ENVIRONMENTAL IMPACT ASSESSMENT REPORT

FOR

AUTOMATED STORAGE AND RETRIEVAL SYSTEM PROJECT at SILVASSA DETERGENTS FACTORY

AT

HINDUSTAN UNILEVER LIMITED
SURVEY NO.151/1/1 VILLAGE: DAPADA,
KHANVEL ROAD, SILVASSA
DADRA AND NAGAR HAVELI AND DAMAN AND DIU

MONITORING PERIOD- 1ST OCTOBER, 2024 TO 31ST DECEMBER, 2024
MONITORING DONE BY- VIRAT GLOBAL LAB (A DIVISION OF ASERIES ENVIROTEK INDIA PVT LTD)
CERTIFICATE NO. TC-14455

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Project ID:- AEIPL/EIA/150/2024

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Chapter 1. Introduction

1.1 Purpose of the EIA report

The project proposal is for construction and operation of Automated Storage and Retrieval System (ASRS) in the Silvassa Detergents Factory Unit of the Hindustan Unilever Limited located at Survey No:151/1/1, Village: Dapada, Kanvel Road, Silvassa (Dadra and Nagar Haveli and Daman and Diu). Dapada Detergent Factory is engaged in manufacturing of detergent bars and powders under various brand names. The project proposal is for creating facilities for automated storage and retrieval of products, and does not involve any change in production capacity or product range. The existing or proposed project activities are not covered under the Schedule of EIA Notification, 2006. Therefore, the proposed ASRS project does not require Prior Environmental Clearance.

Established in 2001, The Dapada Detergent Factory of HUL was established in the year 2001, and has been operating with valid consents to operate under Water and Air Acts, and authorization under the Hazardous Wastes Rule. Recently, the area adjacent to the factory boundary has been notified as Wild Life Sanctuary, and part of the processing area falls under eco-sensitive zone. The prime objective of this EIA report is to assess the impact of the operations on the Wildlife Sanctuary and to formulate and implement necessary measures to mitigate the adverse impacts, if any.

Environmental Impact Assessment Report is a process used to identify the environmental, social and economic impacts of a project, and is a decision-making tool used to ensure sustainable development. EIA systematically examines both beneficial and adverse consequences of the project and ensures that these impacts are considered during the project designing and implementation. Therefore, additional objectives of the EIA study are:

- To describe the Project and associated activities together with the need for implementation of the Project;
- To identify and describe the components of the natural and man-made environment likely to be affected by the project;
- To identify and quantify the environmental impacts associated with the project to facilitate visualization of post-project scenario and recommend appropriate mitigation measures;
- To identify and justify the scope for post-project environmental monitoring to ensure the implementation and the effectiveness of the environmental protection and pollution control measures; and
- To identify any additional studies necessary to fulfill the objectives to the requirements of this EIA Study.

1.2 Identification of the Project & Project Proponent

1.2.1 Project Proponent

Hindustan Unilever Limited (HUL) is an Indian fast-moving consumer goods company, headquartered in Mumbai. It is a subsidiary of the British company Unilever, one of the world's leading manufacturers of Food, Home Care, Personal Care and Refreshment products with sales in over 190 countries.. HUL's products include foods, beverages, cleaning agents, personal care products and other consumer staples.

HUL was established in 1931 as Hindustan Vanaspati Manufacturing Co. Following a merger of constituent groups in 1956, it was renamed Hindustan Lever Limited. The company was renamed again in June 2007 as Hindustan Unilever Limited.

As of 2019, Hindustan Unilever's portfolio had more than 50 product brands in 14 categories. The company has 21,000 employees and recorded sales of ₹34,619 crores in FY2017–18. In April

HUL is the market leader in Indian consumer products with presence in over 20 consumer categories such as soaps, tea, detergents, and shampoos amongst others with over 700 million Indian consumers using its products.

Established in 2001, the Dapada Detergent Factory of HUL produces three million units per day laundry products brands like Surf excel, Vim, Rin and Wheel. This site started its digital journey in 2018 and is known to be the first Unilever dedicated Home Care site globally to be recognized as an E2E lighthouse factory, paving the way for rapid digital transformation in South Asia.

Name and address of the authorized signatory and the Contact person for the EIA study of the project are as follows:

Mr. Hargovind Yadav
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Hindustan Unilever Limited,
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Khanvel Road, Silvassa
Mob. No- 91-6394751730
Email ID: Hargovind.Yadav@unilever.com

1.2.2 Project Proposal

The project proposal is for construction and operation of automated storage and retrieval system at Dapada Detergent Factory. The proposed project does not envisage any change in the manufacturing process, raw material & utility consumption, and waste generation. Details of the proposed ASRS facility are as follows.

No. of Pallets to be handled at a time: 7938
Standard Pallet size: 1200m x 1200m

Dapada Detergent Factory of HUL comprises two Units, Unit 1 and Unit 2. The production capacities of the two Units are as follows.

Unit 1:

Synthetic detergent, 180,000 TPA

Unit 2:

Detergent bar: 75,000 TPA
Detergent powder: 75,000 TPA

The products are manufactured through formulation only, involving blending and mixing, and no chemical processing is involved.

1.3 Brief description of the Project

1.3.1 Nature of the Project

The proposed project is for creation and operation of automatic storage and retrieval facilities for the packed product bars and powders. The entire operation will be controlled from a centrally located control room.

1.3.2 Size of the Project

The proposed automated storage and retrieval system will be capable of handling the entire product range of the Dapada factory. The system has a storage capacity of 7392 pallets, and the standard size of the pallets is 1200m x 1200m.

1.3.3 Project Location

The Dapada Detergent Factoy, spread over an area of 6.8 Hectares, is located at Survey No: 151/1/1 Village: Dapada Khanvel Road, Silvassa. At present, major part of the plot area is occupied by the two units of the Detergents Plant and storage tanks/ containers for raw materials.

Silvassa Detergents Factory, is well connected by roads to other parts of Dadra and Nagar Haveli and Daman & Diu. It is connected by an all-weather road to Khanwel Road (NH-848A) which is approx. 0.25 km from the site. It is also connected to Udhawa-Khanwel Road, at a distance of approx. 2.6 km through all-season road, which joins SH-73 which is approx. 10 km and Golden Quadrilateral (NH 48) IS 12.66 km. The project site is at a distance of approx. 12 km from Silvassa. The nearest Railway Station is at Vapi, at a distance of approx. 21 km in the northwest direction. The nearest commercial airport is at Surat, at a distance of approx. 140 km from the factory.

1.3.4 Importance of the project

The Silvassa Detergent Factory plays a vital role in the industrial landscape of Silvassa, the capital of Dadra and Nagar Haveli and Daman & Diu. It contributes significantly to the local economy by creating employment opportunities and supporting related industries. Located in a well-connected industrial hub, the factory benefits from efficient logistics for sourcing raw materials and distributing finished products. Its operations support economic development in the region while meeting the growing demand for detergent products.

The proposed automated storage and retrieval system will facilitate automated handling of products, including lifting and placing of products, stores inventory, and retrieval and loading of products for transport to destination.

1.4 Scope of the study

1.4.1 Acts and Rules applicable to the project

The following acts and rules with their amendments are applicable to the project.

- The Water (Prevention and Control of Pollution) Act, 1974
- The Air (Prevention and Control of Pollution) Act, 1981
- The Environment (Protection) Act, 1986
- The Environment (Protection) Rules, 1986
- The Wildlife (Protection) Act, 1972
- The Hazardous Wastes Management Rules, 2016

The factory is being operated with valid Consents to operate and authorization for Hazardous wastes. The latest consents and authorization are annexed as **Annexure-I to II**.

This EIA report is prepared to meet the requirements of the applicable acts, rules and notification and their revisions.

1.4.2 Brief description of EIA studies

The study area of the EIA covers the area falling within 10 km radius around the proposed project site. The scope of the study consists of the following stages:

- Description of the proposed project, description of proposed site and surrounding area, description of alternate sites, and analysis of alternatives.
- Establishing baseline data of the study area.
- Identification of expected pollution load due to various activities during construction and operational phases of the project.
- Impact Assessment to predict the post-project scenario, including prediction of increase in levels of pollutants in the study area due to the proposed activity.
- Environmental Management Plan outlining the measures for improving the environment quality and scope for sustainable development in future.
- Risk Assessment and Disaster Management Plan, Occupational Health and Safety Plan and Green Belt Development Plan.

The baseline environmental scenario has been established through primary data generated in the study area and secondary data available at site/ published in literature. The field monitoring was performed during the post-monsoon season from 1st October, 2024 to 31st December, 2024. The EIA Report is based on primary data for meteorology, air quality, water quality, ecology, soil and noise and simultaneously secondary data for all other environmental components from March to May, 2023. The baseline environmental scenario has been presented in **Chapter 3**.

1.4.3 Structure of EIA report

The EIA report has been structured as per Appendix-III of the EIA Notification, 2006 (Generic structure of environmental impact assessment document). Structure of EIA report is given in Table 2.3.

Table 1-1: Generic Structure of EIA report

Chapter	EIA STRUCTURE	CONTENTS
1.	Introduction	• Purpose of the report • Identification of project & project proponent • Brief description of nature, size, location of the project and its importance to the country, region • Scope of the study • Tor Compliance Statement
2.	Project Description	• Type of project • Need for the project • Location (maps showing general location, specific location, project boundary & project site layout)

Chapter	EIA STRUCTURE	CONTENTS
		• Size or magnitude of operation (incl. Associated activities required by or for the project • Proposed schedule for approval and implementation • Technology and process description • Project description. Including drawings showing project layout, components of project etc. • Description of mitigation measures incorporated into the project to meet environmental standards,
3.	Description of the Environment	• Study area, period, components & methodology • Establishment of baseline for valued environmental components, as identified in the scope • Base maps of all environmental components
4.	Anticipated Environmental Impacts & Mitigation Measures	• Details Environmental impacts due to project location, design, construction, and regular operations, • Measures for minimizing and / or offsetting adverse impacts identified • Mitigation measures
5.	Analysis of Alternatives (Technology & Site)	• Description of each alternative • Selection of alternative
6.	Environmental Monitoring Program	Technical aspects of monitoring the effectiveness of mitigation measures (incl. frequency, location, data analysis, reporting schedules, emergency procedures, detailed budget & procurement schedules)
7.	Additional Studies	• Risk assessment • Social Impact Assessment. R&R Action Plans
8.	Project Benefits	• Improvements in the physical infrastructure • Improvements in the social infrastructure • Employment potential – skilled; semi-skilled and unskilled • Other tangible benefits
9.	Environment Management Plan	• Description of the administrative aspects of ensuring that mitigative measures are implemented and their effectiveness monitored, after approval of the EIA • Summary of Control and mitigation measures
10.	Summary & Conclusion	• Overall justification for implementation of the project • Explanation of how, adverse effects have been mitigated
11.	Disclosure of Consultants engaged	The names of the Consultants engaged with the nature of Consultancy rendered

Chapter 2. Project Description

2.1 Type of Project

2.1.1 Project brief

The proposed project involves the installation of an Automated Storage and Retrieval System (ASRS) at the Silvassa Detergents Factory of Hindustan Unilever Limited (HUL) located at Survey No:151/1/1, Village: Dapada, Kanvel Road, Silvassa (Dadra and Nagar Haveli and Daman and Diu). The ASRS will automate material handling and improve storage efficiency, aiming to increase productivity, reduce costs, and enhance inventory management

The ASRS will include automated storage racks, conveyors, robotic arms, and integration with existing warehouse management. The project involves the installation of these systems within the current warehouse structure to optimize space and improve operational efficiency. Construction activities will primarily involve the setup of new equipment, electrical systems, and possible adjustments to the facility layout.

2.1.2 Salient features of the project

Salient features of the proposed Automated Storage and Retrieval System (ASRS) at the Silvassa Detergents Factory of Hindustan Unilever Limited (HUL) are as given in **Table 2-1**.

