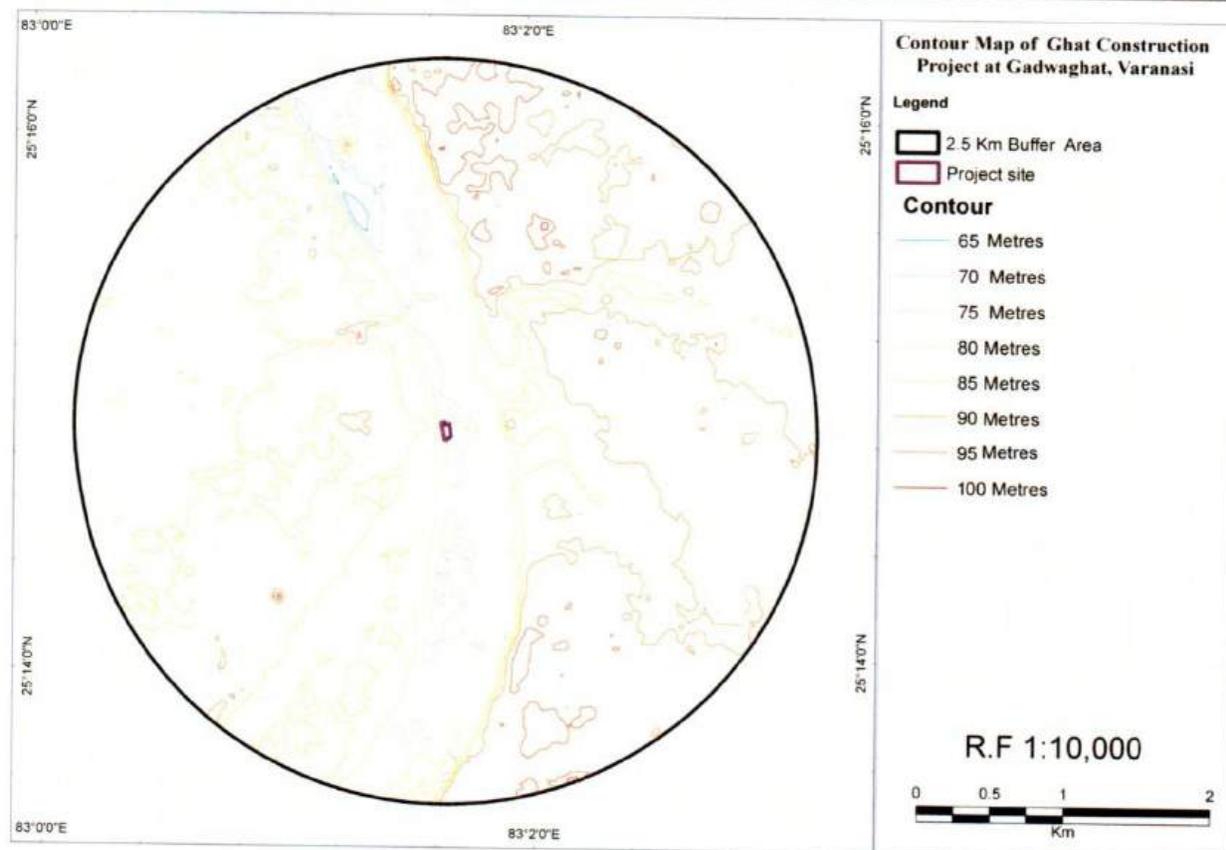


Fig 2.6 Contour Map of the Project Site

a. Water Course & Hydrology

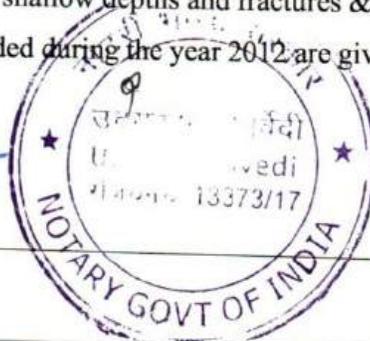
Exploratory drilling data of C.G.W.B. and state tubewells department show that the ground water occurs in two distinct formations: a) A shallow ground water body which occurs principally in clay and kankar beds of back swamp deposits and b) Deep or main ground water body which occurs in thick sands of the meander belt deposits. These two water bodies are hydraulically distinct. The back swamp deposits are thick but are likely to be interconnected when they are comparatively thin. The shallow ground water in back swamp deposits is generally unconfined and its static water level is only few meters bgl.

b. Ground Water Development

Central Ground Water Board has established number of ground water monitoring stations in Varanasi district to monitor the water level behaviour in space and time. The data compiled on the basis of 14 NHS of Varanasi district. Ground water is mainly controlled by drainage, topography and lithological behaviour, it occurs under phreatic condition at shallow depths and fractures & granular zones under at deeper depths. The depths to water levels recorded during the year 2012 are given in Table-II. Depth to



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water in pre-monsoon ranges between 5.33 to 20.55 mbgl and the post-monsoon water level varies between 2.30 to 17.06 mbgl. The depths to water level map for both pre-monsoon & post-monsoon periods of 2012 were prepared (Plate-II & III). The water level fluctuation ranges from 0.65 to 4.11 m Table-III. Water level fluctuation is maximum in Arazi Line block. The average 8 magnitude of falling trend over last 5 years is 50-65 cm/year. The yields of the wells vary from 700 lpm to 3550 lpm.

The city of Varanasi is located in the middle Ganges valley of North India, in the Eastern part of the state of Uttar Pradesh, along the left crescent-shaped bank of the River Ganges. The river system consists of the mighty Ganga highly revered by Hindus since ages and Gomti, Varuna, Assi, Banganga, Chandra Prabha and Karmnasa are tributaries of the Ganga that drain the area. Being located in the Indo-Gangetic Plains of North India, the land is very fertile because low level floods in the Ganges continually replenish the soil.

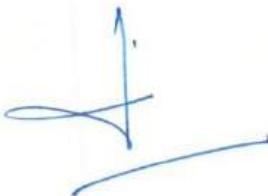
c. Drainage System

The total geographical area of the district is 1535 km². The Ganga River and several tributaries of river Ganga are flowing in the Varanasi district. Average rain in the district approximate 1036.00 mm. General climate of the district is healthy and pleasant. The net irrigated area is 80,349 ha and the net area sown is 1,13,946Ha, which shows that area is irrigated by ground water and the surface water while the rest depends on rainfall.

Table 2.2 Drainage System with Description of Main Rivers

S. No.	Name of River	Area Drained (Sq.Km.)	% Area drained
1.	Ganga River	58.4	3.80

Name of River/Stream	Total Length in the District (in km)	Place of Origin	Altitude at Origin
Ganga River	61.8	Gangotri Glacier, Uttarakhand	3892m



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM
AT LEFT BANK OF RIVER GANGA IN VARANASI.

EIA/EMP

CHAPTER II- DESCRIPTION OF THE PROJECT

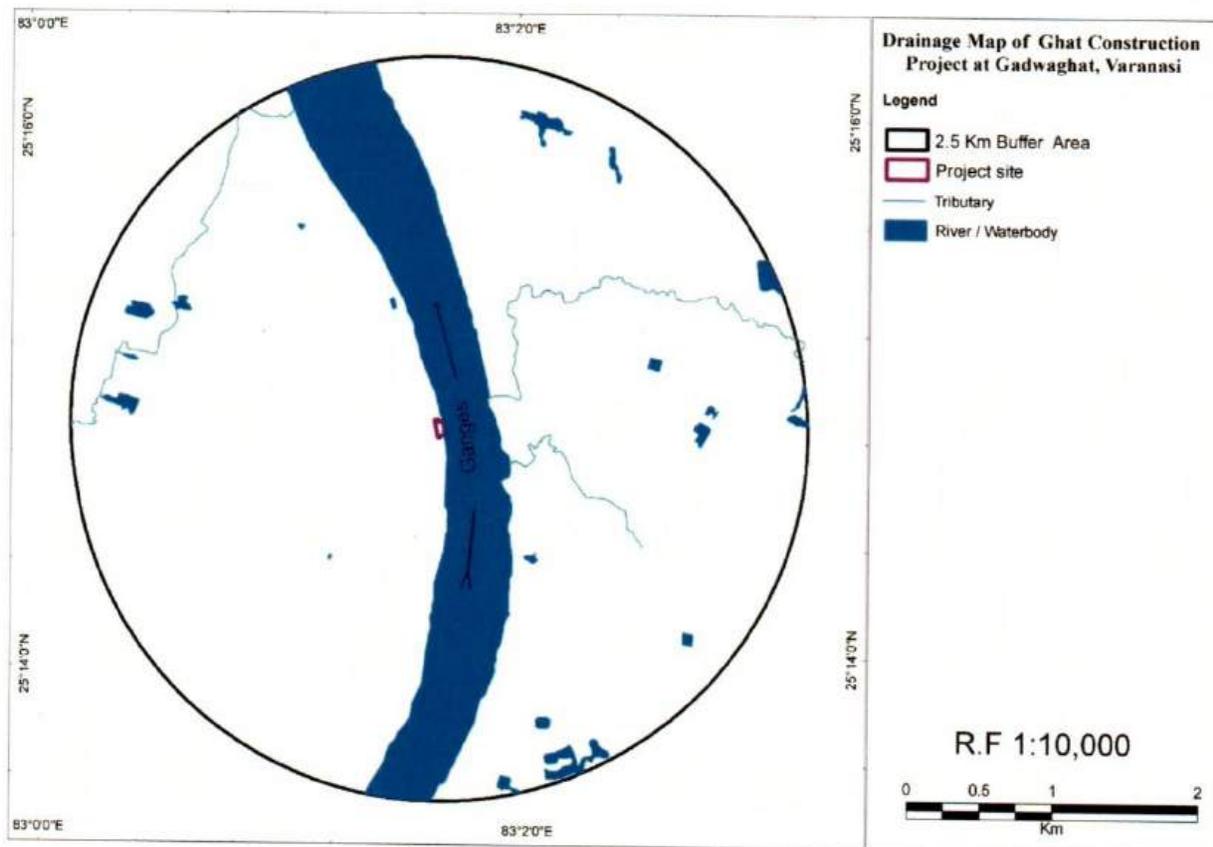


Fig 2.7 Topographical drainage map of the study area

Table 2.3 List of Villages through which river Ganga passes

S. No.	Name of Place	Elevation
1	Kharauna	71m
2	Kathi	71m
3	Dhankhawa	71m
4	Rampur	70m
5	Gaura	70m
6	Muridpur	69m
7	Barthara Gangbarar	69m
8	Shivdasa Gangbarar	69m
9	Lutha Khurd	68m
10	Dhobhai	68m
11	Sarsaul	68m
12	Misirpura	68m
13	Dharadhar	68m
14	Gangapur	68m
15	Mokalpur	68m



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PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM
AT LEFT BANK OF RIVER GANGA IN VARANASI.

EIA/EMP

CHAPTER II- DESCRIPTION OF THE PROJECT

16	Kurahna	68m
17	Ramchandipur	68m
18	Nakhwa	68m
19	Sehbar	68m
20	Rajapur	68m
21	Sarai Mohana	68m
22	Nagwa	67m
23	Bahgwanpur	67m
24	Madarwa	67m
25	Madhopur	67m
26	Chhitauni	67m
27	Betwar	67m
28	Gosainpur	67m

Table 2.4 List of drains in District Varanasi

S. No.	Name of Water Body	Merges with
1.	Atthi Nala	Ganga River
	Asi Nala	
	Nand Nala	
	NArokhar Nala	
	Sota Nala	
	Subha Nala	

The main river is Ganga which enters from North and flows south east, in the district. Other rivers the Varuna, Assi, Gomti, Nanda, Hathi, Banganga, Lumui and Karamnasa and their tributaries which mostly rises in the terai generally run through the district in the southerly and south-easterly direction to join Ganga River.

2.6 GEOLOGY

The district Varanasi is mainly composed of Gangetic alluvium the deposition of which commenced from the Pliestocene period after the final upheaval of the Himalayas and is still continuing. It consists of interbedded layers of sand, silt and clay, which are associated in places with kankar. Sections obtained by sinking wells have generally given a profile of about 35 feet of loam or clay mixed with sand in varying proportions, 30 feet of blue silt, 20 feet of strong clay and below that a water bearing stratum of reddish sand.



The Vindhyan rocks which occur in the southern portion of the district in tehsil Chakia consist of different kinds of quartzite and sandstone belonging to the Dhandraul and Scrap-Sandstone stages. The mineral products that are commonly found in this district are reh, kankar and brick and pottery earths. Reh-This mineral occurs as a white encrustation in the usar land. Soda ash, which is extracted from it, is used in the making of soap and glass. It can also be used for the treatment of hard water, in the dyeing industry and, when rich in sodium sulphate, for the extraction of sulphur. In its slightly purified form, it is commonly used by dhobis as a substitute for soap. Its main ingredient is sodium carbonate frequently mixed with sodium sulphate, sodium chloride and other salts. Deposits of reh are found in a number of places in the tehsils of Bhadohi and Chakia roughly covering areas of 269 and 5 acres respectively.

Kankar- This mineral is available in many parts of the district and occurs generally at a depth of two to four feet while small quantities can be procured from the banks of rivers and ravines.

There are four recognized varieties of kankar: *bhwa*, *gathia*, *matinnila* or *pakanwa* and *chwan* or block kankar. The first two are mostly used as road metal,

Mineral wealth

As per geological and mineral atlas of India sheet no 14, miscellaneous bulletin no-30 and mineral resource map of district the area contained alluvial loam along with some percentage of sand upto a deep layer. Mineral wealth of the district has great significance in terms of socio-economic prosperity and economic base.

Types of Soil found in District - Varanasi

The scientific survey of the soils, in respect of the fertility of the land, was completed by the soil survey organization, U. P., in 1951. The soils were classified into two broad groups, alluvial and residual, representing the different stages of soil development resulting from a sub-humid to a humid climate and the physical and chemical weathering of the soils. The alluvial group, comprising the greater and the more important portion of the district-the tehsils of Bhadohi, Chandauli and Varanasi possesses soils developed from the alluviums of the Ganga, while the residual group comprising an area of less importance tehsil Chakia-primarily possesses residual soils developed in situ from the Vindhyan rocks. The groups are inherently and genetically different in nature. Agriculturally also they behave differently, the alluvial soils being very productive, the soils of the Vindhyan system supporting only sparse cultivation. Thus, the following types of soils have been recognised in the district:



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The alluvial group (1) Varanasi type 1 (Ganga sand)- The Ganga flood plain within its high and abrupt bank, comprising the south-western portion of tehsil Bhadohi, the eastern portions of parganas Dehat Amanat, Jallnipur and Katchar and a narrow strip along the northern borders of parganas Barah and Mahaich, consists of a shelving stretch of sand generally sterile or producing nothing beyond grasses used for thatching but occasionally covered with a rich and fertile deposit left behind by annual floods. In places where the sand is not deep and overlies a bed of clay, melons are cultivated. Ganga sand is brown to greyish brown and needs heavy organic manuring. The waterlogging of these areas can be checked by making drains. Practices such as making bunts and growing cover crops during the rains and the winter and strip cropping are other ways in which waterlogging can be held in check. Inferior cereals like bajra (millets), barley and sugar-cane do well in this soil.

(2) Varanasi type 2- This is found in the western lowland which is comprised of northern Pandrah, a small area in eastern Bliadohi, Kolasla, the greater part of Katehar and the central portion of Ath-gawan. The soils here are clayey loam to loam and grey to dark grey in colour, with a high percentage of soluble salts at the surface. The area suffers from poor drainage which can be remedied through planned drainage. The soils require light irrigation and are more suited to the cultivation of paddy, barley, pea, sugar-cane and berseem (*Trifolium alexandrinum Linn*).

(3) Varanasi type 2-A (Dhankar)- This is found in the eastern low-land which consists of the central portion of tehsil Chandauli and three small and scattered patches in tahsil Chakia. The soils are clayey and grey to dark grey in colour having a high percentage of soluble salts and in places are mixed with kankar. The lowland soils need light irrigation and are suited to the cultivation of paddy, barley, pea, sugar-cane and berseem. In this type of soil green manuring (usually by growing dhaincha) precedes the sowing of paddy and is found to be good for replacing the nitrogenous element of the soil.

(4) Varanasi type 2-B (Karail)- This is found in the pargana of Ralhupur, some scattered areas in Mahaich in the basin of the Ganga and a long narrow belt roughly parallel to the Karamnasa stretching from south-west to north-east in the parganas of Majhwar and Narwan. The soils bear a great resemblance to the black-coloured mar or habar soils of Bundelkhand or the black cotton soils of Central India, their consistency being so stiff that they cannot be used for agricultural purposes when dry. On the application of water they swell up considerably and become sticky but when dry they shrink and crack and cause fissures through which the water percolates and escapes far below the ground level. These heavy-textured soils owe their existence to parent material different in type from that of the adjoining alluviums of the Ganga.



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(5) **Varanasi type 2-C-** This occurs in the western lowland (halo-morphic phase) which is made up of the central and north-western portions of tehsil Bhadohi and the soils are clayey loam, ash grey in colour and calcareous at the surface. Reh is particularly abundant around Sherpur, Ujh and Jangla and the plains at times look as if they have been covered with hoar. As the drainage is faulty the accumulated water of the rains cannot be drained out which results in waterlogging. Increased irriгатоio facilities are required for leaching the dissolved salts. The soils are favourable for the cultivation of paddy and barley.

(6) **Varanasi type 3-** This is found in the western upland which is comprised of the central and southern portions of tehsil Varanasi and the northern and southern portions of tehsil Bhadohi. The soils are sandy to loam, brownish in colour and favourable for growing all kinds of crops, preferably barley, sugarcane, berseem and early paddy.

(7) **Varanasi type 3a-** This is found in the eastern uplands which are composed of the pargana of Mahuari, the southern portions of parganas Mahaich, Mawai and Dhus and the eastern parts of Majhwar and Narwan and continues in the tehsil of Chakia for a short distance along the rivers Chandraprabha and Karamnasa. The soils are loamy sand, yellow to brown in colour and require frequent but light irrigation being well suited for the cultivation of barley, early paddy, berseem and sugarcane.

(8) **Varanasi type 4-** This is found in the Vindhyan upland which is comprised of the greater part of mina Chakia. The soil has the texture of sandy loam, is brown to reddish brown in colour and is severely hazardous and requires bulky organic manures, and frequent irrigation. Inferior millets, til, oilseeds, barley and gram are the usual crops grown in these soils.

(9) **Varanasi type 5-** This is found in cite Vindhyan lowland which is made up of the western and south-western parts of tehsil Chakia. The soil is textured loam to clayey loam and is blackish in. colour and possesses sonic particles of kankar. It requires light irrigation and is good for growing paddy, pea and oilseeds.

Sand

Sand is the main mineral available in the basin of Ganga which is used in civil construction work. Few bricks manufacturing units are working in this area.

Texture and mineralogy of Ramganga sand at Varanasi, Uttar Pradesh

Texture- Fine to Medium grain sand

Minerals- Mostly constituted of Quartz and feldspar mineral with little micaceous minerals and heavies. It contains very little amount of clayey minerals.



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PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

EIA/EMP CHAPTER II- DESCRIPTION OF THE PROJECT

NAME OF PROJECT:-	PROPOSED CONSTRUCTION OF GARHAWA GHAT & DEVELOPMENT AT DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN DISTT-VARANASI (U.P.)
BUILDING:-	GARHAWA GHAT
DRG TITLE:-	SECTION DETAIL
NOTES:-	<ol style="list-style-type: none"> 1. ALL DIMENSIONS ARE IN MM AND ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED. 2. THIS DRAWING IS THE PROPERTY OF M/S. PARADISE DESIGNERS. IT IS NOT ALLOWED TO REPRODUCE ITS CONTENTS IN ANY FORM OR MANNER WITHOUT THE WRITTEN PERMISSION OF THE CLIENT. 3. ANY DIMENSIONS IN THE DRG. SHALL BE BROUGHT TO THE NOTICE OF THE WORK CONTRACTOR PRIOR TO THE WORK. 4. THIS DRAWING SHOULD BE EXCLUDED IN CORRELATION WITH STRUCTURAL DRAWING.
CONSTRUCTION AGENCY:-	U.P. PROJECT CORPORATION LTD. UNIT-03, VARANASI (U.P.)
CLIENT DEPT:-	
PROJECT MANAGER:-	
A.P.M.:-	
J.E.:-	
DATE:-	
SCALE:-	
DRG. NO.:-	3
REV. NO.:-	
ARCHITECT.:-	PARADISE DESIGNERS PLOT NO. 10, INDUSTRIAL AREA, PHASE II, VARDHMAN PARK, VARANASI (U.P.) NEAR AMITY UNIVERSITY. Ph: 9818134161. E-Mail: architec@paradisedesigners.com

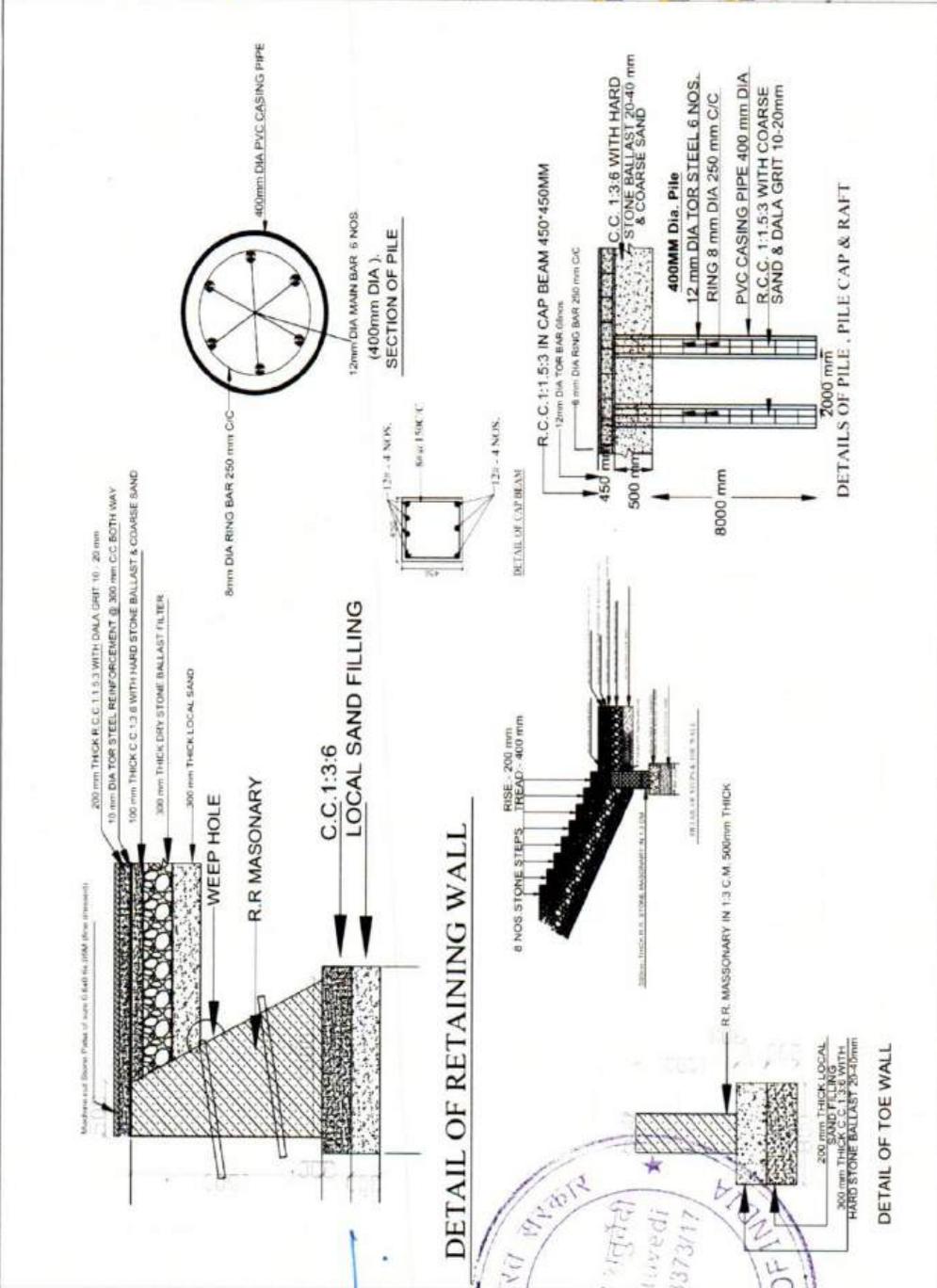
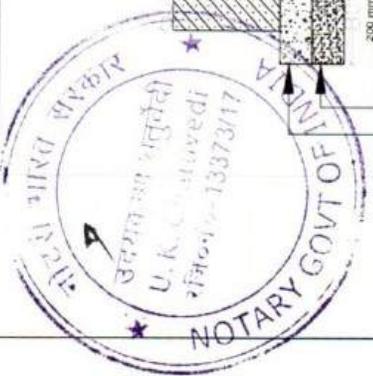


Fig 2.8 Structure of Retaining Walls at the Garhwa Ghats



2.7 BACKGROUNF OF PROPOSED GADHWA GHAT CONSTRUCTION

- The estimate of the project has been prepared by the Project Manager, Uttar Pradesh Project Corporation Ltd., Varanasi, which is countersigned by the Deputy Director, Tourism, Varanasi and Vindhyaachal Division and recommended by the Director, Tourism Department, Deputy Chairman and Director General, Tourism Department, Uttar Pradesh, Lucknow and the project proposal is approved by the administrative department.
- It is proposed to do this project from the amount provided under item no. 46- tourism facilities and beautification in Varanasi in the budget for the financial year 2023-24.
- Project Corporation Ltd. has been named as the implementing agency for the project.
- Regarding the need of the project, it has been mentioned that Garhwa Ghat Ramnagar is a place located in Varanasi district of Uttar Pradesh state of India. There is an ashram located at Gadhwan Ghat here, where devotees keep coming to feed the cows, perform pooja-paath and bhajan-kirtan. Flowers are offered to the statue of Mahant Shri Shri 1008 Atma Vivekanand Ji Maharaj and he is saluted. People also participate in the Sant Samagam here.
- People go here to meet the head priest Sadguru Sharananand ji Maharaj and to have darshan and worship him. This ashram is of great importance from the historical, mythological, religious, legend, ecological, biological and natural point of view, which is of great importance to the people of the region, nationally and internationally.
- The project proposal has been tested on the latest schedule of rates of Public Works/Irrigation Department and DSR-2023. Certain works under the project which are not available in the schedule of rates of Public Works Department/Irrigation Department for the year 2020/2021 and DSR have been proposed on the basis of market/quotation, the cost has been tested considering these rates as indicative rates. The administrative department/executing agency will be fully responsible for getting these rates done at the minimum and actual rates.
- Under the scheme, funds have been sanctioned at the rate of 18% GST. The administrative department should ensure at its level that GST is not included separately in various items under the scheme.
- Administrative and financial approval should be issued only after the administrative department obtains the approval of the competent level on the project.
- Land is available for the construction of the project.



- Construction work will be started only after the administrative department obtains all the necessary statutory clearances and environmental clearances from the competent level as per rules.

NEED OF RETAINING WALLS AT THE PROJECT SITE- GARHWA GHAT

Retaining walls are needed at ghats to prevent soil erosion, manage water runoff and drainage, stabilize sloping and unstable soil, and create usable flat land for development and safety. They stop landslides and rockfalls, protect roads and infrastructure from soil movement, and can be incorporated with drainage systems to prevent water buildup and structural damage.

➤ Reasons for Retaining Walls at Ghats

Soil Erosion Control:

Ghats are inherently prone to soil erosion from rain and wind. Retaining walls hold back the soil, preventing it from washing away and causing landslides or damaging roads and structures.

Slope Stabilization:

The steep and uneven terrain of ghats makes the soil unstable. Retaining walls provide essential structural support, preventing the soil from failing and sliding down the slope.

Drainage Management:

Water runoff from rain can saturate the soil, increasing erosion and instability. Retaining walls can help manage and redirect this water away from slopes and foundations, preventing water buildup behind the wall.

Creating Usable Land:

By creating stable, level terraces, retaining walls transform sloping areas into functional land. This is crucial for building roads, infrastructure, and other facilities on ghats where space is limited.

Preventing Landslides:

The primary purpose is safety; by holding back soil and rock, retaining walls significantly reduce the risk of dangerous landslides and rockfalls that could harm people and damage property or roads.

Protecting Infrastructure:

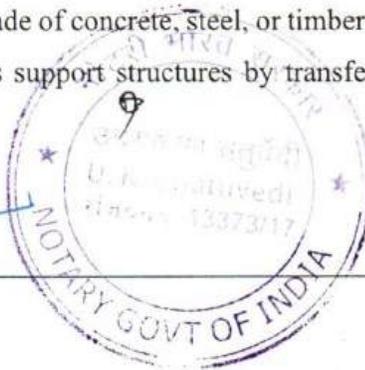
Retaining walls ensure the structural integrity of vital infrastructure, such as roads and pathways, that are built along the sides of ghats.

DETAILS OF PILE

A pile is a long, slender structural element made of concrete, steel, or timber that is driven or bored into the ground to form a deep foundation. Piles support structures by transferring heavy loads through



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weak, unstable surface soils to stronger, more stable soil or bedrock at greater depths. The load is transferred either by end bearing (the bottom of the pile rests on a hard layer) or skin friction (friction between the pile's sides and the surrounding soil) or a combination of both.

Components of a Pile Foundation System

- **Piles:** The long, slender members driven or bored into the ground to reach the bearing strata.
- **Pile Cap:** A concrete structure that connects the tops of the individual piles, spreading the load from the structure's columns over the piles.

Reasons for Using Pile Foundations

Pile foundations are used when:

- **Weak Surface Soils:** The shallow soils are not strong enough to support a building or structure.
- **Heavy Loads:** The loads from the structure are too heavy for shallow foundations.
- **High Water Tables:** Piles can penetrate into stable soil layers beneath the high water table.
- **Soil Liquefaction Risk:** In earthquake-prone areas, piles can provide stability against liquefaction.
- **Lateral Forces:** Piles can be designed to resist bending actions and lateral forces from wind or earthquakes.
- **Settlement Control:** They prevent excessive or differential settlement of the structure.

Common Materials for Piles

- **Reinforced Concrete:** Piles made of concrete often contain steel reinforcing bars for added strength.
- **Steel:** Steel piles are strong and can be driven or drilled into the ground.
- **Timber:** Wood piles are also used but may be limited in certain applications.

How Piles Transfer Loads

- **End Bearing:**

The pile's bottom surface rests on a hard, competent soil or rock layer, directly supporting the load.

- **Skin Friction:**

The side surface of the pile experiences friction with the surrounding soil, transferring the load along its entire length.



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2.8 UTILITIES**a) Power**

Power Requirement: 2 KW Source: Renewable Energy

All the electricity supply will be of Renewable energy, for which High Mast Solar Street Lights will be installed at the site.

b) Generator Details

No any DG sets will be installed at the site. Not required

c) Rainwater Harvesting

There is no Rain harvesting Proposed for the Ghat

d) Water Supply

During construction phase water will be supplied by private water tankers, whereas during operation phase water supply will be provided through the Municipal water supply. Total water requirement is approx. 18 KLD. Fresh water requirement is approx. 8 KLD. & recycled water 5 KLD.

✚ Storm Water Management System

The storm water disposal system for the project site shall be self-sufficient to avoid any collection/stagnation and flooding of water. The amount of storm water run-off depends upon many factors such as intensity and duration of precipitation, characteristics of the tributary area and the time required for such flow to reach the drains. Taking the advantage of road camber, the rainfall run off from roads shall flow towards the ground. Storm water from various areas of project site shall be connected to adjacent drain by a pipe through catch basins.

✚ Storm Water Management-

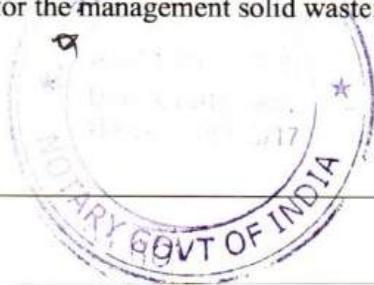
- Storm water on site will be harvested to recharge the ground & surface water. Thus, proper management of water resource is a must to ensure that it is free from contamination.
- Regular inspection and cleaning of storm drains & catchment pipes.
- Covered waste storage areas
- Conducting routine inspection to ensure cleanliness
- Provision of slit traps in storm water drains

e) Solid Waste Management System

Solid waste would be generated both during the construction as well as during the operation phase. The following steps were proposed to be followed for the management solid waste:



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- Construction yards are proposed for storage of construction materials.
- The excavated material such as topsoil and stones was stacked and reused for other stages of construction.
- Excavated top soil was stored in temporary constructed soil bank and reused for landscaping of Ghat Complex.
- Remaining soil shall be utilized for refilling / road work / rising of site level at locations/ selling to outside agency for construction of roads etc.

During Construction phase, majorly waste consist of municipal waste from labour, excavated materials, cement bags, bricks, concrete, MS rods, tiles, wood etc. Waste handling during the construction phase will be done by the site contractor whose responsibility lies with collection and storage and safe disposal of all type of waste generated on the site. Solid waste management plan during construction phase is mentioned in Table below:

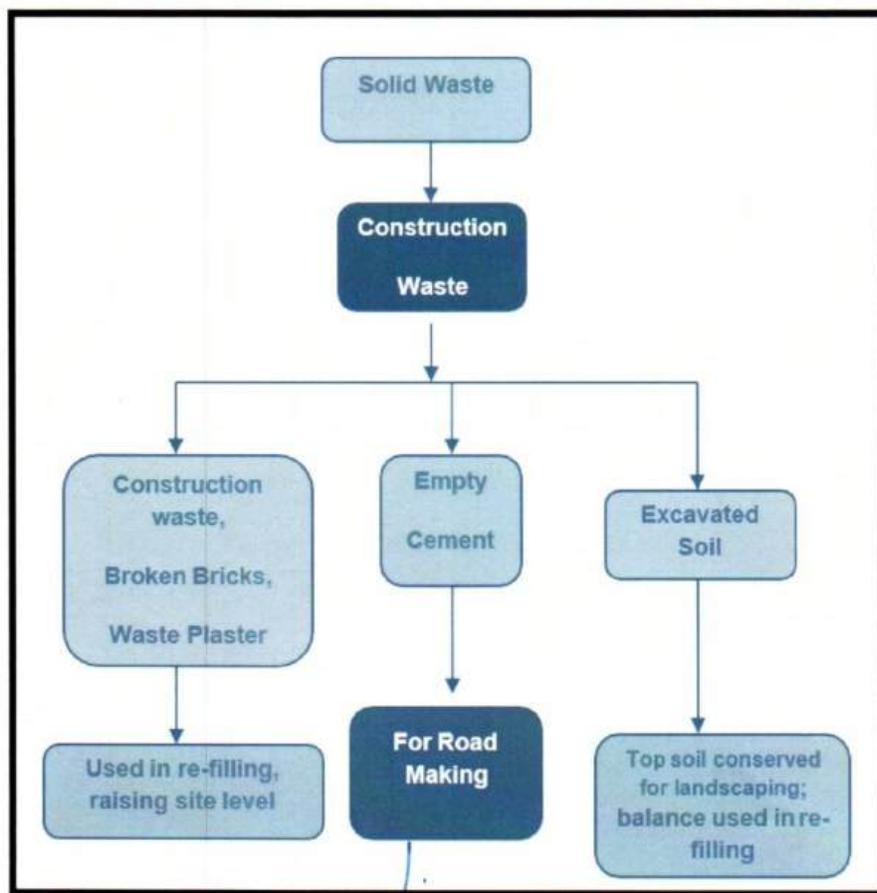


Table 2.5 Solid Water Management during Construction Phase

S. No.	Solid Waste	Solid Waste Management
1.	Waste materials like MS Rods, bricks, concrete, broken tiles, wood pieces, cement bags etc.	Material would be segregated. Recyclable material will be sold to authorized dealers. Rest will be used within project site for filling & levelling purpose.
2.	Excavated Soil	This top soil will be used for landscaping purpose. Remaining soil will completely be consumed within the site for backfilling and plinth filling. No soil will be disposed off outside the site as there will be additional requirement of soil in the site for filling purpose.
3.	Domestic Waste by labours	Compostable waste (wet waste) will be pit composted within the site and compost will be used for landscaping purpose at the site. Other waste will be disposed of through the local agency in the area on regular basis.

During the operation phase, waste will comprise domestic, landscape. The solid waste generated from the project will be mainly domestic waste and estimated quantity of the waste shall be approx. 81.25 kg per day (@ 0.25 kg per capita per day for any kind of staff, @ 0.15 kg per capita per day for the visitor, and Following arrangements will be made at the site in accordance to Solid Wastes Management Rules, 2016.

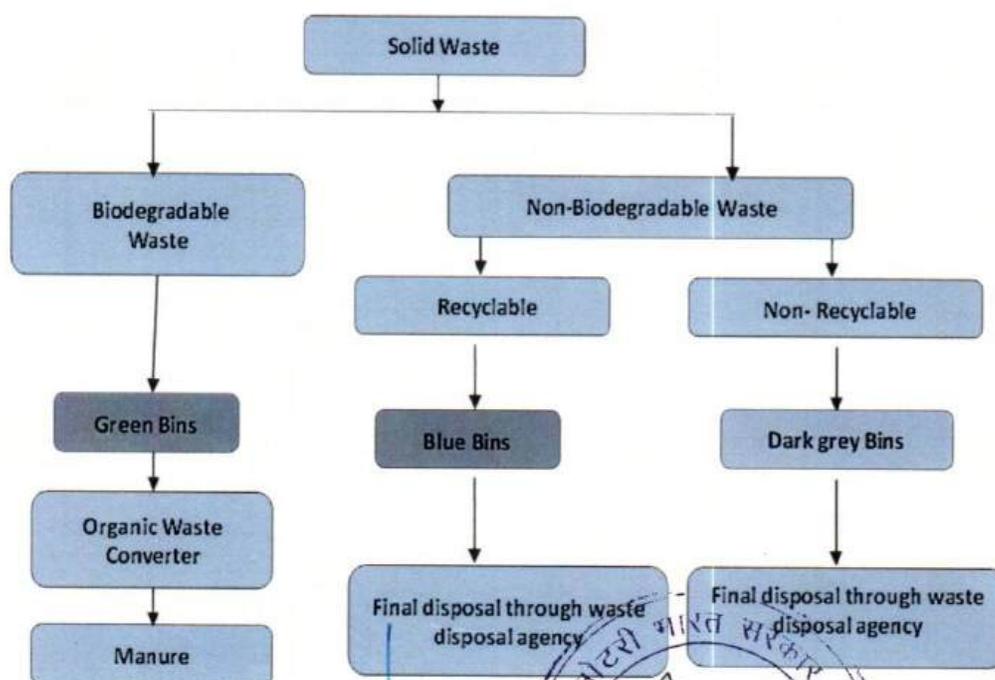


Table 2.6 Calculation of Solid Waste Generation during Operation Phase

S. No	Particulars	Population	Waste generated in kg/day
1.	Visitors (@0.15kg/day)	500	75.00
2.	Staff (@ 0.25kg/day)	25	6.25
Total Solid waste generated			Approx. 81.25 kg/day

Collection and Segregation of waste

- Adequate number of coloured bins (Green and Blue bins for bio-degradable and non-biodegradable respectively) is proposed to be provided.
- Litter bin will also be provided in open areas like parks etc.