Table 2-1: Salient features of the project

S. No.	Items	Details
i.	Project Name	Implementation of ASRS Project at Silvassa Detergents Factory of the Hindustan Unilever Limited
ii.	Location	Khasra No, 807/4, 811, Village Sarora, Tehsil Tilda, Distt. Raipur, Chhattisgarh
iii.	Type of Project	Construction and operation of automated handling system (storage and retrieval) of finished products
iv.	Total Plot area	6.88 hectares
v.	Existing capacity	**Unit 1:** Synthetic detergent, 180,000 TPA **Unit 2:** Detergent bar: 75,000 TPA Detergent powder: 75,000 TPA
vi.	Proposed capacity	Automated Storage and Retrieval System (ASRS) storage capacity of 7392 Pallets.
vii.	Raw materials	**Unit 1:** Synthetic detergent, 180,000 TPA **Unit 2:** Detergent bar: 75,000 TPA Detergent powder: 75,000 TPA
viii.	Nature of the Project	The proposed project is for creation and operation of automatic storage and retrieval facilities for the packed product bars and powders. The entire operation will be controlled from a centrally located control room.
ix.	Air pollution control facilities	The Proposed ASRS does not involve process or fugitive emissions. Adequate air pollution control

S. No.	Items	Details
		facilities have been provided in the existing operations.
x.	Effluent Management Facilities	The Proposed ASRS does not involve generation of wastewater. Process wastewater generated from the existing plants is treated in the ETP, and the treated water is utilized quantitatively for plantation. The plants are being operated on zero effluent discharge basis.
xi.	Sewage management facility	Treated in the ETP, and the treated water is utilized quantitatively for plantation.
xii.	Solid waste management facility	Bio-degradable wastes from the existing facilities are segregated and composted, and the compost together with sludge from the ETP is utilized for green belt and plantation within premises. Non-biodegradable and non-hazardous wastes are disposed stored within covered and enclosed shed and disposed as scrap.
xiii.	Hazardous waste management facility	The Proposed ASR System does not involve generation of wastewater. Used batteries, used oil and other hazardous wastes generated in the existing plants are disposed through approved TDSF as per applicable rules.
xiv.	Green belt	Approx unutilized area in the premises shall be covered under green belt and plantation.

2.2 Need of the project

2.2.1 Importance of Automated Storage and Retrieval System (ASRS)

The Automated Storage and Retrieval System (ASRS) is crucial for modern warehouses and manufacturing facilities due to its significant operational benefits. One of its primary advantages is space optimization. By utilizing vertical storage and automated systems, ASRS maximizes storage capacity, enabling businesses to store more goods in less space. ASRS also enhances efficiency and productivity by automating the processes of storing and retrieving items, reducing manual labour and minimizing operational delays. This leads to faster order fulfilment and increased throughput. Additionally, ASRS systems improve accuracy by minimizing human error in inventory management, ensuring that products are correctly stored and retrieved with real-time tracking.

In terms of cost reduction, ASRS lowers labor costs by reducing the need for manual handling and improving inventory accuracy, which in turn helps reduce overstocking and waste. Moreover, ASRS increases safety by minimizing human involvement in physically demanding tasks, reducing workplace accidents. Another benefit is scalability—ASRS can be easily expanded as business needs grow. With better inventory management, businesses can ensure stock levels are optimized, preventing stockouts and overstocking. Overall, ASRS enhances operational efficiency, reduces costs, and improves customer satisfaction through faster and more accurate order processing.

2.2.2 Demand Supply Gap

The demand-supply gap for detergents in the context of Silvassa Detergents Factory reflects the growing consumer demand for detergents, alongside the challenges of ensuring consistent supply. Demand is driven by factors such as rising hygiene awareness, population growth, and urbanization, especially in India's rural and semi-urban markets, where Silvassa Detergents has significant market penetration. The increasing preference for liquid detergents and eco-friendly products, coupled with e-commerce growth.

To address this gap, Silvassa Detergents Factory continues to invest in capacity expansion, which incorporates advanced technologies like Automated Storage and Retrieval Systems (ASRS). The company is also focusing on sustainable innovation and resilient supply chain management.

2.2.3 Need for Automated Storage and Retrieval Systems

The Hindustan Unilever (HUL) Silvassa detergent manufacturing facility requires Automated Storage and Retrieval Systems (ASRS) to manage operations efficiently and meet growing consumer demand. Handling large volumes of raw materials, packaging supplies, and finished goods, the plant needs advanced inventory management to minimize errors and ensure real-time visibility. ASRS enables precise tracking and faster retrieval, significantly enhancing operational efficiency. Space optimization is another critical need, as ASRS facilitates vertical storage and maximizes warehouse capacity, allowing the plant to handle high production and distribution volumes effectively. Faster order fulfillment is essential in the fast-moving consumer goods sector, and ASRS reduces retrieval and dispatch times, ensuring timely deliveries.

Additionally, automation helps reduce dependency on manual labor, cutting labor costs and mitigating challenges from workforce shortages. It also ensures safe and controlled handling of detergent products, preventing damage and maintaining product quality.

2.3 Project Location and Plant Layout

2.3.1 Project location

The project site, comprising 6.8 Hectares at Survey No:151/1/1, Village: Dapada, Kanvel Road, Silvassa (Dadra and Nagar Haveli and Daman and Diu). Location of the project site, including the existing plants and facilities, is shown in maps of various scales in Figures 2-1 to 2-6.

At present, the land is covered by existing plant and facilities, and adequate unutilized area for expansion. It is plain land and its average elevation is 35m above mean sea level. The site is located in Survey of India Topo sheet No. 46H/4, and its location on the topo sheet is shown in Figure 2-1. The plot is of irregular shape and the geographical coordinates of the boundary pillars are given in Table 2-2.

Table 2-2: Corner coordinates of the project area

B. P. No.	Latitude	Longitude
1	20°11'7.42"N	73° 1'50.50"E
2	20°11'3.68"N	73° 1'52.37"E
3	20°10'56.25"N	73° 1'52.38"E
4	20°10'53.67"N	73° 1'49.64"E
5	20°10'52.18"N	73° 1'49.29"E

6	20°10'50.20"N	73° 1'49.24"E
7	20°10'50.22"N	73° 1'48.33"E
8	20°10'51.74"N	73° 1'47.64"E
9	20°10'52.78"N	73° 1'46.86"E
10	20°10'52.17"N	73° 1'46.61"E
11	20°10'52.42"N	73° 1'45.30"E
12	20°10'54.53"N	73° 1'45.58"E
13	20°10'57.70"N	73° 1'45.73"E
14	20°10'59.49"N	73° 1'46.40"E
15	20°10'59.36"N	73° 1'47.04"E
16	20°11'2.02"N	73° 1'47.72"E
17	20°11'2.07"N	73° 1'47.85"E
18	20°11'2.63"N	73° 1'48.18"E
19	20°11'2.88"N	73° 1'48.05"E
20	20°11'5.34"N	73° 1'49.54"E
21	20°11'5.48"N	73° 1'49.47"E

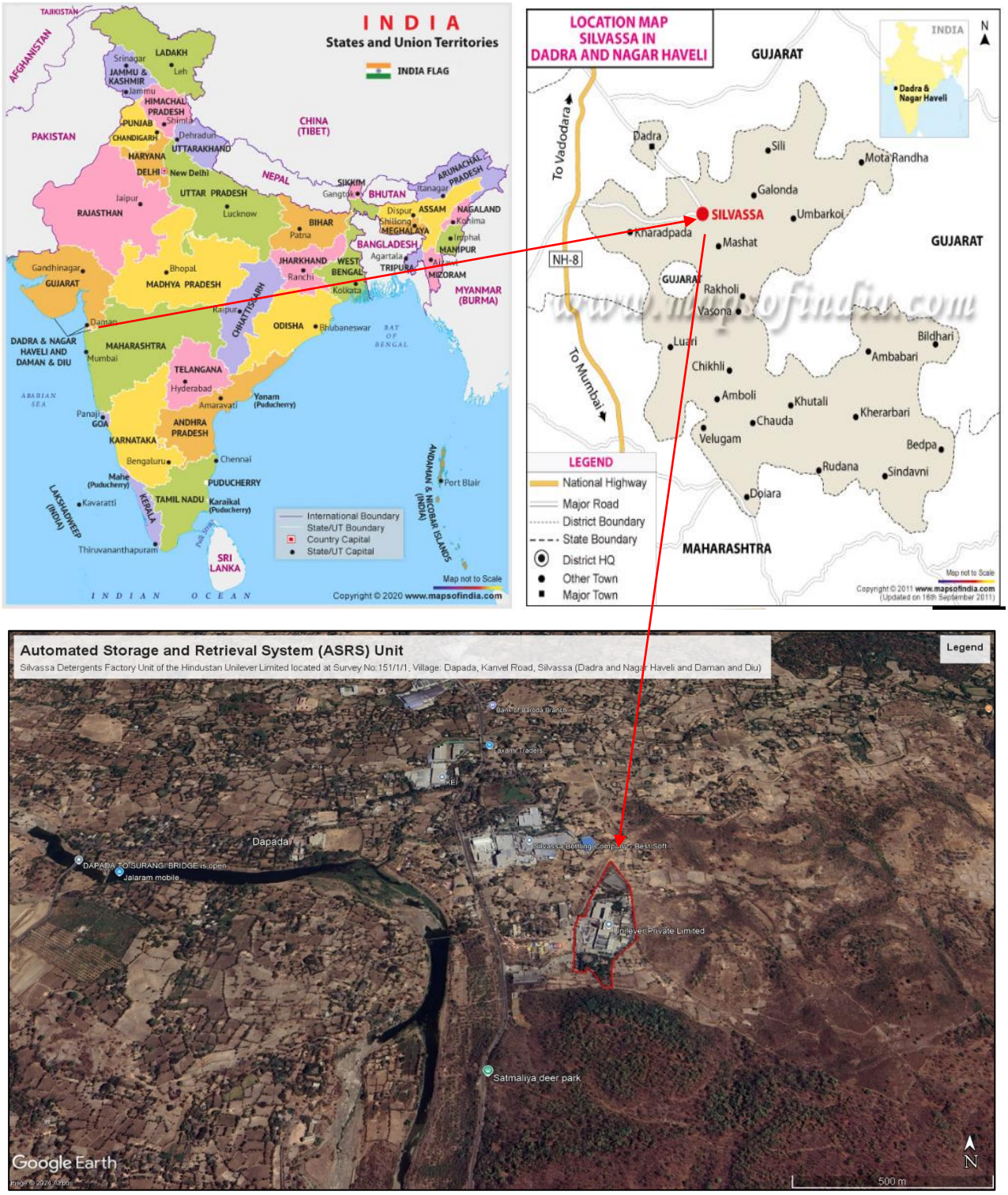


Figure 2-1: Location map

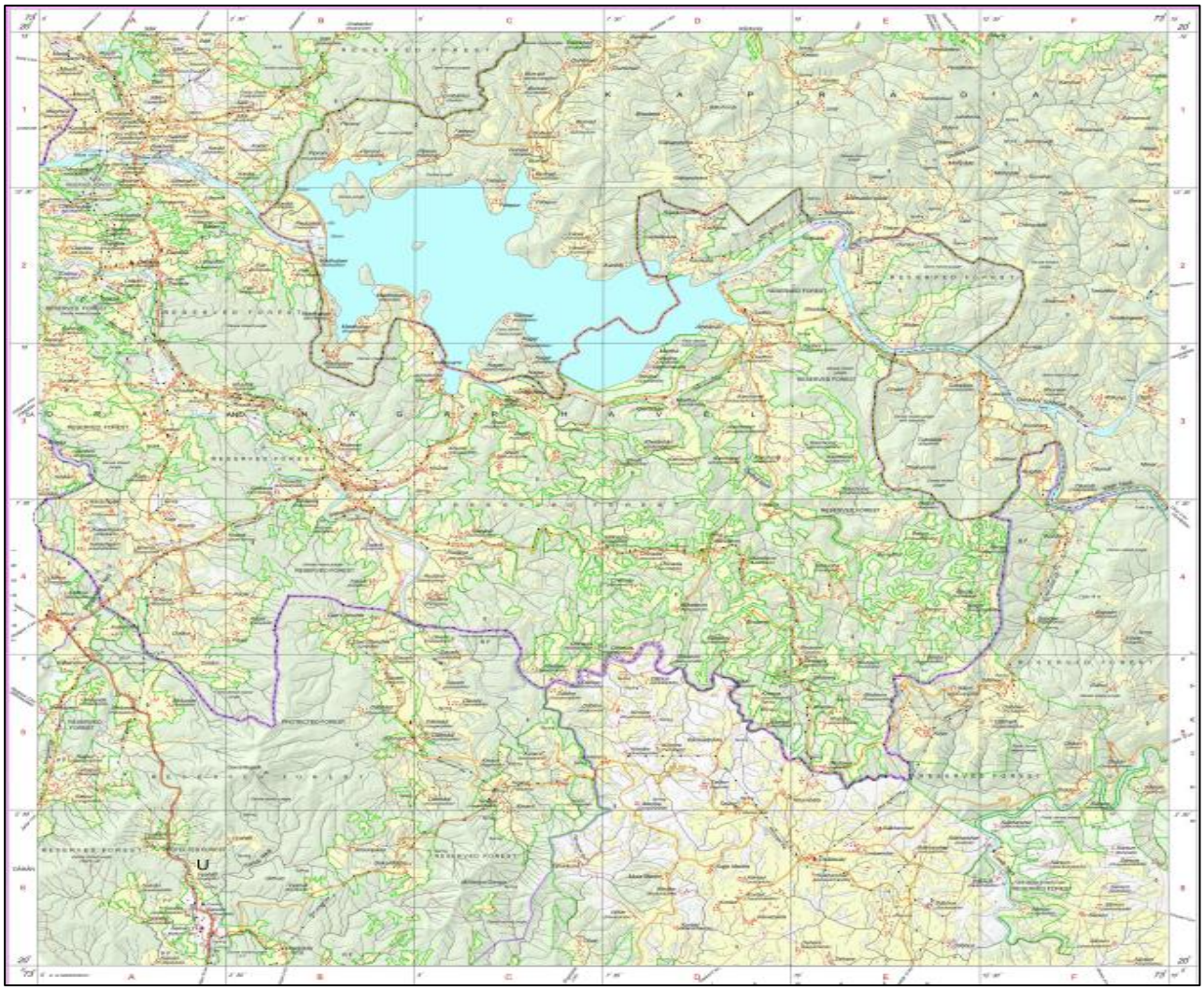


Figure 2-2-2: Map showing Project Location on SOI Toposheet No. 46H/4

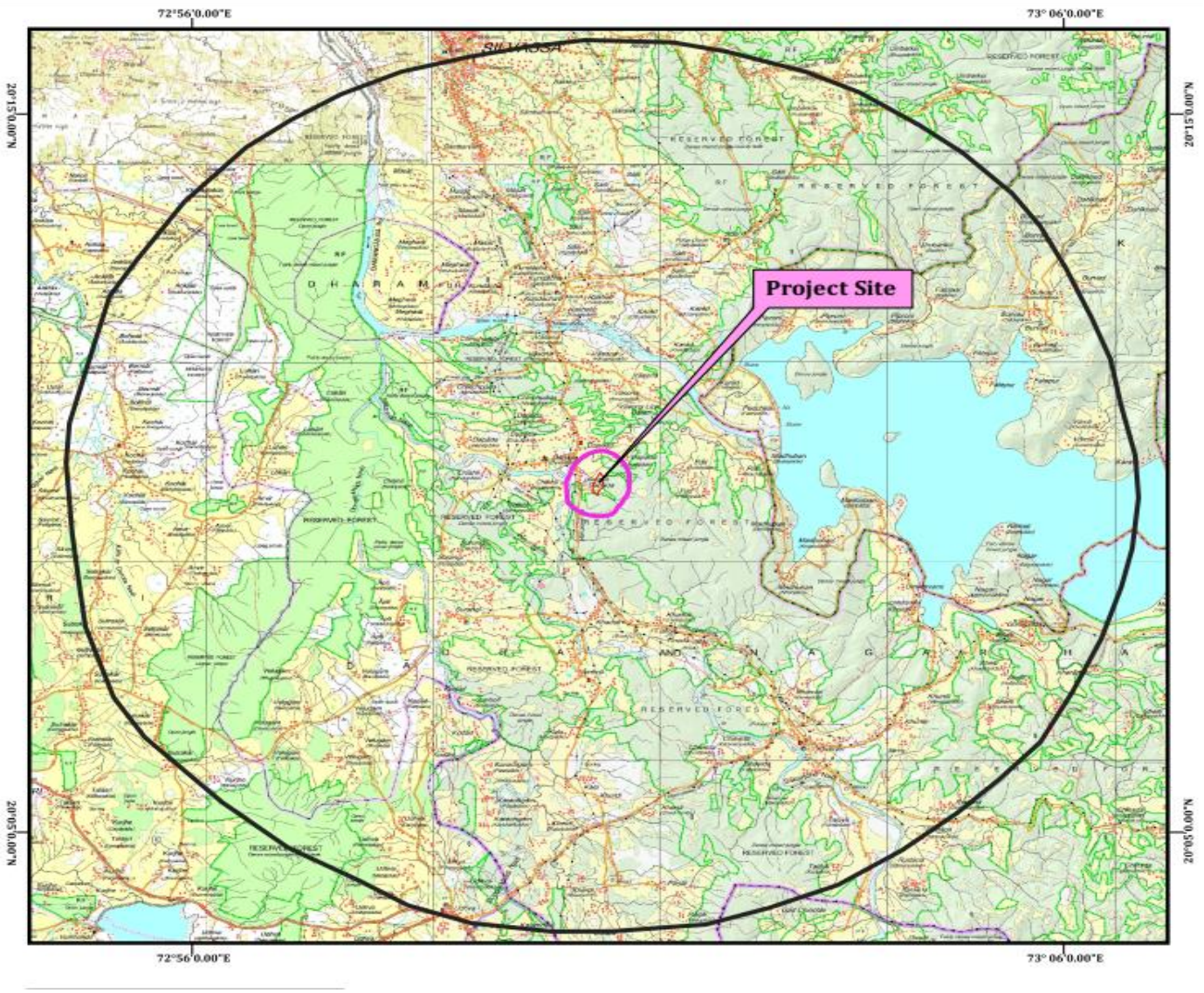


Figure 2-2-3: Topographical Map of the area within 10 km distance

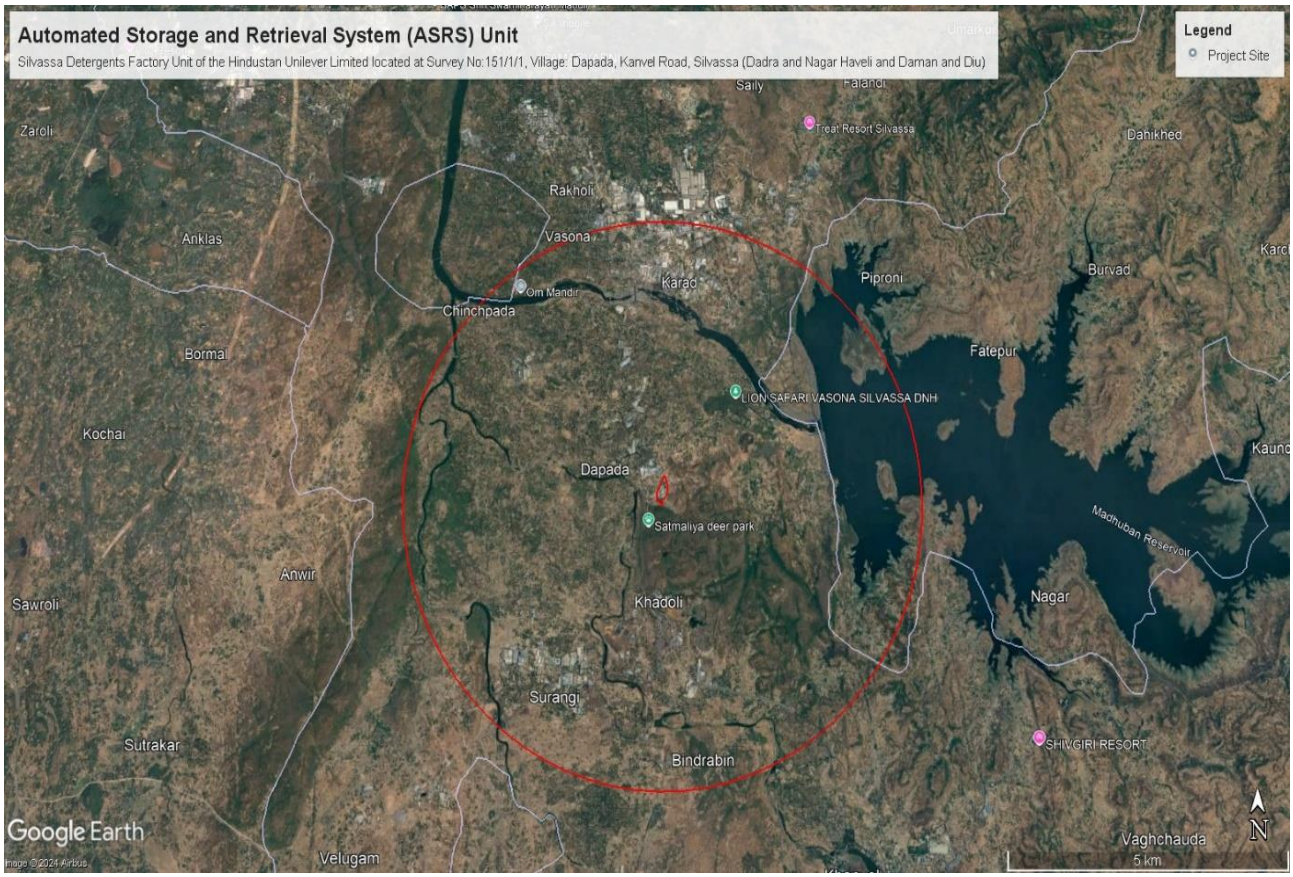


Figure 2-2-4: Satellite Imagery of site and area within 5 km distance

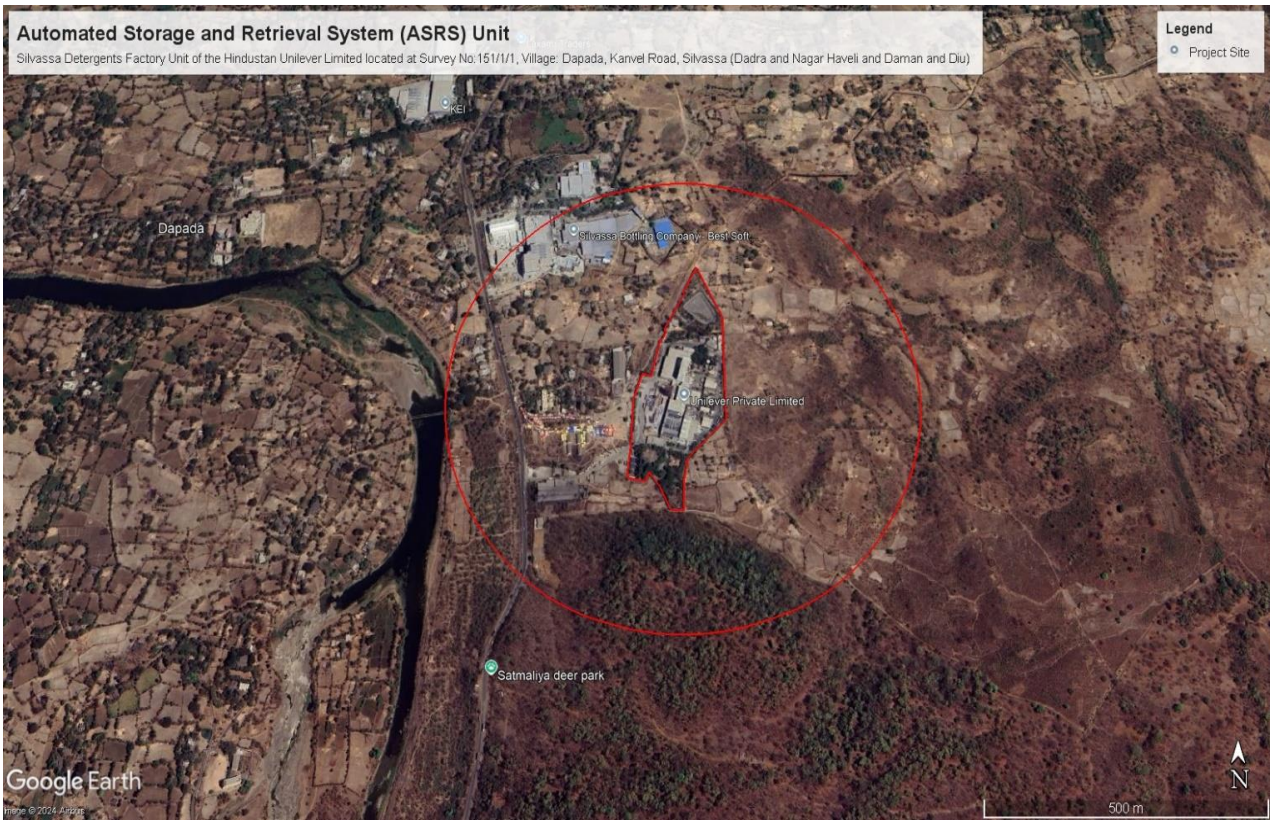


Figure 2-2-5: Satellite Imagery of site and area within 500 m distance

Figure 2-2-6: Map showing existing Plot boundary and existing plant

2.3.2 Connectivity

Silvassa Detergents Factory, is well connected by roads to other parts of Dadra and Nagar Haveli and Daman & Diu. It is connected by an all-weather road to Khanwel Road (NH-848A) which is approx. 0.25 km from the site. It is also connected to Udhawa-Khanwel Road, at a distance of approx. 2.6 km through all-season road, which joins SH-73 which is approx. 10 km and Golden Quadrilateral (NH 48) IS 12.66 km. The project site is at a distance of approx. 12 km from Silvassa. The nearest Railway Station is at Vapi, at a distance of approx. 21 km in the northwest direction. The nearest commercial airport is at Surat, at a distance of approx. 140 km from the factory.