Disposal

- The Municipal Solid Waste Management will be conducted as per the guidelines of Solid Waste Management Rules, 2016.
- The inert non-recyclable wastes will be disposed through government approved agency for land filling. A solid waste management scheme is depicted in the above figure for proposed Project.

f) Green Area Details

Project has proposed its landscape as per the bye-laws. Total green area measures 1043.14 Sqm i.e. approx. 16.65 % of Net Plot Area of the proposed project. Indigenous trees will be prepared for the plantation and samplings will be purchased from government nursery or government approved nursery. Landscape Plan Attached as Annexure.

Total Plot Area	1043.14 Sqm
-----------------	-------------



3.0 INTRODUCTION

Information on the existing environmental status is essential for assessing the likely environmental impacts of the project. In order to get an idea about the existing state of the environment, various environmental attributes such as meteorology, air quality, water quality, soil quality, noise level, ecology and socio-economic environment have been studied/ monitored. This section contains the description of baseline studies of the 10 km radius of the Study area. The proposed project is Constructional project, where Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi will be done. The data collected has been used to understand the existing environment scenario around the proposed mining project against which the potential impacts of the project can be assessed.

3.1 BASELINE DATA

Baseline environmental data generation for air, water, noise and soil quality monitoring has been conducted at project site and other locations from 1th March 2025 to 31st of May 2025.

3.2 LAND ENVIRONMENT

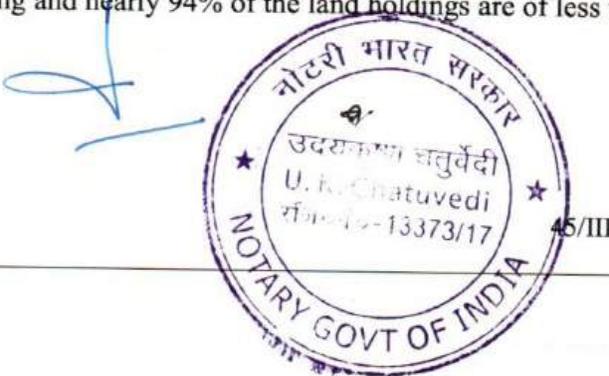
To assess the land use pattern of the study area i.e. 10 km radius of the site, a detailed study was carried out and using the Survey of India Toposheet a landuse map has been prepared as shown in the figure below. The land use pattern reveals that the 10 km environs is predominantly agricultural land.

Also, the land use cover of the study area is tabulated below wherein it shows that the project area is completely river bed which is completely an undisturbed land where presently no mining activity is being carried out.

The district is characterized with alluvial formations and plain topographic features. The district area in general is more or less flat. River Ganga is most important stream apart from river Varuna. There is significant meandering in the area of the district where river Ganga has taken its course. The average elevation of the land surface is about 85 to 105m amsl. The general slope of the tract is from west to east. The topography is influenced or modified by the existing rivers and streams.

Land utilization pattern of the district

The majority of population is rural and the district is primarily agrarian with 73.5% of the geographical area under cultivation. A net sown area is around 1.14-lakh hectares out of which nearly half (62 thousand hectares) is sown more than once with 138% crop intensity. Small and marginal farmers dominate the scenario of land holding and nearly 94% of the land holdings are of less than 1 hectare in size.



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

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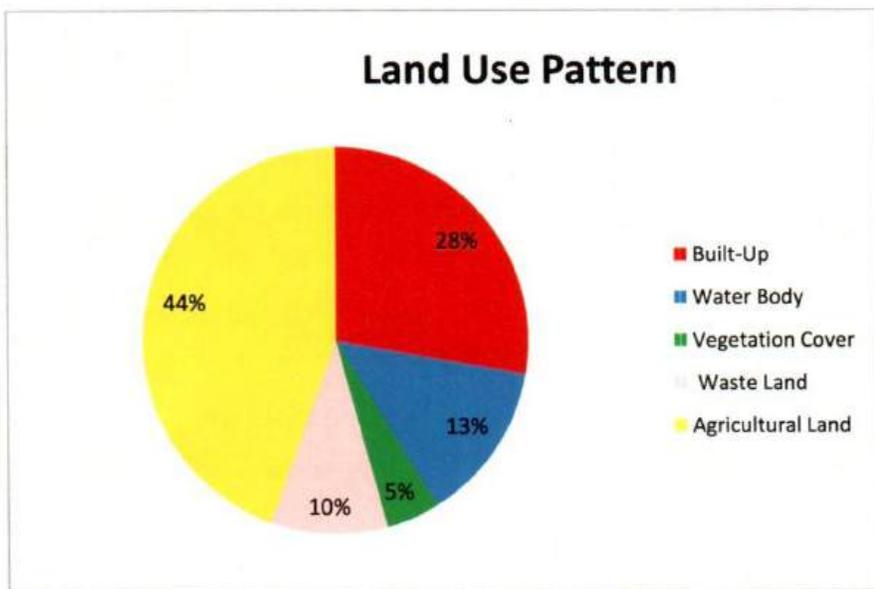
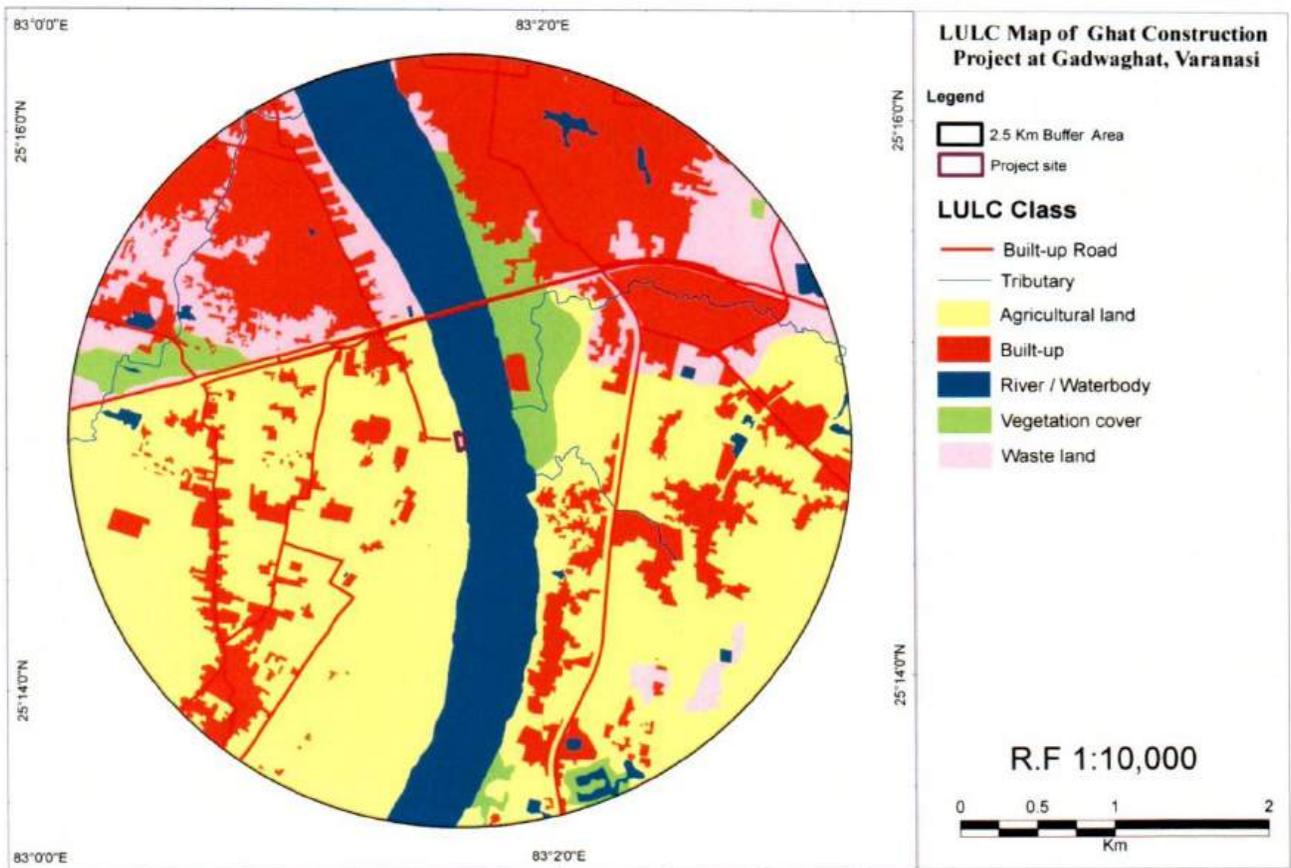


Fig 3.1 Land Use Pattern



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S. No.	Land use Categories	Area (Ha)	Percentage
1	Built-Up	567.557	27.772
2	Water Body	274.369	13.426
3	Vegetation Cover	92.704	4.537
4	Waste Land	200.188	9.796
5	Agricultural Land	908.808	44.470
6	Total area	2043.628	100

3.3 AIR ENVIRONMENT

The prime objective of the baseline study with respect to ambient air quality is to establish the present air quality and its conformity to National Ambient Air Quality Standards. This data has been further used during impact assessment to predict the final air quality. Ambient air quality monitoring stations were selected primarily on the basis of surface influence, demographic influence and meteorological influence. 24 hourly monitoring was carried out for SO₂, NO₂, and PM₁₀ & PM_{2.5} twice a week at each station. This study was done during pre-monsoon season for a period of 3 months (1st March 2025 to 31st May 2025).

METHODS FOR MONITORING The Central Pollution Control Board (CPCB) has published comprehensive document on emission testing regulations ("Emission Regulations Part-3, 1985"). Those procedures relevant to the particulate monitoring are summarized below:

Table 3.2 Methods adopted for PM_{2.5}, PM₁₀, SO₂ and NO_x (as NO₂)

Parameters	Technique	Technical Protocol	Minimum Detectable Limit
PM _{2.5}	Gravimetric method	US EPA Method	5 (µg/m ³)
PM ₁₀	Gravimetric method	IS 5182 (Part-XXIII)	5 (µg/m ³)
Sulphur Dioxide	West and Gaeke	IS-5182 (Part-II)	3 (µg/m ³)
Nitrogen Oxide	Jacob & Hochheiser	IS-5182 (Part-VI)	7 (µg/m ³)

Equipment Calibration: For accurate testing of emission sources, the components of the sampling train is calibrated by outsource and supplier (Master Calibrator) standards and solutions are used, calibrated under certified reference material. The Ambient air quality monitoring locations are marked in Map. The ambient air quality data were collected to find the existing GLC



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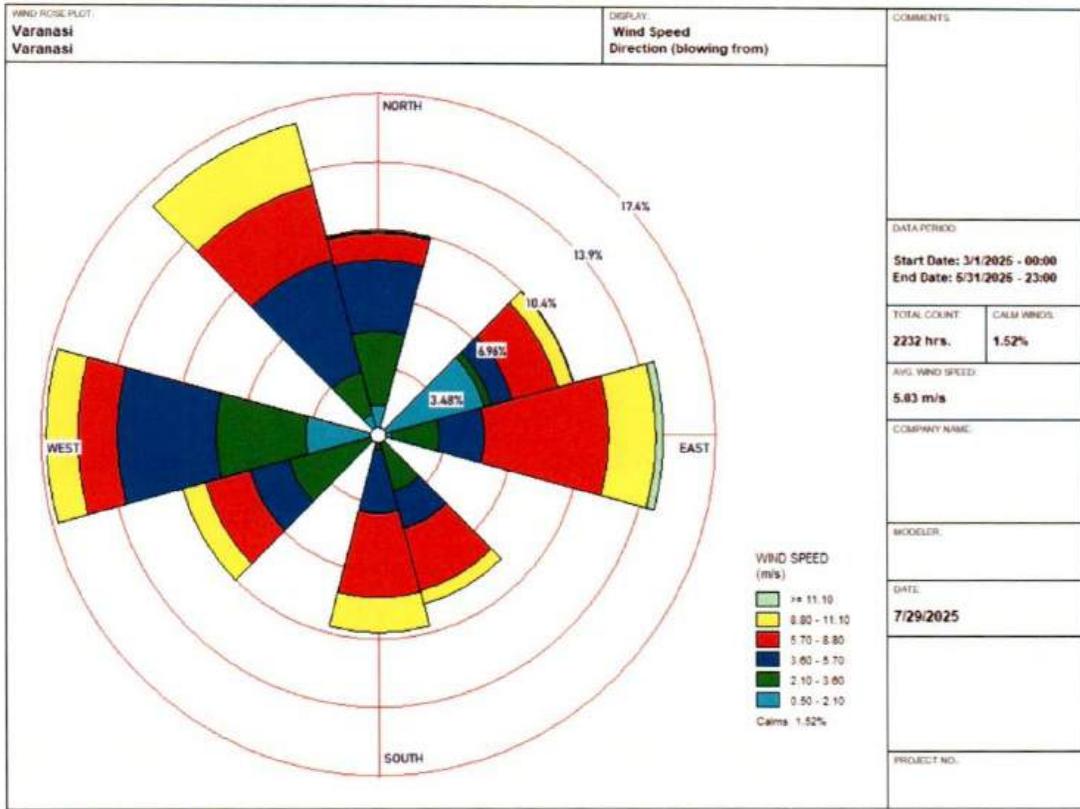


Fig 3.2 – Wind Rose Diagram

To quantify the impact of the project on the ambient air quality, it is necessary at first to evaluate the existing ambient air quality of the area. The existing ambient air quality, in terms of Particulate Matter – 10 (PM₁₀), Particulate Matter- 2.5 (PM_{2.5}), Sulphur-dioxide (SO₂) and Oxides of Nitrogen (NO₂), has been measured through a planned field monitoring. Table 3.2(ii) gives location of the ambient air quality monitoring stations.

Table 3.3 (i) Ambient Air quality monitoring stations

Location Code	Location	Distance	Direction	Project area/Study Area
AAQ1	Project Site	0.73	E	Project area
AAQ2	Rasul Ganj	0.98	SE	Study Area
AAQ3	Sir Gobardhan	1.51	W	Study Area
AAQ4	Ramnagar	1.73	NE	Study Area
AAQ5	Ramna	1.99	SW	Study Area



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11	08-04-2025	53.5	82.90	9.3	19.8
12	12-04-2025	46.8	80.64	7.0	20.8
13	16-04-2025	44.5	89.78	6.2	21.3
14	20-04-2025	56.2	83.3	7.0	22.7
15	24-04-2025	51.6	81.90	8.5	16.5
16	27-04-2025	58.8	80.25	9.5	15.8
17	02-05-2025	41.5	76.74	8.9	16.9
18	05-05-2025	51.5	75.50	7.0	14.8
19	08-05-2025	50.5	80.49	7.5	15.5
20	12-05-2025	46.5	72.89	9.8	14.8
21	15-05-2025	47.5	82.45	8.9	15.9
22	18-05-2025	52.2	74.46	7.9	11.9
23	21-05-2025	51.38	90.23	8.5	17.5
24	25-05-2025	41.9	85.54	10.6	15.6
Minimum		41.5	69.82	4.9	10.5
Maximum		58.5	97.15	10.6	22.7
Average		47.02	81.01	7.58	16.24
98th Percentile		57.60	93.97	10.23	22.06
NAAQS, For 24 Hourly Monitoring		60.0	100.0	80.0	80.0

(b) Rasul Ganj AAQ2

S.No	Date	Particulate Matter PM2.5 ($\mu\text{g}/\text{m}^3$)	Particulate Matter PM10 ($\mu\text{g}/\text{m}^3$)	Sulphur Dioxide SO ₂ ($\mu\text{g}/\text{m}^3$)	Nitrogen Dioxide NO ₂ ($\mu\text{g}/\text{m}^3$)
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)
1	02-03-2025	45.5	76.20	8.8	10.9
2	06-03-2025	46.0	74.58	9.5	11.4
3	11-03-2025	47.3	75.27	9.8	12.4
4	15-03-2025	48.5	58.6	7.3	13.7
5	19-03-2025	49.7	72.16	8.4	14.2
6	23-03-2025	50.5	73.29	6.9	15.3
7	26-03-2025	51.5	74.5	8.7	16.8
8	29-03-2025	53.8	78.5	7.9	17.7
9	01-04-2025	54.5	79.25	6.2	18.3
10	05-04-2025	56.2	80.2	5.2	19.7
11	08-04-2025	52.6	76.4	5.4	20.0
12	12-04-2025	58.2	83.20	7.7	21.4
13	16-04-2025	52.5	85.40	15.3	22.6
14	20-04-2025	49.2	71.23	7.8	22.9
15	24-04-2025	48.6	75.56	11.2	23.3
16	27-04-2025	47.6	78.23	8.6	20.5
17	02-05-2025	46.6	76.50	6.9	19.4



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18	05-05-2025	46.0	77.19	7.3	18.7
19	08-05-2025	55.7	79.25	8.6	14.7
20	12-05-2025	42.1	70.21	5.5	19.8
21	15-05-2025	50.1	80.64	6.2	20.3
22	18-05-2025	47.7	62.62	9.8	8.4
23	21-05-2025	51.5	76.64	10.8	9.8
24	25-05-2025	49.2	79.85	8.6	19.7
Minimum		42.1	58.6	5.2	8.4
Maximum		58.2	85.4	15.3	23.3
Average		50.05	75.64	8.27	17.16
98th Percentile		57.28	84.39	13.41	23.12
NAAQS, For 24 Hourly Monitoring		60.0	100.0	80.0	80.0

(c) Ramna AAQ3

S.No	Date	Particulate Matter PM2.5 ($\mu\text{g}/\text{m}^3$)	Particulate Matter PM10 ($\mu\text{g}/\text{m}^3$)	Sulphur Dioxide SO ₂ ($\mu\text{g}/\text{m}^3$)	Nitrogen Dioxide NO ₂ ($\mu\text{g}/\text{m}^3$)
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)
1	02-03-2025	42.4	76.40	5.3	17.5
2	06-03-2025	41.3	81.40	6.4	17.4
3	11-03-2025	44.4	82.30	7.9	16.6
4	15-03-2025	48.3	84.52	7.2	17.3
5	19-03-2025	45.8	85.85	8.2	19.8
6	23-03-2025	46.5	81.43	9.4	17.7
7	26-03-2025	47.5	95.67	4.9	16.2
8	29-03-2025	48.5	87.52	8.3	17.2
9	01-04-2025	49.8	85.90	9.6	18.9
10	05-04-2025	50.5	84.64	10.5	15.8
11	08-04-2025	52.5	79.30	8.4	18.4
12	12-04-2025	54.8	71.57	10.4	16.3
13	16-04-2025	55.5	76.70	9.8	19.9
14	20-04-2025	56.2	75.49	7.3	17.5
15	24-04-2025	57.6	80.80	6.6	19.8
16	27-04-2025	58.0	81.41	10.3	21.9
17	02-05-2025	51.1	83.12	11.5	20.2
18	05-05-2025	49.5	75.90	7.9	19.3
19	08-05-2025	48.5	79.65	8.4	16.9
20	12-05-2025	48.9	78.43	9.5	19.3
21	15-05-2025	47.5	77.58	12.2	16.9
22	18-05-2025	46.5	76.67	13.5	18.3
23	21-05-2025	47.30	75.70	9.6	17.0
24	25-05-2025	49.70	80.23		15.2



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Minimum	41.3	71.57	4.9	15.2
Maximum	58.0	95.67	13.5	21.9
Average	49.53	80.76	8.7	17.97
98 th Percentile	57.82	91.92	12.9	21.12
NAAQS, For 24 Hourly Monitoring	60.0	100.0	80.0	80.0

(d) Sultanpur AAQ4

S.No	Date	Particulate Matter PM2.5 ($\mu\text{g}/\text{m}^3$)	Particulate Matter PM10 ($\mu\text{g}/\text{m}^3$)	Sulphur Dioxide SO ₂ ($\mu\text{g}/\text{m}^3$)	Nitrogen Dioxide NO ₂ ($\mu\text{g}/\text{m}^3$)
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)
1	02-03-2025	47.4	78.22	7.2	15.2
2	06-03-2025	51.3	71.58	8.8	13.4
3	11-03-2025	52.5	76.27	9.9	17.7
4	15-03-2025	55.5	84.53	10.5	16.7
5	19-03-2025	48.8	79.20	8.2	14.4
6	23-03-2025	49.5	75.58	10.5	15.3
7	26-03-2025	50.2	74.35	9.3	16.2
8	29-03-2025	50.5	76.52	7.2	17.8
9	01-04-2025	45.5	81.56	5.1	18.3
10	05-04-2025	41.2	87.49	5.9	14.9
11	08-04-2025	44.6	84.70	7.5	16.7
12	12-04-2025	48.5	79.58	8.3	15.4
13	16-04-2025	49.5	85.56	7.1	17.3
14	20-04-2025	50.2	80.64	9.2	18.2
15	24-04-2025	52.6	75.20	6.3	14.8
16	27-04-2025	53.5	78.40	7.9	16.23
17	02-05-2025	54.8	81.20	10.2	17.24
18	05-05-2025	55.1	80.40	11.8	16.9
19	08-05-2025	56.5	72.23	9.4	19.8
20	12-05-2025	47.5	79.80	8.2	17.3
21	15-05-2025	50.5	75.48	6.8	18.4
22	18-05-2025	49.5	76.55	7.5	21.4
23	21-05-2025	45.30	81.67	5.9	19.2
24	25-05-2025	49.70	75.23	6.5	18.7
Minimum		41.2	71.58	5.1	13.4
Maximum		56.5	87.49	11.8	21.4
Average		50.01	78.83	8.13	16.98
98th Percentile		56.04	86.60	11.2	20.66
NAAQS, For 24 Hourly Monitoring		60.0	100.0	80.0	80.0



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(e) Naipura Khurd AAQ5

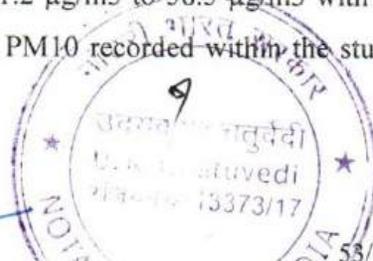
S.No	Date	Particulate Matter PM2.5 ($\mu\text{g}/\text{m}^3$)	Particulate Matter PM10 ($\mu\text{g}/\text{m}^3$)	Sulphur Dioxide SO ₂ ($\mu\text{g}/\text{m}^3$)	Nitrogen Dioxide NO ₂ ($\mu\text{g}/\text{m}^3$)
		IS:5182(Part-23)	IS:5182(Part-24)	IS:5182(Part-2)	IS:5182(Part-6)
1	02-03-2025	45.5	79.62	7.4	16.5
2	06-03-2025	48.2	72.46	8.6	17.9
3	11-03-2025	50.2	75.48	9.8	16.5
4	15-03-2025	46.1	86.14	10.3	16.7
5	19-03-2025	48.8	82.50	8.4	14.2
6	23-03-2025	46.5	85.20	9.9	15.3
7	26-03-2025	44.5	84.65	7.5	18.8
8	29-03-2025	46.5	89.80	6.4	17.7
9	01-04-2025	48.8	84.41	5.2	21.3
10	05-04-2025	49.5	87.12	10.2	15.7
11	08-04-2025	54.5	86.90	9.4	16.3
12	12-04-2025	56.8	75.61	5.9	20.7
13	16-04-2025	56.5	72.43	9.3	15.0
14	20-04-2025	50.2	74.50	11.7	17.2
15	24-04-2025	58.0	82.90	12.2	16.9
16	27-04-2025	52.5	85.85	7.7	16.7
17	02-05-2025	45.5	70.12	8.5	19.3
18	05-05-2025	48.5	79.90	6.6	16.7
19	08-05-2025	51.5	78.61	13.2	19.4
20	12-05-2025	42.8	77.43	9.0	16.2
21	15-05-2025	41.9	76.50	6.2	18.7
22	18-05-2025	44.9	84.90	8.5	18.8
23	21-05-2025	47.5	75.70	7.8	20.3
24	25-05-2025	49.5	70.50	6.6	15.4
Minimum		41.9	70.12	5.2	14.2
Maximum		58	89.8	13.2	21.3
Average		48.97	79.97	8.6	17.43
98th Percentile		57.45	88.57	12.74	21.02
NAAQS, For 24 Hourly Monitoring		60.0	100.0	80.0	80.0

Observations:

Ambient Air Quality Monitoring (AAQM) has been carried out at Five locations during pre- monsoon season from 1st March 2025 to 31st of May 2025. The minimum and maximum level of PM2.5 recorded within the study area was in the range of 41.2 $\mu\text{g}/\text{m}^3$ to 58.5 $\mu\text{g}/\text{m}^3$ with the 98th percentile 57.82 $\mu\text{g}/\text{m}^3$. The minimum and maximum level of PM10 recorded within the study area was in the



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range of 58.6 $\mu\text{g}/\text{m}^3$ to 97.15 $\mu\text{g}/\text{m}^3$ with the 98th percentile 93.97 $\mu\text{g}/\text{m}^3$. The minimum and maximum concentration of SO_2 recorded within the study area was in the range of was 4.9 $\mu\text{g}/\text{m}^3$ to 15.3 $\mu\text{g}/\text{m}^3$ with the 98th percentile 13.41 $\mu\text{g}/\text{m}^3$. The minimum and maximum level of NO_2 recorded within the study area was in the range of was 8.4 $\mu\text{g}/\text{m}^3$ to 23.3 $\mu\text{g}/\text{m}^3$ with the 98th percentile 23.12 $\mu\text{g}/\text{m}^3$. The results thus obtained indicate that the concentrations of PM_{10} , $\text{PM}_{2.5}$, SO_2 and NO_2 in the Ambient Air are well within the National Ambient Air Quality (NAAQ) standards for Industrial, Residential, Rural and other areas.

Free SiO_2 (in $\mu\text{g}/\text{m}^3$):

SiO_2	AAQ-1	AAQ-2	AAQ-3	AAQ-4	AAQ-5
Maximum	0.97	1.02	1.72	1.85	1.59
Minimum	1.20	1.12	1.83	1.90	1.62

The standard for Respirable dust is 3 $\mu\text{g}/\text{m}^3$ for 8 hour of working period where free silica content should not exceed 5% as prescribed by Directorate General of Mines Safety.

Observations:

The minimum & maximum concentrations of SiO_2 were found to be 1.12 $\mu\text{g}/\text{m}^3$ at AQ-2 & 1.85 $\mu\text{g}/\text{m}^3$ at AQ-4 respectively.

3.4 WATER ENVIRONMENT

Water quality assessment is one of the essential components of EIA study. Such assessment helps in evaluating the existing health of water body and suggesting appropriate mitigation measures to minimize the potential impact from development projects. Water quality of ground water has been studied in order to assess proposed water-uses in construction, drinking, cooling and horticulture purpose. The water quality at project site and other locations within the 10 km impact zone was monitored during 1st March 2025 to 31st of May 2025.

A) Ground water

Three water samples were collected from the study area. The locations of the monitoring are given below:-

Table 3.3 (iii) Ground water sampling locations

Location Code	Sample collected from	Distance (Km)	Direction	Project area/Study Area
GW - 1	Project Site	0.73	E	Project area
GW - 2	Ramna	1.51	W	Study Area
GW - 3	Ramnagar	1.73	NE	Study Area



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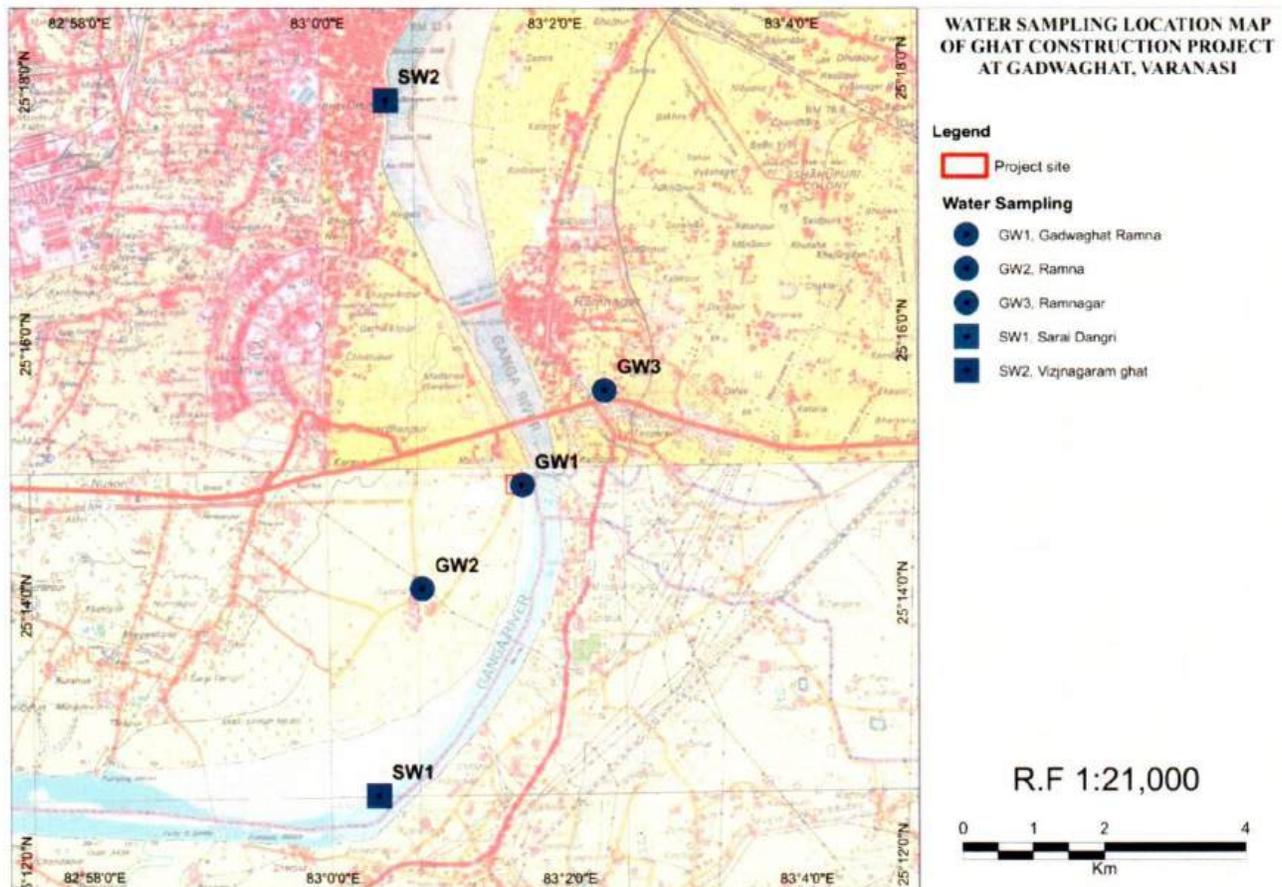


Fig 3.2 (b) Ground water Quality Monitoring Locations

Table 3.3 (iv) Physico-chemical properties of ground water Study

S.No	Parameter	Results Location			Units	Acceptable Limit	Permissible Limit in the Absence of Alternate Source
		GW-1	GW-2	GW-3			
1	pH	7.21	7.15	6.41	-	6.5-8.5	-
2	Colour	<5.0	<5.0	<5.0	-		
3	Odour	Agreeable	Agreeable	Agreeable	-	Agreeable	Agreeable
4	Taste	Agreeable	Agreeable	Agreeable	-	Agreeable	Agreeable
5	Turbidity	<1.0	<1.0	<1.0	-	1	5
6	Total Hardness (as CaCO ₃)	204	145	254	mg/l	200	600
7	Calcium (as Ca)	62	51	88	mg/l	75	200



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8	Magnesium (as Mg)	31	37	42	mg/l	30	100
9	Chloride (as Cl)	115	89	112	mg/l	250	1000
10	Iron (as Fe)	0.38	0.45	0.42	mg/l	0.3	No Relaxation
11	Fluoride (as F)	0.8	0.9	0.8	mg/l	1	1.5
12	Free Residual chlorine	<0.1	<0.1	<0.1	mg/l	0.2	1
13	Total Dissolved Solid	341	304	214	mg/l	500	2000
14	Phenolic Compound (as C ₆ H ₅ OH)	<0.001	<0.001	<0.001	mg/l	0.001max	0.002 Max
15	Anionic Detergents (as MBAS)	<0.1	<0.1	<0.1	mg/l	0.2	1.0
16	Sulphate (as SO ₄)	20	35	36	mg/l	200	400
17	Nitrate (as NO ₃)	8	5	10	mg/l	45	No Relaxation
18	Alkalinity (as CaCO ₃)	164	178	215	mg/l	200	600
19	Chloramines (as Cl ₂)	< 1.0	< 1.0	< 1.0	mg/l	4	No Relaxation
20	Cadmium (as Cd)	<0.001	<0.001	<0.001	mg/l	0.003	No Relaxation
21	Lead (as Pb)	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
22	Total Chromium (as Cr)	<0.01	<0.01	<0.01	mg/l	0.05	No Relaxation
23	Copper (as Cu)	<0.01	<0.01	<0.01	mg/l	0.05	1.5
24	Total Ammonia	<0.5	<0.5	<0.5	mg/l	0.5	No Relaxation
25	Nickel (as Ni)	<0.01	<0.01	<0.01	mg/l	0.02	0.2
26	Zinc (as Zn)	0.78	0.60	0.85	mg/l	5	15
27	Manganese (as Mn)	<0.1	<0.1	<0.1	mg/l	0.1	0.3
28	Boron (as B)	<0.1	<0.1	<0.1	mg/l	0.5	1
29	Selenium (Se)	<0.01	<0.01	<0.01	mg/l	0.01	No Relaxation
30	Arsenic (as As)	<0.01	<0.01	<0.01	mg/l	0.01	0.05



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RESULTS
As per IS 10500:2012

S. No	Parameter	Test Method	Results			Units	Requirements
			GW-1	GW-2	GW3		
1	E.coli	IS-1622	Not Detected (<2)	Not Detected (<2)	Not Detected (<2)	E.Coli/100ml	Shall not be detectable in 100 ml sample
2	Total Coliform	IS-1622	Absent	Absent	Absent	MPN/100ml	Shall not be detectable in 100 ml sample

Note: Un- Objectionable

Observation:

Analysis results of ground water reveal the following: -

- pH varies from 6.41 to 7.21.
- Total hardness varies from 145 to 254 mg/l.
- Total dissolved solids vary from 214 mg/l to 341 mg/l.

The ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards promulgated by Indian Standards IS: 10500.

Fluorides and nitrates are within the permissible limits. Most of the parameter in ground water sources are well within the permissible limits as per IS – 10500, drinking water standards.

b. Surface water

Two water samples were collected from the study area. The physico-chemical analysis of the water samples is given in the Table 3.2(vi). The Surface water sampling locations are marked in fig no. 3.2(c)

Table 3.3 (v) Surface water sampling locations

Location Code	Sample collected from	Direction	Distance (Km)	Project area/Study Area
SW – 1	Ganga River (upstream)	NNW	5 km	Study Area
SW – 2	Ganga River (Downstream)	SSW	5 km	Study Area

Table 3.3 (vi) Physico-chemical properties of surface water

S. No	Parameter	SW-1 Ganga River (Upstream)	SW-2 Ganga River (Downstream)	Units
1	pH	7.45	7.80	-
2	Temperature	13.7	16.5	°C
3	Turbidity	7	7	NTU



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4	Conductivity @25°C	420	440	µs/cm.
5	Total Suspended Solid	33.5	32.4	mg/l
6	Total Alkalinity (as CaCO ₃)	112	106	mg/l
7	Biological Oxygen Demand (Max.) (at 270C for 3 days)	2.7	4.2	mg/l
8	Dissolved Oxygen (as O ₂) Min.	6.4	5.8	mg/l
9	Calcium (as Ca)	91.64	20.23	mg/l
10	Magnesium (as Mg)	42.03	12.02	mg/l
11	Chloride (as Cl), Max	62.04	50.44	mg/l
12	Iron (as Fe), Max	0.15	0.19	mg/l
13	Fluoride (as F), Max	0.98	1.09	mg/l
14	Total Dissolved Solid	634	263	mg/l
15	Total Hardness (as CaCO ₃)	163.21	120.05	mg/l
16	Sulphate (as SO ₄) Max	19.21	15.08	mg/l
17	Phosphate (as P)	0.09	<0.2	mg/l
18	Sodium (as Na)	23.02	20.04	mg/l
19	Manganese (as Mn)	0.09	<0.1	mg/l
20	Total Chromium (as Cr)	<0.05	<0.05	mg/l
21	Zinc (as Zn)	1.25	0.54	mg/l
22	Potassium (as K)	2.75	3.45	mg/l
23	Nitrate (as NO ₃), Max	0.65	<0.5	mg/l
24	Cadmium (as Cd)	<0.01	<0.01	mg/l
25	Lead (as Pb)	<0.01	<0.01	mg/l
26	Copper (as Cu)	<0.01	<0.01	mg/l
27	Chemical Oxygen Demand (asO ₂)	14.34	15.76	mg/l
28	Arsenic (as As)	<0.01	<0.01	mg/l

RESULTS

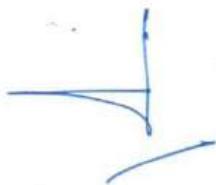
S.No	Parameter	Test Method	Results	Units	Tolerance Limit as per IS:2296				
					Class A	Class B	Class C	Class D	Class E
SW-1	Total Coli Form	IS:1622	65	MPN/100ml	50	500	5000	-	-
SW-2	Total Coli Form	IS:1622	97	MPN/100ml	50	500	5000	-	-

Observation:

The analysis results indicate that the pH ranges between 7.45 and 7.80.