2.3.3 Environmental sensitivity

Map showing environmentally sensitive features within 10 km distance is given as Figure 2-7. The list of environmentally sensitive features is provided in Table 2-3.

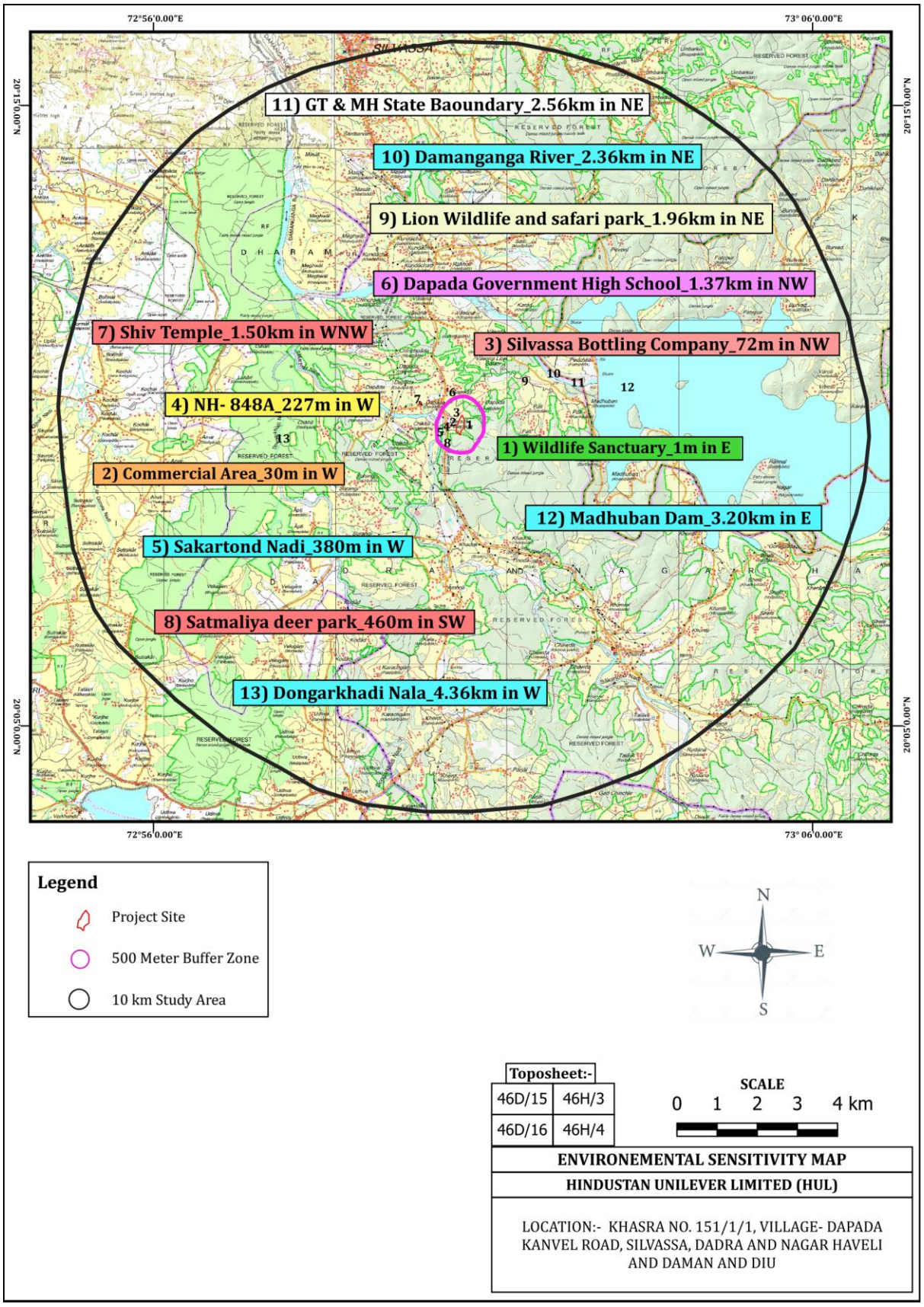


Figure 2-2-7: Sensitivity Map of the study Area

Table 2-3: List of environmentally sensitive features

Environmental feature	Details
Nearest town/ City	Silvassa, 12 km in North Direction
Nearest railway station	Vapi Railway Station, 21 km in Northwest Direction
District headquarters	Silvassa, 12 km in North Direction
Nearest Airport	Surat Airport, 140 km in Northwest Direction
Protected / Reserved Forest	Reserved Forest located near the factory has been notified as Wild Loife Sanctuary.
Ecologically sensitive areas viz. National Parks, WL Sanctuaries etc. within 10 km distance	Dadara and Nagar Haveli Wild Life Sanctuary is located adjacent to the Eastern boundary of the Detergent Factory. Satmalya Deer Park is 460 m in Southwest Direction and Lion Safar Park is 1.9 km in Northeast-eastern Direction – both are located within the Wild Life Sanctuary.
Rivers	Sakartond Nadi, 380m in West Direction Damanganga, 2.36 km in Northeast Direction Madhuban Dam, 3.20 km in East Direction

2.3.4 Plant layout

The proposed automated storage and retrieval system will be capable of handling the entire product range of the Dapada factory. The system has a storage capacity of 7392 pallets, and the standard size of the pallets is 1200m x 1200m. Location of the proposed Automated Storage and Retrieval System is shown in Figure 2.8.

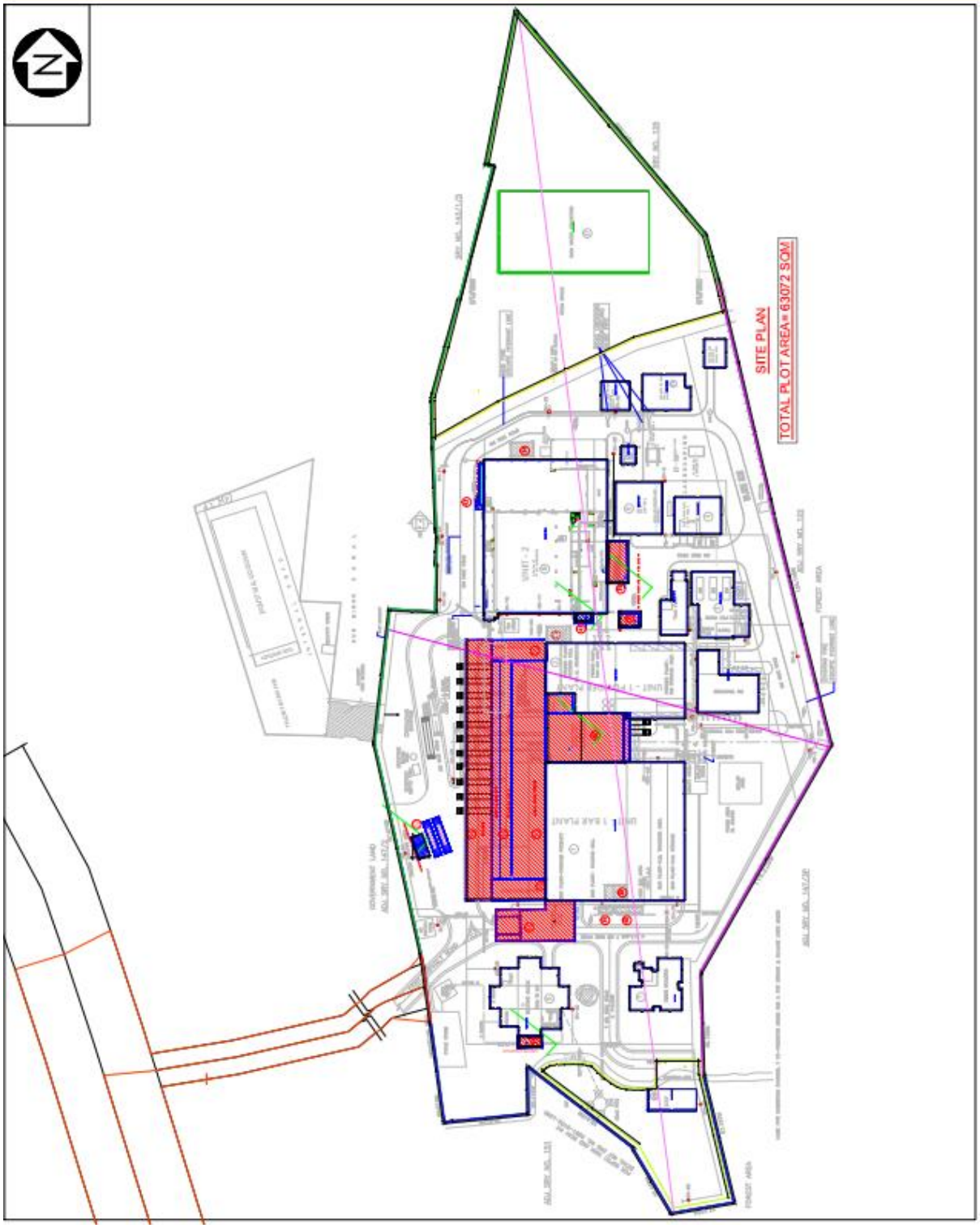


Figure 2-2-8: Plot Plan of existing & Proposed Plants and facilities

2.4 Size or magnitude of Operations

The Automated Storage and Retrieval System (ASRS) at the Dapada Detergent Factory is engineered to handle large-scale operations, reflecting the size and magnitude of the facility's

production and storage needs. With a storage capacity of 7,938 pallets (Standard Pallet Size 1200m x 1200m), the ASRS is capable of efficiently managing high volumes of raw materials, packaging supplies, and finished goods critical to detergent manufacturing.

The system is designed to support a fast-paced, high-throughput environment, enabling rapid storage and retrieval of materials to meet continuous production demands. Advanced automation technologies such as cranes, shuttles, and robotic arms ensure precise and efficient material handling, significantly boosting operational throughput. The ASRS can seamlessly process large numbers of transactions, supporting real-time inventory tracking, order processing, and shipment preparation.

The production capacities of the two units are as follows: Unit 1 : Synthetic detergent, 180,000 TPA & Unit 2: Detergent bar: 75,000 TPA Detergent powder: 75,000 TPA

2.4.1 Pre-Project Activities

Before implementing the Automated Storage and Retrieval System (ASRS) at the Silvassa Detergents Factory, several crucial pre-project activities are necessary. First, a feasibility study will assess the practicality of the ASRS by evaluating current operations, space, and financial costs, ensuring the system meets the factory's needs. Next, a site assessment will review the physical space and determine any required modifications for installing the ASRS. The system design and technology selection phase will involve choosing the best equipment, such as automated cranes, shuttles, and robotic arms, while integrating with Warehouse Management Systems (WMS) and Enterprise Resource Planning (ERP). Following this, a vendor selection and procurement process will choose reliable suppliers for equipment and installation. An environmental and safety assessment will ensure compliance with regulations and worker safety. Resource allocation and budgeting will ensure the project has adequate funding and clear timelines, while stakeholder engagement will ensure communication with all parties involved. Finally, training and skill development will prepare staff for operating and maintaining the ASRS system. These activities will ensure a well-structured and efficient ASRS implementation, improving warehouse operations and integrating automation smoothly into the factory's processes.

2.5 Process Technology

2.5.1 Process description

Detergent is a synthetic combination that functions much like soap, with certain major improvements. Soap cleans because each soap molecule consists of a hydrocarbon chain and a carboxylic group (fatty acids) that perform two important functions. The carboxylate end of the soap molecule is hydrophilic, meaning that it is attracted to water, while the hydrocarbon end of the molecule is both hydrophobic (repelled by water) and attracted to the oil and grease in dirt. The dirt attached to the carboxylate end of the molecule is chemically dragged away from the clothes being cleaned and into the wash water. Properly agitating and rinsing the clothes furthers the cleansing process.

While the hydrocarbons used in soap generally come from plants or animals, those used in detergent can be derived from crude oil. Adding sulfuric acid to the processed hydrocarbon produces a molecule similar to the fatty acids in soap. The addition of an alkali to the mixture

creates a surfactant molecule that will not bond with the minerals in hard water, thus avoiding the accumulation of precipitates.

In addition to a surfactant, modern detergent contains several other ingredients like builders and chemicals which serve several purposes. They increase the efficiency of the surfactant, and also sequester minerals in hard water, meaning that they hold them in solution, preventing them from precipitating out. Furthermore, builders can emulsify oil and grease into tiny globules that can be washed away. Some, like sodium silicate, inhibit corrosion and help assure that the detergent will not damage a washing machine. Still other builders contribute to the chemical balance of the wash water, making sure that it conduces to effective washing.

Modern detergents have several other ingredients including anti-redeposition agents, chemicals that help prevent soil from settling back on washed clothes. Fluorescent whitening agents are also common. By converting invisible ultraviolet light into visible blue light, these help to maintain brightness or whiteness. Oxygen bleaches such as sodium perborate improve the detergency of the mixture, especially in low-phosphate or no-phosphate products, as well as helping to remove some types of stains. Processing aids such as sodium sulfate are also used to prevent caking and to standardize product density.

Enzymes and perfumes are also added in commercial detergents. Enzymes break down some stains to make them easier to remove and are an essential ingredient in various pre-soak products used to treat heavily soiled clothes prior to laundering. Perfumes or fragrances cover the odor of the dirt and any chemical smell from the detergent itself..

2.5.2 Manufacturing process

Although there are three ways of manufacturing dry laundry detergent, only two are commonly used today.

In the blender process favored by smaller companies, the ingredients are mixed in large vats before being packaged. The machines used are very large: a common blender holds 4,000 pounds (1,816 kilograms) of mixed material, but the blenders can accommodate loads ranging from 227 to 4,540 kilograms. By industry standards, these are small batches for which the blender process is ideal. While some settling may occur, the resulting detergent is of high quality and can compete with detergents made by other processes. The second commonly used method of production is called the agglomeration process. Unlike the blender process, it is continuous, which makes it the choice of very large detergent manufacturers. The agglomeration process can produce between 6,800 and 22,700 kilograms of detergent per hour. In the third method, dry ingredients are blended in water before being dried with hot air. Although the resulting product is of high quality, the fuel costs and engineering problems associated with venting, reheating, and reusing the air have led to this method being largely replaced by agglomeration.

1. Blender process: First, ingredients are loaded into one of two machines: a tumbling blender or a ribbon blender. The tumbling blender, shaped like a rectangular box, is turned and shaken from outside by a machine, while the ribbon blender is a cylinder fitted with blades to scrape and mix the ingredients. After the ingredients inside the blender have been mixed, a doorway at the bottom of the bowl is opened. With the blender still agitating the ingredients, the mix is allowed to run out onto a conveyor belt or other channeling device. The belt then moves the detergent to another area of the factory where it can be dropped into boxes or cartons for delivery to wholesalers or distributors.

2. Agglomeration Process: In this method, dry ingredients for a detergent are first fed into a large machine known as agglomerator. Inside the agglomerator, sharp, whirling blades mix the material to a fine consistency; the process resembles food being textured inside a food processor. After the dry ingredients have been blended, liquid ingredients are sprayed on the dry mix through nozzles fitted into the agglomerator's walls. The blending continues, causing an exothermic (heat-producing) reaction to occur. The resulting mixture is a hot, viscous liquid similar to gelatin that hasn't hardened. Next, the liquid is allowed to flow out of the agglomerator. As it leaves the machine, it collects on a drying belt where its own heat, exposure to air, and hot air blowers render it friable—easy to crush or crumble. The newly made detergent is then pulverized and pushed through sizing screens that ensure that no large lumps of unmixed product go out to the market. The result of this process is a dry detergent made up of granules of the mixed detergent.

3. In the third process, ingredients are dissolved in water to create a slurry. With a pump, the slurry is blown through nozzles inside the top of a cone shaped container as hot, dry air is simultaneously forced into the bottom of the cone. As the slurry dries, "beads" of dry detergent fall to the bottom of the cone, where they can be collected for packaging.

Liquid detergent: Liquid detergents are manufactured mixing the powder detergent with/ in a solution consisting of water and various chemicals known as solubilizers. The solubilizers help the water and detergent blend together more fully and evenly.

2.5.3 Material Balance

The manufacturing of detergent powder or cakes involves blending of different ingredients at different stages of manufacturing, and does not involve chemical reactions. Therefore, the total output is the sum total of all the ingredients added during the manufacturing process. Although the composition of detergent powder and cake varies widely for different products and brands, the tentative composition of common ingredients manufactured by different companies are described in Table 2-3.

Table 2-3: Tentative composition of common detergent products

S. N.	Ingredient	Weight % in	
		Premier grade	Popular grade
1.	LABSA (85%)	18	15
2.	Sodium carbonate (soda ash)	35	32
3.	Sodium metasilicate	2	0
4.	Alkaline sodium silicate	0	7
5.	Sodium bicarbonate	10	10
6.	Sodium Sulphate (anhydrous)	20	25
7.	Sodium tripolyphosphate	10	7
8.	Sodium carboxy methyl cellulose	1.5	1
9.	Colour	0.1	0.1
10.	Optical whitener	0.3	0.2
11.	Perfume	0.1	0.1

2.6 Raw materials & utilities

2.6.1 Requirement of raw materials

The annual consumption of main raw materials, based on the actual consumption during January to August, 2024, are described in Table 2-4.

Table 2-4: Average annual consumption of raw main materials

S. No.	Material description	Annual, T
1	SODA ASH (LIGHT)	38249.6
2	DOLOMITE	32885.5
3	SULPHONIC ACID 90% -35 KLETT(100% BASIS)	32585.7
4	CALCITE NORMAL	26441.6
5	SODAL	23479.9
6	SALT - PVD/SUPERFINE	13622.8
7	CHINA CLAY BRIGHT	10302.5
8	ALUMINIUM HYDRATE	9496.6
9	SODIUM CHLORIDE (GRADE 0)	9062.3
10	SUPERIOR REFINED SALT	8624.5
11	SODIUM SILICATE 45% (100% BASIS)	7379.4
12	ZEOLITE	12350.9
13	SODIUM HYDROXIDE 48% (100% BASIS)	6131.1
14	PRECIPITATED CALCIUMCARBONATE	5507.3
15	PHOSPORIC ACID (85%)	4620.7
16	FELDSPAR WHITE	3550.7
17	CHINA CLAY NORMAL	3348.6
18	STPP -LOW TR	2888.3
19	FRISIS - TALC LAUNDRY GRADE	2691.0
20	ALPHA OLEFIN SULPHONATE(PASTE) 70 (100%)	2587.9
21	ALUMINIUM SULPHATE 50%	2438.4
22	HYDRATED LIME HA 20	2301.1
23	BRIGHT CALCITE	1856.5
24	AA HOMOPOLYMERS LIQUID/ ACUSOL	1354.0
25	AZHAGU BLEND(DV28+DASCC+HEDP)	418.1
26	SODIUM CARBOXYL METHYL CELLULOSE	343.9
27	BLUE SALT SPECKLES CI74160 0.1%	258.7
28	ORANGE SALT SPECKLES	258.3
29	ANTIFOAM POLYMER SLM SD 8007 M1	193.3
30	SODA ASH-(DENSE)	174.7
31	BLUTON CBUS-3B-L/TINOPAL DMAX	139.9
32	HICURE YELLOW OP COATINGHIV - 1510	123.3
33	SILICON ANTIFOAM WITH 10% ZEOLITE	95.6
34	SPECKLES BLUE/BRIGHT PINK	143.5
35	FRAG/ ERFUME	190.5

2.6.2 Sources, transportation & storage of raw materials

All the raw materials are sourced from their manufacturers and transported to the site through road. The liquid raw materials are transported in Tank lorries, unloaded through pumping and stored in overground tanks. The solid raw materials, procured in the form of fine powder, are transported in Truck Tankers, unloaded pneumatically and stored in designated silos.

2.6.3 Water consumption & wastewater disposal

Water requirement for the proposed ASR System is limited to potable and sanitary water. No process or industrial water is required.

Total water requirement of the existing plants and facilities is approx. 80 KLD, including 17 KLD for domestic consumption, 43 KLD for industrial use, and 20 KLD in the manufacturing process. Approx 50% of the water is drawn from ground through Boe wells and balance 50% from the Water Pond. Material balance of water consumption and wastewater disposal, based on the water consumption records for the last one year is presented in Figure 2-9.

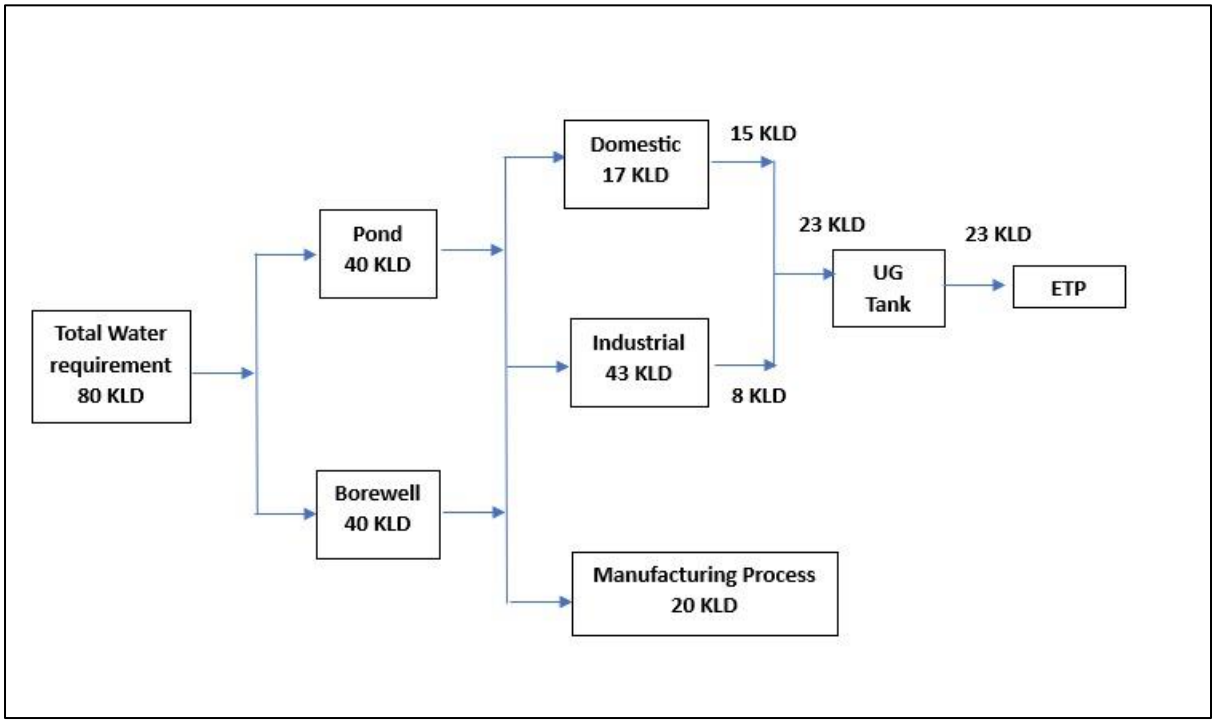


Figure 2.2-9: Water balance diagram

The Company has permission for ground water extraction to the tune of 71 KLD.

The company has constructed 7 Nos. of rain water harvesting systems. The water collected in the harvesting tanks is filtered and stored in a lined pond located in the northern part of the factory premises. The total storage capacity of the pond is 13 lakh liters.