Dissolved Oxygen (DO) was observed in the range of 5.8 mg/l against the minimum requirement of 6.4 mg/l. BOD values were observed to be in the range of 2.7 mg/l. to 4.2 mg/l.

The chlorides and Sulphates were found to be in the range of 50.44 – 62.04 mg/l and 15.08 – 19.21 mg/l respectively.



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Bacteriological examination of surface water samples revealed the presence of total coliform in range of 65 MPN/100ml to 97 MPN/100ml. Based on the results it is evident that most of the parameters of the samples comply with 'Category 'A' standards of CPCB indicating their suitability for Drinking water source after conventional treatment and disinfection.

3.5 SOIL ENVIRONMENT

Soil may be defined as a thin layer of earth's crust, medium for the growth of plants. The soil characteristics include both physical and chemical properties. The soil survey and soil sample were carried out / collected to assess the soil characteristics of the study area. Soil samples were collected from 3 locations and analyzed as per CPCB norms.

The soil sampling locations are marked in **fig. 3.2 (d)** the Physico-chemical characteristic of these soil samples is given in Table No. 3.2(viii).

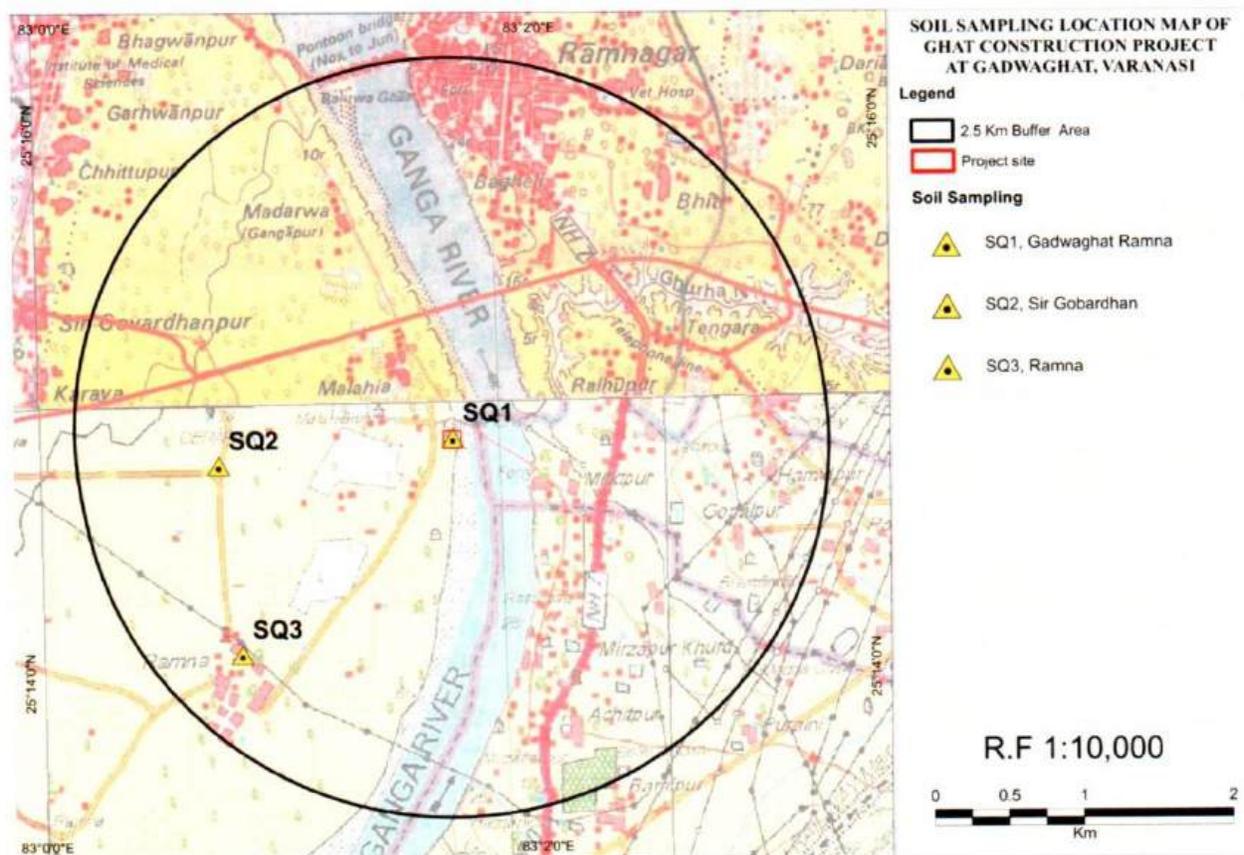


Fig.3.2 (d) Soil sampling Location



Table No. 3.3 (vii) Soil sampling locations

Location Code	Location	Distance (Km)	Direction	Project area/Study Area
SQ1	Project Site	0.73	E	Project area
SQ2	Sir Gobardhan	1.51	W	Study Area
SQ3	Ramna	1.99	SW	Study Area

Table 3.3 (viii) Physico-chemical properties of soil

S. No	Parameter	Units	Result		
			Location		
			SQ-1	SQ-2	SQ-3
1	Texture	-	Clay Loam to Silty Loam	Clay Loam	Clay Loam
	Sand	%	42.56	32.45	30.87
	Clay	%	35.8	34.65	32.75
	Silt	%	15.6	16.55	18.55
2	Ph (1:2.5 Suspension)	-	6.34	7.34	7.23
3	Electrical Conductivity	µmhos/cm	123.4	145.45	176.45
4	Potassium (as K)	mg/kg	166.98	170.58	177.46
5	Sodium (as Na)	mg/kg	252.49	234.59	243.59
6	Calcium (as Ca)	mg/kg	3090.52	4170.56	4120.56
7	Magnesium (as Mg)	mg/kg	624.80	565.37	502.37
8	Sodium Absorption Ratio	-	0.97	0.86	0.49
9	Water Holding Capacity	%	30.43	31.54	32.93
10	Total Kjeldahl Nitrogen	%	0.059	0.087	0.089
11	Phosphorous	mg/kg	56.48	52.12	53.15
12	Bulk Density	gm/cc	1.46	1.53	1.58
13	Organic Matter	%	0.26	1.64	1.54
14	Porosity	%	36.26	37.64	37.32

Observations:

Samples collected from identified locations indicate the soil is sandy type and the pH value ranging from 6.34 – 7.34, which shows that the soil is alkaline in nature. Potassium is found to be from 166.98 mg/kg to 177.46 mg/kg. The water holding capacity is found in between 30.43 % to 32.93 %.

3.6 NOISE ENVIRONMENT

The noise levels within the study area were recorded using Sound Level Meter and noise monitoring results were compared with the Ambient Noise Quality Standard notified under Environment Protection Act, 1986. The levels recorded are as stated in Table 3.3 (x).

The noise level monitoring locations are marked in Fig. no.3.3 (e)



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Table 3.3 (ix) Noise quality monitoring stations

Location Code	Location	Distance (Km)	Direction	Project area/Study Area
NQ1	Project Site	0.73	E	Project area
NQ2	Rasul Ganj	0.98	SE	Study Area
NQ3	Ramna	1.51	W	Study Area
NQ4	Ramnagar	1.73	NE	Study Area

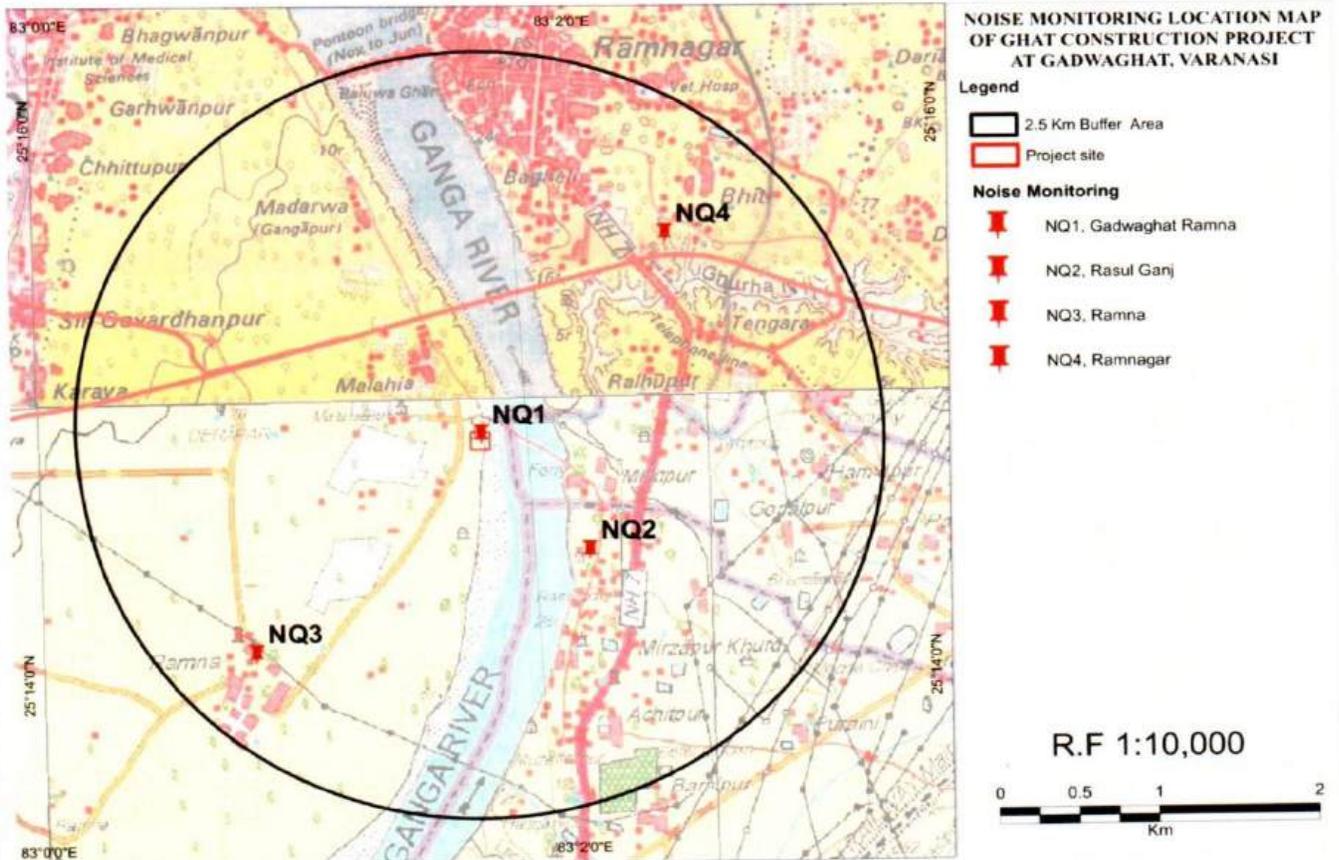


Fig.3.2 (e) - Noise quality monitoring stations

Table No. 3.3 (x) Noise level status

S. No	Location	Observed Value Leq dB(A)			Zone
		Day*	Night*	Day/Night	
1	NQ1- Project Site	59.8	48.9	54.35	Industrial
2	NQ2- Rasul Ganj	50.9	41.5	46.2	Industrial
3	NQ3- Ramna	46.5	30.8	38.65	Industrial
4	NQ4- Ramnagar	40.7	42.7	41.7	Industrial



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*Day Time	Leq (6.00AM TO 10.00 PM)
*Night Time	Leq (10.00PM TO 6.00 AM)
Limit as per CPCB Guidelines Leq. dB(A) (Day-Night)	Residential Zone = 55 - 45 Leq. dB(A)
	Industrial Zone = 75 - 70 Leq. dB(A)

Results

Noise monitoring reveals that the maximum & minimum noise levels at day time were recorded as 59.8 dB (A) & 40.7 dB (A), respectively. The maximum & minimum noise levels at night time were found to be 48.9 dB (A) & 30.8 dB (A). There are several other sources in the 10 km radius of study area, which contributes to the local noise level of the area. Traffic activities as well as activities in nearby villages and agricultural fields add to the ambient noise level of the area.

3.7 BIOLOGICAL ENVIRONMENT

3.7.1 Introduction

Ecological communications presents the highest level of commitment to the environment, to personal and community ecology and to a sustainable way of life for us and for the next generation

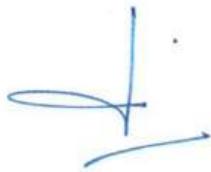
Environment consists of all living and non-living factors which balance the weather conditions and may be disturbed by some mechanical activities. Due to introduction of such activities, the surrounding water, air and habitats may disappear or some new species may appear.

By conducting ecological studies, we may be able to understand the pattern of change in weather condition, appearance or disappearance of flora and fauna, changes in vegetation pattern in respect of their quantity & quality.

The future developmental activities may be so planned in such a way that the existing ecosystem may not get disturbed beyond sustainable limits. Hence, ecological studies form a part of environmental monitoring studies required for proper management of environment.

3.7.2 Importance of Conducting the Ecology & Biodiversity Study

A biodiversity study establishes a baseline understanding of the existing flora and fauna in the project area. This information is essential for predicting how a development project might affect the local ecosystem. The study helps predict how species, habitats, and ecological processes might be affected. This allows for proactive measures to minimize negative impacts.



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The findings of the biodiversity study inform the development of mitigation measures to reduce negative impacts and, where possible, enhance biodiversity. This may include habitat restoration, species protection, and other conservation strategies. The study provides decision-makers with the necessary information to make informed choices about project design, location, and implementation, minimizing potential harm to biodiversity.

By identifying potential threats to sensitive species or habitats early on, biodiversity studies can help avoid irreversible damage to ecosystems and prevent species extinction.

3.7.3 Methodology for Field Survey through Quadrant Sampling Procedure

A) Floristic survey and quantitative analysis of vegetation

For assessing the floral diversity in the study area both floristic survey and quantitative analysis of vegetation are done. The quantitative analysis of vegetation are done by using quadrats as sampling units. The quadrats are laid randomly in identified sites (as per project impact) at Vegetation near Village areas and surrounding areas The vegetation analysis undertaken by collecting numerical community data for trees, shrubs, herbs, grasses, bamboos from the randomly laid quadrats. Quadrat size of 10 m x 10 m was used to enumerate trees, 5 m x 5m are used to enumerate shrubs and herbs are enumerated through 1m x 1m quadrats. The numbers of quadrats laid for different vegetation components at different sampling sites depends on the size of the study area and density of the vegetation to be studied.

During the survey, each individual species within the quadrat are identified up to the species level, and the number of individuals of each species in each quadrat are counted. The GBH of all trees having girth of more than 16 cm (equivalent to 5 cm DBH) are measured.

Based on the quadrat data, frequency, density and cover (basal area) for each species are calculated using the following formulae:

Frequency: Frequency is the number of times a plant species occurs in a given number of quadrats. Frequency is usually expressed as a percentage and is sometimes called a Frequency Index.

Frequency (%) = Number of quadrats in which the species occurred/ Total number of quadrats studied
* 100



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Density: Density in plant ecology is defined as the number of individuals of a given species that occurs within a given sample unit or study area. Density is often used in a vegetation survey to describe a species' status in a plant community.

For tree, Density = Total number of individual of the species in all the quadrats / Total number of quadrats studied * 50

For shrub, Density = Total number of individual of the species in all the quadrats / Total number of quadrats studied * 100

For herb, Density = Total number of individual of the species in all the quadrats / Total number of quadrats studied * 10,000

Abundance: It is the study of the number of individuals of different species in the community per unit area. By quadrats method, samplings are made at random at several places and the number of individuals of each species was summed up for all the quadrats divided by the total number of quadrats in which the species occurred. It is represented by the equation:

Abundance = Total number of individual of the species in all the quadrats / Total number of quadrats in which the species occurred.

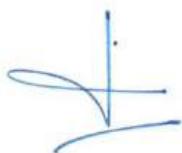
Basal area: Basal area ($m^2 ha^{-1}$) = Mean total basal area of all the individuals of the species per Quadrat and conversion to per hectare basis.

b) Importance Value Index

This index is used to determine the overall importance of each species in the community structure. In calculating this index, the percentage values of the relative frequency, relative density and relative dominance are summed up together and this value is designated as the Importance Value Index or IVI of the species (Curtis, 1959).

Relative density: Relative density is the study of numerical strength of a species in relation to the total number of individuals of all the species and can be calculated as:

Relative density = Number of individual of the species / Total number of individual in all the species * 100



Relative frequency: The degree of dispersion of individual species in an area in relation to the number of all the species occurred.

$$\text{Relative frequency} = \text{Frequency of occurrence} / \text{Total frequency of all occurrence of all species} * 100$$

Relative dominance: Dominance of a species is determined by the value of the basal cover. Relative dominance is the coverage value of a species with respect to the sum of coverage of the rest of the species in the area.

$$\text{Relative dominance} = \text{Total basal area of the species} / \text{Total basal area of all the species} * 100$$

The total basal area was calculated from the sum of the total diameter of immerging stems. In trees, poles and saplings, the basal area was measured at breast height (1.5 meters) and by using the formula πr^2 . The importance value index (IVI) for different trees species were determined by summing up the Relative Density, Relative Frequency and Relative dominance. The Relative Density and Relative Frequency values were used to calculate the IVI of shrubs and herbs. The importance value index is a measure of the relative contribution of a species to the community.

c) Diversity index

To assess diversity of floral elements and structure of the plant community in different study sites, various diversity indices were computed. A diversity index is a mathematical measure of species diversity in a community. They provide more information about community composition than simply species richness (i.e., the number of species present); they also take the relative abundances of different species into account. Three species diversity indices viz., Shannon index of general diversity (H), Dominance index (D) were computed.

d) Shannon index

It is an index used to measure diversity in categorical data. In a basic sense, it is the information entropy of the distribution in a given area treating species as symbols and their relative population sizes as the probability. The diversity index takes into account the number of individuals as well as number of taxa. It varies from 0 for communities with only a single taxon to high values for communities with many taxa, each with few individuals. The advantage of this index is that it takes into account the number of species and the evenness of the species. The index is increased either by



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having additional unique species, or by having greater species evenness. Higher values of Shannon index indicate that a particular community has more information.

$$H = \frac{ni}{N} \ln \left(\frac{N}{ni} \right)$$

e) Dominance index

It is calculated as:-

$$D = \sum \left(\left(\frac{ni}{n} \right)^2 \right)$$

Where ni is number of individuals of taxon i. The value of D Ranges from 0 (all taxa are equally present) to 1 (one taxon dominates the community completely).

3.7.4 Forest Types of Uttar Pradesh

Uttar Pradesh features a variety of forest types including Tropical Moist Deciduous, Tropical Dry Deciduous, and Tropical Thorn Forests. The specific types depend on rainfall patterns and elevation, with the northern areas having more moist forests and the southern regions experiencing drier conditions. (Source: https://fsi.nic.in/cover_2011/uttarpradesh.pdf)

- **Tropical Moist Deciduous Forests:**

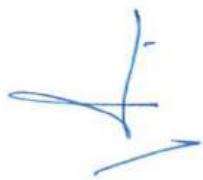
These are found in the Bhabhar and Terai regions, characterized by higher rainfall (100-150 cm annually). Sal, Mahua, and Bamboo are common trees in these forests.

- **Tropical Dry Deciduous Forests:**

These are more widespread, covering the central, eastern, and western plains. They experience lower rainfall than moist deciduous forests. Trees like Neem, Peepal, and Rosewood are found here.

- **Tropical Thorn Forests:**

These are located in the drier southern part of the state, with rainfall between 50-75 cm. Acacia, thorny legumes, and Euphorbias are characteristic of these forests.



- **Subtropical Pine Forests:**

While less common, these can be found in higher altitude areas of the state.

Additionally, Uttar Pradesh has areas of Littoral and Swamp forests. The state also has a diverse range of medicinal plants and herbs, many of which are found in these forests and grasslands.

3.7.4.1 Forest Types of Varanasi

Varanasi primarily features Tropical Dry Deciduous forests. These forests are characterized by a mix of deciduous trees that shed their leaves during the dry season.

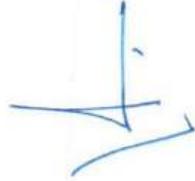
As per ISFR 2019 data the total geographical area of Varanasi is 1535 sq. Km out of which very dense forest cover is almost nil followed by moderate dense forest cover is 1 sq km while open forest cover is 16.0 sq. km which altogether comes to 17.10 sq. Km of the total geographical area.

Percentage wise forest cover is 1.11% of the total geographical area.

(Source: https://fsi.nic.in/cover_2011/uttarapradesh.pdf)

✦ Administrative Division of Forests

1. **Reserved Forests** – In such forests, due to the sensitivity related to environmental, land conservation and wildlife conservation, gathering, harvesting and animal grazing activities are completely prohibited. These forests remain completely under state control.
2. **Protected Forests** – Protected forests are also kept under government control, but unlike reserved forests, local residents are not prohibited from grazing cattle and cutting wood.
3. **Unclassified Forests** – Such forests which have not yet been classified are called unclassified forests. In these forests too, the local people have the facility of cutting wood and grazing animals.
4. **State Forests** – Such forests are completely kept under state protection and control.
5. **Community Forests** – Such forests which are completely under the control of local bodies, such as Zilla Parishads, Municipal Corporations, Municipalities or Nagar Panchayats, are called community forests.
6. **Private Forests** – Forests with individual rights are called private forests. Their control is completely with the private person.



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3.7.5 Agriculture and Crops

Entire district of Varanasi falls between Ganga and Varuna rivers. The loamy soils of the area are very fertile. About 85% of the total geographical area of the district is cultivated area. The main rabi crops are wheat and oil seeds while paddy and pulses are the main kharif crops. The abundantly produced sugarcane is a perennial crop.

Site Description

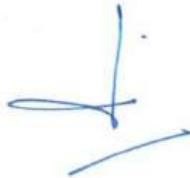
Varanasi district is located in Eastern Uttar Pradesh and is a part of the Indo-Gangetic plains of India. The soil is alluvial type formed by the deposition of sediments of river Ganges. Soil is fertile and sandy loam in texture. The climate is Tropical monsoonal type with three distinct season, the cold (November to February), the hot (March to mid-June) and the rainy (mid-June to September), while October is regarded as strictly transitional month. The diurnal range of temperature ranges as average between 13°C and 14.5°C in the cold and hot months, respectively. The highest monthly temperature is recorded in May, varying between 32°C and 42°C. The annual rainfall is around 100 cm of which 90% occurs in the rainy season (*Singh and Rana, 2006*)

The study area falls near to the South central part of Uttar Pradesh. The topography of the area is nearly plain and falls under the Gangetic plains with River Ganga flowing through the study area. The area is drained by River Ganga. About 66% area of the district is utilized for agriculture purpose and the rest covered with built up area and other features. Dense settlement can be seen in Kaashi Vidyapeeth block and South west of Chiraigaon block of Varanasi district which includes the Urban area.

3.7.6 Methodology for the Study

To accomplish the above objectives, a general ecological survey covering an area of 10 km radius from the proposed project was done as follows:

- Reconnaissance survey for selection of floral inventory sites in and around the site on the basis of meteorological conditions.
- Compilation of secondary data from published literature of forest division.
- Primary data generation through systematic studies which was done through
 - Generation of primary data to understand baseline ecological status, fauna structure and important floristic characteristics
 - Preparing a checklist of plants observed at the site.



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- Determining the bird population by taking random readings at every location.
- Observing mammals, reptiles, amphibians, insects, droppings of animals, burrows, and other signs.
- Interaction with local residents for ethno-botanical study
- Collection of secondary data from forest working plan and from published literature.

Survey was conducted to evaluate floral and faunal composition of the study area. Primary data on floral and faunal composition was recorded during site visit. Secondary data was collected from published literature.

3.7.7 Terrestrial Flora and Fauna

A) FLORA

There is no eco-sensitive area, forest, or wild life sanctuaries within the 10 km study area. A floral enlistment of trees, shrubs and herbs with their scientific names, local names are tabulated in **Table below** In addition, floral species observed during field visits have been depicted under the below table

Table 3.4 (i): List of Flora within the Study Area

S. No.	Scientific Name	Common Name	Family
Trees			
1.	<i>Neolamarckia cadamba</i>	Kadam	Rubiaceae
2.	<i>Polyalthia pendula</i>	Ashoka	Annonaceae
3.	<i>Cocos nucifera</i>	Narial	Palmae
4.	<i>Santalum album</i>	Chandan	Santalaceae
5.	<i>Mangifera indica</i>	Aam	Anacardiaceae
6.	<i>Syzygium cumini</i>	Jamun	Myrtaceae
7.	<i>Aegle marmelos</i>	Bel	Rutaceae
8.	<i>Acacia catechu</i>	Khair	Fabaceae
9.	<i>Artocarpus heterophyllus</i>	Jackfruit	Moraceae
10.	<i>Acacia arabica</i>	Babul	Fabaceae
11.	<i>Zizyphus jujuba</i>		Rhamnaceae



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S. No.	Scientific Name	Common Name	Family
12.	<i>Azadirachta indica</i>	Neem	Meliaceae
13.	<i>Psidium sp</i>	Gauva	Myrtaceae
14.	<i>Terminalia arjuna</i>	Arjun	Combretaceae
15.	<i>Dalbergia sissoo</i>	Sheesham/Indian Rose wood	Fabaceae
16.	<i>Pongamia pinnata (L.) Pierre</i>	Kanj/Karanj	Fabaceae
17.	<i>Butea monosperma</i>	Palas	Leguminosae
18.	<i>Melia dubia/ Melia azedarach</i>	Maha Neem/Ghora Neem	Meliaceae
19.	<i>Terminilia chebula</i>	Bahera	Combretaceae
20.	<i>Ficus benghalensis</i>	Bargad	Moraceae
21.	<i>Ficus religiosa</i>	Pipal	Moraceae
22.	<i>Madhuca longifolia</i>	Mohua tree	Sapotaceae
23.	<i>Magnifera indica</i>	Aam	Anacardiaceae
24.	<i>Melia azedarach</i>	Bukkam Neem	Meliaceae
25.	<i>Moringa olerifera</i>	Munga	Moringanaceae
26.	<i>Ficus benghalensis</i>	Bargad	Moraceae
27.	<i>Musa paradisiacal</i>	Banana	Musaceae
28.	<i>Nerium oleamder</i>	Kaner	Apocynaceae
29.	<i>Phoenix sylvestris</i>	Date palm	Arecaceae
30.	<i>Phyllanthus emblica</i>	Awla	Euphorbiaceae
31.	<i>Pisidium guava</i>	Guava	Myrtaceae
32.	<i>Bombax ceiba</i>	Semal	Malvaceae
Herbs			
33.	<i>Tinospora cardifolia</i>	Giloy	Menispermaceae
34.	<i>Andrographis paniculata</i>	Kalmegh	Acanthaceae
35.	<i>Dalura metel</i>	Dhotra	Solanaceae
36.	<i>Echinops echinatus</i>	Unthkantari	Asteraceae



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S. No.	Scientific Name	Common Name	Family
37.	<i>Ervatamia divaricata</i>	Chandani	Apocynaceae
38.	<i>Euphorbia hirta</i>	Mothi dudhi	Evphorbiaceae
39.	<i>Ipomoea carnea</i>	Besharam	Convolvulaceae
40.	<i>Lantana camara</i>	Ghaneri	Verbenaceae
41.	<i>Mimosa pudica</i>	Chui Mui	Mimosaceae
42.	<i>Ocimum sanctum</i>	Tulsi	Labiatae
43.	<i>Parthenium hysterophorus</i>	Gajar grass	Asteraceae
Shrubs			
44.	<i>Hibiscus sp.</i>	Gudhail	Malvaceae
45.	<i>Bougainvillea glabra</i>	Paper flower	Nyctaginaceae
46.	<i>Calotropis procera</i>	Aakra	Asclepiadaceae
47.	<i>Cassia auriculata</i>	Tarwar	Fabaceae
48.	<i>Sida cordifolia</i>	Bala	Malvaceae
49.	<i>Macaranga peltata</i>	Macaranga	Euphorbiaceae
50.	<i>Strobilanthus callosus</i>	Karvi	Acanthaceae
51.	<i>Moringa oleifera</i>	Sahajan	Moringaceae
52.	<i>Tabernaemontana divaricata</i>	Chandni	Apocynaceae
53.	<i>Nyctanthes arbor-tristis</i>	Harsingar	Oleaceae
54.	<i>Bougainvillea spectabilis</i>	<i>Bougainvillea</i>	Nyctaginaceae
55.	<i>Calotropis procera</i>	<i>Aak</i>	Asclepiadaceae
56.	<i>Clerodendron infortunatum</i>	<i>Kadu</i>	Verbenaceae
57.	<i>Cuscuta reflexa</i>	<i>Amarbel</i>	Cuscutaceae
58.	<i>Bougainvillea spectabilis</i>	<i>Bougainvillea</i>	Nyctaginaceae
Bamboo			
59.	<i>Dendrocalamus giganteus</i>	Bans	Poaceae
60.	<i>Dendrocalamus strictus</i>	Bans	Poaceae



/s/



S. No.	Scientific Name	Common Name	Family
61.	<i>Bambusa bambos</i>	Bans	Poaceae
62.	<i>Dendrocalamus asper</i>	Bans	Poaceae
63.	<i>Bambusa tulda</i>	Bans	Poaceae

Source: Literature Review & Forest Working Plan Varanasi

Threatened and Endangered Plant Species

No endangered or threatened species are present in the study area.

Economical Important Plant species

A survey was carried out to identify the wild plants used by the local peoples for different purposes. The data was mainly collected by taking views of the local people and the ethno botanical data was recorded in the specially formatted questionnaires.

Agriculture is the major occupation in the project area. Cereals are the major crops grown in the area. Rice and wheat are the major cereals. Cereals are mainly grown for self-consumption, while, vegetables and mango have major contribution in the economy of the area. Plant species are used for medicinal purposes for treating cough, cold, fever, asthma and externally for rheumatism, skin diseases, cuts, boils, fractures and injuries. Around 10 different plants listed from these areas are used for various purposes. The ethno-botanical utility of various trees, shrubs, herbs, species observed and reported in the study area and its surroundings are given in Table below.

Table 3.4 (ii): List of Plants with Medicinal importance

S. No.	Scientific Name	Common Name
1	<i>Adhatoda vasica</i>	Basak
2	<i>Ocimum sanctum</i>	Tulsi
3	<i>Phyllanthus emblica</i>	Amla
4	<i>Moringa oleifera</i>	Sahajan
5	<i>Nyctanthes arbor-tristis</i>	Harsingar
6	<i>Butea monosperma</i>	Palas
7	<i>Madhuca longifolia</i>	



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8	<i>Syzygium cumini</i>	Jamun
9	<i>Aegle marmelos</i>	Bel
10	<i>Haldina cordifolia</i>	Haldu

B) FAUNA

The area supports varied habitats viz. open space, agricultural fields, and human settlements. The information of the fauna, which are present in and around the study area, is gathered from various sources like interrogating the locals, as well as by detailed survey of these areas by study team. During the field survey naturally occurring species, which were observed were recorded. A list of mammals, birds, and reptiles with their scientific names prepared from various secondary sources as well as primary sources is presented in Table below

1. Mammal

The list of mammals are prepared based on secondary information like interaction with the local, wild mammals like Indian mongoose, Langur, striped squirrel etc. are recorded from secondary sources and literature review. Domesticated mammals like goat, sheep, dog, cow, ox, donkey etc. are reported. These animals are domesticated for animal husbandry purposes.

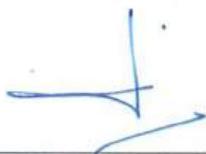
2. Reptiles

The reptiles include snakes and lizards. Rat snake (*Ptyas mucosus*), checkered keel sighting is common. Other reptilian species commonly reported are Garden lizard (*Calotes versicolor*) along shady places in agricultural field or where growth of bushes is noticed. Among non-poisonous snakes rat snakes (*Ptyas mucosus*) are commonly noticed in field, followed by poisonous snakes like Cobra (*Naja naja*) and Indian Krait.

Detail list of fauna that are recorded from the study area are given in table below.

Table 3.4 (iii) : List of Fauna in the study area.

S. No.	Common Name	Scientific Name	Family	Schedule status (as per WPA- 1972)	IUCN status
Mammals					
1.	<i>Funambulus palmarum</i>	Three-striped Squirrel	Suidae	III	LC



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S. No.	Common Name	Scientific Name	Family	Schedule status (as per WPA-1972)	IUCN status
2.	<i>Canis lupus</i>	Dog	Canidae	V	LC
3.	<i>Herpestes edwardsi</i>	Indian Grey Mongoose	Canidae	II	LC
4.	<i>Hyaena hyaena</i>	Stripped hyena	Leporidae	V	LC
5.	<i>Lepus nigricollis</i>	Indian Hare	Canidae	II	LC
6	<i>Sus scrofa</i>	Wild Boar	Canidae	III	LC
7	<i>Semnopithecus entellus</i>	Common Langur	Cercopithecidae	II	LC
8	<i>Rousettus leschenaultia</i>	Indian Fulvous Fruit-Bat	Pteropodidae	V	LC
9	<i>Mus booduga</i>	Indian Field Mouse	Muridae	V	LC
10	<i>Rattus rattus</i>	Common House Rat	Muridae	V	LC
11	<i>Bandicota bengalensis</i>	Bandicoot Rat	Muridae	V	LC
12	<i>Bos taurus</i>	Cow	Bovidae	V	LC
13	<i>Capra hircus</i>	Goat	Bovidae	V	LC
14	<i>Bos taurus indicus</i>	Cattle	Bovidae	V	LC
Reptiles & Amphibians					
15	<i>Eutropis carinata</i>	Common skink	Scincidae	IV	LC
16	<i>Calotes versicolor</i>	Garden lizard	Agamidae	IV	LC
17	<i>Varanus sp.</i>	Monitor lizzard	Varanidae	II	LC
18	<i>Ptyas mucosa</i>	Rat Snake	Colubridae	II	-
19	<i>Bungarus caeruleus</i>	Common Kraits	Elapidae	II	LC
20	<i>Naja Naja</i>	Indian cobra	Elapidae	II	LC
21	<i>Bufo melanostictus</i>	Common toad	Bufoidea	IV	LC
22	<i>Euphlyctis hexadactylus</i>	Pond frog	Dicroglossidae	IV	LC
23	<i>Hoplobatrachus tigerinus</i>	Indian Bull frog	Dicroglossidae	IV	LC
24	<i>Polypedates maculatus</i>	India tree frog	Rhacophoridae	IV	LC



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CHAPTER III- DESCRIPTION OF THE ENVIRONMENT

S. No.	Common Name	Scientific Name	Family	Schedule status (as per WPA- 1972)	IUCN status
IUCN Status =LC: Least Concern					

3. Avian Fauna

Avian fauna most commonly seen birds are the Myna Common myna, Grey heron, Spotted Owlet Cattle egret, Striated heron Great egret, Black Ibis, Bee-eaters, Cattle Egret, and Warblers among many more. Table below provides the list of avifauna.

Detail list of avian-fauna that are recorded from the study area from secondary sources are given in table below.

Table 3.4 (iv) Avian fauna recorded from the study area

S.No	Scientific Name	Common Name	Family	Schedule Status (WPA- 1972)	IUCN Status
1.	<i>Acridotheres tristis</i>	Myna	Sturnidae	IV	LC
2.	<i>Acridotheres tristis</i>	Common myna	Sturnidae	IV	LC
3.	<i>Ardea cinerea</i>	Grey heron	Ardeidae	IV	LC
4.	<i>Ardea purpurea</i>	Purple heron	Ardeidae	IV	LC
5.	<i>Ardeola grayii</i>	Indian pond heron	Ardeidae	IV	LC
6.	<i>Athene brama</i>	Spotted Owlet	Strigidae	IV	LC
7.	<i>Bubulcus ibis</i>	Cattle egret	Ardeidae	IV	LC
8.	<i>Butorides striatus</i>	Striated heron	Ardeidae	IV	LC
9.	<i>Casmerodius albus</i>	Great egret	Ardeidae	IV	LC
10.	<i>Centropus sinensis</i>	Crow pheasant	Cuculidae	IV	LC
11.	<i>Columba livia</i>	Pigeon	Columbidae	IV	LC
12.	<i>Corvus macrorhynchos</i>	Jungle crow	Corvidae	IV	LC
13.	<i>Corvus splendens</i>	Crow	Corvidae	V	LC
14.	<i>Francolinus pondicerianus</i>	Titar	Phasianidae	IV	LC



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S.No	Scientific Name	Common Name	Family	Schedule Status (WPA- 1972)	IUCN Status
15.	<i>Gallinule chloropus</i>	Common moorhen	Rallidae	IV	LC
16.	<i>Gallus gallus</i>	Jungle hen	Phasianidae	IV	LC
17.	<i>Halcyon smymensis</i>	White-throated kingfisher	Alcedinidae	IV	LC
18.	<i>Milvus migrans</i>	Black Kite	Accipitridae	IV	LC
19.	<i>Nycticorax nycticorax</i>	Black-crowned night heron	Ardeidae	IV	LC
20.	<i>Passer domesticus</i>	House sparrow	Passeridae	IV	LC
21.	<i>Pseudibis papillosa</i>	Red-naped ibis	Threskiornithida e	IV	LC
22.	<i>Psittacula krameri</i>	Rose ringed Parakeet	Psittacidae	IV	LC
23.	<i>Pycnonotus cafer</i>	Red-vented bulbul	Pycnonotidae	IV	LC
24.	<i>Saxicoloides fulicatus</i>	Indian robin	Psittaculidae	IV	LC
25.	<i>Spilopelia senegalensis</i>	Little brown dove	Columbidae	IV	LC
26.	<i>Tringa tetanus</i>	Common redshank	Charadriidae	IV	LC
27.	<i>Turdoides caudate</i>	Common babbler	Leiothrichidae	IV	LC

IUCN Status =LC: Least Concern, VU: Vulnerable.

Eco sensitive areas

There is no Eco sensitive Zone like Biosphere Reserve, National Park, and Wildlife Sanctuary is present within 10 km of the study area or its near vicinity

CONCLUSION

Flora: Floral diversity contributes to ecosystem stability and function. For example, diverse plant life supports a variety of animal life, provides food and shelter, helps with pollination, and contributes to nutrient cycling. Diverse plant life supports a variety of animal life, provides food and shelter, helps



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with pollination, and contributes to nutrient cycling. Specific conservation strategies that could be implemented, such as habitat protection, sustainable land management, and controlling invasive species. The findings of the floral study reveals that during study period all total of 32 Tree species and 26 species of Shrubs & Herbs and 5 species of bamboo were reported from secondary sources.

Fauna: No species was reported from the entire study area which is listed under Schedule I of Wildlife Protection Act, 1972. There is no protected area in the study area. The presence of faunal species plays an important role in maintaining a healthy ecosystem and supporting ecological processes such as pollination, seed dispersal, and pest control. Faunal diversity should be protected from potential threats of habitat loss, climate change, and pollution and over exploitation of natural resources.

3.7.8 AQUATIC FAUNA

❖ Fish Fauna of the River Ganga at Varanasi

The species of fishes reported during primary visit are Rohu, Catla, Hilsa, *Mystus sp*, *Cirrhinus Sp*, etc. Species of fishes reported in the study area is given in table below.

The species of fishes given in Table are commonly reported in the fresh water bodies like river, streams, lakes, pond and estuaries. They are cosmopolitan in distribution and are reported all over India and Indian Sub continents. These species of fishes are commonly used in aqua culture practice and had good commercial importance.

Ecologically these species are primary and secondary consumer in the freshwater ecosystem mainly in rivers. They do not have fix breeding and nesting site and mainly spawn during monsoon season when the water is diluted, laden with silt and current of water is high to keep their spawn (egg) floating for hatching of eggs. Hence they breed all over river, streams, lakes, etc. during favorable conditions.

Therefore the species of fishes reported in table are not confined to project site only but are reported all over Ganges courses. Detail list of fish-fauna that are recorded from the study area from secondary sources are given in table below.



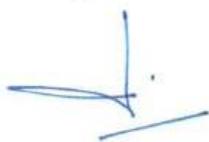
Table 3.4 (v) Fish fauna recorded from the study area

S. No.	Fish Species	Common Name
Major Carps		
1	<i>Labeo rohita</i>	Rohu
2	<i>Catla catla</i>	Catla
3	<i>Cirrhinus mrigala</i>	Mrigal
Catfishes		
4	<i>Eutropiichthys vacha</i>	Vacha
5	<i>Sperata seenghala</i>	Giant river catfish
6	<i>Clupisoma garua</i>	Garua batcha
Other Species		
7	<i>Wallago attu</i>	Wallago, Lanchi
8	<i>Tor putitora</i>	Golden Mahaseer
9	<i>Channa punctata</i>	Spotted snakehead
10	<i>Oreochromis niloticus</i>	Nile Tilapia
11	<i>Cyprinus carpio</i>	Common Carp
12	<i>Mystus tengara</i>	Tangra
14	<i>L. calbasu</i>	Kalbasu
15	<i>Chitala chitala</i>	Chital
16	<i>Hilsa hilsa</i>	Hilsa

(Source: <https://nmcg.nic.in/>)

❖ Other Aquatic Fauna of Gangetic Plains

The Ganga supports a rich fauna and flora, including the endangered Ganges River dolphin (*Platanista gangetica gangetica*) and at least nine other species of aquatic mammals. Reptiles include three species of crocodiles along with one species of monitor lizard (*Varanus bengalensis*) and eleven species of freshwater turtles. The Ganga also has the richest freshwater fish fauna (378 species) anywhere in India (Behera 2002; Rao 1995).



The Ganges river dolphin has received protection in nine protected areas (PAs) in India. Out of these nine, only one protected area 'Vikramshila Ganges River Dolphin Sanctuary' near Bhagalpur is specially notified for the Ganges river dolphin. Dolphins have also received some protection in the National Chambal Sanctuary, specially created on the Chambal River, a major tributary in the Ganga river system, for the protection of the Indian Gharial (*Gavialis gangeticus*).

Aquatic Species of Concern

There are several riverine species which are threatened by human activities the Ganga basin. However, the Ganges river dolphin and the riverine turtles are two reliable indicator species of the health of the Ganga river ecosystem. This makes them species of special concern for WWF-India. (Source: <https://wwfin.awsassets.panda.org/>)

o The Gangetic River Dolphin

Introduction

Research studies under the Ganga Action Plan project in the 1980s provided the baseline information about the species population and distribution. It was estimated at the time that around 5,000–6,000 dolphins were present in its distribution range and distributed in the Ganga-Brahmaputra-Meghna and Karnaphuli river systems and its tributaries of Nepal, India, Bhutan and Bangladesh, between the foothills of the Himalayas and the tidal zones. In India, one can sight these beautiful dolphins along deep river reaches in Assam, Bihar, Jharkhand, Madhya Pradesh, Rajasthan, Uttar Pradesh and West Bengal.

While there is no complete scientific estimate of range-wise abundance of the species, it is assumed that presently around 2,500 individuals are surviving across their entire range, out of which an estimated 1,800 are within Indian Territory. The population is declining fast. It has already become extinct from most of its earlier distribution ranges and even in its present day distribution ranges the density of this animal is decreasing. (Source: <https://wwfin.awsassets.panda.org/>)

Ganges river dolphin (*Platanista gangetica gangetica*)

While there is no complete scientific estimate of range-wise abundance of the species, it is assumed that presently around 2,500 individuals are surviving across their entire range, out of which an estimated 1,800 are within Indian Territory. The population is declining fast. It has already become



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the males mature earlier. The gestation period is 9-11 months and a female gives birth to only one calf, once in 2-3 years.

Importance of the Species

Just like the tiger in a forest ecosystem, the Ganges River dolphin is an indicator species for the river ecosystem. It is at the apex of the food chain. It is an endemic and rare charismatic mega-fauna found only in the Indian subcontinent. At the same time it is a part of our natural aquatic heritage. Developing a comprehensive program to conserve river dolphins in Ganga is required for the following reasons:

Conservation Status

The Ganges river dolphin is listed in Appendix 1 of CITES. Further, the IUCN World Conservation Union has classified the Ganges river dolphin as 'Endangered'. The UN Convention on the Conservation of Migratory Species of Wild Animals (CMS), known as the Bonn Convention, which focuses on wild animals crossing national boundaries, has included the Ganges river dolphin in Appendix I. India has also included the species in Schedule 1 of the Wildlife (Protection) Act, 1972. In 1991, the Government of India notified a stretch of 150 kms (middle Ganga) between Kahalgaon to Bhagalpur as a Dolphin Sanctuary.

In 2005, another 82 km of stretch (Upper Ganga) from Brijghat to Narora was declared as a Ramsar Site, especially for the conservation of dolphins. Subsequently in 2009, the Indian Government accorded the status of 'National Aquatic Animal' to the Ganges River dolphin.

Distribution of the Species (*Platanista gangetica gangetica*)

The Ganges River dolphin is primarily found in the Ganges and Brahmaputra rivers and their tributaries in India, Bangladesh and Nepal. From the 1970s until 1998, they were regarded as separate species; however, in 1998, their classification was changed from two separate species to subspecies of a single species (Smith and Braulik 2008).

Habitat of the Species (*Platanista gangetica gangetica*)

The habitat of the Ganges River dolphin is within one of the most densely populated areas of the world. The biotic resources in the dolphin habitat are under severe threat from over-exploitation by the



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communities who live close by as well as due to various developmental projects. According to a study by S. Jones (1982) 'anything can happen under heavy population pressure and the desperate conditions brought about by unexpected natural calamities or manmade disasters. There is no guarantee that the Ganga River will be left in peace.' With the increased utilization of water resources for various development projects, the water quantity as also quality in the Ganga River has deteriorated considerably, thereby affecting the aquatic environment.

Habitat Preferences

Primary habitats of the dolphins are characterized by an eddy counter current system in the main river flow caused by a point bar formed from sediments deposits, a convergent stream branch or by an upstream meander. The Ganges River dolphin is also found below sand bars and bridges where eddies are formed (Sinha and Sharma 2003).

The Ganges River dolphin adapts to a wide range of temperature fluctuation. This it does by moving into deeper pools to maintain its body temperature. It can tolerate temperature as low as 5⁰C in the River Karnali in the winter season in Nepal, and as high as 35⁰C in the summer season in the plains of Uttar Pradesh and Bihar. It is found in highly turbid waters during monsoon, even less than 20 cms in depth. Thus, water temperature and turbidity appear to be factors of low significance as compared to depth, in determining the distribution of this species (Behera 1995).

Behaviour of the Species (*Platanista gangetica gangetica*)

Gangetic Dolphins swim and vocalize constantly. Due to the turbid nature of the Ganga, the underwater activities of Gangetic Dolphins in the wild are difficult to observe. Their short surfacing time is also a major constraint for behavioral studies. A recent study recorded six types of surfacing patterns, which were dependent on age class and off-shore distance of the individual (Sinha et al. 2010a). Gangetic Dolphins exhibit greater preference for the surface than other river dolphins; even when swimming, which they do on their sides, they occasionally keep their beaks out of water. Newborn calves frequently leap completely out of the water. (Source: <https://nmcg.nic.in/>)

Food and Feeding Grounds of the Species (*Platanista gangetica gangetica*)

Gangetic Dolphins are catholic feeders and feed on several species of fishes, invertebrates (Sinha et al., 1993), and possibly turtles and birds. A list of prey species documented for the Gangetic dolphins is



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impact on the physical and biological characteristics of the river basin. It affects the other river biota, including fish, reducing the prey base of the dolphin. High altitude grazing, forest management, limited cultivation, and road building in the mountain ranges from where these rivers originate are the prime factors influencing sedimentation (Wasson, 2003). The River Ganga receives sediments from Himalayas as well as the central India.

- Riverine Resource Extraction: Dredging and development of the river environment has altered its nature and eliminated counter currents, one of the most preferred habitats of the dolphin. These activities threaten the ecological integrity of the riverine environment, especially in small tributaries where suitable habitat is more.
- Pollution: The concentrations of fertilizer and pesticide residues, and industrial and domestic effluents are very high in the Ganga River. The effects of such pollutants may be deleterious to dolphin populations.

Aspects behind Habitat Damage

- The population of the Ganges river dolphin has declined throughout its former range due to habitat destruction, commercial exploitation and incidental catch in fishing nets. The Ganges river dolphin is still hunted for meat and oil, both used medicinally. The oil is also used to attract catfish in net fishery (Sinha and Sharma 2003). Dams and barrages have created permanent barriers across the rivers blocking the movement of the Ganges river dolphin leading to isolated populations.
- The study also suggests that the dolphins below the dams are threatened by heavy pollution, increased fishing activities and vessel traffic. Due to all these human interventions, dolphins in the upper reaches of Ganga River were considered extinct. In the 1991 publication by the Ganga Project Directorate, Government of India (Murthi et al 1991) there is no mention of the Ganges river dolphin in the upper reaches of Ganga River.

Measures for Conservation and Management of the Species (*Platanista gangetica gangetica*)

Main aim is to develop a strategy for tackling threats to one of the most ecologically valuable stretches of the whole Ganga system, known to support one of the highest-remaining densities of the Ganges river dolphin—an indicator of the relatively good health of the ecosystem in this location.

A strong focus on working at a local level and using the cultural and religious importance of the river as a means of engaging with rural communities



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- ✓ Mapping of the existing land use land cover of the region with a focus on river basin.
- ✓ Highlighting the threats to the Indicator Aquatic species population with special emphasis on Ganges dolphin in the study area.
- ✓ Mapping of aquatic biodiversity based on the ground information and GPS locations.
- ✓ Studying land use patterns in and around the river basin.
- ✓ Identifying and prioritizing areas which require immediate protection and management intervention in terms of Indicator Aquatic species population and river threats.
- ✓ Detailed mapping of two focal villages where, conservation/climate change adaptation efforts can be taken up.
- ✓ Reducing incidental mortality through rescue and release efforts.
- ✓ Researching and Reducing environmental pollution
- ✓ Reducing the effects of water development on rivers in Ganga basin
- ✓ Habitat protection and restoration a major challenge in extending the coverage and level of protection conferred through protected areas is to convince stakeholders that conservation measures.
- ✓ Ensuring Critical Levels of Water Flow in Riverine Habitats of Dolphins: The survival of the Gangetic Dolphin and a host of other aquatic wildlife is dependent on riverine ecology in general and the maintenance of an optimum water flow.
- ✓ Setting up of Protected Areas for the Gangetic Dolphin: There is need to propose manageable Protected/Conservation Areas under the provisions of the Wildlife (Protection) Act (1972) taking local stakeholders into confidence.
- ✓ Capacity Building for Gangetic Dolphin Conservation and Management: System has to be developed for guiding and adopting the research scholars by the peers for encouragement of the guided research and development activities on Gangetic Dolphin.

3.8 SOCIAL IMPACT ASSESSMENT, REHABILITATION & RESETTLEMENT (R&R) ACTION PLAN

In this section of the report an attempt has been made to measure Socio-economic impact of the proposed Garhawa Ghat project Varanasi, State-Uttar Pradesh. The various attributes that have been taken into account are population composition, employment generation, occupational shift, household income, consumption pattern, ethnic issue and law & order problem. The key objective of the study is



to assess possible impact of the project on socio-economic life of the people in the neighborhood known as study area.

Introduction

In this section of the report an attempt has been made to measure Socio-economic impact of the proposed construction of garhawa ghat and development of destination tourism at left bank of river ganga in Varanasi. There are several other sources in the 10 km radius of study area, which contributes to the local noise level of the area. Traffic activities as well as activities in nearby villages and agricultural fields add to the ambient noise level of the area. The various attributes that have been taken into account are population composition, employment generation, occupational shift, household income, consumption pattern, ethnic issue and law & order problem. The key objective of the study is to assess possible impact of the project on socio-economic life of the people in the neighborhood known as study area.

The objectives of the socio-economic impact assessment are as follows:

- a) To collect baseline data of the study area.
- b) To know the socio-economic status of the people living in the study area of the proposed mining project.
- c) To assess the possible impact of the project on socio-economic aspects in the study area.
- d) To measure the impact of the project on Quality of life of the people in the study area.

Approach & Methodology

- a) A mixture of both quantitative and qualitative approach has been adopted in the current socio-economic study.
- b) The study has been conducted based on primary and secondary data. While primary data has been collected through a sample survey of selected households in the study area, the secondary data has been collected from the administrative records of the Government of Bihar, Census 2011, district hand books and from the Bihar Government portal.
- c) The details regarding population composition, number of literates, workers, etc have been collected from secondary sources and analyzed. Also, village/city/town wise details regarding amenities available in the study area have been collected from secondary sources like Census 2011, and analyzed.
- d) Two stage sampling design has been adopted to select the sampling units. The first stage units are census villages in the rural areas and towns/cities in urban areas. The ultimate stage units are



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households in the selected villages and towns/cities. Probability sampling has been adopted to select the sampling units.

- e) Estimation of various parameters has been made based on sample data and bottom top approach has been adopted.
- f) On the basis of a preliminary reconnaissance survey, two questionnaires were developed to make it suitable to fulfill the objectives of the study. The questionnaires contained both open ended and close ended questions
- g) The data collected during the above survey was analyzed to evaluate the prevailing socio-economic profile of the area.
- h) Based on the above data, impacts due to mining operation on the community have been assessed and recommendations for improvement have been made.

Concept & Definition of Terms Used

- a) **Study Area:** The study area, also known as impact area has been defined as the sum total of core area and buffer area with a radius of 10 Kilometers from the periphery of the project site. The study area includes all the land marks both natural and manmade, falling therein.
- b) **QoL:** The Quality of Life (QoL) refers to degree to which a person enjoys the important possibilities of his/her life. The 'Possibilities' result from the opportunities and limitations, each person has in his/her life and reflect the interaction of personal and environmental factors. Enjoyment has two components: the experience of satisfaction and the possession or achievement of some characteristic.
- c) **Household:** A group of persons who normally live together and take their meals from a common kitchen are called a household. Persons living in a household may be related or unrelated or a mix of both. However, if a group of related or unrelated persons live in a house but do not take their meals from the common kitchen, then they are not part of a common household. Each such person is treated as a separate household. There may be one member households, two member households or multi-member households.
- d) **Sex Ratio:** Sex ratio is the ratio of females to males in a given population. It is expressed as 'number of females per 1000 males'.
- e) **Literates:** All persons aged 7 years and above who can both read and write with understanding in any language are taken as literate. It is not necessary for a person to have received any formal



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education or passed any minimum educational standard for being treated as literate. People who are blind but can read in Braille are also treated as literates.

- f) **Literacy Rate:** Literacy rate of population is defined as the percentage of literates to the total population aged 7 years and above.
- g) **Labour Force:** The labour force is the number of people employed and unemployed in a geographical entity. The size of the labour force is the sum total of persons employed and unemployed. An unemployed person is defined as a person not employed but actively seeking work. Normally, the labour force of a country consists of everyone of working age (commencing from 14 to 16 years) and below retirement (around 65 years) that are participating workers, that is people actively employed or seeking employment. People not counted under labour force are students, retired persons, stay-at home people, people in prisons, permanently disabled persons and discouraged workers.
- h) **Work:** Work is defined as participation in any economically productive activity with or without compensation, wages or profit. Such participation may be physical and/or mental in nature. Work involves not only actual work but also includes effective supervision and direction of work. The work may be part time or full time or unpaid work in a farm, family enterprise or in any other economic activity.
- i) **Worker:** All persons engaged in 'work' are defined as workers. Persons who are engaged in cultivation of land or milk production even solely for domestic consumption are also treated as workers.
- j) **Main Workers:** Those workers who had worked for the major part of the reference period (i.e. 6 months or more in the case of a year) are termed as Main Workers.
- k) **Marginal Workers:** Those workers who did not work for the major part of the reference period (i.e. less than 6 months) are termed as Marginal Workers.
- l) **Work participation rate:** The work participation rate is the ratio between the labour force and the overall size of their cohort (national population of the same age range). In the present study the work participation rate is defined as the percentage of total workers (main and marginal) to total population.



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Findings of the Study

Study Area

The field investigation revealed the entire study area of the proposed project is Constructional project, where Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga is located at Varanasi, State-U.P. The study area details given below.

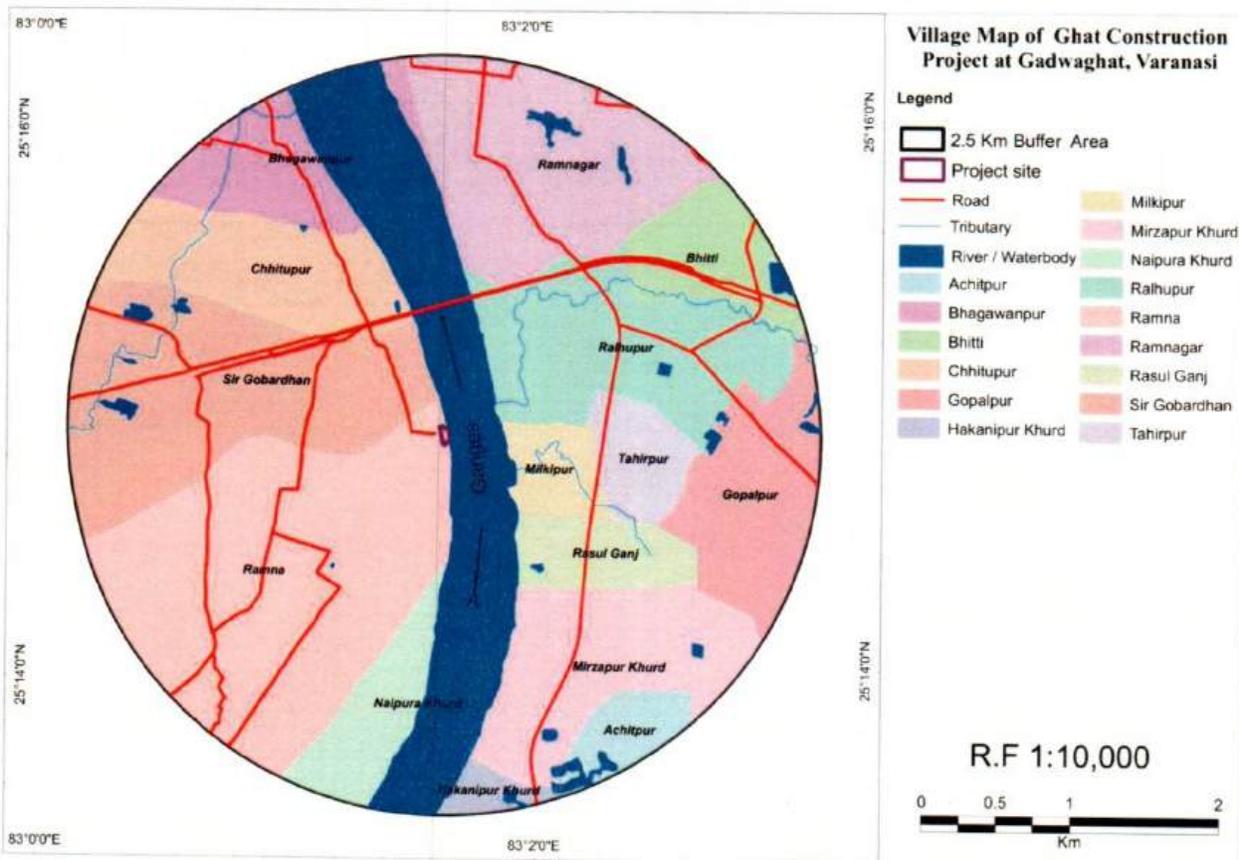


Fig. 3.3 – Village Map of Ghat Construction Project at Gadwaghat, Varanasi

Table 3.5 (i) Demographic Particulars of the Buffer area (10km)

S.No.	Description	Number	Percentage to Respective totals
1	Gender wise Total Population of the Study Area	59363	100
	Male	31266	52.66
	Female	28097	47.33
	Sex Ratio (No. of females per 1000 males)		898.64
2	Gender wise Total Population (0-6 age group)	7965	100



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	Male	4325	54.3	
	Female	3640	45.610	
	Sex Ratio of 0-6 age group population (No. of females per 1000 males)	841.61		
3	Total number of Households	9319		
	Average Household size in the Study Area as a whole	6.37		
	Highest Household size in the Study Area	6.49		
	Lowest Household size in the Study Area	5.50		
4	Total no. of villages in the study area	20		
	5	Total Population of Schedule Caste Community in the Study Area	6879	
		Male	3656	
		Female	3223	
Sex Ratio (No. Of females per 1000 males)		881.56		
6	Total Population of Schedule Tribe Community	6879		
	Male	3656		
	Female	3223		
	Sex Ratio of Schedule Caste population in Study Area (No. Of females per 1000 males)	881.56		
7	Total Literates in the Study Area	40613	100	
	Male	23620	58.15	
	Female	16993	41.84	
	Overall Literacy Rate in the Study Area	68.41		
	Male	75.54		
	Female	60.47		
	Gender gap in literacy rate	15.07		
8	Total Workers in the Study Area	18133	100	
	Male	14371	79.25	
	Female	3762	20.74	
	Overall Work Participation Rate in the study area	30.54		
	Male	45.96		
	Female	13.38		
	Gender Gap in work participation rate	32.58		
9	Total Main Workers in the Study Area	14571	100	
	Male	11969	121.73	
	Female	2602	17.85	
10	Total Marginal Workers in the Study Area	3562	100	
	Male	2402	67.43	
	Female	1160	32.56	



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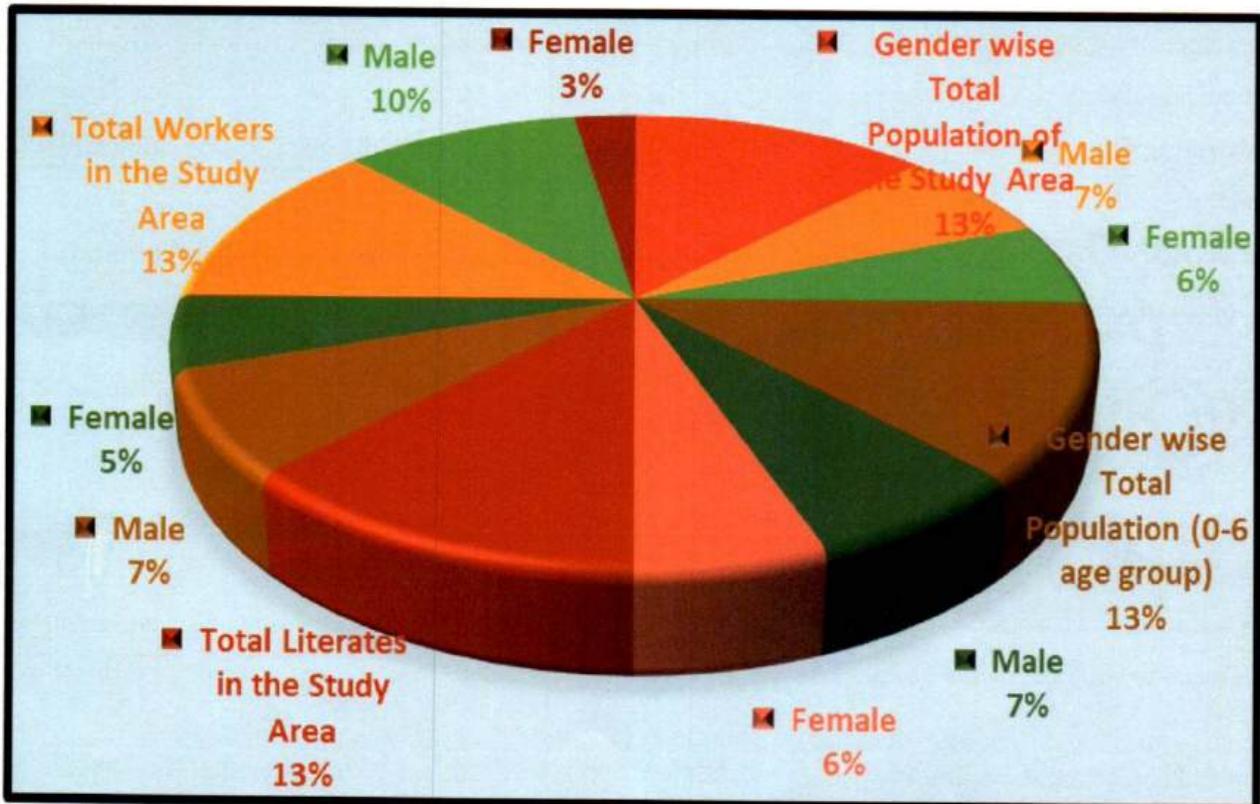
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11	Total Household Industrial Workers in the Study Area	785	100
	Male	660	84.07
	Female	125	15.92
12	Total Agricultural Workers in the Study Area	918	100
	Male	448	48.80
	Female	470	51.19
13	Total Cultivators in the Study Area	2669	100
	Male	1929	72.27
	Female	740	27.72
14	Total 'Other Workers' in the Study Area	9165	100
	Male	7961	86.86
	Female	1204	13.13

DEMOGRAPHIC COMPOSITION



The study area of the Garhawa Ghat project Varanasi covers 20 villages with a total population of 59,363 and a sex ratio of 899 females per 1,000 males. Literacy rate is 68.41% (male 75.54%, female 60.47%) with a gender gap of 15.07%. There are 9,319 households averaging 6.37 persons each. The workforce participation rate is 30.54%, predominantly male (45.96% male vs 13.38%



female). Major occupational groups include cultivators, agricultural labourers, household industry workers, and other worker.

Various amenities available in the study area are given below:

The villages in the Garhawa Ghat study area are served by basic infrastructure and public facilities, though availability varies between settlements. Key amenities include:

- **Education** – Most villages have primary schools, while middle and secondary schools are located within a few kilometers. Higher education facilities are available in nearby urban centers such as Varanasi city.
- **Healthcare** – Primary Health Sub-Centres and Anganwadi Centres are present in some villages; residents rely on Community Health Centres and private clinics in nearby towns for advanced medical services.
- **Drinking Water** – Hand pumps, tube wells, and piped water supply are the main sources of potable water.
- **Electricity** – All villages have access to electricity for domestic use, though supply reliability varies.
- **Communication** – Mobile network coverage is available in most areas; post offices are located in select villages.
- **Transport** – Approach roads are mostly unpaved (kachcha) within villages, connecting to nearby metalled (pucca) roads. Public transport is available from nearby hubs.
- **Markets and Banking** – Weekly markets (haats) and small retail shops cater to daily needs; banking facilities are available in larger villages or nearby towns.
- **Sanitation** – Household latrine coverage is improving under government schemes, but open defecation still occurs in some pockets.

Public Perception about the Project

Visit to project village has revealed that no villager was opposed to the proposed project. They whole heartedly welcomed it as they were disgusted with perennial poverty. They hoped that the upcoming project will definitely increase their income.



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CHAPTER III- DESCRIPTION OF THE ENVIRONMENT

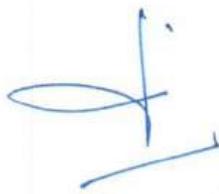
The villagers living in the distant villages located within the study area were found either not aware or partially aware of the upcoming project and they did not make any comment about its utility. They however demanded that labour intensive projects should be implemented in their area, to fight poverty.

Conclusion

The overall environment baseline data and analysis reveals that the aforesaid project of construction of garhawa ghat and development of destination tourism at left bank of river ganga in Varanasi is not disturbing the environment. Only while constructing the ghat, the air, water and soil parameters will be influenced by the ongoing constructional activity, and to mitigate the same various programmes like, plantation, water sprinkling will be done regularly at the site. In prospect of water environment, aquatic species will be taken care off from the activity. River Ganga water will be protected and conserved as much as can while constructing the Ghat.



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4.0 GENERAL

The "demand of ghats" at riverbeds, in the context of India, can refer to two main things: the need for more ghats for religious and cultural activities like bathing, prayers, and festivals, or the high demand for sand and other minerals from riverbeds for construction and infrastructure development. The former stems from the socio-cultural significance of ghats, particularly the Ganges, while the latter arises from the continuous growth of the construction industry and urbanization, creating a demand-supply gap for raw materials like sand.

All development projects have an impact on the natural set up of the environment. This impact may be beneficial or adverse, depending on the improvement or the deterioration it brings about in the status of air, water, land, ecology, natural systems, socio-cultural life styles and economics of the population. Depending on the nature of activities and baseline environment status, the impacts are assessed for their importance. On the basis of the impact analysis, the mitigating action and future monitoring requirement are focused in the Environmental Management plan for countering or minimizing the impacts.

Keeping in mind, the environmental baseline scenario as detailed in Chapter 3 and the proposed activity described in chapter 2, it is attempted to assess the likely impact and its extent on various environmental parameters and likely mitigation measures to be adopted. This Chapter provides a brief overview of the potential impacts on various environmental components due to the proposed activities. The construction and development operations in general cause environmental degradation and if adequate control measures are not taken to prevent/mitigate the adverse environmental impacts, these operations may cause irreversible damage to the eco- system.

Any human activity in any environment produces impact, modifying it to status which is considered adverse or beneficial according to damage or improvement it brings about in physical, chemical & biological status, the impacts are assessed for their importance. On the basis of impact analysis, the mitigation action is focused in the environmental management plan for counting or minimizing adverse impacts. Effects of this project on each of the environmental parameters are detailed below in accordance with the parameters of environment likely to be affected- Climate, Air environment, Land environment, Ecology, Water requirement, Noise levels, Soil, Socio-economic environment, Cultural & Heritage environment. Centrally the environment impacts can be categorized as either primary or secondary. Primary impacts are those which can be attributed directly to the projects. On



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the indirectly or induced typically include the associated investments & change patterns if social & economic by the proposed actions.

The proposed project shall be developed and constructed gradually in the time span of 1 years. In development phase, basic infrastructure facilities like internal roads, street lighting etc. shall be developed.

The impact identification and prediction process aims to:

- Identify potential source or cause of impact throughout the life of project.
- Characterize the potential impacts affecting a target or receptor (physical, human and socio-economic).
- Assess the potential of changing the likely-hood of impact through Environmental Management Plan (EMP).

4.1 POLLUTION SOURCES AND CHARACTERISTICS

The pollutants generated in the development of proposed project during both construction and operational phases are solid, liquid and gaseous in nature. Also, the generation of pollution could be continuous, periodic or accidental. The sources of pollutants and their characteristics during the construction and functional phase are mentioned in Table 4.1.

Table 4.1: Pollution Sources and Characteristics

S. No.	Activity / Area	Pollutant	Pollutant Characteristics	Frequency and Probable Impact
Development & Construction Phase				
1	Site Preparation, Construction of SuperStructure, development of road and other infrastructure	Air emission- PM ₁₀ , PM _{2.5} , SO ₂ and NO ₂	a. Dust from construction activities and excavation. b. Particulates matter, NO ₂ and CO from Vehicle exhaust	a. Temporary during construction phase only. b. Bulk of the emissions are expected from ground working and leveling activities.
		Earth / Solid waste	Solid waste from construction activity and excavation.	Periodic
		Noise	Noise generated from construction equipment machinery and vehicles	Temporary during initial construction phase
2	Labour welfare Camps	Sewage	Sewage generated from temporary labour camps on site	Temporary during the initial construction Phase (Mobile Toilets)
		Solid Waste	Solid Waste generated from temporary labour camps on site	Temporary during the initial construction phase



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potential environmental impact. The Potential Environmental Impact and their mitigation is mentioned in Table 4.2.

Table 4.2: Impacts during pre-construction phase

S. No.	Phase	Activity	Potential Environmental Impact	Mitigation Measures
1.		Soil investigation	Negligible	-
2.		Site fencing (putting boundary, hoarding etc.)	Dust generation from prefatory work of fencing.	Temporary during pre-construction phase only.
3.	Pre Construction		Iron nails and aluminum scrape from fence. Temporary loosening of soil due to putting pillars to support temporary structure (site office).	Aluminum sheets shall be used, thus no scrape shall be generated and the site shall be clean at the same time. Dig soil shall be refilled to support pillars.

B) Impact identification matrix during construction and operation phase

Various activities from the proposed scheme are likely to have some impacts on the environmental constituents during its construction as well as operational phase. The impact assessment matrix is mentioned in Table 4.3 reveals the impact associated with each activity of the project on various environmental parameters during construction and operational phase respectively before any mitigation measures are implanted.

Table 4.3: Impact Matrix

Environmental Parameters	Nature of Potential Impacts during Construction and Operational							
	Local	Regional	Short Term	Long Term	Reversible	Irreversible	Adverse	Beneficial
Topography	√							
Drainage	√							
Soil	√							
Water Resources	√	√	√		√		√	
Water Quality	√			√				
Land Use	√			√		√		√
Air Quality	√	√		√	√		√	
Noise	√	√			√		√	
Flora	√					√		√



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Fauna	√					√		√
Employment	√	√		√		√		√
Aesthetic	√	√		√		√		√

C) ANALYSIS OF IMPACTS DURING CONSTRUCTION PHASE

4.2.1 Land Environment

This is the construction of proposed project “GARHAWA GHAT” so there shall a land use and cover change from nearby riverbed waste land to tourist spot. There are shrubs present on the site thus no removal is required. The development of green area is proposed for the same details are given in chapter 8. No major impact is anticipated on land use of the project site. The average land elevation levels are shown below. There is no any basements construction and excavation shall be carried only for construction of Ghat.

Mitigation Measures

- C&D waste will be reused as much as possible and rest will be sent to the C&D waste site.
- Lubricating waste oil and waste paints will be collected separately in drums and handed over to the authorized outside agency.
- To avoid any spillage of materials during road construction, machinery & material used will be covered. Service installation will be done with precautionary measures to avoid any spillage on the soil.
- Procedures for maintenance of equipment would ensure that this risk is minimized, and clean-up response is rapid if any spill occurs. Lubricating waste oil will be collected separately in drums and handed over to the authorized agency.
- Procedures for maintenance of equipment would ensure that this risk is minimized, and clean-up response is rapid if any spill occurs. Lubricating waste will be collected separately in drums and handed over to the authorized outside agency.
- Regular Maintenance of vehicles would ensure that this risk will be minimized, and clean-up response is rapid if any spill occurs.
- Biodegradable waste will be sent to an authorized vendor for disposal at a municipal landfill site. Waste water generated from the site during construction phase will be treated in the existing STP. Mobile toilets for construction labours will be provided which will be cleaned regularly and hygienic conditions will be maintained at site. No untreated wastewater will be disposed off on the soil.



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- Solid and other wastes from the project will be properly collected, stored and disposed as per the Solid Waste Management Rules, 2016. An integrated solid waste management plan will be implemented to avoid land nuisance.

No adverse impact is anticipated on land use of buffer zone due to present mining operations. As all the related activities are confined to the core zone.

The area likely to be degraded due to quarrying, pitting & roads. The impact on the land form or physiography will be limited to the modification of the slope. The landscape and land use will undergo a radical change due to open cast mining.