2.7 Pollution Control and Mitigation Measures

2.7.1 Process Emissions

During the operation of the Automated Storage and Retrieval System Unit, there are no process emissions, so as dust control devices is not required.

Manufacturing of detergent powder and bars involves blending and mixing of different ingredients at different stages of rthe manufacturing process, and does not involve chemical reactions leding into process emissions. The entire operation of blending, mixing and transfer from one vessel to the next one is carried out in a fully closed system. Therefore, there is no emission from the manufacturing process.

The Company operates an 1.5 TPH steam boiler, and the fuel used for steam generation is briquettes. The flue gas is passed through a Bag house and is discharged through a stack of 31.5m height.

To meet the emergecy power requirements, 3 Nos. of 750 KVA DG Sets are operated. The DG Set exhausts are discharged through individual stacks of 12m height.

2.7.2 Fugitive emissions

All operations including unloading, storage and transfer are done in closed circuit – pneumatic transfers for solids and pumping for liquid materials handlin. The raw materials are stored in closed Silos and Tanks. Therefore, there is no generation of fugitive dust or fumes. In the proposed ASR System, the materials are handled in sealed cartons.

2.7.3 Solid wastes

No solid waste shall be generated for disposal from the proposed ASR System.

Packing materials, containers and other non-hazardous wastes are segregated, stored in a dedicated store (**Figur 2-10**) and disposed as scrap.

Domestic wastes are segregated and collected as biodegradable and non-biodegradable wastes. The biodegradable wastes shall be composted within premises and the resulting compost shall be utilized as fertilizer for green belt and plantation. The non-biodegradable waste shall be disposed through approved recyclers.

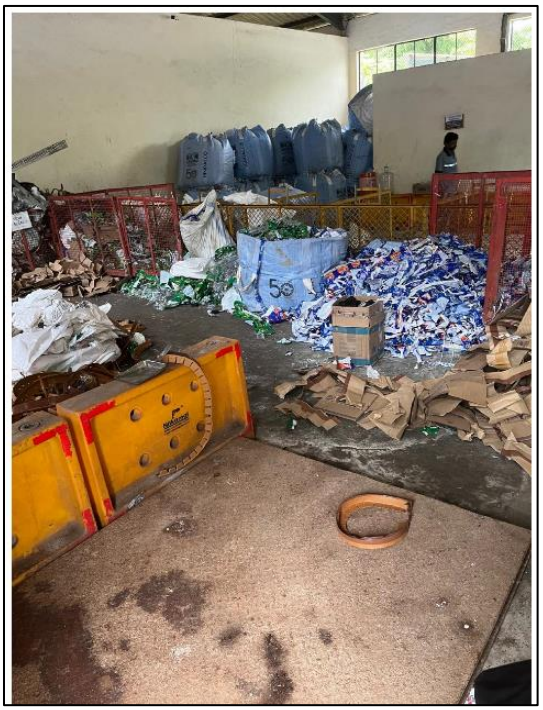


Figure 2-2-10: Solid waste storage Room

2.7.4 Hazardous wastes

No hazardous waste will be generated from the proposed ASR System.

Process waste like Sodal, Labsa, Acusol, Silicate, etc., generated from the existing plant operations, are considered as hazardous wastes, and are stored and disposed as per Hazardous Wastes Rule, 2016. Approximately 30 TPA of process wastes generated from the operations are stored in Hazardous wastes room (**Figure 2-11**) and disposed through approved TSDF facilities.

The company operates with Consolidated Consent (under water and Air Acts) and Authorization (Under HW Rules, 2016). The hazardous wastes listed in the authorization include Process wastes, residues and sludges (category 21.1, Schedule I), and Contaminated cotton rags or other cleaning materials (Category 33.2, Schedule I).

Figure 2-2-11: Hazardous waste Storage Room

2.7.5 Waste water

No waste water will be generated from the proposed ASR System.

The existing plants and facilities are being operated with Zero Effluent Discharge (ZLD). Sanitary waste water from toilets and wash rooms, as well as industrial wastewater from the auxiliary facilties are collected and treated in the Effluent Treatment Plant, and the treated water is utilized quantitatively for gardening and plantation within premises. Process flow diagram of the ETP is shown in **Figure 2-12**.

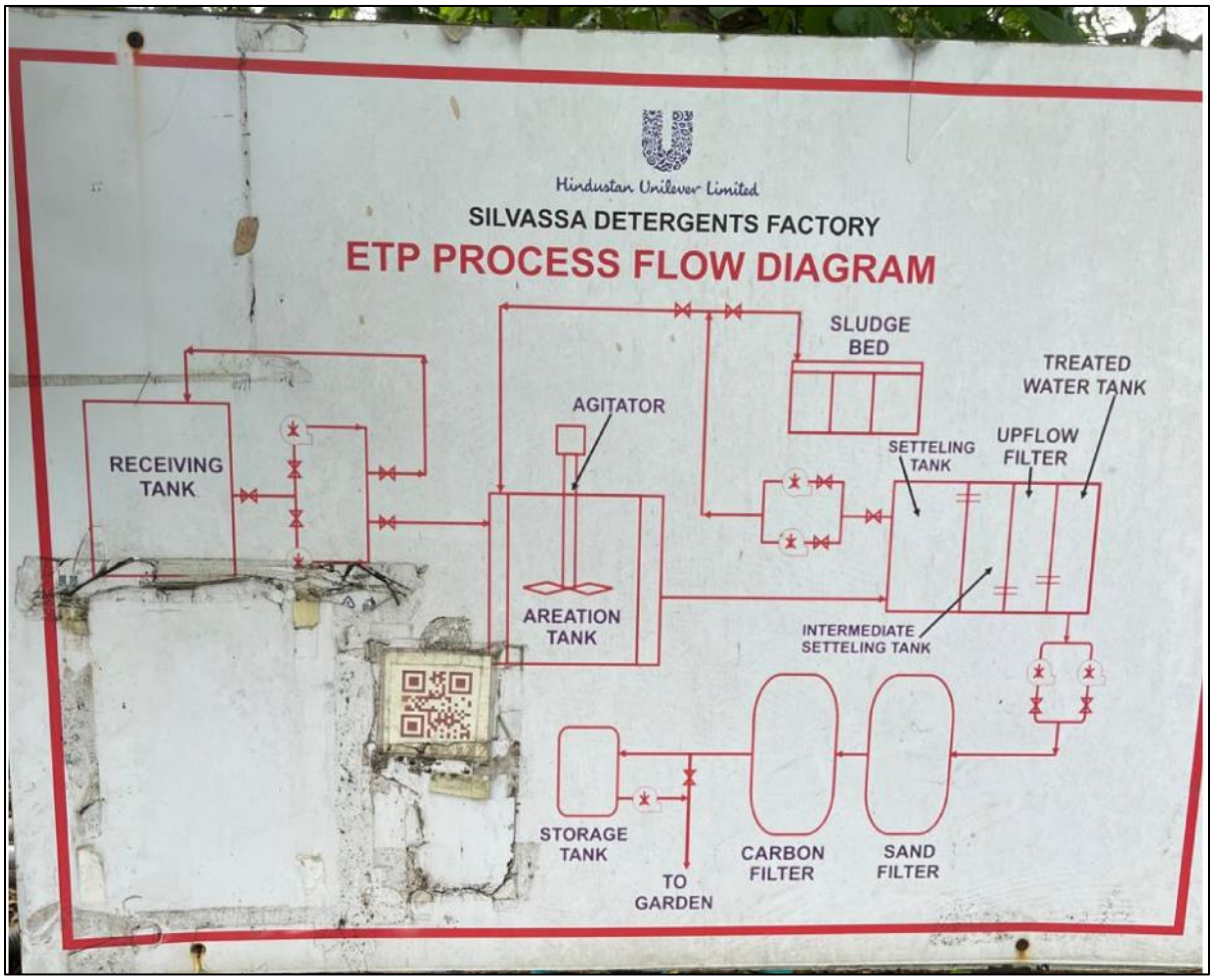


Figure 2-2-12: ETP Process Flow Diagram

2.8 Manpower

The Silvassa Detergents Factory currently employs a total of 900 workers, comprising 450 permanent employees and 450 contractual workers. With the existing workforce, no additional direct employees are required for the future. However, the project will generate both direct and indirect employment opportunities. A significant portion of the semi-skilled and most of the unskilled labor will be sourced from the local population. The project will also create indirect employment in service sectors and transportation activities. The plant will operate in multiple shifts, with loading and unloading activities being carried out during the daytime only.

The skilled and semi-skilled manpower will be permanent employees of the project, and the un-skilled work force will be drawn from local population on contract basis.

2.9 Project Cost

The estimated Capital Cost of the proposed ASRS project is approx. Rs. 295 Crores.

Chapter 3. Description of Environment

3.1 Introduction

3.1.1 Study period

As per the statustory requirements, the baseline environmental status needs to be established through study during one full non-monsoon season. Accordingly, monitoring and field studies for establishing the baseline environmental status were carried out during post-monsoon season of 2024, starting from 1st October 2024 and continued up to 31st December, 2024.

3.1.2 Study Area

The area of influence for the environmental impact assessment was considered as the area falling within 10 km radius from the project site. Thus the study area considered for establishing the baseline environmental status is the area falling within 10 km radius from the project site. Geographically, the project site is located between Latitudes 20°10'50.30"N to 20°11'7.00"N and Longitudes 73°01'45.99"E to 73°01'52.39"E. The study area for the EIA study is covered in Survey of India Topo-sheet Nos. 46D/15, 46D/16, 46H/3 & 46H/4 (1:50,000 scale), and includes urban areas of Silvasa, Dadra and Nagar Haveli Wildlife Sanctuary, Damanganga River, etc.

3.1.3 Environmental Components

The environmental componenets considered and covered under the study are topography, physiography, hydrology, water quality, climate & meteorology, air quality, ecology & bio-diversity, noise, soil, land use and socio-economic profile. This chapter provides the description of the studies and findings during the baseline studies in the area of influence.

3.1.4 General Methodology

Ambient air quality, water quality, ambient noise level, on-site meteorological data and soil quality has been assessed through sampling and monitoring performed by Virat Global Laboratory, which is MoEF approved and NABL accredited environmemntal monitoring laboratory **(Annexure III to X).** These were performed through sampling/monitoring at appropriate numbers of representative sampling/ monitoring locations. Baseline status of ecology & bio-diversity, sociao-economic profile, climatological data, geology & topography, ground water resources, etc, were collected from secondary sources, including published data, and authenticated through field surveys and interactions.

3.1.5 General setting

The proposed expansion project site for the Automated Storage and Retrieval System (ASRS) at the Silvassa Detergents Factory Unit of Hindustan Unilever Limited (HUL) is located at Survey No: 151/1/1, Village Dapada, Kanvel Road, Silvassa in Dadra and Nagar Haveli and Daman and Diu. The plot of land is already designated for industrial use, with an established infrastructure to factory operations. The location benefits from excellent connectivity to major roads, including Khanwel Road (NH-848A), which is just 0.25 km away, and Udhawa-Khanwel Road, approximately 2.6 km away, linking to SH-73 and the Golden Quadrilateral (NH 48), which is 12.66 km from the site. This ensures easy access to transportation routes for goods and raw materials.The nearest Tehsil headquarters, Silvassa, is 12 km away, while the nearest railway station is at Vapi, about 21 km to the northwest. The closest commercial airport is in Surat, 140

km from the site, providing access to national and international markets. There are several medium-scale industrial units, fostering a conducive industrial environment.

Figure 3-1: Study area map (10 Km radius) on Toposheet

3.2 Land Environment

3.2.1 Land use & Land cover

The objectives of land use/ Land cover studies are:

- To determine the present land use pattern;
- To ascertain the temporal changes in land use pattern due to construction and operation phase.

Methodology

Satellite data: - The land use of the study area is studied and analyzed by using the latest available satellite imagery. Ground control point has been collected for geo referencing process for ortho-rectification. Base maps are studied for classification of land use classes.

Topographical maps of the study area: - The Survey of India topographical map of 46D/15,46D/16,46H/3,46H/4 on 1:50,000 scale covering 10 Km study area, was used as reference map for geo referencing of the remote sensing data.

Land use /Land Cover of the study area

The study area of 10-km around the plant boundary is considered in the land use pattern study. The study area theoretically covers an area of 333.78 sq km (33378.0 ha) within the circle encompassed by 10-km radius around the project site. Land Use/ Land cover map of the study area is shown in Figure 3-2.