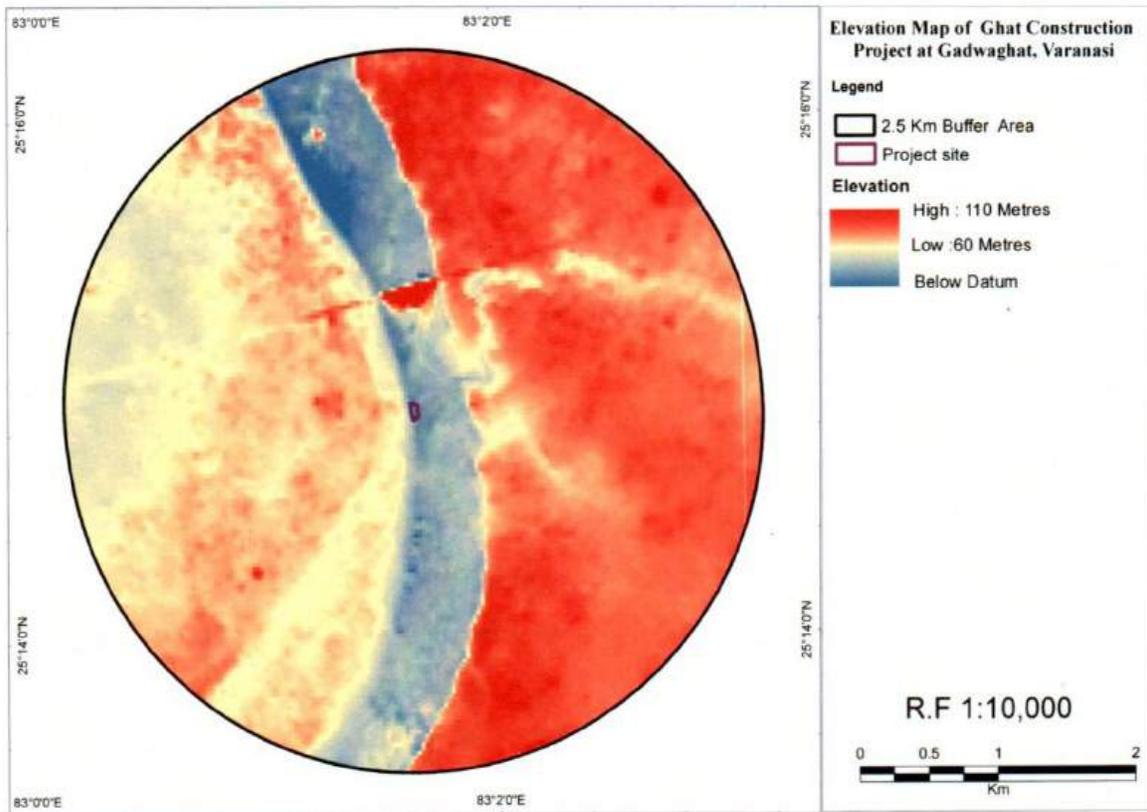
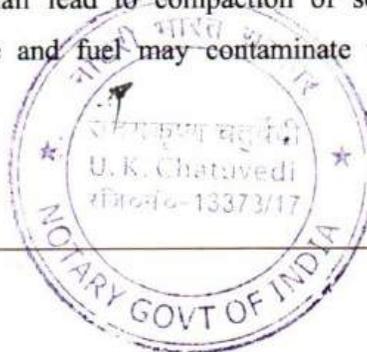
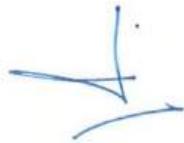


Fig 4.1 Elevation Map of the Study Area

4.2.2 Soil Environment

The soil shall be excavated for construction of ghat due to which top soil may get impacted. The excavation may also lead to soil erosion and loss of soil layer. The movement of construction vehicles and equipment shall lead to compaction of soil. The spillage of construction materials like paint, grease and fuel may contaminate the soil. Due to an



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improper disposal of solid waste & liquid waste includes the leaching from biodegradable waste and effect on flora from spillage of waste on soil. Also, soil if disposed in improper on unscientific manner may impact the soil quality, air quality and water quality of the area significantly. The mitigation measures are required to be taken to prevent the soil pollution which are mentioned below:

Mitigation Measures

- The top soil shall be stripped from excavation areas (app 15 cm) and stock piled in covered condition for later reuse in landscaping in covered sheds.
- No excavation works or tree cutting, or vegetation removal works shall be undertaken during rainy season.
- The remaining soil shall be stored separately from top soil and shall be used for filling the site, construction of roads, medians and pavements.
- The site shall be cleaned on daily basis. The debris and loose raw material shall be stored on the paved surfaces in covered condition.
- The entry to this area shall be restricted and only authorized and trained person shall be allowed. These drains shall be provided with oil & grease trap also to prevent mixing of oil with the site run-off.
- The dustbins shall be provided at the site and labour camp area for collection of the waste.
- The municipal waste from labour camp and site shall be collected and disposed of through local agency in area on daily basis.
- The waste water from site shall be disposed through soak pits.
- The construction debris shall be collected and segregated into reusable, recyclable and reject fraction. Reusable material shall be stored at the site in covered condition, recyclable material shall be sold to the vendors and reject shall be disposed of as per the guidelines of C& D Waste Management & Handling Rules, 2016.
- The temporary roads shall be provided for movement of the vehicles within the project site. The vehicle shall move on the routes designated. The parking space shall be provided within the project site for trucks and cars. So as there is no soil compaction due to vehicular movement and parking in all the areas within the site.



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4.2.3 Water Environment

This section describes the potential impacts of project and mitigation measures on water environment during the construction and operation phase. The water shall be required for domestic purpose of construction workers and staff and for carrying out construction activities. Total 15 labours shall be employed on a daily basis. The labour camps shall be provided within the site. The utilization of water may impact the water demand of the vicinity. The construction shall be continued for 1 years, thus the impact is anticipated to be short term. Also, there shall be generation of waste water from the Toilets in operation phase.

Mitigation Measures

- No ground water shall be extracted.
- The workers shall be educated to use water wisely and do not leave the taps open without use. Written notice shall be displayed near the water taps for saving water & closing the taps.
- The waste water generated shall be disposed through soak pits.
- The water supply and sanitation facilities shall be made available at labour camp and other areas at site.
- All necessary measures shall be taken to save water.

Surface Water Quality- The surface water shall not be used for construction phase, as the surface water body Ganga River is present at the vicinity of the project site. The water for construction shall be purchased from private tanker suppliers.

During Construction Phase, the impact on water environment is in two ways:

- Use of water
- Discharge of wastewater

Construction activities for the project can have non-significant impact on the water environment. Potential impacts on the surface and ground water quality have been discussed as under:

Wastewater from Site Development and Construction Activity: Wastewater generation during site development and construction like from the construction areas, stockpiles of construction materials and wastes, etc. mainly containing high suspended solids.

Wastewater Generation from Site Workshop: The repair and maintenance of construction equipment's/ transport vehicles, and washing of vehicles on-site may also generate wastewater containing oil and grease though only in minimal quantities as normally these



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activities are not undertaken on-site). Toilets and Washing area: Domestic wastewater is generated from the temporary Mobile toilets, washing areas, drinking water points, etc. constructed for the construction workers and other staff on-site.

Mitigation Measures:

Substantial quantities of water would be used in the construction activities to meet the domestic requirement of construction personnel.

Under good construction practices, construction wastewater shall be collected in construction pits and reused in construction activities e.g. wastewater from stone cutting, cleaning, curing, etc. Thus, no significant impacts are expected on water quality in the project area due to generation of this wastewater. The impact of the surface runoff (from the stockpiles, construction areas, etc.) is not expected to be significant except during the rainy season. To mitigate any impacts, soak pits (for collection and reduction in the runoff). It would be ensured that construction materials and wastes stockpiles are moved on a periodic basis to prevent any stockpiles. Regarding the construction workers, employment preference would be given to local construction workers of the nearby areas. Thus, no major settlements i.e. any labour camps/colonies, etc. would be established on-site. Temporary offices would be constructed at the site for the office staffs only and hence there would be minimal domestic wastewater generation, which would be treated through conventional treatment methods like soak pit etc.

- Toilets shall be provided at the construction site and labour camp site.
- Waste material, lose construction material fuel, paints, emulsions and such raw material shall be stored on paved area only in covered condition.
- Oil spill kits shall be provided at the project site for cleaning the spills, if any.
- Measures shall be taken to prevent their spillage and mechanism for immediate clean-up shall be developed in case of spillage.
- Proper waste management system shall be followed at site for municipal waste, hazardous waste and e-waste management.
- Proper drainage shall be provided for collection of wastewaters from construction site, to avoid stagnation of water.
- Ground water resources are proposed to be augmented by artificially recharging ground water aquifers through collected rainwater from site.



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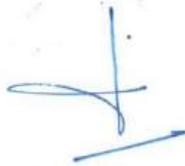
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4.2.4 Air Environment

The Air quality will get impacted in the area during construction phase due to various project activities including site preparation, excavation and filling, transportation and storage of raw materials & debris, movement of construction vehicle, Operation of construction machinery & equipment set. All these activities have potential to generate fugitive dust emissions. Majorly pollutants will be dust, SO₂, NO₂ & CO. construction equipment/machinery and vehicles may also generate the exhaust which affects the air quality of the area. The increased PM level and dust generation may cause respiratory problems to the workers and other people in the area. Spillage of Diesel, used oil, chemicals may result in emission of VOCs in the air environment which will cause irritation in eyes, nose and throat, difficulty breathing and nausea. The impact of increased emission shall impact most the particulate matter concentration in the area. Thus, measures shall be taken to overall reduce the emissions due to the project to minimize impact on air quality. Suggestive mitigation measures are mentioned below.

Mitigation Measures

- Transportation of raw material and debris shall be done in vehicles covered with tarpaulin cover.
- Raw materials/debris/excavated muck shall be properly stacked and stored under covered conditions at designated areas/storage yards. Debris/muck shall be regularly removed from the site for regular storage/disposal.
- Locally available raw material shall be preferably used.
- Temporary connection of electricity shall be taken for operation of machinery/equipment and lighting at site.
- Water sprinkling shall be carried out at casting & storage yards, construction site, loading & unloading area, approach road, haulage road, raw material storage area and muck disposal sites. Flow rate of water sprinklers should be maintained to minimize the run-off and for effective results.
- Adequate parking area shall be provided for vehicle for loading & unloading so as to prevent parking on the road and causing traffic jams and congestion.
- Precautions w.r.t air pollution control as stipulated in IS: 5121 "Safety code for Piling and other Deep Foundation" should be adopted.
- Storage of raw materials like cement, sand, soil etc shall be done in covered sheds or should



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be covered by tarpaulin cover.

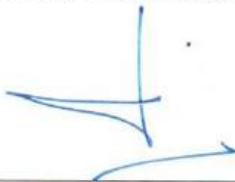
- Vehicles and equipment shall be regularly serviced and maintained.
- Green belt development shall be started at the site during construction phase only.
- Construction workers shall be provided with mask.
- Vehicles entering the site shall be checked for PUC certificates.
- Barricading the site shall be done for suppression of dust generation.
- Covering the scaffolding shall be done to minimize dust generation.
- Temporary road shall be constructed and sprinkled with water for dust suppression.
- Separate storage area with barricading for C&D waste management shall be provided. C&D waste shall be handled as per the Construction and Demolition (C&D) Waste Management Rules, 2016.
- However, the impacts will be temporary in nature. Existing green cover in the operational phase shall be instrumental in reversing the impacts of the dust generated in the construction phase. Plants for the site will be selected that are effective in air pollution attenuation. It is also important to note, that with the existing air quality in the study area is exceeding the NAAQS norms. Hence, any construction activity will only add to the existing levels. With strict adherence to the suggested mitigation measures, the impacts can be minimized.

A) Air Modelling

The proposed project includes various activities material handling and transport of Construction materials, excavation of underneath soil. These operations generally result in generation of dust and thereby pose health hazards. However, it is proposed that adequate control measures will be provided at every stage of operation such as, water sprinkling at loading, unloading points and on haul roads before transportation to reduce the fugitive dust emissions.

The air borne particulate matter (PM10 & 2.5) generated by transportation is the main Respirable air pollutant. The emissions of Sulphur dioxide (SO₂), Nitrogen Oxides (NO₂) contributed by vehicles plying on haul roads will be marginal. Prediction of impacts on air environment has been carried out taking into consideration proposed production and net increase in emissions.

In general, during constructional and operational phase there is generation of substantial quantities of airborne Respirable dust, which leads release of huge amount of dust. These air



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borne dust particles, generally below 100 micron in size, are nuisance particulates and cause health hazards as an ill effect of project activities. Extraction activities like material handling and transport are a potential source of air pollution. Therefore, a detailed study on emission sources and quantification of pollutant concentration by means of dispersion modelling is required to assess the environmental impact of the project activity. On the basis of the predicted increments to air pollutant concentrations, an effective mitigation and environmental plan can be devised for sensitive areas. The air borne particulate matter generated by heavy vehicles used for transportation of constructional materials and the machineries at the project site are the main source of air pollutant. The dumpers and HEMM will emit smoke and noxious gases and un-burnt hydrocarbons.

The emissions of Sulphur dioxide (SO₂), Oxides of Nitrogen (NO₂) contributed by diesel operated excavation/loading equipment and vehicles plying on haul roads are marginal. Prediction of impacts on air environment has been carried out taking into consideration proposed production and net increase in emissions.

Water tankers with spraying arrangement will be used for regular water sprinkling on the approach roads to ensure effective dust suppression. The vehicles will be well maintained so that exhaust smoke does not contribute abnormal values of noxious gases and un-burnt hydrocarbons.

The prediction of Ground level concentrations (GLC) of pollutants emitted from the activities will be carried out using ISCST-3 Air Quality simulation model released by USEPA. This model is basically a Gaussian dispersion model, which considers multiple sources. The model accepts hourly meteorological data records, to define the conditions of plume rise for each source and receptor combination for each hour of input meteorological data sequentially calculates short term averages up to 24 hours.



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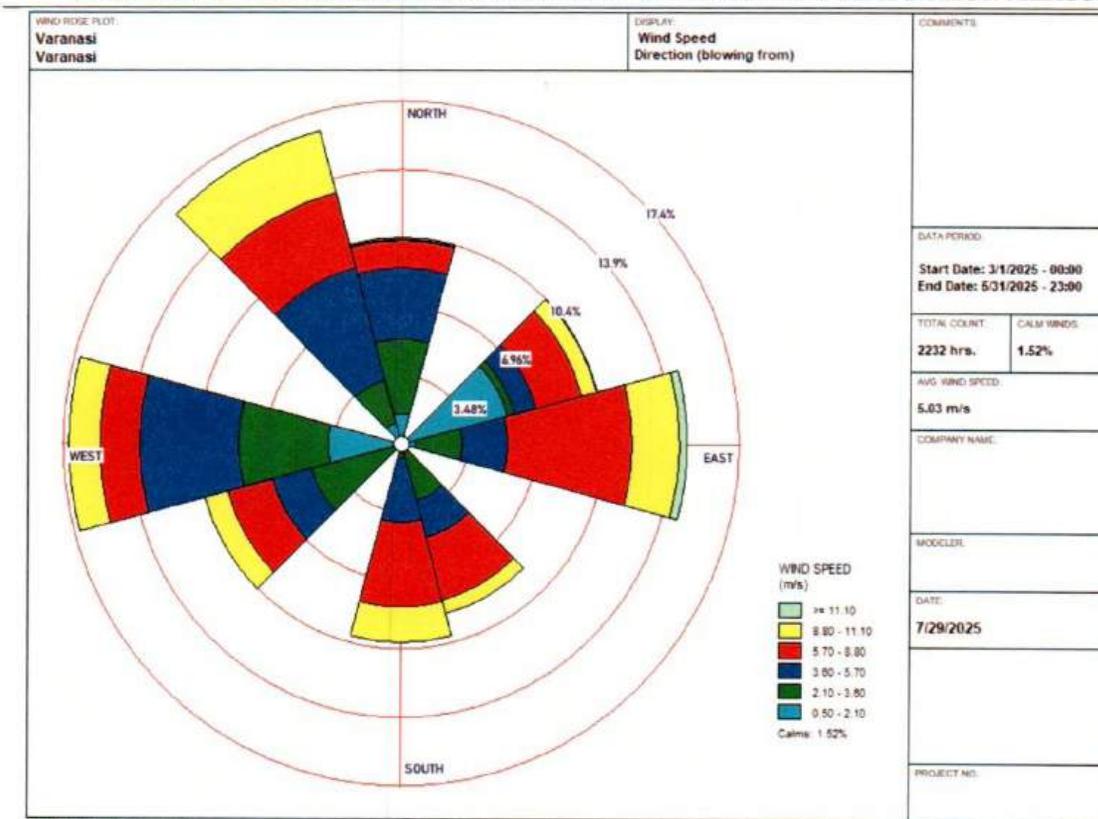


Fig 4.2 Windrose of the project area

Air Pollution Impact Prediction through Dispersion Modelling

Prediction of impacts on air environment has been carried out by employing Industrial Source Complex Short Term (ISCST3) dispersion model.

The ISC area source model is used to simulate the effects of fugitive emissions from sources such as storage piles and dumps. The ISC models use a numerical integration approach for modelling impacts from area sources. The ISC models accept rectangular areas that may also have a rotation angle specified relative to a north-south orientation.

The dust dispersion modelling requires the following data:

- Micro – meteorological data
- Mining data
- Dust concentration data
- Micro - meteorological data

Meteorological parameters



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The hourly meteorological data recorded at site for the period from March to May 2025 covering pre-monsoon season is converted to the mean meteorological hourly data as specified by CPCB and the same has been used in the model. The mean meteorological data recorded at the site has been used for the modelling. In absence of site-specific mixing heights, mixing heights published in IMD Publication “Atlas of Hourly Mixing Height and Assimilative Capacity of Atmosphere in India” by S.D. Attri, Siddhartha Singh, B. Mukhopadhyay, and A.K. Bhatnagar (2008) has been used. Each one of the operations is, in turn, divided into various different activities, that depend on the technologies used. Each activity is an emission source. The Table below shows the emission factors considered for modelling exercise.

Table 4.4 -Emissions

Activity type	Emission
Mineral loading	5.5 x 10 ⁻⁵ kg PM10/t
Mineral unloading	3.4 x 10 ⁻⁵ kg PM10/t
Mineral Transportation	1.74x 10 ⁻⁴ kg PM10 VKT

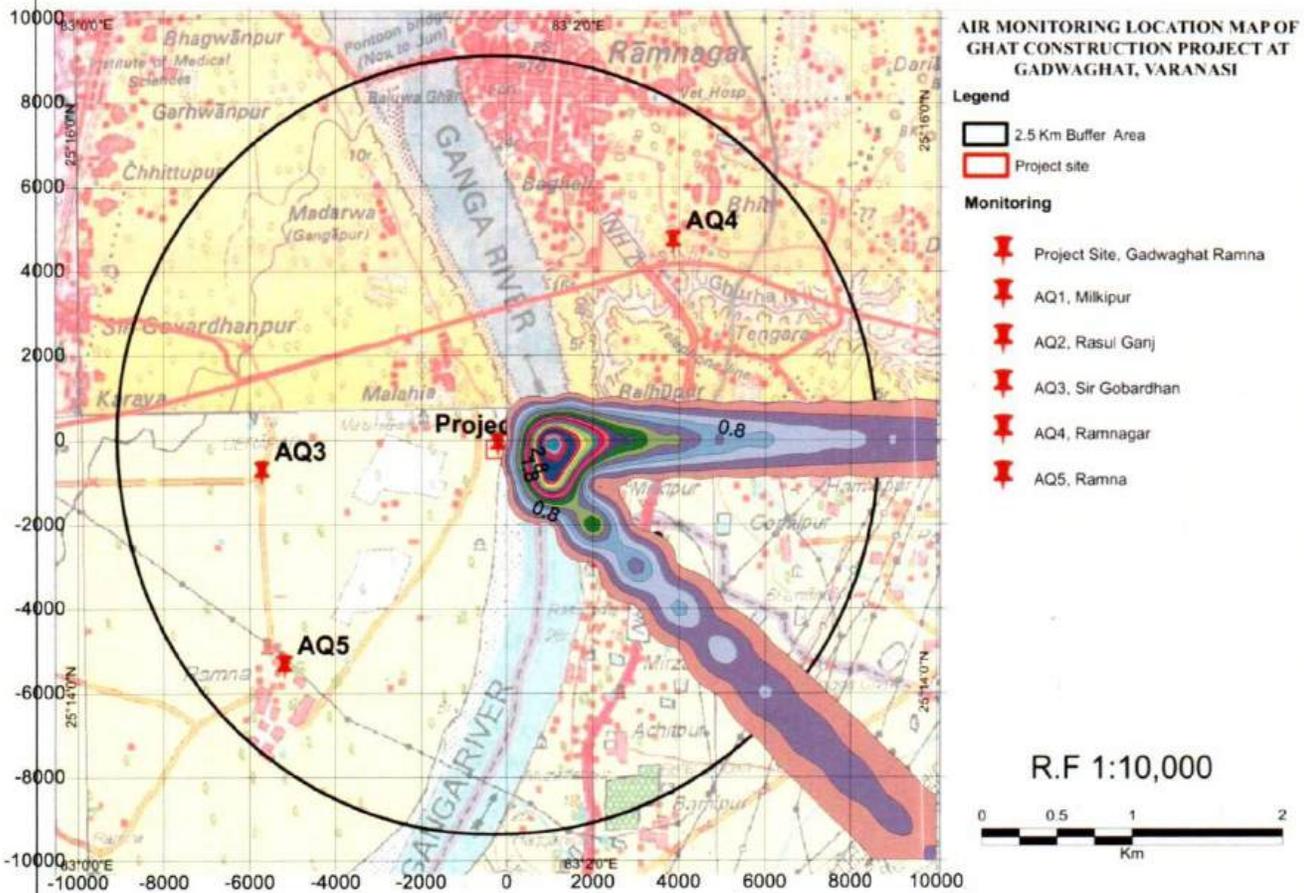


Fig 4.3 Isopleth of PM 10



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Emission was calculated with the help of emission factor calculated by formula given below

$$E=TP \times EF$$

Where E= Emissions (tons/year)

TP= Annual Throughput

EF= Emission Factor

After processing of area source data in ISCST3, Isopleth for fugitive dusts (Line Source + Area Source) is generated, this is presented in Figure 4.3

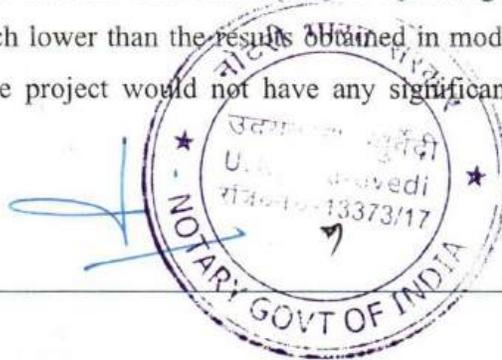
Table 4.5 -Incremental GLC for the Study area

Locations	Location	Distance	Direction	Background value (98 percentile) in $\mu\text{g}/\text{m}^3$	Incremental GLC in $\mu\text{g}/\text{m}^3$	Total Predicted GLC in $\mu\text{g}/\text{m}^3$
AAQ1	Project Site	0.73	SE	93.97	1.45	95.42
AAQ2	Rasul Ganj	0.98	NW	84.39	0.65	85.04
AAQ3	Sir Gobardhan	1.51	E	91.92	1.23	93.15
AAQ4	Ramnagar	1.73	NE	86.60	0.98	87.58
AAQ5	Ramna	1.99	SW	88.57	0.87	89.44

ISCST3 - Model was used for prediction of impact of PM10 during conditions i) Loading/unloading and ii) transportation of ore by trucks on roads by using area source model to predict GLC of PM10 during these conditions. Prediction was made with emission values due to loading / unloading and transportation of Construction material by trucks on haul road. Total max. predicted 24-h maximum GLC of PM10 at project site was 95.42 $\mu\text{g}/\text{m}^3$ occurred at the project site after superposition of base-line value 93.97 $\mu\text{g}/\text{m}^3$ over the incremental 1.45 $\mu\text{g}/\text{m}^3$ due to combined impact of loading and unloading and transportation over the haul road. Meteorological data under worst case scenario.

Conclusion

- From the results of ISCST3 model, it is concluded that the maximum cumulative concentrations of PM10 and PM2.5 will not meet the prescribed standards; whereas the maximum cumulative concentrations of NO2 and SO2 due to project is expected to be comply with the prescribed NAAQ standards.
- It is expected that during other seasons and under normal operating conditions, the concentration values will be much lower than the results obtained in modelling. Hence, it can be safely concluded that the project would not have any significant impact on air



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quality in the project region.

- The impact due to vehicular emission in project would be negligible.

Mitigation Measures

The following mitigation measure are proposed in order to prevent any planned / unplanned accidental impacts on air quality –

- The emissions from the stacks shall be monitored regularly for concentration of PM10 and PM2.5, SO2 and NO2. Sampling port shall be provided according to CPCB guidelines.
- Increased vegetation in the form of greenbelt is one of the preferred methods to mitigate air and noise pollution. Plants serve as a sink for pollutants, act as a barrier to break the wind speed as well as allow the dust and other particulates to settle on the leaves. It also helps to reduce the noise level at large extent.
- Adequate footpaths and pedestrian ways would be provided at the site to encourage non-polluting methods of transportation.
- During construction, vehicles will be properly maintained to reduce emission. As it is an institutional project, vehicles will be generally having "PUC" certificate.

4.2.5 Noise Environment

The source of noise during the construction phase of project shall be from operation of construction machinery such as bull dozer, dumpers, back hoes, loaders, JCBs, concrete mixers, etc. Also there shall be noise generation from movement of vehicles carrying material, loading & unloading activities, demolition of existing structures, etc. However, magnitude of the impact shall depend upon the type and nature of the machinery, time schedule of operations, construction method and management practices followed during activities. The noise generation along with vibration may cause mental & physiological effects like annoyance, headache, auditory impact, and increase in heartbeat of elderly people on construction labours & nearby people. The noise levels generated during various stages of construction and due to construction machinery are mentioned below in Table 4.6.

Table 4.6 - Noise Level during various construction phase activities and from construction machinery

S. No.	Equipment	Noise Level in dB(A) 50 ft (15 m) from source
1.	Air compressor	81



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2.	Tower crane	88
3.	Concrete mixer	85
4.	Concrete vibrator	76
5.	Dozer	85
6.	Jack hammer	88
7.	Back hoe	80
8.	Transit mixer	85
9.	Concrete pump	82
10.	Vibro roller 3T	74
11.	Crusher	85
12.	Paver	89
13.	Pneumatic tool	85
14.	Drill (pavement breaker)	98
15.	Truck	88
16.	Generator	81

According to the Table 4.6, the noise level caused by the construction machinery, and trucks, etc in the distance of 15 m will be in the range of 80-81 dB (A). It is evident from the above table that operation of construction machinery & equipment will generate high noise levels due to which it may affect the health of construction labour and nearby residents if the adequate mitigation measures are not taken. Highest noise level during construction phase may reach up to 81 dB (A).

Estimations are also made to calculate the distance at which the sound levels will attenuate to the acceptable noise levels as defined by CPCB in Noise Rules, 2000. Standard sound wave propagation equation is used to calculate the noise levels at receptor and the equation is mentioned below.

$$\text{Noise (receptors)} = \text{Noise (source)} - 20 \text{ Log} [\text{distance (receptor)}/\text{distance (Source)}]$$

For purpose of calculating noise level using above equation, flat terrain is considered and environmental attenuation factors are not considered so as to formulate the worst- case scenario. This distance is required when no noise shield, buffer or absorbent is used. When barricading of boundary wall and the green belt are used, the distance required may reduce significantly. The boundary will be constructed all around the project site at the initial stage, also sufficient temporary green belt will be developed at the project site. Also, minimum distance which is required for each type of land use as defined CPCB under Noise Rules, 2000 is calculated and is mentioned in Table 4.5.



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Table 4.7: Minimum Distance Required from Different Land Use (Pre-construction phase) to Achieve Prescribed Noise Levels as Per Noise Rules, 2000

Zone	Receptor Noise level dB (A) as per CPCB	Minimum Safe Receptor Distance (m)
Residential	55	622
Commercial	65	197
Industrial	75	63
Silence	50	1107

Proposed mitigation measures for minimizing noise levels from the site are mentioned below.

Mitigation Measures

- All the construction machinery and equipment used shall be provided with adequate noise mufflers and noise suppression equipment. Proper lubrication and maintenance of the machinery & equipment and vehicle will be carried out to minimize the noise generation due to abrasion
- All noisy activities should be carried out during daytime only (9:00 AM to 10:00 PM). No noisy works shall be undertaken during night time.
- Activity area shall be barricaded. Barricading helps to lower the noise levels. GI sheet barricades will be used for reducing the noise as well as for controlling dust spread.
- Self-compacting concrete will be used in place of consolidating the concrete by means of vibrators or hand consolidation due to which there will be minimal or negligible noise and vibration generation
- Temporary noise shields shall be provided all around the heavy noise making activities.
- Noise level from loading & unloading of material will be reduced by usage of various types of cranes & placing material on sand or sandy bag beds.
- Noise monitoring shall be carried out to ensure the effectiveness of mitigation measures and develop a mechanism to record and respond to complaints on noise.
- Adequate parking space will be provided at the project site to minimize the honking requirement due to congestion and jams and restricting the speed limits.
- Job rotations will be practiced for workers, working in noisy environment.
- Protection devices (earplugs or earmuffs) shall be provided to the workers operating near high noise generating machines.



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OSHAS guidelines shall be followed for maintaining noise exposure levels of the construction workers. As per occupation standards, workers' exposure to 90 dB (A) noise level should not be more than 8 hours. OSHAS guidelines shall be followed for exposure to specific noise levels for workers and are listed in Table 4.8.

Table 4.8: OSHAS Noise Exposure Limits for the Work Environment

Noise Levels in dB(A)	Permissible Exposure (hours & minutes)
85	16 hrs
90	8 hrs
96	3 hrs 30 minutes
102	1 hr 30 minutes
108	40 min
115	15 min
121	6 min
127	3 min
130	1 min

Source: Marsh, 1991, p.322

4.2.6 Ecology & Biodiversity

The baseline flora and fauna has been depicted in Chapter-3. The development without impacts might not be possible; however efforts should be done to mitigate them through proper management strategy. The project site is free of nesting, roosting, and foraging habitat of wild animals, hence no impacts on the displacement of the fauna from the project. The construction activities generate dust and this dust when get settled on leaves may impact the photosynthesis capacity of the plants. Also, Vehicular emission like NO₂, NO etc. can inhibit the growth of plants and pre-mature leaves senescence. Due to the noise generation fauna may get disturb resulting in their relocation and thus reducing the biodiversity of an area. Thus, the measures shall be taken to minimize the impact as mentioned below:

Mitigation Measures

- Construction sites, casting yards, storage yards etc. shall be regularly sprinkled with water for dust suppression.
- Barricading will be done all around the project boundary to reduce noise and dust.
- No debris/construction waste shall be disposed-off in any water body in the area or any other vegetated land.
- Workers and staff at the site shall be clearly instructed about not harming any animal or bird or removing vegetation or cutting any tree for any purpose from the nearby area.



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- Entire activity area shall be barricaded so as to prevent trespassing of any animal.
- No toxic or poisonous substance shall be stored in open which can be consumed/spilled by any fauna.
- Greenbelt will be developed. (Details are given in Chapter 2 & 8)
- Suppression of dust by sprinkling of water twice a day depending upon weather conditions.
- The project site is in the designated land-use, hence birds and other domesticated biodiversity are already adapted to the habitats. Though the increase in noise level due to movement of vehicles and construction workers may affect the fauna species. Following mitigation measures are proposed-Regular maintenances of the vehicles to reduce the noise & Noisy construction equipment shall not be used at night time.

Greenbelt Development details are given in Chapter 8 of EIA Report.

➤ **Criteria for Plants /Trees Species Selection for Greenbelt Development:**

- Having tolerance to dust pollution.
- The trees should provide shade.
- Trees less affected due to pruning should be given preference because pruning will yield fuel wood.
- Every plant species to be planted in the green belt should have some basis for its selection to be planted in the greenbelt.
- Only local species will be taken for plantation.
- The species should be fast growing and providing optimum penetrability.
- The species should be wind-firm and deep rooted.
- The species should form a dense canopy.
- As far as possible, the species should be indigenous and locally available.
- Species tolerance to air pollutants like particulate matters should be preferred.
- Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces.
- Soil improving plants (Nitrogen fixing rapidly decomposable leaf litter).

Post Plantation Management

Watering will be done immediately after plantation. Further watering will depend on the rain while during dry seasons watering will be regularly done at least twice a week. Saplings will



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be regularly monitored and remedial actions will be undertaken as required. During this 1 year period, casualties will be replaced at the beginning of each monsoon.

4.2.7 Socio – Economic Environment

The term development is defined as the process of creating something more advanced; a more advanced product on land, including the air above it and the ground below it, and any buildings or structures on it. It is also referred to as realty. It covers residential housing, commercial offices, trading spaces such as theatres, hotels and restaurants, retail outlets, industrial buildings such as factories and government buildings. The project development involves transportation of material and construction activities. Construction activities have their impacts on surroundings like unpleasant view, increased traffic, increased noise, emissions, waste generation & piling of waste etc. All these have impacts on the society. However, construction phase will generate employment options for skilled and unskilled labour. Following the measures should be taken to minimize the negative impacts on existing society.

Mitigation Measures

- Mitigation measures proposed for pollution control shall be adequately followed.
- Hygienic conditions shall be maintained at site by provision of dustbins at site for collection of waste, regular cleaning of site, provision of toilets at site, regular disposal of construction spoils, avoiding stockpiling of construction material at site etc.
- Barricading the site shall be done to obstruct the unpleasant view.
- Clean drinking water facility shall be provided for construction labour.
- Dustbins shall be provided at site for collection of waste and workers shall be made aware for using the dustbins.
- Municipal waste shall be disposed of through local agency in the area on daily basis. Construction material shall be disposed of regularly.

The construction activities involve various risks for construction labour like slip, fall, fire, collapse of structure etc. The accidents at construction site can be fatal not only for workers but for the residents of nearby areas. Following are the occupational health & safety management plan which shall be followed to minimize the impacts on socio-economic environment:

- Provision of PPE to the workers like helmets, safety jackets, masks, ear plugs, gum boots etc.
- Adequate illumination should be provided at site and in labour camps, if any.
- LPG shall be provided as fuel and no open burning of fuel should be carried out at site.



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- Quality supervisor shall be available at site to ensure the quality of raw material and the structures constructed.
- EHS supervisor shall be deputed at site to ensure the healthy and safe environment at workplace.
- Workers shall be given training at the site for safety for handling the construction material and equipment.
- Cautionary notice shall be provided for safety and no entry in areas associated with the risks.

4.2.8 Solid & Other Waste Management

Solid waste expected to be generated during construction phase will comprise of excavated materials, used bags, bricks, concrete, MS rods, tiles, wood etc. Quantification of construction waste material is mentioned in Table 4.8. Apart from this some quantity of municipal waste may also generate from labour camps. This waste is required to be collected segregated and disposed in manner that it does not mixes or polluting air, water and soiling environment. Measures for management of soil waste are listed below:

Table 4.9: Quantification of construction waste material

Non-Hazardous				
S. No.	Type of Waste	Quantity	UoM	Disposal System
1	Metal Scrap	10	Mt/M	Govt. Approved Recyclers
2	Wooden Scrap	10	Mt/M	
3	Plastic Scrap	10	Mt/M	
4	Corrugated Box	10	Mt/M	
Hazardous and Other				
S. No.	Type of Waste	Quantity	UoM	Disposal System
1	Used Oil	250	Ltr/M	Send to Authorized Re-processor
2	E-Waste	2	Mt/M	
3	Used Chemical Containers	250	Nos/M	CHWTSDF

At the project site, different kinds of waste will be kept in separate bins with appropriate label and directions. Construction debris is bulky and heavy. Thus, re-utilization is an important strategy for management of such wastes. Construction and Demolition Waste Management Rules, 2016 will be followed. C & D waste basically comprises concrete and masonry. Recycling of this waste by conversion to aggregate can offer benefits of reduced landfill space and reduced extraction of raw materials for new-construction activities. This is particularly applicable to the project site as the construction is to be completed in a phased



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manner. No unauthorized waste dumping will be allowed outside the project site. Waste will be disposed through authorized recyclers only. Hence, impacts from the construction wastes will be localized and temporary which will be made insignificant by following a well-designed Waste Management Plan.

Recyclable wastes such as plastics, steel scraps, roofing etc. shall be sold to authorized recyclers. The use of the construction material basically depends on their separation and conditions of the separated material. A majority of these materials are durable and therefore, have high potential of reuse. It would however, be desirable to have quality standards for the recycled materials. Construction wastes can be used in the following manner:

Impacts Prediction

- Construction waste materials like cement bags, steel in bits and pieces and packaging materials etc. generated will decrease the aesthetic value of the site, dust emissions and an unhygienic environment.
- Discarded paint containers, chemicals and other materials will be generated which may cause harm if they come into contact with workers.
- Wastes during storage of material will be generated that may decrease the aesthetic value in the area and will create nuisance among people.
- Waste generated from construction machinery including waste oil, grease, sludge and any other may cause nuisance if not maintained properly.
- Improper storage and disposal of biodegradable waste will enhance the risk of microbial contamination, population, will enhance the risk of disease occurrence and cause foul smell. It will attract the vectors.

Mitigation Measures

- Dust bins shall be provided at site for collection of municipal waste. Municipal waste shall be handed over to local authority on daily basis for disposal.
- Construction debris is bulky and heavy and re-utilization and recycling is an important strategy for management of such waste. As concrete and masonry constitute the majority of waste generated, recycling of this waste by conversion to aggregate can offer benefits of reduced landfill space and reduced extraction of raw material for new construction activity.
- There will be generation of small amount of C&D waste during site cleaning which will be stored in covered yards. Construction waste will be segregated into inert, recyclable/reusable



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and discarded material. Majorly waste will be used within the site for site levelling and construction of roads. Recyclable material will be sold to authorize dealers. Re-usable material will be stored under covered conditions at site and reject will be disposed off at the designated locations by local body. C&D waste management rules 2016 will be followed.

- Waste storage shall be done on paved surface and covered area only.
- Waste carrying vehicles shall not be overloaded and shall be always covered.
- Construction and Demolition Waste will be reused for backfilling to major extend and rest will be sent to IL&FS C&D waste site.
- Compliance to SWM, HWM, E-waste, BMW, C&D Waste, battery waste, rules shall be adhered.
- Training will be provided to the workers.
- Standard Signage will be provided.

4.3 TRAFFIC ANALYSIS

The proposed development will attract and generate the additional trips as an add-on to the existing traffic during its construction and operational period. In order to analyse the traffic conditions during the construction and throughout the project lifespan, a traffic impact assessment is performed. The traffic impact assessment (TIA) is a technical analysis of traffic problems and issues relating to the specific development. The chief objective of the TIA report is to identify whether a particular development project will have an impact on the safety and efficiency of adjacent roads.

In essence, a TIA within an EIA helps ensure that new developments are planned and implemented in a way that minimizes negative traffic-related impacts on the environment and the surrounding community.



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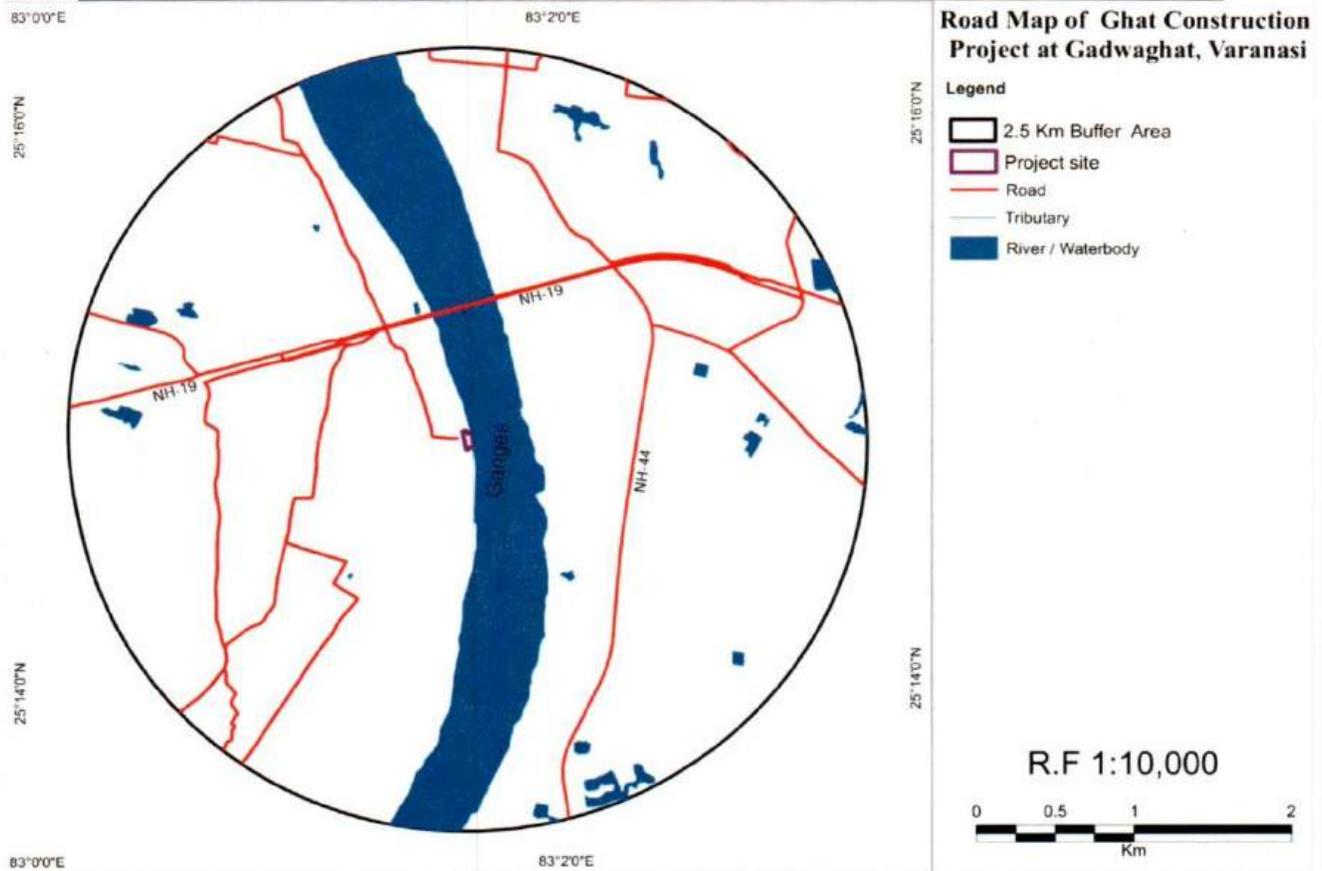


Fig 4.4 Road Map of the Study area

Traffic analysis is carried out by understanding the existing carrying capacity of the roads near to the project site and the connecting main roads in the area. Then depending on the capacity of the project, the number of trucks that will be added to the present scenario will be compared to the carrying capacity.

The traffic survey, to ascertain the traffic density in the study area was conducted at multiple junctions near the project site. The average composition of Traffic includes Two-Wheeler, Four-Wheeler (Cars/Jeep) and Four-Wheeler Heavy Vehicles like Trucks/Tankers & Bus.

Level of Services (LOS) can be defined as a letter designation that describes a range of operating characteristics on a given facility. Six Levels of Service are defined for capacity analysis. They are given letter designations from A to F, with LOS 'A' representing best level of operational standards and LOS 'F' the worst.



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V/C	LOS	Performance
0.0 - 0.2	A	Excellent
0.2 - 0.4	B	Very Good
0.4 - 0.6	C	Good / Average / Fair
0.6 - 0.8	D	Poor
0.8 - 1.0	E	Very Poor

Note: Capacity as per IRC: 64-1990 page no 11-12 for arterial road/ Highways.



Fig 4.5 Junction Road 1- North Direction (Gadhwa Ghat Road-Varanasi Prayag Raj Road)

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Fig 4.6 Junction Road 2- North-East Direction (Varanasi Prayag Raj Road NH-19-
Mirzapur Road NH-35)

Traffic Analysis for Construction of Garhwa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi

Table 4.10 (i): Existing No. of Day count Vehicles (inventory)

S. No.	Traffic Vehicle	No. of vehicles per day count Garhwa Ghat road	No. of vehicles per day count NH-19	Factor	Equivalent Passenger Car Unit Garhwa Ghat Road	Equivalent Passenger Car Unit NH-19
1.	H.M.V	50	2418	3	150	7254
2.	L.M.V	34	526	1	34	526
3.	Two/ three wheelers	86	730	0.5	43	365
4.	Others	0	0	-	0	0
	Total	170	3674		227	8145

Table 4.10 (ii): Existing Traffic Scenario & LOS

Road	V	C	Existing V/C Ratio	LOS
Garhwa Ghat road	227	2000	0.114	A



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NH-19	8145	15000	0.543	C
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Fig 4.7 Both the Junction Points

Expected No. of Vehicles at the project site – (Per Day)

In Construction Phase		In Operation Phase	
H.M.V	25	H.M.V	10
L.M.V	20	L.M.V	70
Two/ three wheelers	18	Two/ three wheelers	120

In Construction Phase

Table 4.10 (iii): Additional per day load due to proposed Construction (Modified)

S. No.	Traffic Vehicle	No. of vehicles per day count Garhwa Ghat Road	No. of vehicles per day count NH-19	Factor	Equivalent Passenger Car Unit Garhwa Ghat Road	Equivalent Passenger Car Unit NH-19
1.	H.M.V	50+25= 75	2418+25= 2443	3	150	7329
2.	L.M.V	34+20=64	526+20=546		64	546



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3.	Two/ three wheelers	86+18= 104	730+18= 748	0.5	52	374
4.	Others	0	0	-	0	0
	Total	243	3737		266	8249

Table 4.10 (iv): Modified Traffic Scenario & LOS

Road	V	C	Modified V/C Ratio	LOS
Garhwa Ghat	266	2000	0.133	A
NH-19	8249	15000	0.549	C

✚ In Operation Phase

Table 4.11 (iii): Additional per day load due to proposed operation (Modified)

S. No.	Traffic Vehicle	No. of vehicles per day count Garhwa Ghat Road	No. of vehicles per day count NH-19	Factor	Equivalent Passenger Car Unit Garhwa Ghat Road	Equivalent Passenger Car Unit NH-19
1.	H.M.V	50+10= 60	2418+10= 2428	3	180	7284
2.	L.M.V	34+70=104	526+70=596	1	104	596
3.	Two/ three wheelers	86+120= 206	730+120= 850	0.5	103	425
4.	Others	0	0	-	0	0
	Total	370	3874		387	8305

Table 4.12 (iv): Modified Traffic Scenario & LOS

Road	V	C	Modified V/C Ratio	LOS
Garhwa Ghat	387	2000	0.1935	A
NH-19	8305	15000	0.554	C

✚ Results-

Road	Existing LOS	Modified V/C Ratio in Construction Phase	Modified V/C Ratio in Operation Phase	Modified LOS
Garhwa Ghat	A	0.133	0.1935	A
NH-19	C	0.549	0.554	C



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From the above analysis it can be seen that the V/C ratio will change in both construction phase and operation phase but LOS changed from "A" to "C" in both the phases.

As per the traffic analysis, it is seen that the project activity doesn't interfere with the Existing scenario of traffic as the LOS for all the roads is same in constructional phase as well as in operational phase. However, some of the traffic management points are being proposed for control over dust emission and congestion over roads. Speed breakers near habitation will be proposed for control over the speed of the vehicles and regular water sprinkling will be done for dust suppression.

4.4 PUBLIC HEALTH IMPLICATIONS

With the mitigation measures in relation to air pollution, water pollution, soil contamination and noise pollution proposed to be adopted at the site along with plantation and other CER activities, with green belt plantation along the place which authorized by local authority, it is expected that there will be no adverse impact of project on the population in the impact zone. However, the following measures shall be adopted:

- Health check of all villagers in the immediate vicinity of the site shall be carried out periodically.
- Surface water management shall be adopted to ensure that run-off from the site does not adversely affect natural water streams or other water bodies.
- Operators of all transport vehicles shall be instructed not to honk unnecessarily and not over speed while passing through villages or near schools.



CHAPTER – V
ANALYSIS OF
ALTERNATIVES
TECHNOLOGY AND SITE



5.0 GENERAL

Alternative technologies exist for ghat construction and integration, focusing on sustainability, reduced costs, and improved functionality through methods like 3D printing, modular construction, geosynthetics for soil stability, and eco-friendly materials. While traditional methods are prevalent, these innovations offer potential to alter and improve ghat design, from the structure itself to integrating accessibility features like platform lifts and using Building Information Modeling (BIM) for planning.

A) Sustainable and Modern Materials

- **Geosynthetics:**

Products like geotextiles can be used to stabilize slopes and improve the performance of earth structures, potentially reducing reliance on large amounts of conventional concrete and stone.

- **Eco-Friendly Materials:**

Exploring the use of recycled, renewable, or naturally sourced materials can reduce the environmental footprint of construction, aligning with sustainable building practices.

B) Innovative Construction Techniques

- **3D Printing:**

This emerging technology can be used to create complex architectural forms and potentially reduce material waste and construction time for certain elements of a ghat structure.

- **Modular Construction:**

Pre-fabricated components can be assembled on-site, offering potential for increased efficiency, better quality control, and reduced on-site disruption.

5.1 ABOUT THE PROJECT ACTIVITY

Examination of alternatives of technology and Site are an utmost important part for assuring that the project has long term sustainability, especially large projects, which involves a lot of money, manpower & their safety and nature, value of minerals & environmental hazards. River bank construction is a very simple operation needing extraction of sand from river bank which does not need much mechanization or drilling and blasting.



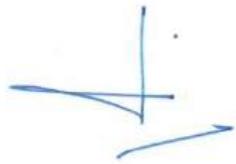
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CHAPTER V – ANALYSIS OF ALTERNATIVES (TECHNOLOGY & SITE)

Since this is an proposed Constructional project, where Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi will be done River bed mining is a site-specific project depending upon the geological set up and mineable portion of the river. Being covered in the riverbed region and the river meandering course, no objects of economic or ecological importance are disturbed. The area allotted is with abundant scope of construction of Ghats and hence sanctioned by the state. Hence, there is not much scope for site alternative.

For the constructional operation, since this is small built-up area project where a small magnitude of construction is done in semi mechanized way, no alternative technology has been adopted. As this leads to low- medium temporary employment potential of local habitants. This place is connected to the religious beliefs of the people Thus, it will have more acceptability and help in socio economic upliftment of the area.





CHAPTER – VI
ENVIRONMENT MONITORING
PROGRAMME



**PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM
AT LEFT BANK OF RIVER GANGA IN VARANASI.**

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CHAPTER VI- ENVIRONMENTAL MONITORING PROGRAMME

6.0 INTRODUCTION

The industrial development of any area needs to be intertwined with judicious utilization of non-renewable resources of the study area and within the limits of permissible assimilative capacity. The assimilative capacity of the study area is the maximum amount of pollution load that can be discharged into the environment without affecting the designated use and is governed by dilution, dispersion and removal due to physico-chemical and biological processes.

Regular monitoring of the various environmental parameters is necessary to evaluate the effectiveness of the management programme so that the necessary corrective measures can be taken in case there are some drawbacks in the proposed programme. Since environmental quality parameters at work zone and surrounding areas are important for maintaining sound operating practices of the project in conformity with environmental regulations, the post project monitoring work forms part of Environmental Monitoring Program.

Environmental Monitoring Program will be implemented once the project activity commences. Environmental monitoring program includes

- (i) Environmental surveillance,
- (ii) Analysis & interpretation of data,
- (iii) Preparation of reports to support environmental management system and
- (iv) Organizational set up responsible for the implementation of the programme.

The Environment Monitoring Programme is required to ensure sustainable development in the study area (10 km) of the project site, hence it needs to be an all-encompassing plan for which the plant authorities, Government, regulating agencies like Pollution Control Board etc. working in the region and more importantly the affected population of the study area need to extend their co-operation and contribution.

The purpose of monitoring programme is to ensure that the specified mitigation measures defined in the EMP are complied with and leads to the desired benefits for the target area and its population. To ensure the effective implementation of the EMP and gauge the efficiency of the mitigation measures, monitoring will be undertaken during the operation period of the project.



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6.1 ENVIRONMENTAL MONITORING AND REPORTING PROCEDURE

Monitoring shall confirm that commitments are being met. 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 in the vicinity of a site using ecological/biological, physical and chemical indicators. Monitoring may include socio-economic interaction, through local liaison activities or even assessment of complaints. The preventive approach to environment management may also require monitoring of process inputs, for example, type and method used, resource consumption, equipment and pollution control performance etc.

The key aims of environment monitoring are:

1. 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.
2. To verify the evaluations made during the planning process, in particular with risk and impact assessments and standard & target setting and to measure operational and process efficiency.
3. Monitoring will also be required to meet compliance with statutory and corporate requirements.
4. Finally, monitoring results provide the basis for auditing i.e. to identify unexpected changes.

The said team will be responsible for:

- i. Collecting water and air samples from surrounding area and work zone monitoring for pollutants.
- ii. Analyzing the water and air samples.
- iii. Implementing the control and protective measures.
- iv. Co-coordinating the environment related activities within the project as well as with outside agencies.
- v. Collecting statistics of health of workers and population of surrounding villages.
- vi. Monitoring the progress of implementation of environmental management program.



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The laboratory will be suitably equipped for sampling/testing for various environmental pollutants.

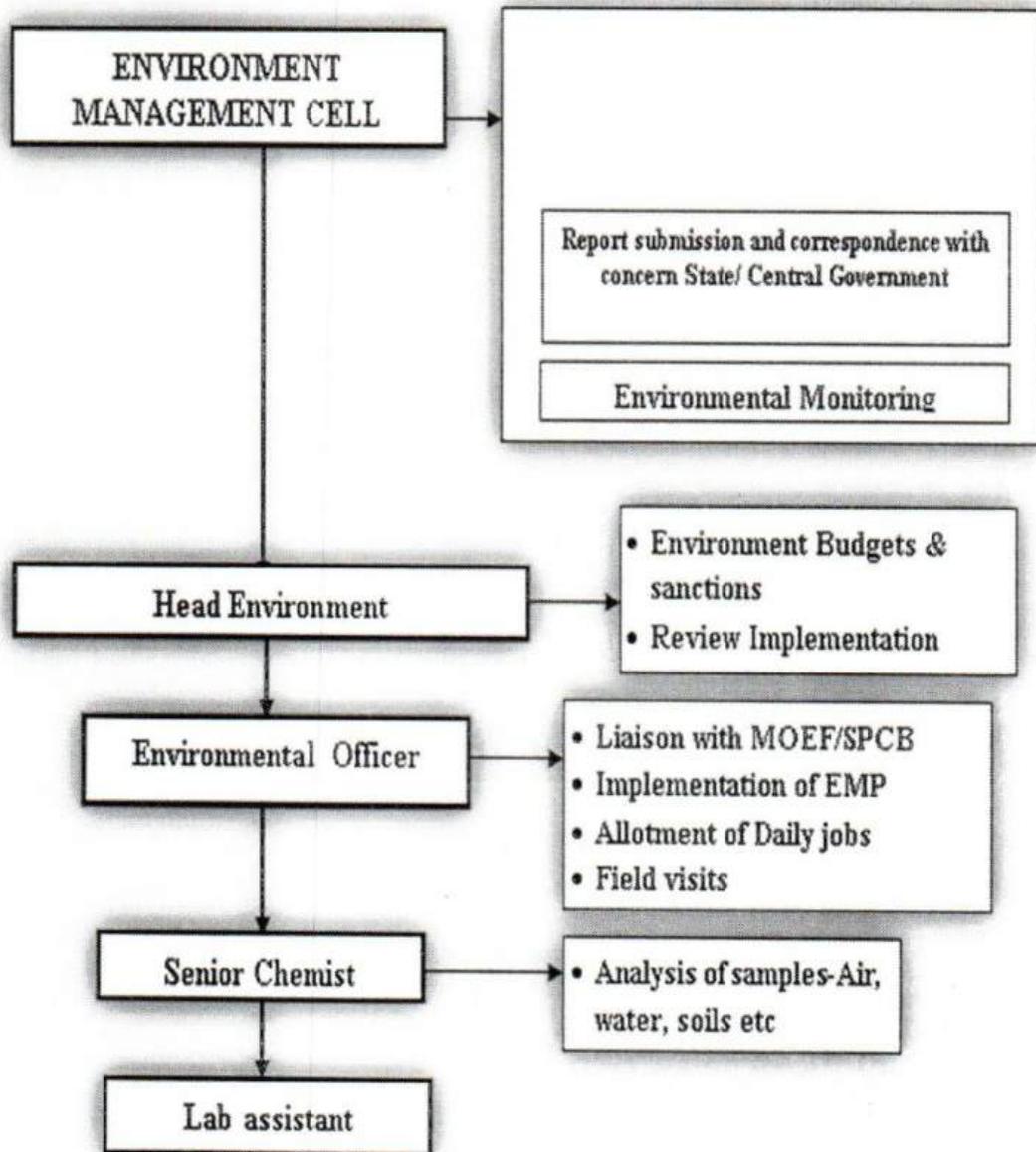


Fig. 6.1 Function of Environmental Management Cell



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To implement the EMP, a structured Environment Management Cell (EMC) which includes plant manager and representative of consultants interwoven with the existing management system is there. Occupational safety and health is very closely related to productivity and good employer- employee relationship. The factors of occupational health in the proposed project are mainly dust and land degradation. Safety of employees during operation and maintenance etc. shall be as per the rules and regulations. To avoid any adverse effect on the health of workers due to various pollutants, sufficient measures relating to safety and health will also be practiced.

A comprehensive environmental monitoring program as laid down by State Pollution Control Board is followed. All the above observations will be complied and documented by the EMC to serve the following purposes:

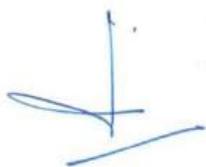
- Identification of any environmental problems that are occurring in the area.
- Initiating or providing solution to those problems through designed channels and verification of the implementation status.
- Controlling activities inside the project, until the environmental problem has been corrected.
- Suitably responding to emergency situations.

6.2 MONITORING METHODOLOGIES AND PARAMETERS

Air Quality Monitoring

Air Quality monitoring is essential for evaluation of the effectiveness of abatement programme and to develop appropriate control measures. Suspended Particulate Matter (PM₁₀ & PM_{2.5}), Sulphur Dioxide (SO₂) and Nitrogen Dioxide (NO₂) will be monitored at the workplace i.e. core zone. The methodology proposed for is shown below:

Parameters	Technique	Technical Protocol
PM _{2.5}	Gravimetric method	CPCB Guideline Vol. I May' 2011
PM ₁₀	Gravimetric method	IS 5182 (Part-XXIII)



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Sulphur Dioxide	Improved West and Gaeke	IS-5182 (Part-II)
Nitrogen Dioxide	Modified Jacob & Hoch heiser	IS-5182 (Part-VI)

Water Quality monitoring

Water quality monitoring involves periodical assessment of quality of surface water and the ground water near the project site. Surface water samples will be analyzed for all the parameters as per EPA, 1986 ground water samples will be analyzed for all the parameters as per IS-10500.

Phreatic surface levels will be monitored through out the life of the project to study the impact of project operations on ground water regime. A network of observation wells will be located in the villages around the projects area for monitoring of phreatic surface levels. The water levels will be monitored during pre-monsoon and post-monsoon seasons four times in a year.

Noise Level Monitoring

Noise level monitoring will be done for achieving the following objectives:

- To compare sound levels with the values specified in noise regulations
- To determine the need and extent of noises control of various noise generating sources
- Correlation of noise levels with community response to noise levels

Noise level monitoring will be done at the work zone to assess the occupational noise exposure levels. Noise levels will also be monitored at the noise generating sources like mineral handling arrangements, vehicle movements and also nearby villages for studying the impact due to higher noise levels for taking necessary control measures at the source.

Soil Quality Monitoring

The soil quality monitoring is carried out to assess the soil characteristic. The soil quality will be analyzed as per CPCB norms.

Socio-economic Survey

Socio economic condition will be monitored to assess the demographic particulars of the area including the impacts on the social & economical condition on the residents nearby.

Plantation monitoring programme

Plantation monitoring will be done to ensure survival & growth rate of plantations.



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6.3 MONITORING SCHEDULE

The schedule has been shown below for the parameters proposed for monitoring.

Table 6.1: Monitoring Schedule and Parameters

Environment Component	Project stage	Parameter	Standards	Location	Duration / Frequency
Ground Water Quality	Operation Phase	Drinking water parameters	Drinking water standards (IS 10500)	Project site	Once every year during the dry season
Drinking water	Operation Phase	Drinking water parameters	Drinking water standards (IS 10500)	Supply water	Half yearly
Air	Operation Phase	PM, SO ₂ , NO ₂ , CO,	National Ambient Air Quality Standards	Project Site	Continuous 24-hourly, Half Yearly
Noise	Operation Phase	Noise Level in dB (A)	As per Ambient Noise Standards	Project site	One day hourly measurement, Half yearly

Reporting Schedules

The environment management cell will be responsible for timely conduct of the monitoring activities. The results of the analysis will be intimated to the project head.

Any anomaly in test results will be investigated into and proper corrective actions will be undertaken. A complaint register will also be maintained to note any complaints from the staff and visitors in the project or any other stakeholder. Corrective actions taken against the complaints will also be noted.

6.4 MONITORING SCHEDULE IMPLEMENTATION

An implementation programme has been prepared as it serves no purpose if it is not implemented in letter and spirit. The major attributes of environment are not confined to the site alone. Implementation of proposed control measures and monitoring programme has an implication on the surrounding area as well as for the region. Therefore, Project management should strengthen the existing control



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measures as elaborated earlier in this report and monitor the efficacy of the control measures implemented within the study area relating to the following specific areas:

- Collection of air and water samples at strategic locations with frequency suggested and by analyzing thereof. If the parameters exceed the permissible tolerance limits, corrective regulation measure will be taken.
- Collection of soil samples at strategic locations once every two years and analysis thereof with regard to deleterious constituents, if any.
- Measurement of water level fluctuations in the nearby ponds dug wells and bore wells and to assess if sand mining from the river bed has got any impact on it or not.
- Measurement of noise levels at mine site, stationary and mobile sources, and adjacent villages will be done twice a year for first two years and thereafter once a year.
- Post plantation, the area will be regularly monitored in every season for evaluation of success rate. For selection of plant species local people should also be involved.

An Environmental Management Cell (EMC) is envisaged which will be responsible for monitoring EMP and its implementation. EMC members should meet periodically to assess the progress and analyze the data collected during the month.

6.5 BUDGET ALLOCATION FOR MONITORING

The EMC will be responsible to carry on the monitoring. Budget allocated has also been proposed for the same:

Table 6.2 Budget allotted for the Environmental Management Plan

S. No	Description	Annually Recurring Cost (INR)
1	Pollution Monitoring i) Air pollution ii) Water pollution iii) Soil iv) Noise Pollution	(Air- 40,000/-, Water – 20,000 Soil – 20,000, Noise – 20,000)
TOTAL		1,00,000/-



6.6 REPORTING SCHEDULES OF THE MONITORING DATA

It is proposed that voluntary reporting of environmental performance with reference to the EMP should be undertaken. The environmental monitoring cell shall co-ordinate all monitoring programmes at site to furnish the data to the State regulatory agencies regularly in respect of the stipulated prior environmental clearance terms and conditions.

The proponent shall prominently advertise in the newspapers indicating that the project has been accorded environmental clearance and also the details of website where it is displayed.





CHAPTER – VII
ADDITIONAL STUDIES



7.0 GENERAL

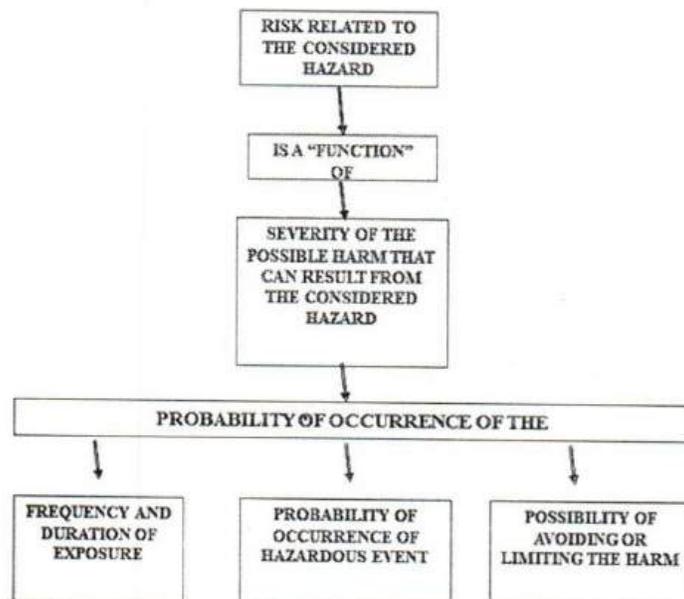
This chapter broadly looks at various aspects related to disaster management, resource conservation and resettlement issues.

7.1 HAZARD IDENTIFICATION AND RISK ASSESSMENT METHODOLOGY

A) Risk Assessment and Disaster Management Plan

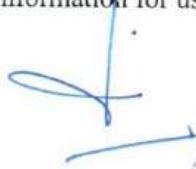
Risk analysis is the systematic study of uncertainties and risks encountered in various areas. Risk analysis is to identify the risks involved in mining operations at various phases. Potential locations and activities around the proposed site are identified and probable risks are estimated on a person, business and Govt. establishment.

The project will encompass the lives of a large number of people. It will also involve installation of various structures and machineries that meet the comfort and needs of its occupants but may also pose serious threat in case of an accident. It is thus considered necessary to carry out a risk assessment and disaster management plan for the project.



Tolerable risk: Risk which is accepted in a given context based on the current values of society

Protective measure: The combination of risk reduction strategies taken to achieve at least the tolerable risk. Protective measures include risk reduction by inherent safety, protective devices, and personal protective equipment, information for use and installation and training.



Severity: Severity is used for the degree of something undesirable.

Risk Analysis: A systematic use of available information to determine how often specified events may occur and the magnitude of their likely consequences.

The different steps of risk assessment procedure are as given below:

Step I: Hazard Identification

The purpose of hazard identification is to identify and develop a list of hazards for each job in the organization that are reasonably likely to expose people to injury, illness or disease if not effectively controlled. Workers can then be informed of these hazards and controls put in place to protect workers prior to them being exposed to the actual hazard.

Step II: Risk Assessment

Risk assessment is the process used to determine the likelihood that people exposed to injury, illness or disease in the workplace arising from any situation identified during the hazard identification process prior to consideration or implementation of control measures. Risk occurs when a person is exposed to a hazard. Risk is the likelihood that exposure to a hazard will lead to injury or health issues. It is a measure of probability and potential severity of harm or loss.

Step III: Risk Control

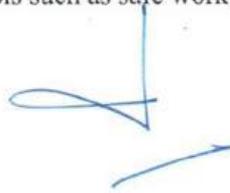
Risk control is the process used to identify, develop, implement and continually review all practicable measures for eliminating or reducing the likelihood of an injury, illness or diseases in the workplace.

Step IV: Implementation of risk controls

All hazards that have been assessed should be dealt in order of priority in one or more of the following hierarchy of controls

The most effective methods of control are:

- i. Elimination of hazards
- ii. Substitute something safer
- iii. Use engineering/design controls
- iv. Use administrative controls such as safe work procedures



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v. Protect the workers i.e. By ensuring competence through supervision and training, etc.

Each measure must have a designated person and date assigned for the implementation of controls. This ensures that all required safety measures will be completed.

Step V: Monitor and Review

Hazard identification, risk assessment and control are an on-going process. Therefore regular review of effectiveness of the hazard assessment and control measures is to be done. Make sure that you undertake a hazard and risk assessment when there is change to the workplace including when work systems, tools, machinery or equipment changes. Provide additional supervision when the new employees with reduced skill levels or knowledge are introduced to the workplace.

B) RISK ANALYSIS

The risk assessment portion of the process involves three levels of site evaluation:

- a) Initial Site Evaluation,
- b) Detailed Site Evaluation,
- c) Priority Site Investigations and Recommendations.

The risk assessment criteria used for all levels of site evaluation take into account two basic factors:

- The existing site conditions
- The level of the travelling public's exposure to those conditions.

The Initial Site Evaluation and Detailed Site Evaluation both apply weighted criteria to the existing information and information obtained from one site visit. The Initial Site Evaluation subdivides the initial inventory listing of sites into 5 risk assessment site groups. The Detailed Site Evaluation risk assessment is then performed on each of the three highest risk site groups in order of the group priority level of risk. The result of the Detailed Site Evaluation process is a prioritized listing of the sites within each of the three highest risk site groups.

Risk analysis is done for:

- Forecasting any unwanted situation
- Estimating damage potential of such situation
- Decision making to control such situation



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- Evaluating effectiveness of control measures

C) ACCEPTABLE RISK

Risk that is acceptable to regulatory agency and also to the public is called acceptable risk. There are no formally recognized regulatory criteria for risk to personnel in the Construction industry. Individual organizations have developed criteria for employee risk and the concepts originally arising from industries. Because of the uncertainties linked with probabilistic risk analysis used for quantification of the risk levels the general guiding principle is that the risk be reduced to a level considered

As Low as Reasonably Practicable (ALARP). The risk acceptability criteria are given in following Table. It can be seen that there are three tiers:

- A tolerable region where risk has been shown to be negligible and comparable with everyday risks such as travel to work.
- A middle level where it is shown the risk has been reduced to As Low as Reasonably Practicable level and that further risk reduction is either impracticable or the cost is grossly disproportionate to the improvement gained. This is referred as the ALARP region.
- An intolerable region where risk cannot be justified on any grounds. The ALARP region is kept sufficiently extensive to allow for flexibility in decision making and allow for the positive management initiatives which may not be quantifiable in terms of risk reduction.

Table-7.1 The risk acceptability criteria

1	Risk un acceptance and must be reduced. The actions may include equipments and people or procedural measures. If risk cannot be reduced to ALARP level, operating philosophy must be fundamentally reviewed by the management.	Intolerable Region
2	Efforts must be made to reduce risk further and to as low as reasonably practicable, without expenditure that is grossly disproportionate to the benefit gained	ALARP Region (As Low as Reasonably Practicable)
3	Risk level is so low as to not require actions to reduce its magnitude further.	Tolerable Region

A logical systematic process is usually followed during a qualitative risk assessment to identify the key risk events and to assess the consequences of the events occurring and the likelihood of their occurrence.



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Table 7.2 Qualitative Risk Assessment

Risk Rank X Likelihood Consequence	L1 Almost certain	L2 Likely	L3 Possible	L4 Unlikely	L5 Rare
C1 Catastrophic	1	2	4	7	11
C2 Major	3	5	8	12	16
C3 Moderate	6	9	13	17	20
C4 Minor	10	14	18	21	23
C5 Insignificant	15	19	22	24	25

RISK RATING:

High Risk:	1-6
Medium Risk:	7-15
Low Risk:	16-25

7.1 RISK HAZARD & ITS CONTROL MEASURES

Though the construction of project will be done in compliance to all applicable safety norms, however, it is not always possible to totally eliminate such eventualities and random failures of equipment or human errors. An essential part of major hazard control has therefore, to be concerned with mitigating the effects of such emergency and restoration of normalcy at the earliest. A detailed table showing activities during construction and operation phase along with mitigation measures are given in Table 7.3.

Table 7.3: Activities during construction and operation along with mitigation measures

Hazards Associated with Activities (During Construction & Operation)	Control/Mitigation Measures
Manual Handling - Strains and sprains due to incorrect lifting - too heavy loads - Twisting - bending - repetitive movement body	- Exercise/warm up - get help when needed control loads - rest breaks/no exhaustion - no rapid movement /twisting/ bending / repetitive movement



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- vibration.	- Good housekeeping.
Falls - Slips - Trips <ul style="list-style-type: none"> - Falls on same level - falls to surfaces below - poor housekeeping - slippery surfaces - uneven surfaces - poor access to work areas climbing on and off - plant - unloading materials into excavations wind falling objects. 	<ul style="list-style-type: none"> - Good Housekeeping - tidy workplace - guardrails, handholds, harnesses, hole cover, - hoarding, no slippery floors/trip hazards - clear/ safe access to work areas - egress from work areas - dust/water controlled
Fire <ul style="list-style-type: none"> - Flammable liquids/Gases like LPG, Diesel Storage area and combustible building materials - Poor housekeeping - Grinding sparks - Open flames, absence of Fire hydrant network. 	<ul style="list-style-type: none"> - Combustible/flammable materials properly stored/used - Good housekeeping - Fire extinguishers made available & Fire hydrant Network with reserve Fire water - Emergency Plan in case of Fire or collapse of structure.
Absence of Personal Protective Equipment <ul style="list-style-type: none"> - Lack of adequate footwear - head protection - hearing/eye protection - respiratory protection - gloves /goggles. 	<ul style="list-style-type: none"> - Head/face - footwear - hearing/eye - skin - respiratory protection provided - training - Maintenance
Defective or wrong Hand Tools <ul style="list-style-type: none"> - Wrong tool - defective tool - struck by flying debris - caught in or on - missing guards 	<ul style="list-style-type: none"> - Right tool for the job - proper use of tools - good condition/ maintenance guards - isolation/ proper demarcation of work space - eye/face protection - - flying debris controlled
Electricity <ul style="list-style-type: none"> - Electrocutation - overhead/underground services 	<ul style="list-style-type: none"> - Leads good condition and earthed - no temporary repairs - no exposed wires



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<ul style="list-style-type: none"> - any leads damaged or poorly insulated - temporary repairs - -no testing and tagging - circuits overloaded - non-use of protective devices. 	<ul style="list-style-type: none"> - good insulation - no overloading - use of protective devices - testing and tagging - no overhead/ underground services
<p>Scaffolding</p> <ul style="list-style-type: none"> - Poor foundation - lack of ladder access insufficient planking - lack of guardrails and toe boards - insufficient ties or other means - all scaffolds incorrectly braced or stabilized to prevent overturning. 	<ul style="list-style-type: none"> - All scaffolds correctly braced and stabilized - 3:1 height to base ratio - firm foundation, plumb and level - ladder access provided and used - proper platform (3 planks/675 mm) - planks secured - guardrails and toe boards - 900mm to 1100mm high, within 200mm of working face, mid-rail.
<p>Ladders</p> <ul style="list-style-type: none"> - Carrying loads - not secured against dislodgement - defective ladders - not sufficient length - wrong positions - incorrectly placed (angles, in access ways, vehicle movements. 	<ul style="list-style-type: none"> - Secured against movement or footed - ladders in good condition - regularly inspected - extend 1m above platform - 4:1 angle - out of access ways, vehicle movements - not carrying loads - 3 points of contact - no higher than 3rd step down - use for access only, not working platforms
<p>Gas Cutting and Welding</p> <ul style="list-style-type: none"> - Fire - welding flash, burns, fumes, electrocution in wet conditions - flashback in oxygen set, leaking cylinders, acetylene cylinders lying down - poorly maintained leads. 	<ul style="list-style-type: none"> - Welding flash and burns controlled with PPE and shields - fumes controlled with ventilation and PPE (in good condition and properly positioned), Gas cylinders be kept upright & secured position (properly tied) - Combustible materials to be kept at secured place to avoid fire & Fire Extinguishers to be kept in fire prone area with training to people for its use.
<p>Noise</p>	



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- Unknown noise levels	- Levels below 85 decibels
- known noise levels over 85 decibels	- Proper protection.
Falling Material	
- Fall during carrying/Lifting materials- dislodged tools and materials from overhead work areas.	- Materials to be secured - kept away from edge - toe boards - Use of hard hats.

7.2 OCCUPATIONAL HEALTH HAZARDS

Construction activity in open cast area 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 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 site mainly comes under the physical hazards. Possible physical hazards are as below mention: -

Physical hazards due to mining operations

Following health related hazards were identified mining operations to the workers: -

1. **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.
2. **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 time up to 48 °C or above mining area.



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3. **Eye Irritation:** - During the high windy days in summer the dust could be the problems for eyes like itching and watering of eyes.
4. **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.
5. **Noise Induced Hearing Loss:** - Machinery is the main source of noise pollution at the mine site. Too much noise from the machines can induce loss of hearing.

Table-7.4 Management of Health Hazards

Particulars	Control Measures
Heat & Light	The site will have adequate drinking water supply so that workers do not get dehydration. Awareness will be created to wear lightweight and loose-fitting clothes having light colors.
Noise	Vehicles will be maintained properly. Greasing oiling will be done regularly. The personal protective equipment will be provided for each workers. Supervisor will be instructed for reporting any problems with hearing protectors or noise control equipment. Haul road will be leveled and maintained daily.
Respiratory	Pack cabin will be given to the excavator operator with the sun glass and mask. PPE like face mask etc. will be provided during mining activity. Periodic medical examinations will be provided for all workers. Awareness program will be organized for workers. Control of dust through water spraying.

Occupational health and Safety programme of the workers shall be undertaken periodically to observe any contractions due to exposure to dust and take corrective measures if required.

7.3 ADDITIONAL MITIGATION MAJORS TO BRING HAZARDS UNDER "ALARP" ZONE

7.3.1 Measures to prevent accidents during transportation

- All transportation within the main working will be carried out directly under the supervision and control of the management.
- The vehicles will be maintained in good repairs and checked thoroughly at regular intervals by the competent person authorized for the purpose by the Management.



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- To avoid danger while reversing the vehicles especially at the embankment and tipping points, the areas for reversing of lorries will be made man free as far as possible.
- The truck will be covered and maintained to prevent any spillage and no overloading will be permitted.
- The maximum permissible speed limit will be ensured.
- The truck drivers will have proper driving license.
- A statutory provision of the fences, constant education, training etc. will go a long way in reducing the incidents of such accidents.

7.3.2 Measures to prevent Dangerous Incidents during Inundation/Flooding

Inundation of flooding is expected at these ghats as during Monsoon period.

- During monsoon months and heavy rains the project site should be ceased.
- There would be mechanism/warning system of heavy rains and discharges from the upstream dams to make the workers alert.

7.3.3 Measure to Prevent Drowning

- The construction should be done under strict supervision and only during the dry season.
- Deep water areas must be identified.
- No go zones should be clearly marked and made aware to the workers.
- Signages will be erected if there is any steep slopes or existing pits, so that there is no movement in that area.