For computation of the land use pattern in the study area, ERDAS IMAGINE-9.2, Arc GIS and AUTO CADD software are used. The geographical area of all settlements covered within the study area is considered. The land use is classified into 5 classes - viz. agricultural land, settlements, surface water bodies, forest area & waste land. Land use classification of the study area has been presented in Table 3-1 and break-up of Land use in the study area is shown in Figure 3-3.

Table 3-1: Land use classification of the study area

Sr. No.	Classes	Area in ha	Area in %
1	Agriculture Area	13708.5	41.07
2	Settlements	722.6	2.16
3	Surface Water Bodies	2983.1	8.94
4	Forest Area	12543.9	37.58
5	Waste Land	3419.9	10.25
Total		**33378.00**	**100.00**

Land use of the project area: The proposed expansion project area is presently occupied by the two units of the Detergents Plant and storage tanks/ containers for raw materials.

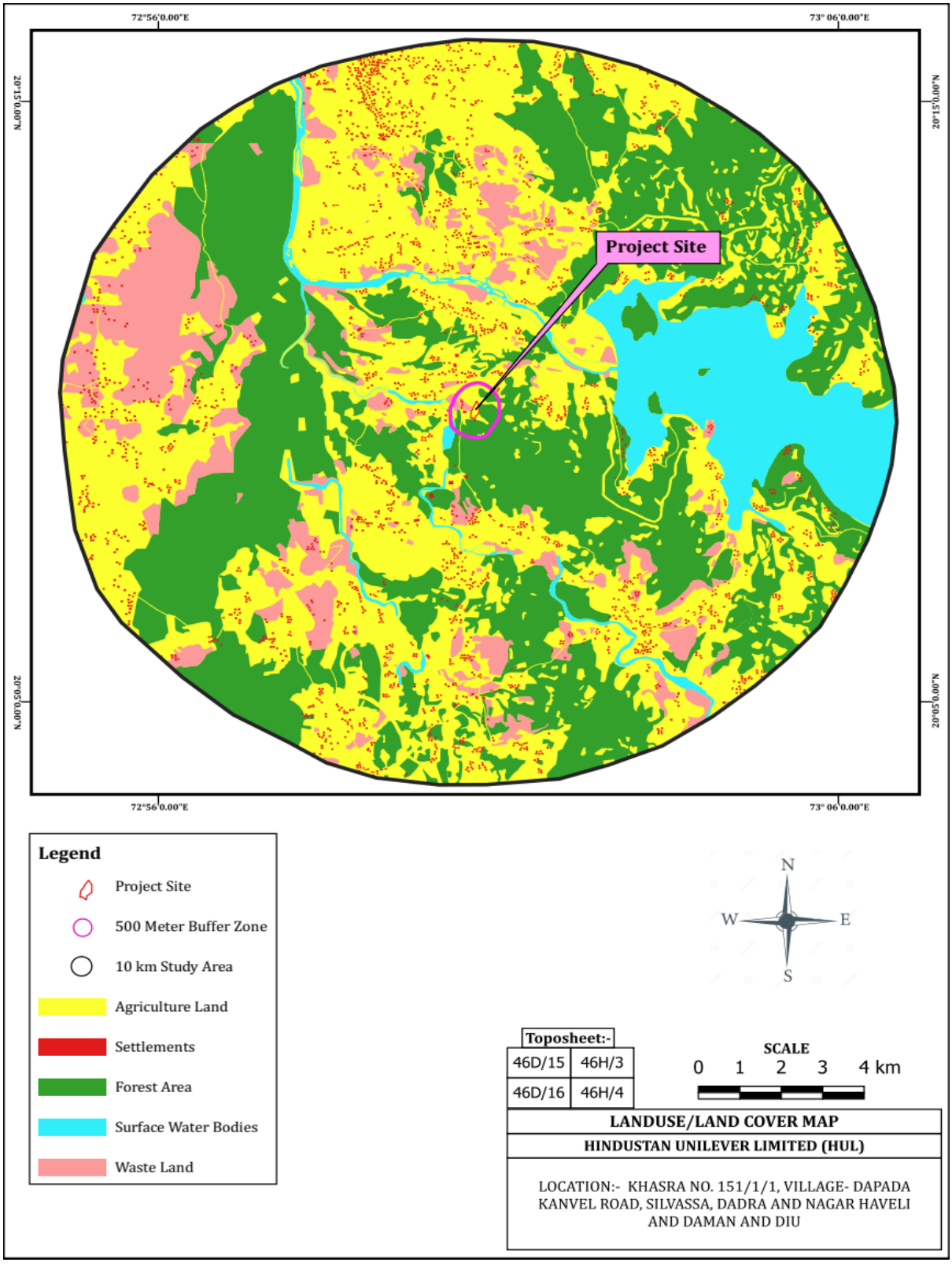


Figure 3-2: Land Use/ Land cover map of the study area

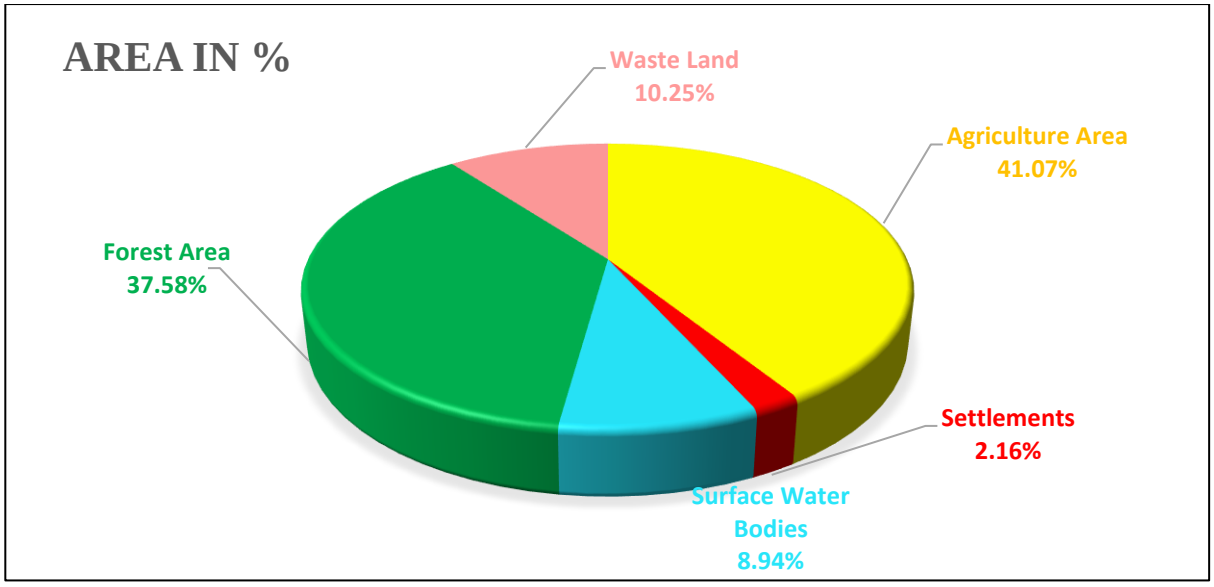


Figure 3-3: Break-up of Land use in the study area

3.2.2 Soil Quality

Geomorphologically the district is having matured type of landforms and can be broadly divided into three prominent geomorphic units. These are Residual Plateaus, Denudational Slopes and Valley Plains

The soils occurring on the Deccan plateau are generally black cotton soils. Within this broad categorization, there are significant variations depending upon topography.

Three major type of soil occurs in the UT i.e., lateritic soils, shallow black cotton soils deep black soils and their description is as follows:

1) Lateritic Soil, these soils are well stabilized and have good porosity leading to good permeability and aeration and are non-calcareous soils and have low pH.

2) Shallow Black Cotton Soil, are medium textured soils with 8 gravels and pebbles and hard rock is met early below the soil restricting free movement of water and air. Though the soils are permeable enough, but have low moisture holding capacity and thus call for specific moisture management for sustainable land use under cultivation.

3) Deep Black Soil, are very deep soils having very high fertility and are capable of supporting a variable number of crops.

Methodology for soil quality monitoring

Surface and sub-surface (profile) soil samples were collected by ramming a hand auger into the soil up to a depth of 30 cm. The samples were brought to the laboratory, air dried for a few days, ground in an agate mortar with the help of a wooden hammer, and passed through 2-mm (10-mesh) sieve. The material passing through the sieve was sampled by the standard `cone and quartering' method. The processed samples were analyzed for the different parameters according to the standard methods as described under Jackson, M.L., `Soil Chemical Analysis' and Relevant parts of IS 2720: Indian Standard Methods of Test For Soils.

Soil monitoring Locations

The Soil Monitoring was conducted for studying the various parameters at six different locations within the study area, including one from the project site. The locations of the Soil Quality Monitoring are summarized in Table 3-2 and shown in Figure 3.4.

Table 3-2: Soil monitoring locations

Sl. No.	Loc. Code	Sampling station	Co-ordinates		Location w.r. to Project
			Latitude	Longitude	
1	SQ1	Project site	20°10'53.23"N	73° 1'46.69"E	--
2	SQ2	Dapada	20°11'14.03"N	73° 1'57.33"E	0.30km in NE
3	SQ3	Surangi	20°10'6.38"N	73° 1'36.65"E	1.38km in SSW
4	SQ4	Near Lion Safari Vasona Silvassa	20°11'54.37"N	73° 2'32.01"E	1.89km in NE
5	SQ5	Chinchpada	20°12'23.55"N	73° 0'0.64"E	3.96km in NW
6	SQ6	Bindrabin	20° 8'40.85"N	73° 2'5.63"E	3.95km in S

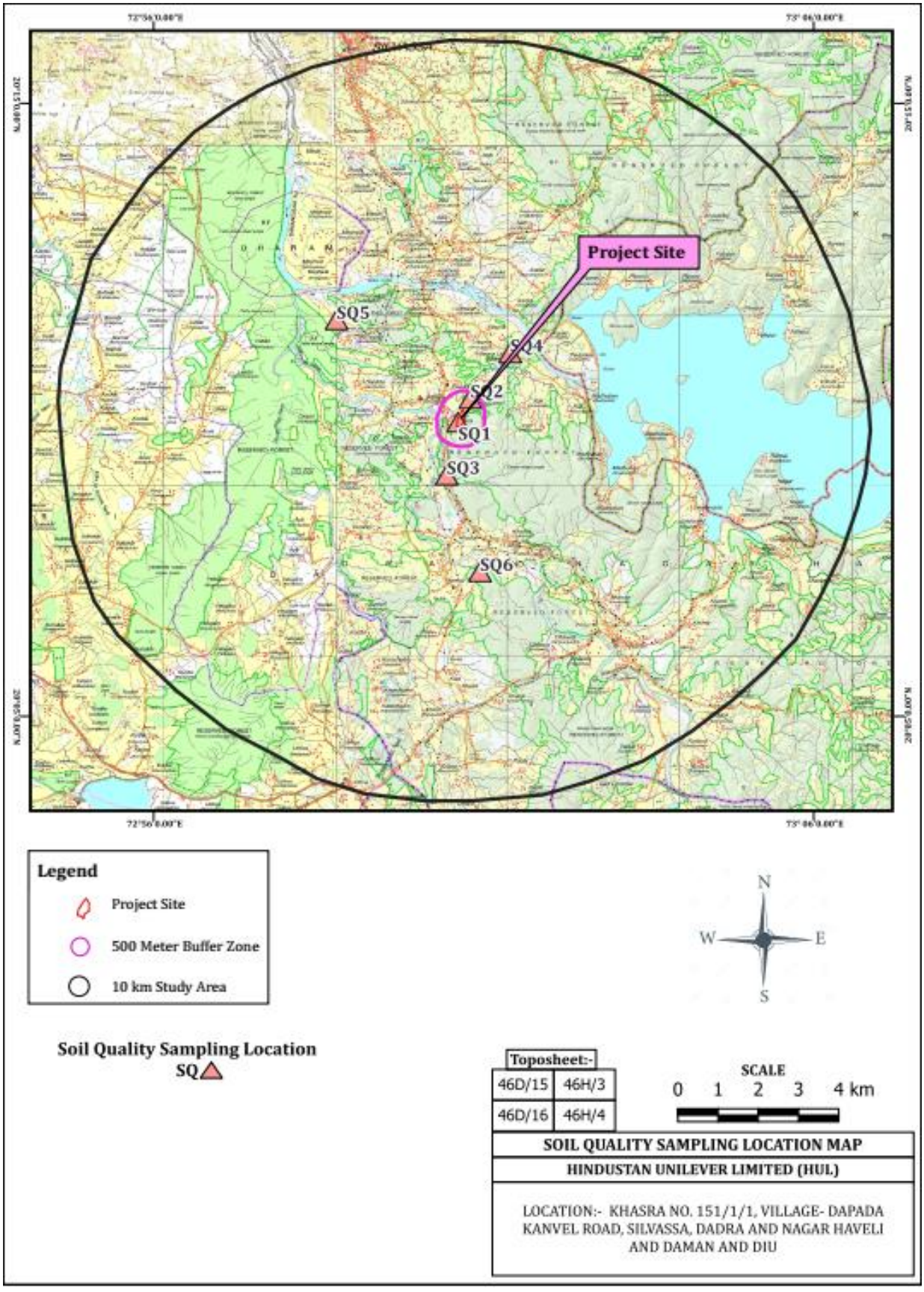


Figure 3-4: Map showing Soil Sampling Locations

Figure 3-5: Photographs showing Soil Sampling

Soil characteristics

Soil samples collected from six locations were analyzed for various parameters. Test reports generated by the testing laboratory are enclosed as **Annexure.** Summary of the results is presented in **Table 3-3**.