7.4 DISASTER MANAGEMENT PLAN

This should deal with action plan for high risk accidents like landslides, subsidence, flood, 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.



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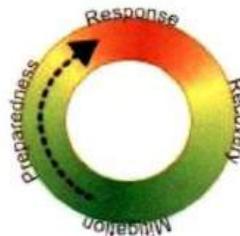


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- Communication plans with easily understandable terminology and methods.
- Proper maintenance and training of emergency services, including mass human resources such as community emergency response teams.
- Development and exercise of emergency population warning methods combined with emergency shelters and evacuation plans
- Develop organizations of trained volunteers among civilian populations.

7.4.1 Natural Hazards Floods:

Flood events are a part of nature. They mostly occur in the monsoon season at times of heavy rainfall. No activity Shall be done in Rainy Season.

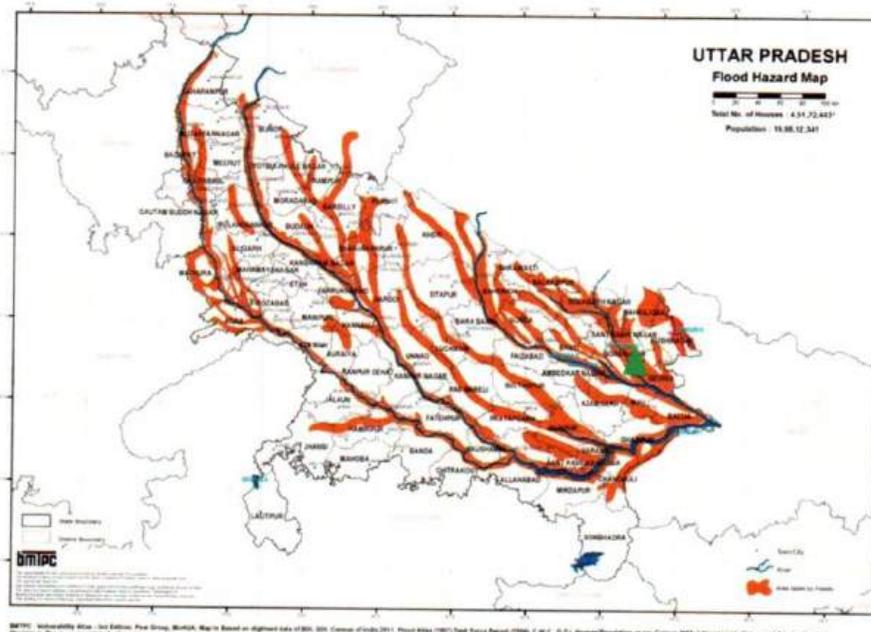


Figure 7.1 - Flood Map of Uttar Pradesh

The region experiences heavy rainfall and due to water collection of the catchment area of various



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rivers, the proposed site may be prone to flood hazards during monsoon. As floods during rainy season are common and the district has minor flood risk, there are some chances of flood. A DMP will be in place to deal with any such occurrences.

Following Precautionary Measures will be undertaken:

- Storm water system will be checked and cleaned periodically
- Storm water network will be meticulously cleaned before the onset of monsoon

Earthquakes: An Earthquake is a sudden, rapid shaking of the earth caused by the breaking and shifting of rocks beneath the earth surface.

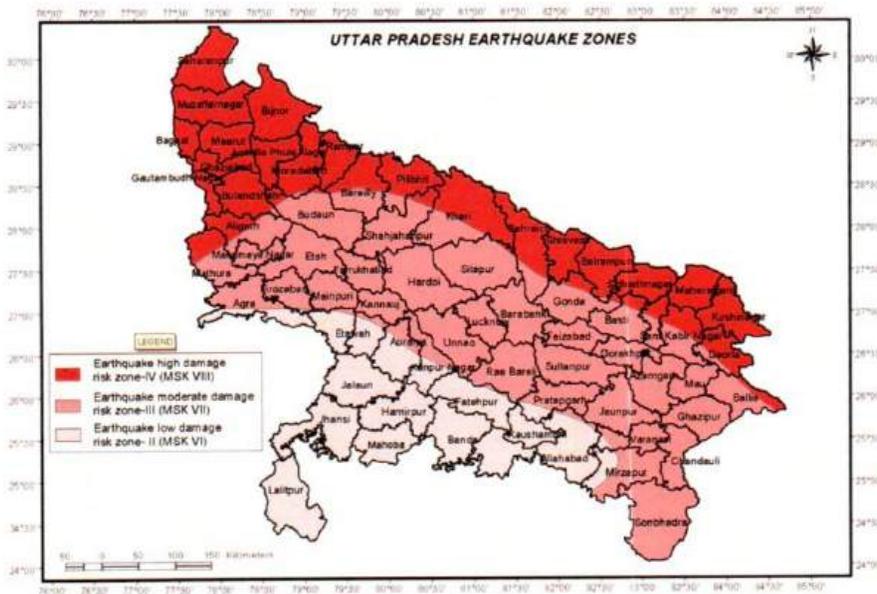


Figure 7.2- Earthquakes Map of Uttar Pradesh

Based on the above figure, it is observed that proposed project lies in moderate damage risk zone. Varanasi district has experienced earthquakes rarely and with less intensity. Since the district lies in Seismic Zone III–Earthquake Moderate damage risk zone -III (MSK-VII) of earthquakes, hence earthquakes are major risks for the proposed project.

Precautionary Measures to be undertaken:

- The complete operation will be carried out under the Management and control of experienced and qualified Manager having Certificate of Competency to manage the Project Site granted by UPPCL.



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- All the provisions and other laws applicable to site will strictly be complied with.
- During heavy rainfall the activities will be ceased.
- All persons in supervisory capacity will be provided with proper communication facilities.
- Detailed warning system, implementation procedure, emergency control centre would be maintained at the mine with names of trained persons.
- Details and availability of heavy machinery, fire-fighting equipment would be available at the site.
- Proper arrangements would be made for treatment of injured person with first aid, if any.
- All the safety equipment will be made available at the mine.

7.5 NATURAL RESOURCE CONSERVATION

Construction Materials: The project required various kinds of natural construction minerals such as sand, gravel, etc. which was sourced from local suppliers. Excavated soil from the project site had been used within the site to the extent feasible. Excess soil was made available to the nearby construction sites, as per demand or sold to local vendors.

Energy: To conserve the energy resources, good practices will be followed during the operational phase such as turning off lights and equipment when not in use, ensuring fuel efficiency of motors and vehicles through proper maintenance and minimal. The principles of energy conservation will also be embedded in the buildings through use of energy efficient fixtures, maximum availability of natural light and use of solar energy for street lighting.



CHAPTER – VIII

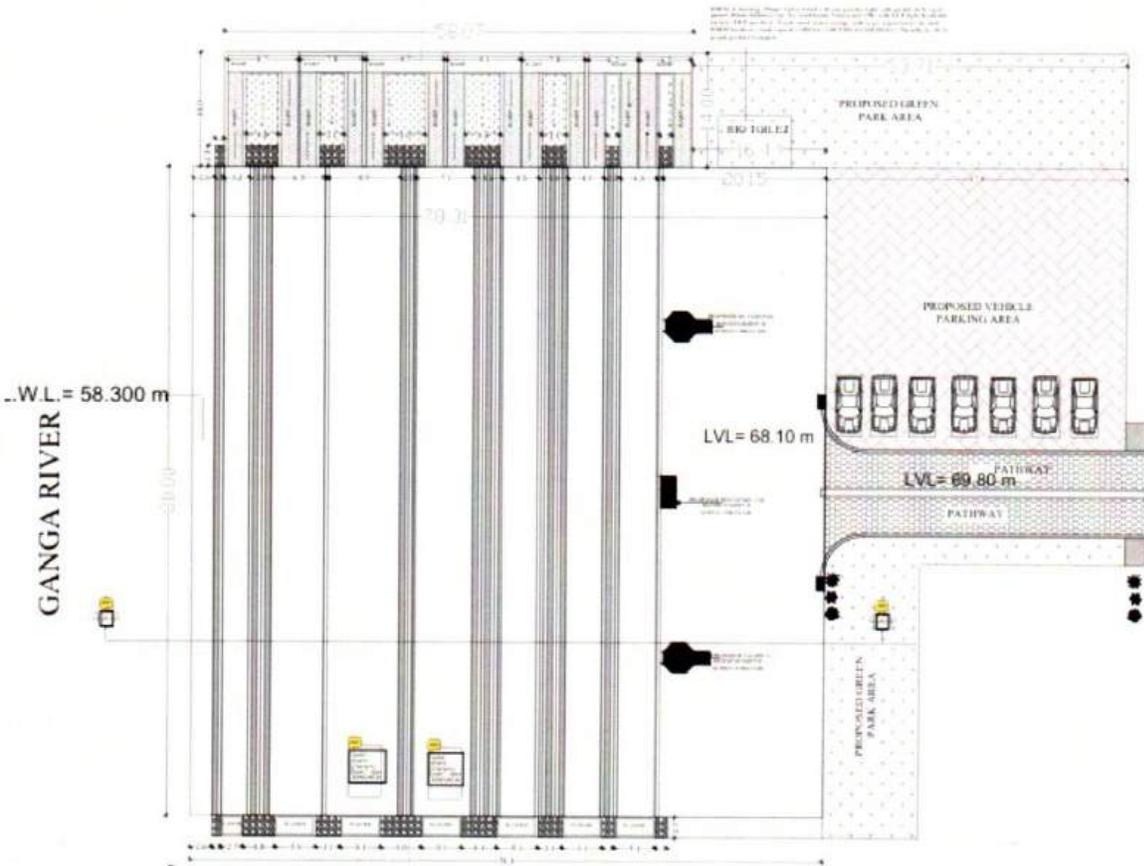
PROJECT BENEFITS



8.0 GENERAL

The operation of the project will protect against building of Ghat Channel at the riverbank of Ganga River adjoining areas for development of destination tourism at left bank of river Ganga in Varanasi. It will bring overall improvement in the locality, neighborhood and the state by bringing industry, roads, water supply, electricity, employment, living standard tourism and economic growth.

The proposed project is Constructional project, where Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi will be done.



PLAN OF GHAT & STEP

After construction of Ghat at the Left Riverbank of Ganga River, the project site will look like this, developed and beautiful tourist place to visit.

The proposed construction and development project will have its own sewerage network via mobile toilets, water supply system, waste collection facility, ground water recharge etc. This project will



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be beneficial not only for the nearby people but also to the people in the nearby region as this project will help in ancillary facilities development in the area.

8.1 PHYSICAL BENEFITS

The opening of the proposed project will enhance the following physical infrastructure facilities in the adjoining areas.

- a. **Road Transport:** There will be improved road communication due to the proposed project and maintenance will also be done time to time.
- b. **Market:** Nearby local people will be provided with a good market opportunity.
- c. **Enhancement of green cover:** As a part of reclamation plan, plantation will be carried along the place in the proposed facility making the surrounding clean beautiful and attractive to tourist.

The impact on the civic amenities will be substantial after the commencement of activities. The basic requirement of the community needs will be strengthened by extending health care, educational facilities (via workshops or stalls representation at the ghats), building/strengthening of existing roads in the area. The proponent will initiate the above amenities either by providing or by improving the facilities in the area, which will help in uplifting the living standards of local communities. Medical facilities will be provided in the form of first-aid facility at the project site. These medical facilities will also be available to local people in the surrounding in case of emergencies.

8.2 SOCIAL BENEFITS

- Generation of employment and improved standard of living;
- Increased revenue to the State by way of royalty, taxes and duties; and
- Superior communication and transport facilities etc.
- There will be significant change in the socio-economic scenario of the area.
- The proposed project will enhance the prospects of employment. Recruitment for the unskilled and semiskilled workers for the proposed project will be from the nearby villages.
- The development of the basic amenities viz. roads, transportation, electricity, drinking water, entertainment, etc. will be developed as far as possible.
- Overall, the proposed project will change living standards of the people and improve the socio-economic conditions of the area.



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8.3 ENVIRONMENTAL BENEFITS

Project has proposed its landscape as per the bye-laws. Total green area measures 1043.14 Sqm i.e. approx. 16.65 % of Net Plot Area of the proposed project. Indigenous trees will be prepared for the plantation and samplings will be purchased from government nursery or government approved nursery. Landscape Plan Attached as Annexure.

Total Plot Area	1043.14 Sqm
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- Protection of banks
- Reducing submergence of adjoining agricultural lands due to flooding
- Reducing aggradations of river levels
- Protection of crops being cultivated along the bank
- A check on illegal mining activity

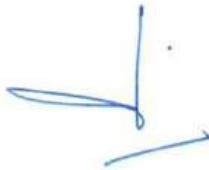
a) Grass Planting Work

- Providing and laying Neelgiri/Mexican grass turf with earth 50mm to 60mm thickness of existing ground prepared with proper level and ramming with tools wooden (Dhurmos) and than rolling the surface with light roller make the surface smoothen and light watering with sprinkler and maintenance for 30 days or more till the grass establish properly, as per direction of officer-in-charge.

b) Ground Cover/ Planting Works

- Preparation of beds for hedging and shrubbery by excavating 60 cm deep and trenching the excavated base to a further depth of 30 cm, refilling the excavated earth after breaking clods and mixing with sludge or manure in the ratio of 8:1 (8 parts of stacked volume of earth after reduction by 20%: one part of stacked volume of sludge or manure after reduction by 8%), flooding with water, filling with earth if necessary, watering and finally fine dressing, leveling etc. including stacking and disposal of materials declared unserviceable and surplus earth by spreading and leveling as directed, within a lead of 50 m, lift up to 1.5 m complete (cost of sludge, manure or extra earth to be paid for separately)

c) Shrub Planting Works



- Providing and stacking of *Ficus benjamina* (green) of height 150-165 cm., bushy with healthy branches and lush green foliage in big size HDPE bags as per direction of the officer-in-charge.
- Providing and stacking of Foxtail palm of ht. 240-270 cm bottom girth 35- 40 cm well developed in big size HDPE bags as per direction of the officer-in-charge.
- Providing and stacking of *Ficus blackii* (*F.vivion*) of height 45-60 cm. with 6- 8 branches healthy foliage in earthen pots of size 25 cm as per direction of the officer-in-charge.
- Providing and Displaying *Ficus black vivion piller Topiary (sylinder type)* well developed with fresh & healthy 180 to 210 cm ht in 40 cm Cement Pot as per direction of the officer-in-charge.
- Providing and stacking of *Plumeria alba dwarf* of height 90-105 cm. with 3-4 branches and thick stem in big size HDPE bags as per direction of the officer-in-charge.
- Providing and Displaying Bamboo Buddha Valley with fresh & healthy 5 to 6 suckers 1.80 m to 2.10m ht umbrella type well developed in 50 cm Cement Pot as per direction of the officer-in-charge.
- Providing and stacking of Bottle palm of ht. 150-180 cm bottom girth 20-25 cm well developed in big poly bags of size 25 cm as per direction of the officer-in-charge.
- Providing and stacking of *Polyalthia pendula* (Ashok Pendula) of height 180-195 cm. in gunny bag of size 30 cm as per direction of the officer-in-charge.
- Standard Rose (H.T. variety) 3 to 4 healthy branch 90 cm and above ht. well developed with one and above flowers in 25 cm Earthen Pot,

A total Estimate for Landscaping and Horticulture for the proposed construction and development of the project is 7.83 Lakhs.

Guidelines & Techniques for Green Belt Development:

Extensive survey in the project area was undertaken to observe the structure and composition of vegetation. Hence a combination of plant is selected depending upon the topographical suitability and species selected.

- The green belt will be developed as per the guidelines for developing green belt by CPCB, 2007. The plantation matrix adopted for the green belt development includes pit of 0.3 m × 0.3 m size with a spacing of 3 m x 3 m. In addition, earth filling and manure may also be required for the proper nutritional balance and nourishment of the sapling.



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- The plantation will be done including the trees and shrubs. Plantation comprising of medium height trees (7 m to 10 m) and shrubs (5 m height) are proposed for the green belt.
- Sustainable green cover with minimal maintenance.

8.4 CORPORATE ENVIRONMENTAL RESPONSIBILITY

High Mast Lights will be installed at the project site.

- Earth work in excavation of foundation in ordinary soil including lift up to 1.5m and lead up to 30m and including filling watering ramming of excavated earth in trench and removal and disposal of surplus earth as directed by E.I.
- P/L C.C. 1:3:6 with hard stone grit 20-40 mm size and coarse sand including all cost of material, labour and T&P complete.
- Providing centering and shuttering for R.C.C. work including all cost of material, labour, T&P. & hire etc. complete.
- Columns, Pillars, Piers, Abutments, Posts and Struts
- P/F Mild steel TMT FE-500 or iron in plain work such as reinforced concrete or reinforced, brick work (when not included in overall rates) wrought to required shape as necessary including bending for proper completion of the work and including supply of all steel and over lapping & hooks.
- P/L R.C.C. 1:1½:3 with Dalla grit 12-20 mm size and coarse sand including cost of all materials, labour T&p etc. complete but excluding cost of steel reinforcement.
- Foundation (Using 1:1.5:3 Mix concrete) & Column (Using 1:1.5:3 Mix concrete).

Each High Mast Light (In Lacs) = 692690.80



CHAPTER IX
ENVIRONMENTAL COST
BENEFIT ANALYSIS



9.0 INTRODUCTION

It is essential to have a cost benefit impact analysis of a project. It is more compressive in scope. It takes long view of the project (further as well as nearer future) and a wide view (in the sense of allowing for side effect). It is the comparison of any positive or negative changes in the value of mine environment amenities with costs (or benefits) of implementing the proposed change.

a) Project Cost

After comprehensive study of the proposed project, it can be concise that the project is desirable and it can be implemented. The proposed project is Constructional project, where Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi will be done is estimated to be ₹ 1154.16 lakhs, which includes all Project expenditures comprising the required operational expenses necessary for the successful execution of the project and the Environmental Management Budget for environment protection during project implementation and mine execution stage.

9.1 ENVIRONMENTAL COST ANALYSIS

A Cost-Benefit Analysis (CBA) of a ghat's construction cost involves quantifying and comparing all projected costs (materials, labour, indirect expenses) with all anticipated benefits (tourism revenue, job creation, improved connectivity) to determine the project's overall economic feasibility. The process includes identifying costs, assigning monetary values to benefits, applying a discount rate, calculating the net present value, and performing sensitivity analyses to make informed decisions on whether the project's advantages outweigh its expenses.

9.2 CONCLUSION

The estimated capital cost and financial viability of the Constructional and developmental Project have been assessed, indicating that the project is both financially and technically viable. The project operations incurs higher environmental benefits in and around the project site.



CHAPTER X
ENVIRONMENTAL
MANAGEMENT PLAN
(EMP)



10.0 INTRODUCTION

Identification and prediction of impacts is followed by mitigation measures which play a vital role in prevention of environmental degradation during operational phase of the project. This leads to preparation of Environmental Management Plan (EMP), therefore EMP forms an imperative part of EIA process. The Environmental Management plan is site specific which is developed to ensure that the project is implemented in an environmentally sustainable manner where all contractors and subcontractors, including consultants if any, understand the potential environmental risks arising from the project and take appropriate actions to minimize those risks. EMP also ensures that the project implementation is carried out in accordance with the planned design and by taking appropriate mitigation actions to reduce adverse environmental impacts during project's life cycle. Every project creates certain inevitable impacts which can be reduced with the help of effective implementation of a well-designed EMP.

The potential environmental impacts which need to be regulated are as mentioned below:

- Overall conservation of environment.
- Minimization of waste generation and pollution.
- Judicious use of natural resources and water.
- Safety, welfare and good health of the work force and population.
- Energy conservation.
- Vigilance against probable disasters and accidents.
- Monitoring of cumulative and longtime impacts.
- Ensure effective operation of all control measures.
- Generation of municipal solid waste from occupants, maintenance of roads, parks, common areas
- Noise pollution due to construction activities as well as vehicular movement;

To ensure better environment in & around the project site, effective EMP needs to be developed and implemented.

10.1 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

During the construction and operation phase of the project, no significant impact is anticipated on local or regional topography and Physiography.



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CHAPTER X- ENVIRONMENTAL MANAGEMENT PLAN

- No overburden or loose sediments will be kept in the vicinity of the working benches.
- The possibility of the project activity contributing to the pollution of watercourses of the region or to the ground water regime is prone that this will significantly constitute an area of concern.
- Construction of well-compacted roads.
- Regular water spraying on haul roads by tankers.
- Personal Protective Equipment (PPE) like earmuffs/earplugs, dust masks, helmets, safety boots will be provided to all operators and employees working near project site machineries or at higher noise zone.
- Proper and regular maintenance of vehicles and other equipment.
- Provision of supplying earplugs for workers and operators.
- Care being taken that noise produced during vehicles movement for carrying material is within the permissible noise level.
- Provision of Green Belt (thick foliage) in the places where required would be done in consultation with local authorities.
- Strict observance of the provisions of Acts, Rules and Regulations in respect of safety both by management and the workers.
- Proper planning and designing of work in order to reduce the risk of hazards.
- Specific instructions and supervisions of working where danger due to fall of side (overhanging, undercutting of bench, fall of objects from higher benches/places is apprehended).
- Training of work persons and the officials.
- Since the haul road will be of considerable length, due importance will be given in the construction of road. The width of road will be maintained more than thrice the width of the vehicle. A code of traffic rules will be implemented.
- A code of practices for tipping in stock piles/dumping of overburden at dump yard and loading point will be implemented.
- In respect of contract work, safety code for contractors and workers will be implemented.



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- They will be allowed to work under strict supervision of statutory person/officials only after they will impart training at vocational training centers. All personal protective equipment will be supplied to them.
- A code of practice for fighting fire will be implemented.
- Competent persons like fitters, mechanics will be imparted with special attention to project impact.
- Care will be taken that no cooking, or burning of woods will be allowed in the adjoining area.
- Provision of temporary rest shelters for workers with amenities like drinking water etc.
- Periodical Medical Examination (PME) of all workers by a medical Officer. First Aid facility is provided at the mine site.
- Close surveillance of the factors in working environment and work practices which may affect environment and worker's health.

(A) PRE-CONSTRUCTION STAGE

- i. **Tree cutting and vegetation clearance-** There are no trees found at the project site. All the trees are required to be saved. Small Vegetation will be required to be removed from the ghat section before the commencement of construction.
- ii. **Mobilization & Site Clearance-** The project is of constructing a ghat at the left side of River Ganga. There are no project affected Families.
- iii. **Procurement of plants and machineries-** Specifications of plant and machinery to be procured need to comply to the relevant national standard norms and with the requirements of emission control and noise pollution abatement requirement as per the standards prescribed by CPCB.
- iv. **Setting up of construction camps-** The construction camps (for 10-15 people) will be located at least 200m away from Ganga ghat and there must be basic necessary (temporary) living accommodation and ancillary facilities per the guideline.



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(B) CONSTRUCTION STAGE**LAND**

Quarrying Material sources- Quarry material shall be sourced from approved and licensed quarries. For operating new quarries, the Contractor shall obtain materials from quarries only after consent of concerned authorities and only after development of a comprehensive quarry" redevelopment plan. Adequate safety precautions shall be ensured during transportation of quarry material from quarries to the construction site. Vehicles transporting the material shall be covered to prevent spillage.

Contamination of soil- Oil & fuel spills from construction vehicles equipment shall be controlled by good O&M practices like maintaining diesel log book, and regular maintenance of the heavy vehicles and equipments.

If there is any oil spill that must be reported to the highest level of the working team of the contractor and immediately the oil spill is shall be converged within absorbents like Absorbent Mat (like Pig Oil Absorbent Mat) shall be placed in a concreted mountain platform so that oil spillage does not mix with the soil.

Generation of Debris- Debris generated due to the dismantling of the ghat area and other concrete structures if any at the site shall be stored at a place sufficiently away from the main channel of Ganga. The generated debris shall be re-used efficiently if found suitable for using mainly as fill materials and stone pitching work.

AIR

Dust Generation- Vehicles carrying construction materials shall be covered; Regular water sprinkling at areas of dust generation.

Equipment Selection, Maintenance and Operation- Regular pollution under check for construction vehicles shall be made; Further, idling of vehicles to be stopped during construction period; Automatic diesel logger may be installed in vehicles to minimize idling Monitoring of air Quality as per the monitoring plan



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WATER

Discharge from existing sewer drains - Route of these discharge point to be diverted before the start of ghat construction; Route to be diverted through the existing sewer line to the existing nearby STP.

Waste Water from construction camp- Adequate sanitation and waste management facility to be provided in construction camp and it is to be ensured that no liquid or solid waste get disposed into river Ganga during the construction period. Monitoring of water quality during construction period as per the monitoring plan

Disposal of Debris and other wastes into Ganga- The debris generated from the structures shall be reused (as a quarry material within project site) as far as possible and the left-over material shall be disposed at a suitable location with following local rules and regulations along with approval from the Engineer and the Environmental Specialist on the project. In no case, no debris shall be disposed into the river Ganga. Empty paint or emulsion containers to be disposed of; Solid Waste generated from construction camp shall be disposed as per the approved waste management plan.

PHYSICAL AND CULTURAL RESOURCES-

Impact on cultural heritage/structures during construction - As part of the project no heritage building/indigenous buildings/temples/mosques shall be demolished. There are no heritage buildings within 25 m or 100m from ghat thus, adequate care shall be taken to minimize vibration impact. During vibration muffler to be used. A conservation architect shall be deployed to guide the contractor on identification and on conservation of structures in the project area; Demolition of any heritage structure shall be not be done Chance find of any heritage structure / remnants during construction shall be immediately reported to the authorities and shall comply with Ancient Monuments and Archaeological Sites and Remains Act, 1958.

NOISE

Noise from Vehicles, Plants and Equipment- Construction activities shall be avoided during evening and night time hours (7 p.m. to 6 a.m.). All jackhammers and pavement breakers used on the construction site shall be fitted with manufacturer's approved exhaust muffler. Use of



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pneumatic impact equipment shall be restricted 100m from noise sensitive locations. Instead of pneumatic hammers electric, hydraulic hammers could be used. Use hydraulic or vibro impact hammers in place of diesel hammers for piling work; The local power grid shall be used to limit generator noise Provision of ear-plugs to contractors exposed to high noise levels.

FLORA AND FAUNA

Fauna Gangetic Dolphin- Construction workers must protect natural resources and especially Dolphin Fishing is strictly prohibited. Throwing of food items in Ganga be restricted as that attracts fish as well as Dolphin.

No debris or any contaminated material to be disposed during the construction stage; No indigenous grasses should be planted during the construction of landscape terraces; No natural amphibious/aquatic grasses of the riparian zone of the river be disturbed as these are breeding ground of various terrestrial and aquatic insects; No underwater noise shall be created during the construction activities. Piling work to use minimum underwater noise so that Dolphins are not disturbed; The temporal and seasonal variation of the in status and distribution of the Ganges River dolphin in the river in the study area during the course of its implementation i.e. during execution and Operation & Maintenance.

SOCIO-ECONOMIC ENVIRONMENT

Accidents- The Contractor will provide, erect and maintain barricades, including signs marking flats, lights and flagmen as required by the SC along the ghat sections, approach roads etc.

Resettlement Action of People- No any Families are getting affected as part of the project. No Affected population will be compensated as per entitlement framework presented in the RAP report.

RISK AND SAFETY

Risk and Safety from construction activities- Adequate precautions will be taken to prevent danger from electrical equipment. Precautions shall be made to provide proper access route to the devotees to access the cultural resources/temples during the construction stage along with adequate signage to avoid any accidents; The safety workers shall be taken care as per the



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prevailing norms and life boat and jackets shall be kept in adequate numbers; No material or any of the sites will be so stacked or placed as to cause danger or inconvenience to any person or the public. All necessary fencing and lights will be provided to protect the public. Protective footwear and protective goggles to all workers employed in mixing asphalt materials, cement, lime mortars, concrete etc. Protective eye-shields to workers engaged in welding works Protective goggles and clothing to workers engaged in stone breaking activities and workers shall be seated at sufficiently safe intervals Earplugs to workers exposed to loud noise (above 75dB (A)), and workers working in crushing, compaction, or concrete mixing operation. The Contractor shall comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. The Contractor shall ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint.

Safety Measures During Construction- All accidents and safety incidents at the project site and involving contractor shall be immediately reported to the Employer and the Engineer. To ensure safety of the temporary accesses during construction, safety devices shall be installed. Workers undertaking various operations during construction shall be protected by providing helmets, masks, safety goggles, hand gloves and rubber boots etc. First aid kits shall be provided at construction site for workers to meet minor accidents during construction The transportation of construction material preferably can be brought to the project site during evening hours (7-10 pm) or during early morning (5-8 am) to avoid congestion in the project area. The collected solid waste will be transported on or before official or academic time schedule. (10 am to 6 pm).

Hygiene- At every workplace, good and sufficient water supply shall be maintained to avoid waterborne / water related / water-based diseases to ensure the health and hygiene of workers. Adequate drainage, mobile toilets shall be provided at workplace. Preventive Medical care shall be provided to workers. An action plan shall be prepared and implemented.

(C) OPERATION STAGE

Sewage generation from Project and Water Quality- Bio-Toilet complex along with will be provided in the project; Approximately 10 KLD of sewage expected; Septic Tank and soak pit shall be provided for the sewage; Water quality to be monitored as per monitoring plan.



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PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

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Surface Run-off- Interceptor drain has been proposed to cater surface run-off from promenade and pathways and will be ultimately be linked with the drains along access roads.

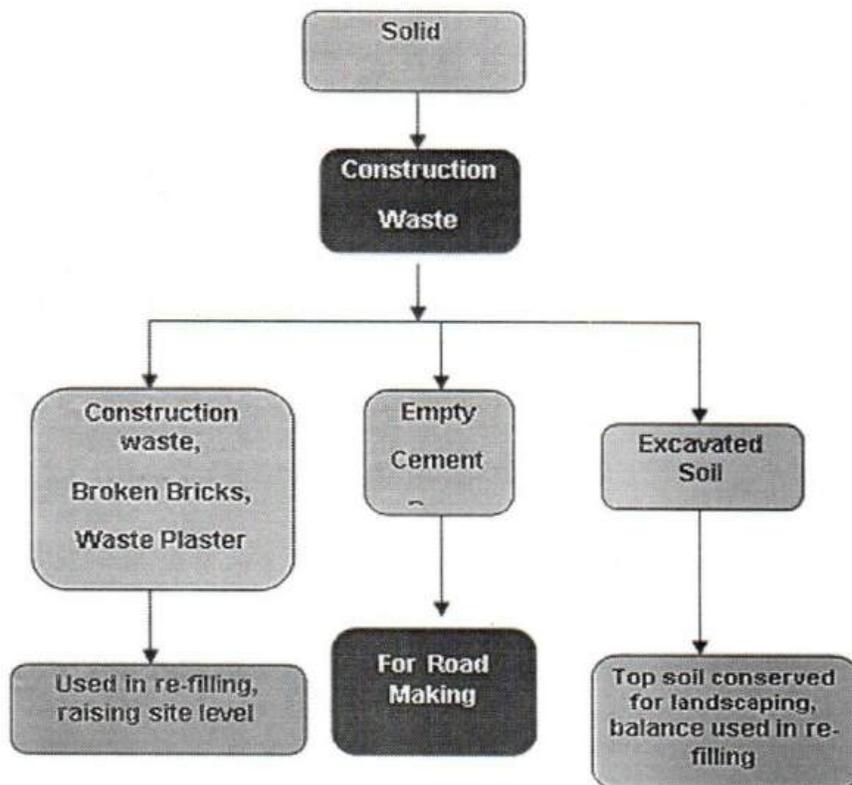
Increase of speed of water at Ghat section and chances of Soil Erosion- As part of the project necessary green areas along the banks will be protected as well as new green areas in terms of parks shall be created. This will provide necessary bank stability. At the bottom of the ghat boulder pitching shall be made so that uniform speed will be maintained.

Solid Waste Management- To minimize the waste disposal in river Ganga, the following measures shall be undertaken:

Bins along Ganga ghats @4 bins in ghat for 20kg capacity;

06 litterbins along promenade and pathways of 1kg capacity;

Masonry bins at 6 locations to facilitate communities to dispose their waste at these bins.



Dolphin Conservation- The mess size of the iron wire to be used to fix the boulders below the steps at ghats close to the water line or river edge should be four inches instead of eight inches.



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**PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION
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The boulders should be in river water even in the leanest month. The invertebrates and fishes should have access to the boulder pitching. No indigenous grasses should be planted in the landscape terraces between two ghats as in the spaces natural amphibious/aquatic grasses of riparian zone of the river grow which are breeding grounds for various terrestrial and aquatic insects and provide habitats for amphibious/aquatic invertebrates. It is advisable that landscape terraces should not be allowed to dump solid waste and be used as open lavatory. It should not be allowed for cattle wallowing. There should be minimum or no noise under the water during implementation of the project. If any mechanized boat is used during implementation of the project, the same may be propeller guard.

BIOLOGICAL ENVIRONMENT

During the construction phase, no tree was cut. The project site supported some local herbs and shrubs only. There is no National Park or Wildlife Sanctuary in 10 km radius of project site. Therefore, no significant impact anticipated on the biological environment from construction of the project.

Project has proposed its landscape as per the bye-laws. Total green area measures 751.94 sqm i.e. approx. 25.44 % of Net Plot Area of the proposed project. Indigenous trees will be prepared for the plantation and samplings will be purchased from government nursery or government approved nursery. Landscape Plan Attached as Annexure.

It is also recommended that the plantation has to be taken up randomly and the landscaping aspects could be taken into consideration. The plants selected for the plantation exhibits, following desirable characteristics:

- The species are fast growing and providing optimum penetrability.
- The species are wind-firm and deep rooted.
- The species form a dense canopy.
- Only indigenous and locally available species have been used.
- Species tolerance to air pollutants like particulate matters have been preferred.
- The species are permeable to help create air turbulence and mixing within the belt.
- There are no large gaps for the air to spill through.




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- Trees with high foliage density, leaves with larger leaf area and hairy on both the surfaces have been preferred.

10.2 ENVIRONMENTAL MANAGEMENT PLAN IMPLEMENTATION

Environmental Management Plan serves no purpose if it is not implemented with true spirit. Some loopholes in the EMP can also be detected afterwards when it is implemented and monitored. Thus, an implementation and monitoring programme shall be done. Implementation of proposed control measures and monitoring programme has an implication on the surrounding area as well as for the region. Therefore, mine management would strengthen the existing control measures as elaborated earlier in this report and monitor the efficacy of the control measures implemented within the mining area relating to the following specific areas:

- a) Collection of air and water samples at strategic locations with frequency suggested and by analyzing thereof. If the parameters exceed the permissible tolerance limits, corrective regulation measure will be taken.
- b) Collection of soil samples at strategic locations once in every year and analysis thereof with regard to deleterious constituents, if any.
- c) The effectiveness of drainage system depends upon proper cleaning of all drains provided in the surrounding of mine area. Any blockage due to siltation or loose material will be checked at least once in a month.
- d) Measurement of water level fluctuations in the nearby ponds, dug wells and bore wells.
- e) Regular visual examination will be carried out to look for erosion of river banks. Any abnormal condition, if observed will be taken care of.
- f) Measurement of noise levels at mine site, stationary and mobile sources, and adjacent villages will be done in every quarter of the year.
- g) Afforestation would be done as per program Post plantation, the area will be regularly monitored in every season for evaluation of success rate. For selection of plant species local people would also be involved.

Operation management will be in regular touch with local surrounding villages to update the various developmental schemes made by them. They will also consider any immediate requirement, which could be taken care of in near future. Construction operation management will be in regular



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**PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION
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touch with State Pollution Control Board and send them annual progress report. Any new regulations considered by State/Central Pollution Control Board for the industry will be taken care of.

10.3 BUDEGT ALLOCATION FOR EMP IMPLEMENTATION

The cost of the complete project including land and development cost and other contingencies is ₹1154.16 lakhs. Below mentioned budget is provided to the Environment Management Cell for implementation of EMP and monitoring of Environmental parameters.

The cost has been examined assuming the quantities and specifications of the proposed works as they are. The implementing agency/administrative department will be fully responsible for ensuring the quantities at the time of construction.

The cost of the project has been estimated by the Division for the purpose of administrative/financial approval and budget allocation. The Division is of the opinion that the construction of the project should be started only after obtaining technical approval from the competent level.

The project has been examined keeping the provisions as they are, in which no significant changes like inclusion of new works, increase in size of works and use of other high specifications etc. will be made without obtaining prior approval of the competent level. The administrative department will include a mention of this in the relevant approval order. Before starting the construction work of the project, technical approval should be obtained from the competent level.

In order to prevent duplication of works proposed under the scheme, before approving the project, the administrative department should ensure that the said work is neither approved nor is proposed to be included in any other scheme/programme in the present or future.

In comparison to the proposed cost of the project of Rs. 1188.68 lakh, the division has estimated the cost to be Rs. 1154.16 lakh. A brief description of the cost is as follows: -



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Table 10.1 Budget allotted for Environmental Management Plan

S. No.	Item of Work	Unit	Proposed Cost			P.F.A.D Cost			Deduction (Rs. In Lacs)
			Quantity	Rate (Rs.)	Amount (Rs. In Lacs)	Quantity	Rate (Rs.)	Amount (Rs. In Lacs)	
1.	Construction of Ghat and Allied Works				929.65			902.40	-27.24
2.	P/F High Mast Solar Street light (power pack) with 7m GI Pipe, 30W 5 Nos. LED, 02 No. 290W PV module, Battery 12 V 150 AH, 04 No. with box, including cost of material, labour carriage loading, unloading and all taxes etc complete.	Nos.	2	2225760.00	4.52	2	2031.5	4.52	0.00
3.	Supply & fixing of 16 mtr high mast light	Nos.	1	863771.18	8.64	1	849094	8.49	-0.14
4.	Construction of Bio Toilet at ghat complete in all respect	Nos.	2	184052.00	3.68	2	184052	3.68	0.00
5.	Supply & fixing small sizes of signages	Nos.	2	6996.00	0.14	2	6996	0.14	0.00
6.	Supply & fixing 2.4m span overhead cantilever structure with 150mm dia MS one vertical post Double side retro reflective sign boards of signage on ghat	Nos.	2	58916.00	1.18	2	58916	1.18	0.00



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	7.	8.	9.	10.	11.	12.	13.	14.	15.								
	Construction of changing room as per the details attached	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00	200.00
	Cost of C.C Road as per detailed	2175.00	2175.00	2175.00	2175.00	2175.00	2175.00	2175.00	2175.00	2175.00	2175.00	2175.00	2175.00	2175.00	2175.00	2175.00	2175.00
	COST OF GHAT																
	Add 1% for Contingencies	956.64	956.64	956.64	956.64	956.64	956.64	956.64	956.64	956.64	956.64	956.64	956.64	956.64	956.64	956.64	956.64
	TOTAL																
	Less 5.0% due to work done by Deptt.	-96.62	-96.62	-96.62	-96.62	-96.62	-96.62	-96.62	-96.62	-96.62	-96.62	-96.62	-96.62	-96.62	-96.62	-96.62	-96.62
	TOTAL (A)																
	Add 10.0% for Centage Charges	917.90	917.90	917.90	917.90	917.90	917.90	917.90	917.90	917.90	917.90	917.90	917.90	917.90	917.90	917.90	917.90
	TOTAL (B)																
	Add 1% for labour cess on Total (A)	1009.69	1009.69	1009.69	1009.69	1009.69	1009.69	1009.69	1009.69	1009.69	1009.69	1009.69	1009.69	1009.69	1009.69	1009.69	1009.69
	TOTAL (C)																
	Add 18% for G.S.T	165.22	165.22	165.22	165.22	165.22	165.22	165.22	165.22	165.22	165.22	165.22	165.22	165.22	165.22	165.22	165.22
	Supply & fixing large size of Dustbin on ghat including cost all materials, labour, T&P etc. complete in all respect 10 Nos. @5250	5250.00	5250.00	5250.00	5250.00	5250.00	5250.00	5250.00	5250.00	5250.00	5250.00	5250.00	5250.00	5250.00	5250.00	5250.00	5250.00
	Providing and fixing drinking water Kiosk 2 Nos.	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315	315
	G. TOTAL																



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION
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CHAPTER X- ENVIRONMENTAL MANAGEMENT PLAN

Detailed estimate for Proposed Construction of
Garhawa Ghat and Development of Destination Tourism at Left Bank of River
Ganga in Varanasi.

Left Bank of River Ganga in Varanasi.

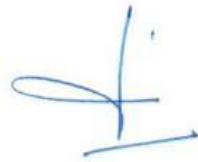
[FORM 'J']

S. No.	Description of Item		Amount (In Lacs)
1	Cost of Ghat Civil Works		938.06
		Total	938.06
2	Less 5.0% due to work done by Deptt.	(-)	46.90
		Total (A)	891.16
3	Add 10.0% for Centage Charges		89.12
		Total (B)	980.27
4	Add 1% for Labour Cess on Total (A)	Rs. 980.27	9.80
		Total (C)	990.08
5	Add 18.00% for G.S.T	891.16	160.41
6	Supply & fixing large size of dustbin on ghat including cost all materials, labour, T&P etc. complete in all respect. 6 Nos @5250/-		0.53
7	Providing and fixing drinking water Kiosk 2 Nos		3.15
		G. TOTAL	1154.15



CHAPTER XI

EXECUTIVE SUMMARY



11.0 INTRODUCTION

Environment Impact Assessment (EIA) is a process used to identify the environmental, social & economic impacts of a project prior to decision making. It guides the decision makers in taking appropriate decisions for proposed projects. It aims predicting environmental impacts at an early stage of project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision makers. By using EIA, both environmental & economic benefits can be achieved. By considering environmental effects prediction & mitigation, early benefits in project planning, protection of environment, optimum utilization of resources, thus saving overall time & cost of the project.

Environmental Impact Assessment report is prepared to comply under EIA Notification of the MoEF dated 14th September 2006, and its subsequent amendments and EIA Guidance Manual for Constructional projects of MoEF, Govt. of India.

As per the EIA Notification S.O. 1533(E) dated 14.09.2006 and subsequent amendments, including S.O. 3252(E) dated 22.12.2014 and S.O. 5736(E) dated 15.11.2018, only building and construction projects with a built-up area exceeding 20,000 square meters and less than 1,50,000 square meters fall under Category 8(a) of the EIA notification and are required to obtain prior Environmental Clearance (EC).

After review, it is confirmed that the "Construction of Gadwaghat" project does not exceed the threshold of 20,000 sq. m of built-up area, as "Construction of Gadwaghat, Varanasi, Uttar Pradesh. Total Construction area (78.3m x 80m = 6,264m²)" nor does it fall under any other category requiring mandatory EIA clearance. Therefore, as per the applicable statutory provisions and government notifications, this project does not require an EIA, and there is no obligation to conduct an Environmental Impact Assessment.

Project Proponent: - U.P. Project Corporation Limited Unit-3 Varanasi, Uttar Pradesh

EIA Consultant and Architect- M/s Aegis Environment Research Pvt Ltd. Is the technical consultant for this project and Paradise Designers is the architect consultant for the Proposed project of Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi.



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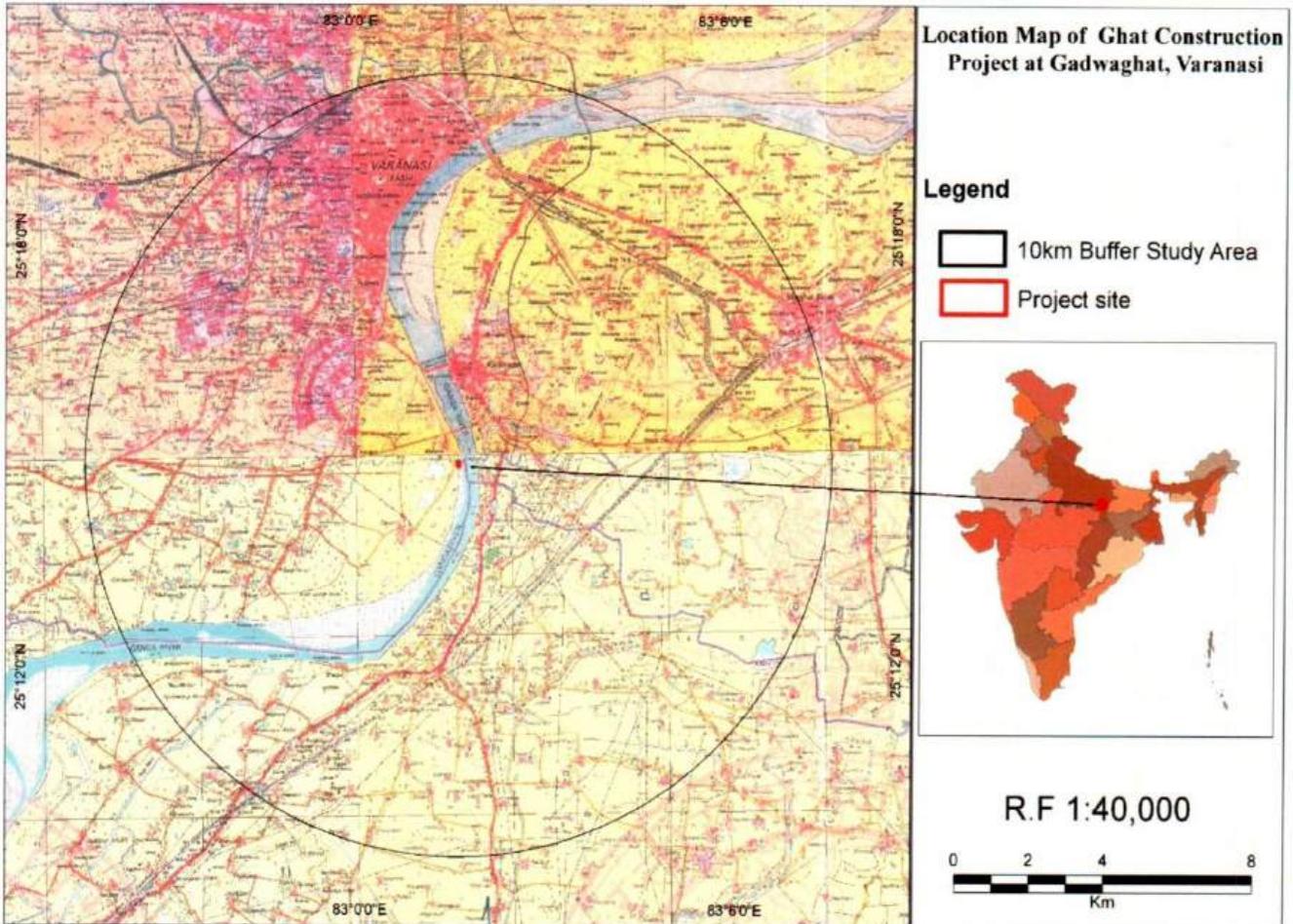
PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

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CHAPTER XI- SUMMARY & CONCLUSION

11.1 LOCATION

A detailed project report on Proposed Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi has been prepared to enhance the potential of Varanasi's River edge infrastructure and future decade. The project area is spread over a length of 0.79 km of the water front. **Built Up Area- 6,264m²**. The proposed project is Constructional project, where Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi will be done.



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION
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Project Coordinates: -

S. No.	Latitude	Longitude
1.	25°14'50.30"N	83° 1'38.56"E
2.	25°14'53.37"N	83° 1'38.06"E
3.	25°14'53.74"N	83° 1'39.90"E
4.	25°14'50.93"N	83° 1'40.26"E
5.	25°14'50.75"N	83° 1'39.98"E
6.	25°14'50.62"N	83° 1'39.98"E

Table 11.1- Site and Surrounding of the Project Site

Nearest Habitation	Milkipur (Right Bank of River Ganga), 0.82 km in SE direction Ramna, Varanasi, Uttar Pradesh, 0.53 km in W direction
Nearest Town	Chittupur Town, 2.57 km in NW direction Salhupur, 0.56 km in NW direction
Nearest Railway Station	Banaras Railway Station, 7.80 km in NW direction Jeonathpur Railway Station, 3.90 km in SE direction
Nearest Airport	Port Inland Helipad (Inland Waterways Authority of India), 0.41 km in NE direction UP Air Sqn NCC (Hangar), 3.38 km in NW direction
Nearest Park/Playground	Vagishwari Park, 0.62 km in NW direction Botanical Garden BHU, 4.31 km in NW direction Cricket Ground of Family, 1.63 km in NW direction
Nearest School/College	Malahiya Primary Govt School, 0.70 km in NW direction Upper Primary School, Tahirpur, Niyamtabad, Chandauli, 1.11 km in E direction Swami Harsewanand Public School (SHPS) Varanasi, 0.85 km in NW direction Shri Shiv Kumar Singh Inter College, 1.60 km in W direction Banaras Hindu University, 3.46 km in NW direction
Nearest Hospital	Shivganga Hospital Pvt Ltd, 3.17 km in NW direction Sharda Hospital, 3.53 km in NW direction Surbhi Hospital & Trauma Center, 1.35 km in NE direction
Nearest Post Office	Tahirpur BO Post Office, 1.30 km in E direction India Post Ramnagar Sub Post Office, 2.39 km in N direction
Nearest Temple	Durga Temple, 0.74 km in SE direction Shital Mata Temple, 1.78 km in NW direction



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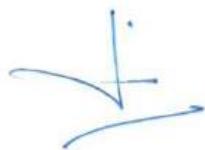
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11.2 BACKGROUND OF PROPOSED GADHWA GHAT CONSTRUCTION

- The estimate of the project has been prepared by the Project Manager, Uttar Pradesh Project Corporation Ltd., Varanasi, which is countersigned by the Deputy Director, Tourism, Varanasi and Vindhyachal Division and recommended by the Director, Tourism Department, Deputy Chairman and Director General, Tourism Department, Uttar Pradesh, Lucknow and the project proposal is approved by the administrative department.
- It is proposed to do this project from the amount provided under item no. 46- tourism facilities and beautification in Varanasi in the budget for the financial year 2023-24.
- Project Corporation Ltd. has been named as the implementing agency for the project.
- Regarding the need of the project, it has been mentioned that Garhwa Ghat Ramnagar is a place located in Varanasi district of Uttar Pradesh state of India. There is an ashram located at Gadhwani Ghat here, where devotees keep coming to feed the cows, perform pooja-paath and bhajan-kirtan. Flowers are offered to the statue of Mahant Shri Shri 1008 Atma Vivekanand Ji Maharaj and he is saluted. People also participate in the Sant Samagam here.
- People go here to meet the head priest Sadguru Sharananand ji Maharaj and to have darshan and worship him. This ashram is of great importance from the historical, mythological, religious, legend, ecological, biological and natural point of view, which is of great importance to the people of the region, nationally and internationally.
- The project proposal has been tested on the latest schedule of rates of Public Works/Irrigation Department and DSR-2023. Certain works under the project which are not available in the schedule of rates of Public Works Department/Irrigation Department for the year 2020/2021 and DSR have been proposed on the basis of market/quotation, the cost has been tested considering these rates as indicative rates. The administrative department/executing agency will be fully responsible for getting these rates done at the minimum and actual rates.
- Under the scheme, funds have been sanctioned at the rate of 18% GST. The administrative department should ensure at its level that GST is not included separately in various items under the scheme.
- Administrative and financial approval should be issued only after the administrative department obtains the approval of the competent level on the project.



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- Land is available for the construction of the project.

11.3 UTILITIES

a) Power

Power Requirement: 2 KW Source: Renewable Energy

All the electricity supply will be of Renewable energy, for which High Mast Solar Street Lights will be installed at the site.

b) Water Supply

During construction phase water will be supplied by private water tankers, whereas during operation phase water supply will be provided through the Municipal water supply. Total water requirement is approx. 18 KLD. Fresh water requirement is approx. 8 KLD. & recycled water 5 KLD.

c) **Solid Waste Management** -During the operation phase, waste will comprise domestic, landscape. The solid waste generated from the project will be mainly domestic waste and estimated quantity of the waste shall be approx. 81.25 kg per day (@ 0.25 kg per capita per day for any kind of staff, @ 0.15 kg per capita per day for the visitor, and Following arrangements will be made at the site in accordance to Solid Wastes Management Rules, 2016.

d) Green Area Details

Project has proposed its landscape as per the bye-laws. Total green area measures 1043.14 Sqm i.e. approx. 16.65 % of Net Plot Area of the proposed project. Indigenous trees will be prepared for the plantation and samplings will be purchased from government nursery or government approved nursery. Landscape Plan Attached as Annexure.

11.4 BASE LINE DATA

This section contains the description of baseline studies of the 10km radius of the area surrounding The proposed project is Constructional project, where Construction of Garhawa Ghat and Development of Destination Tourism at Left Bank of River Ganga in Varanasi will be done Baseline environmental data generation for air, water, noise and soil quality monitoring has been conducted at project site and other locations from 1st March 2025 to 31st of May 2025.



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Environmental data has been collected in relation to proposed mining for:-

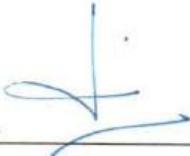
- (a) Air
- (b) Noise
- (c) Water
- (d) Soil
- (e) Ecology and Biodiversity
- (f) Socio-economy

Table 11.2 Baseline Environmental Status

Attribute	Baseline status
Ambient Air Quality	Ambient Air Quality Monitoring (AAQM) has been carried out at Five locations during pre- monsoon season from 1st March 2025 to 31st of May 2025. The minimum and maximum level of PM _{2.5} recorded within the study area was in the range of 41.2 µg/m ³ to 58.5 µg/m ³ with the 98th percentile 57.82 µg/m ³ . The minimum and maximum level of PM ₁₀ recorded within the study area was in the range of 58.6 µg/m ³ to 97.15 µg/m ³ with the 98th percentile 93.97 µg/m ³ . The minimum and maximum concentration of SO ₂ recorded within the study area was in the range of was 4.9 µg/m ³ to 15.3 µg/m ³ with the 98th percentile 13.41 µg/m ³ . The minimum and maximum level of NO ₂ recorded within the study area was in the range of was 8.4 µg/m ³ to 23.3 µg/m ³ with the 98th percentile 23.12 µg/m ³ . The results thus obtained indicate that the concentrations of PM ₁₀ , PM _{2.5} , SO ₂ and NO ₂ in the Ambient Air are well within the National Ambient Air Quality (NAAQ) standards for Industrial, Residential, Rural and other areas.
Noise Levels	Noise monitoring was carried out at five locations. The results of the monitoring program indicated that both the day time and night time levels of noise were well within the prescribed limits of NAAQS, at all the four locations monitored.
Water Quality	3 Groundwater samples and 2 surface water samples were analyzed and concluded that: The ground water from all sources remains suitable for drinking purposes as all the constituents are within the limits prescribed by drinking water standards promulgated by Indian Standards IS: 10500. From the Surface water analysis, it is evident that most of the parameters of the samples comply with 'Category 'A' standards of CPCB indicating their suitability for Drinking water source after conventional treatment and disinfection.
Soil Quality	Samples collected from identified locations indicate the soil is sandy type and the pH value ranging from 6.34 – 7.34, which shows that the soil is alkaline in nature. Potassium is found to be from 166.98 mg/kg to 177.46 mg/kg. The water holding



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	capacity is found in between 30.43 % to 32.93 %.
Ecology and Biodiversity	There are no Ecologically Sensitive Areas present in the study area, but many reserved forests regions surround the project area. No forest land is also present within the mine area.
Socio-economy	The implementation of the project on river Ganga will throw opportunities to local people for both direct and indirect employment. The study area is still lacking in education, health, housing, water, electricity etc. It is expected that same will improve to a great extent due to proposed mining project and associated industrial and business activities.

11.6 BIOLOGICAL ENVIRONMENT

Impact on Ecology of the Area

Excessive and unscientific Riverbed project causes the degradation of rivers. The activity leads to the removal of channel substrate, re-suspension of streambed sediment, clearance of vegetation, and stockpiling on the streambed, will have ecological impacts. These impacts may have an effect on the direct loss of stream reserve habitat, disturbances of species attached to streambed deposits, reduced light penetration, reduced primary production, and reduced feeding opportunities.

Riverbed project activity results in the destruction of aquatic and riparian habitat through large changes in the channel morphology. Impacts include bed degradation, bed coarsening, lowered water tables near the streambed, and channel instability. Continued extraction may also cause the entire streambed to degrade to the depth of excavation.

Riverbed project activity generates extra vehicle traffic, which negatively impairs the environment. Were access roads cross riparian areas, the local environment may be impacted.

Mitigation measures

As the present site construction will be done in a scientific manner as mentioned before, not much significant impact is predicted, however, the following mitigation measure will be taken to further minimize it.

- Re-suspension, turbulence, stream flow, channel substrate and associated species will be disturbed and lost due to proposed mining will disturb existing pattern but in respect to river area is very minimum / less. The activity will mainly be carried out to minimize associate loss, as stated earlier that the settling pit will be created to minimize the adverse impact downstream.
- As the site has small amount of vegetation, thus clearance of vegetation is required.



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- The activity will employ many heavy vehicles to transport the sand outside the area to desired destination that cause the loss to riparian habitat. Safe site / site having less impact will be selected for transportation, all the vehicles will be employed for transportation purpose will be PUC certified. On closure/during the rainy season the eroded bank will be restored/ reclaimed to minimize negative impacts.

Fauna of Varanasi District-

The general rules regulating hunting and shooting in the reserved forests are framed under the Indian Forest Act, 1927. The Wild Elephants Preservation Act (Act No. VI of 1920) provides for the preservation of wild elephants in the district and the Wild Birds and Animals Protection (Uttar Pradesh Amendment) Act (U. P. Act No. XIII of 1934) provides for the protection of birds and animals in the forests of the district:

The Maharaja of Banaras has the sole shooting rights in the forests of the erstwhile Banaras state and no one else is allowed to shoot in the forests. All the rules and laws under these Acts are operative in the Chandraprabha sanctuary also.

The tehsils of Varanasi, Bhadohi and Chandauli are poor in wild animals. The larger carnivora are scarce but jackals and foxes are to be found in the vicinity of village habitations. There are no deer and antelopes are seldom to be seen in the ravines of the Varuna and along the Karamnasa in pargana Narwan. Wild pig and nilgai are frequently seen on the banks of the Ganga where grass jungles afford good cover. The building of darns in wind Chakia necessitated the clearing away of the, best forest which resulted in a considerable decrease in the wild life of these parts. In the Chakia forests, tigers are occasionally found in Naugarh, Moosakhand and Shikarganj elsewhere except perhaps in the gorges of the Kaimur and the Vindhyan hills, they are unknown. The leopard is to be seen in the whole forest area of Naugarh, the hyena is common everywhere, the lynx is rare and the wild dog (kogi) is destructive to the deer which it hunts in packs. Of the deer tribe, the sambar and chital (which were formerly numerous especially in Londa, a mile off from Chakia proper) have greatly decreased in number now. The black buck and chinkara (or Indian gazelle) are for the most part confined to certain localities. Wild bear and wild boar are found in the upland tracts. In December, 1957 three Gir lions were introduced into these forests.



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Flora of Varanasi District-

The forests of the district are mainly of the tropical dry mixed deciduous type, varying in growth and stocking according to the nature of the soil and effective precipitation and are subdivided into the classes mentioned below.

The northern/southern tropical dry mixed deciduous type of forest (1,18,790 acres) occurs on the ridges, flat hill tops, suitable slopes, foot hills and plains of the district. The quality of the trees is on the whole poor, the trunk usually being between four and ten inches in diameter except in the case of salai (*Romania serrata*) and dhawa (*Amogaiissus lalifolia*) which attain a diameter of twelve inches and an average height from thirty to forty feet. The trees of the overwood are salmi (*Romania swam*), piar (*Buchanania latifolia*), mahua (*Madhuca indica Gmel.*), tendu (*Diospyros melanoxlogg*), dhawa (*Anogeissus lati-folia*), bahera (*Terminerlia bellerica*), kulu (*Sterculea wrens*), asidh (*Leger-itroemia parviflora*), "khair (*Acacia catechu*), bel (*Angle marmelos*), rohina (*Soymida febrifuga*), kusum (*Sthleicheria oleosa*), amla (*Emblica olj-eitialis*), galas (*Buten monosperma*), sihor (*Strebitts asper*), blabber (*Zizyphus xylopyrus*), paprq (*Gardenia latifolia*), khaja (*Bridelia return*), and amaltas (*Cassia Fistula*); those of the underwood are jharberi (*Zizyphus rotundifolia*), kanju (*Flacourtia ramantchi*), haraunda (*Carissa spinarum*), the indigofera species, dhawai (*Woodfordia fruticosa*), koraya (*Piolarr-hena antidysenterica*), mainphal (*Randia dumetorum*) and the cassia species; climbers like makoh (*Zizyphus ocnoplia*), badrasin (*Butca superba*), keoti (*Ventilago calyculata*), all (*Mimosa hingalayana*), panibel (*Vitis latifolia*), gunchi (*Abrus precatorius*), dudhai (*Cryptolepis bucha- nani*) and the *ichnocarpus* species. The grasses that grow in these forests are sabai (*Eulaliopsis binata*), kans (*Saccharum spontaneum*), parwa (*Hetero-pogan controtus*), munj (*Saccharum munja*), khuskhus (*Vesiveria zizanoides*) kus or chickwa (*Chrysopogon motanus*), dab (*Des-mostachya bipitanata*), etc.

There are no reserve and protected forest in district Varanasi as per data of ENVIS Centre, Uttar Pradesh. Varanasi has 15 sq km moderately dense forest, 15 sq km open forest which in total comes as 1.05% of total geographical area of the district ie. 1535 sq km.



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11.7 TRAFFIC ANALYSIS

Road	Existing LOS	Modified V/C Ratio in Construction Phase	Modified V/C Ratio in Operation Phase	Modified LOS
Garhwa Ghat	A	0.133	0.1935	A
NH-19	C	0.549	0.554	C

From the above analysis it can be seen that the V/C ratio will change from 0.114 to 0.414 for Village Road with LOS change from "A" to "C" that is Excellent to good, and the V/C ratio will change from 0.093 to 0.168 for MDR Road with LOS remaining the same i.e, "A" that is Excellent, and the V/C ratio will change from 0.143 to 0.183 for NH-19 with LOS remaining the same i.e, "A" that is Excellent so the additional load on the carrying capacity will be affected to a minimum level.

11.8 ENVIRONMENTAL MANAGEMENT PLAN IMPLEMENTATION

Table 11.3 Detailed estimate for Proposed Construction of
Garhawa Ghat and Development of Destination Tourism at Left Bank of River
Ganga in Varanasi.
Left Bank of River Ganga in Varanasi.

S. No.	Description of Item		Amount (In Lacs)
1	Cost of Ghat Civil Works		938.06
		Total	938.06
2	Less 5.0% due to work done by Deptt.	(-)	46.90
		Total (A)	891.16
3	Add 10.0% for Centage Charges		89.12
		Total (B)	980.27
4	Add 1% for Labour Cess on Total (A)	Rs. 980.27	9.80
		Total (C)	990.08
5	Add 18.00% for G.S.T	891.16	160.41



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6	Supply & fixing large size of dustbin on ghat including cost all materials, labour, T&P etc. complete in all respect. 6 Nos @5250/-		0.53
7	Providing and fixing drinking water Kiosk 2 Nos		3.15
		G. TOTAL	1154.15

11.9 POLLUTION SOURCES AND CHARACTERISTICS

Table 11.4 Pollution Sources and Characteristics

S. No.	Activity / Area	Pollutant	Pollutant Characteristics	Frequency and Probable Impact
Development & Construction Phase				
1	Site Preparation, Construction of SuperStructure, development of road and other infrastructure	Air emission- PM ₁₀ , PM _{2.5} , SO ₂ and NO ₂	a. Dust from construction activities and excavation. b. Particulates matter, NO ₂ and CO from Vehicle exhaust	a. Temporary during construction phase only. b. Bulk of the emissions are expected from ground working and leveling activities.
		Earth / Solid waste	Solid waste from construction activity and excavation.	Periodic
		Noise	Noise generated from construction equipment machinery and vehicles	Temporary during initial construction phase
2	Labour welfare Camps	Sewage	Sewage generated from temporary labour camps on site	Temporary during the initial construction Phase (Mobile Toilets)
		Solid Waste	Solid Waste generated from temporary labour camps on site	Temporary during the initial construction phase
Operational Phase				
1	Vehicular Movement	Air emissions and Noise	Vehicle exhaust emissions	Continuous / periodic but mitigable
2	Diesel generators	Air emissions	SO ₂ , NO ₂ , PM, CO from fuel burning	Occasional during power failure
		Noise	Noise due to running	Occasional during power failure
3	LPG Cylinders /	Thermal / Blast Effect	Accidental Explosion due to LPG leaks and fire	Accidental



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S. No.	Activity / Area	Pollutant	Pollutant Characteristics	Frequency and Probable Impact
	PNG			
4	Maintenance / Housekeeping	Solid waste	Used equipment parts and garden wastes	Continuous but mitigable
5	Vehicle Parking Area	Oil spills	Minor oil leaks in parkingspace	Occasionally, Negligible quantities. But can be managed with appropriate measures

11.10 BENEFIT OF MINING

➤ PHYSICAL BENEFITS

The opening of the proposed project will enhance the following physical infrastructure facilities in the adjoining areas.

- Road Transport:** There will be improved road communication due to the proposed project and maintenance will also be done time to time.
- Market:** Nearby local people will be provided with a good market opportunity.
- Enhancement of green cover:** As a part of reclamation plan, plantation will be carried along the place in the proposed facility making the surrounding clean beautiful and attractive to tourist.

➤ SOCIAL BENEFITS

- Generation of employment and improved standard of living;
- Increased revenue to the State by way of royalty, taxes and duties; and
- Superior communication and transport facilities etc.
- There will be significant change in the socio-economic scenario of the area.
- The proposed project will enhance the prospects of employment. Recruitment for the unskilled and semiskilled workers for the proposed project will be from the nearby villages.
- The development of the basic amenities viz. roads, transportation, electricity, drinking water, entertainment, etc. will be developed as far as possible.
- Overall, the proposed project will change living standards of the people and improve the socio-economic conditions of the area.



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ENVIRONMENTAL BENEFITS

Project has proposed its landscape as per the bye-laws. Total green area measures 1043.14 Sqm i.e. approx. 16.65 % of Net Plot Area of the proposed project. Indigenous trees will be prepared for the plantation and samplings will be purchased from government nursery or government approved nursery. Landscape Plan Attached as Annexure.

Total Plot Area	1043.14 Sqm
-----------------	-------------

- Protection of banks
- Reducing submergence of adjoining agricultural lands due to flooding
- Reducing aggradations of river levels
- Protection of crops being cultivated along the bank
- A check on illegal mining activity

11.11 CONCLUSIONS

- The construction of garhawa ghat and development of destination tourism at left bank of river ganga in Varanasi operations will meet the compliance requirements of MoEF & CC;
- Community impacts will be beneficial, as the project will generate significant economic benefits for the region;
- Adoption of Best Available Technology and Best Management Practices with more environmentally friendly process
- With the effective implementation of the Environment Management Plan (EMP) during the mining activities, the proposed project can proceed without any significant negative impact on environment.



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CHAPTER XII
DISCLOSURE OF
CONSULTANTS ENGAGED



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

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CHAPTER V – DISCLOSURE OF CONSULTANTS ENGAGED

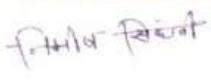
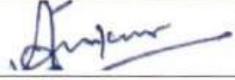
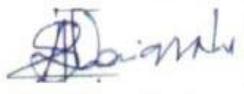
CONSULTANTS ENGAGED

The consultant engaged for the preparation and Validation of the EIA/EMP of the project is M/s Aegis Environment Research Private Ltd. The information about the company with address is as follows:

Basic Information about the Consultant Engaged is as follows stated below:

Name of the Consultant	Aegis Environment Research Private Ltd.
Address	Suite- B 04 H-61Sector –63, Noida - 201301, U.P
Credentials	Accredited by QCI/NABET

Personnel involved in the preparation of EIA/EMP report are stated below:

S. No.	Name	EC/FAE	Details	Signature
01	Mr. Ankur Sharma Team Member – Ms. Jaya Joshi	EC	EIA Coordinator in Sector 39	
02	Mr. Nimish Singhvi	FAE	AP, HG, SHW & GEOLOGY	
03	Mr. Ankur Sharma	FAE	SE, WP	
04	Mr. Ardhendu Sekhar Shannigarhi	FAE	AQ	
05	Ms. Sonal Srishti Singh Team Member- Ms. Jaya Joshi	FAE	EB	
06	Mr. Prakash Mal Jain	FAE	RH, NV	
07	Mr. Jai Deep Singh	FAE	LU	
08	Mr. Vijay Kumar Team Member – Ms. Nisha Yadav	FAE	AP, SC	



PROPOSED CONSTRUCTION OF GARHAWA GHAT AND DEVELOPMENT OF DESTINATION
TOURISM AT LEFT BANK OF RIVER GANGA IN VARANASI.

EIA/EMP

CHAPTER V – DISCLOSURE OF CONSULTANTS ENGAGED

Accreditation Certificate of the Consultant Engaged:



भारतीय गुणवत्ता परिषद्
**QUALITY COUNCIL
OF INDIA**
Creating an Ecosystem to Quality



National Accreditation Board for Education and Training

Certificate of Accreditation

Aegis Environment Research Pvt. Ltd., Noida
B-04, H-61, Sector-63, Noida, Uttar Pradesh- 201301

*The organization is accredited as **Category-A** under the QCI-NABET Scheme for Accreditation of EIA Consultant Organization, 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 including opencast / underground mining	1	1 (a) (i)	A
2.	Mineral beneficiation	7	2 (b)	A
3.	Highways,	34	7 (f)	A
4.	Building and construction projects	38	8 (a)	B
5.	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 March 11, 2025, 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/25/3572 dated March 25, 2025. The accreditation needs to be renewed before the expiry date by Aegis Environment Research Pvt. Ltd., Noida following due process of assessment.

Valid up to
January 29, 2028

Issue Date
March 25, 2025



Certificate No.
NABET/EIA/25-28/IA 0153

Varinder Kanwar
Prof (Dr) Varinder S Kanwar
(CEO NABET)

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



BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
AT PRINCIPAL BENCH , NEW DELHI

AFFIDAVIT

(On behalf of respondent no. 4)

ORIGINAL APPLICATION NO. 1088 OF 2024

IN THE MATTER OF :

Natural Social Services Applicant.

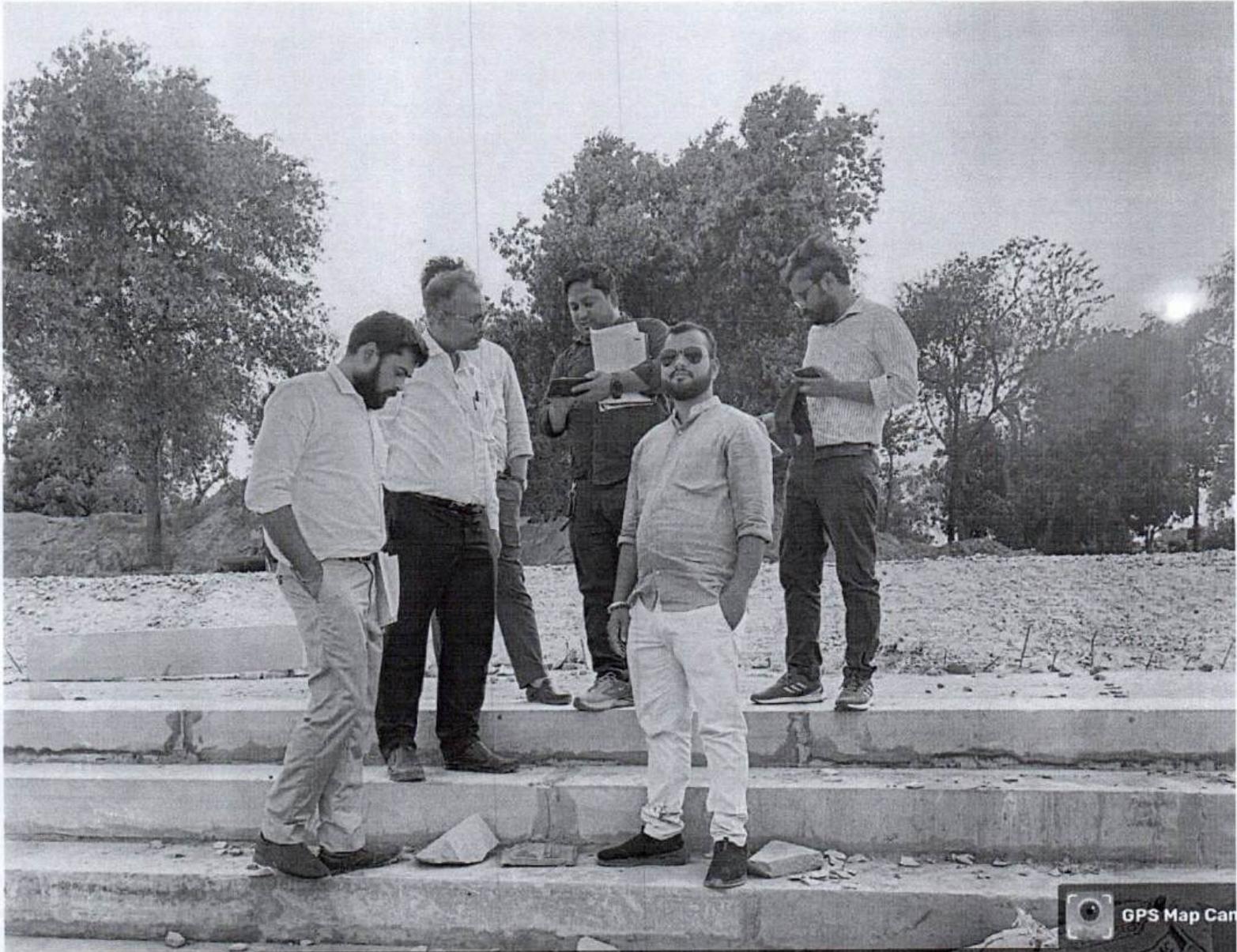
VERSUS

Director General

Directorate of Tourism & Ors. Respondent(s).

Annexure -2





GPS Map Cam

Salhupur, Uttar Pradesh, India

62wg+qm8, Salhupur, Uttar Pradesh 221011, India

Lat 25.247808° Long 83.027378°

01/05/2025 05:18 PM GMT +05:30

Google





Signature

VAKALATNAMA

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
NEW DELHI (PRINCIPAL BENCH) , NEW DELHI

IN

ORIGINAL APPLICATION NO. 1088 OF 2024

IN THE MATTER OF:

Natural Social ServicesApplicant.

VERSES

Director General Directorate of Tourism & Ors.

..... Respondent(s)/Opposite Parties.

I, Dinesh Kumar C/o Gajraj , aged about 51 years , presently posted as **Joint** Director , Tourism at Varanasi , in the Directorate of Tourism , Govt. of Uttar Pradesh and duly authorized to represent Respondent No. 4 in above noted matter.

Respondent No.4 , In the above matter do hereby appoint and retain a fresh advocates(s).

(SAURABH TIWARI)

Advocate,

Adv. Roll- D/966/2017

Office At- Ratnakar Vihar Colony , Near Banaras Hindu University

Varanasi (U.P.) , Pin code-221005 , Mob. No. 9889282315

(VIKASH TIWARI)

Advocate

Adv. Roll- D/283/2020

To act and appear for me/us in the above Petition/Application and on my behalf to conduct and prosecute or defend the same and all proceedings that may be taken in respect to any application connected with the same or any decree or order passed therein, including proceedings in applications for review, to file and obtain the return of documents, and to deposit and receive money on my/our behalf in the said Suit/Appeal/Petition/References and in applications of Review and to represent me/us and to take all necessary steps on my behalf in the above matter. I/We agree to satisfy acts done by the aforesaid advocate(s) in pursuance of these authorities.

I/We appoint the above lawyer(s) with the above-mentioned authorities after setting the fee and agree that whatever shall be done by the said lawyer(s) in connection with the said proceeding shall be binding on me/us. **I withdrew the Vakalatnama filed earlier.**

Dated this the 02 Day of September , 2025

NO OBJECTION

Dinesh
2/9/25

Vikash Tiwari
Adv.

Enrolment No. D/283/2020

Saurabh Tiwari
D/966/2017
ACCEPTED

Counsel for the Applicant/Defendant No. 4

Signature

Witness

Witness

[Handwritten Signature]

वारानसी, विन्ध्यवासिनी एवं आनंदमठ, मण्डल
संयुक्त निदेशक पर्यटन
(दिनेश कुमार)
वारानसी

Saurabh Tiwari
D/966/2017