Table 3-3: Summary of test characteristics of soil samples

Soil quality Parameter	**Project Site**	**Dapada**	**Surangi**	**Near Lion Safari Vasona Silvassa**	**Chinchpada (Agricultural Land)**	**Bindrabin**
Soil texture	Sandy clay	Clay	Clay	Clay	Clay loam	Clay
Bulk density	1.23	1.26	1.37	1.27	1.26	1.29
Moisture, %	16.1	15.6	18.3	12.7	19.3	20.9
Porosity, %	21	19	23	24	25	17
Water holding capacity (%)	45.43	36.82	41.5	46.76	39.1	22.7
pH	8.85	7.72	7.89	8.29	7.76	8.18
Conductivity (µS/cm)	283	163	126	89.4	160.3	77.6
Org. Carbon (%)	0.72	0.86	0.79	1.05	0.9	0.54
Nitrogen (mg/kg)	122.3	136.5	138.4	132.5	145.3	112.3
Phosphorous (mg/kg)	7.2	11.2	7.2	5.3	12.8	10.3
Potassium (mg/kg)	94	96	107	103	98	106
CEC (meq/100g)	12.84	13.2	11.72	12.46	12.9	14.3

The highlights of the observations are as follows.

- Soils from all the six locations are clay in texture.
- The pH values of soil samples vary from 7.72 to 8.85.
- The conductivity of soils of the area is found in the range 77 to 283 mS/cm.
- Organic carbon in soil samples varies from 0.54% to 1.05 %.
- Available nitrogen in soils of the study area is in the range 112.3 to 145.3 mg/kg.
- Available potassium in soils of the study area is in the range 94 to 107 mg/kg.
- Available phosphorous in soils of the study area is in the range 5.3 to 12.8 mg/ kg.
- Water holding capacity is in the range 22.7 to 46.76%.
- Cation exchange capacity is in the range 11.72 to 14.3 meq/100 ml.

Conclusion:

From the analytical results, it is concluded that the soil in the study area is fertile and can be utilised for afforestation and green belt development without any further treatment.

3.2.3 Topography & drainage

The study area is a mix of flat plains and hilly terrain with the influence of the Western Ghats to the east and the presence of the Daman Ganga River as the main drainage system. The drainage system is primarily river-based, and while Silvassa faces occasional flooding risks, the Daman Ganga helps manage the region's water flow. As Silvassa grows, proper drainage and flood control infrastructure will be crucial to managing the urban challenges posed by its topography and seasonal rains.

3.2.4 Geology

The district is shaped by its proximity to the Western Ghats, the Deccan Traps volcanic province, and the Daman Ganga River. The area is characterized by basaltic volcanic rocks, sedimentary layers, and laterite soils, with alluvial deposits near river valleys. The region's geology supports agriculture, with fertile soils and water retention, while its volcanic past and tectonic movements have created a diverse and varied landscape.

3.2.5 Hydrology

The basaltic lava flows are massive and fine grained with negligible primary porosity and transmissivity. The area occurs in the vicinity of western coast, which have witnessed many tectonic disturbances. These have 9 caused development of joints and fractures in the basaltic strata. Also weathered zones of about 10-20 m thickness have developed in plains and depressions. Thus the weathered, jointed and fractured zones of vesicular and massive units of a flow constitute the main water bearing horizons. However, these zones are not continuous and uniformly developed laterally or vertically and this factor plays an important role in the success and failure of wells in the area.

The estimation of ground water resources of UT of Dadra & Nagar Haveli has been done by Central Ground Water Board, Central Region, Nagpur as per the recommendations of GEC 1997 Methodology. Ground Water Resources estimation was carried out for 416.00 sq. km. area out of which 42.35 sq. km. is under command and 373.65 sq. km. is non-command. As per the estimation

the total annual ground water recharge is 59.37 MCM with the natural discharge of 2.96 MCM, thus the net annual ground water availability comes to be 56.40 MCM. The annual ground water draft for all uses is estimated at 8.60 MCM with domestic sector being the major consumer having a draft of 7.49 MCM, whereas draft for irrigation purpose is only 1.11 MCM. The allocation for domestic and industrial requirement up to next 25 years is 8.66 MCM. The net ground water availability for future 12 irrigation is estimated at 46.62 MCM. The UT of DNH being considered as a single taluka/unit for assessment purpose its stage of development was assessed as 15.25% and has been categorised as "Safe'.

3.3 Climate & Meteorology

3.3.1 Climate & Long-term Meteorology

The climate of the Union Territory of Dadra and Nagar Haveli is characterised by an oppressive summer, dampness in the atmosphere nearly throughout the year, heavy southwest monsoon rainfall and a mild winter. The year can be divided in to four seasons. The cold season from December to February is followed by the summer season from March to May. The southwest monsoon season from June to September and the post monsoon season constitute the month of October and November. The average maximum temperature is recorded as 33.2°C whereas average minimum temperature is recorded as 22.5°C. The average wind speed recorded is 5.0 km/h. The total rainfall in this area 2298.7.

The nearest IMD station to the proposed Silvassa Detergents Factory expansion site is located approximately 50 km south at LAT 21°14'N and LONG 81°39'E. Climatological data (1991-2020) from this station provides essential information on temperature, rainfall, wind patterns, humidity, and cloud cover. This data will be crucial in guiding the design and operation of the Automated Storage and Retrieval System (ASRS) by considering environmental factors like seasonal temperature fluctuations, wind flow patterns, and rainfall levels. Understanding humidity and cloud cover is also important for ensuring the optimal functioning of the machinery and systems in the factory. Additionally, the rainfall and temperature data will help in designing the building's drainage system and energy-efficient cooling mechanisms. By incorporating this local climatological information, the project ensures better integration with the environment and enhances operational efficiency, minimizing disruptions from extreme weather conditions and ensuring sustainable operation.

Temperature:

March to June are having the warmest days, and the highest temperature rises up to 41.3^{0}C. January experiences the coldest days, with the daily lowest temperature of 11.5°C.

Rainfall

The normal rainfall in a year is recorded as 1243.4 mm. Distribution of rainfall by season is 3.3 mm in winter (December, January, February), 3.6 mm in summer (March, April, May), 1190.6 mm in monsoons (June, July, August, September) and 45.8 mm in Autumn (October - November). July is the wettest month of the year, accounting for 466.3 mm.

Table 3-4: Climatological Normal data for Surat - Temperature & Rainfall

Month	Mean of Air temperature, ^{0}C				Rainfall	
	Daily max	Daily min	Highest in the month	Lowest in the month	Monthly total mm	No. of rainy days
January	30.2	15.2	34.2	11.5	1.9	0.2
February	32.2	17.2	37.0	12.9	0.3	0.1
March	35.4	20.9	40.3	16.8	0.7	0.1
April	36.6	24.4	41.3	21.4	0.5	0.1
May	35.7	27.4	40.8	24.9	2.4	0.2
June	33.8	27.3	37.7	23.8	255.9	8.0
July	31.1	26.2	33.8	23.9	466.3	15.0
August	30.8	30.8	25.9	33.1	281.7	12.3
September	32.0	25.6	35.5	23.4	186.7	8.1
October	34.9	23.5	37.7	19.5	40.7	2.0
November	34.1	19.9	36.3	16.0	5.1	0.5
December	31.6	16.6	34.7	12.7	1.1	0.1
Annual	33.2	22.5	42.0	11.0	1243.4	46.5

Wind speed and direction

Long term wind direction data indicates that North East to South West winds are predominant in the area. Wind speeds are higher during summer and monsoon seasons (8.0 to 8.4 kmph) as compared to those during post-monsoon and winter months (2.5 to 5.0 kmph).

Humidity

The annual mean values of relative himidity are reported as 55% during evening hours and 75% during morning hours. Relative humidity values are high durng the monsoon months, followed by post-monsoon and winter months.

Table 3-5: Climatological normal data for Surat - Wind speed & Direction

Month		Percentage no. of days with wind from									Mean wind speed, kmph
		N	NE	E	SE	S	SW	W	NW	Calm	
January	I	21	24	6	1	1	0	1	4	42	3.5
	II	31	19	2	1	1	3	7	25	11	
February	I	16	17	3	1	1	1	2	5	54	3.5
	II	28	9	0	0	2	12	14	27	8	
March	I	12	16	3	1	3	5	3	4	53	3.7
	II	20	6	1	0	3	23	17	21	9	
April	I	10	6	1	2	12	22	3	3	41	4.8
	II	11	1	0	0	7	47	17	12	5	
May	I	3	2	1	0	9	56	8	3	18	8.0
	II	2	0	0	0	8	75	7	1	2	
June	I	0	0	0	3	11	57	9	2	18	8.4
	II	0	0	0	1	14	75	7	1	2	
July	I	0	0	0	1	6	57	13	1	22	8.1
	II	0	0	0	0	7	78	11	0	4	
August	I	1	0	0	0	1	51	16	2	29	7.1
	II	0	0	0	0	4	78	10	2	6	
September	I	3	4	0	1	3	20	9	4	56	4.3

	II	4	2	0	1	7	50	14	6	16	
October	I	5	10	6	4	2	3	1	2	67	2.5
	II	13	12	3	1	2	16	12	15	26	
November	I	7	22	11	3	1	0	0	1	55	2.5
	II	17	17	4	0	1	3	8	17	33	
December	I	17	28	7	1	0	0	0	2	50	3.1
	II	28	20	2	0	0	1	4	19	26	
Annual	I	8	10	3	2	4	23	5	3	42	5.0
	II	13	7	1	0	5	39	11	12	12	

3.3.2 Site specific climatology & Micrometeorology

Site specific meteorological data was collected by establishing an automatic weather station at the site. Hourly average values of the following parameters were collected/ recorded for one full season from 1st October to 31st December, 2024.

- Wind speed
- Wind direction
- Atmospheric temperature
- Relative humidity
- Cloud cover
- Rainfall
- Solar radiation

The recorded meteorological data has been used as input for dispersion modelling. Wind rose diagram for the Post-monsoon season, based on site-specific data recorded from 1st October to 31st December, 2024, is presented in Figure 3-6. The summary of recorded hourly average meteorological data is presented below in Table 3-6.

Table 3-6: Summary of On-site Meteorological Observations

S. N.	Parameter	Hourly average value		
		Minimum	Maximum	Mean/ Total
1.	Atmospheric temperature, ^{o}C	14.3	36.4	25.3
2.	Wind speed, m/s	0	20.4	10.2
3.	Relative humidity, %	22	100	61
4.	Cloud cover, tenth	0	10	5
5.	Precipitation, mm	0	13.3	65

Wind speed and direction:

The wind speed was recorded in the range 0.0 m/s to a maximum of 20.6 m/s, with an average value of 7.1 m/s. The 16-directional wind rose, based on the hourly observations, has been presented in Figure 4-5. During the study period, the pre-dominant wind direction is North Northeastern to North East (approx. 13.8%) and East (approx 12.4%), followed closely by East-Northeastern (approx. 11.3%). It can be observed from the wind rose that winds from the Northern sector account for almost 50% of wind direction.

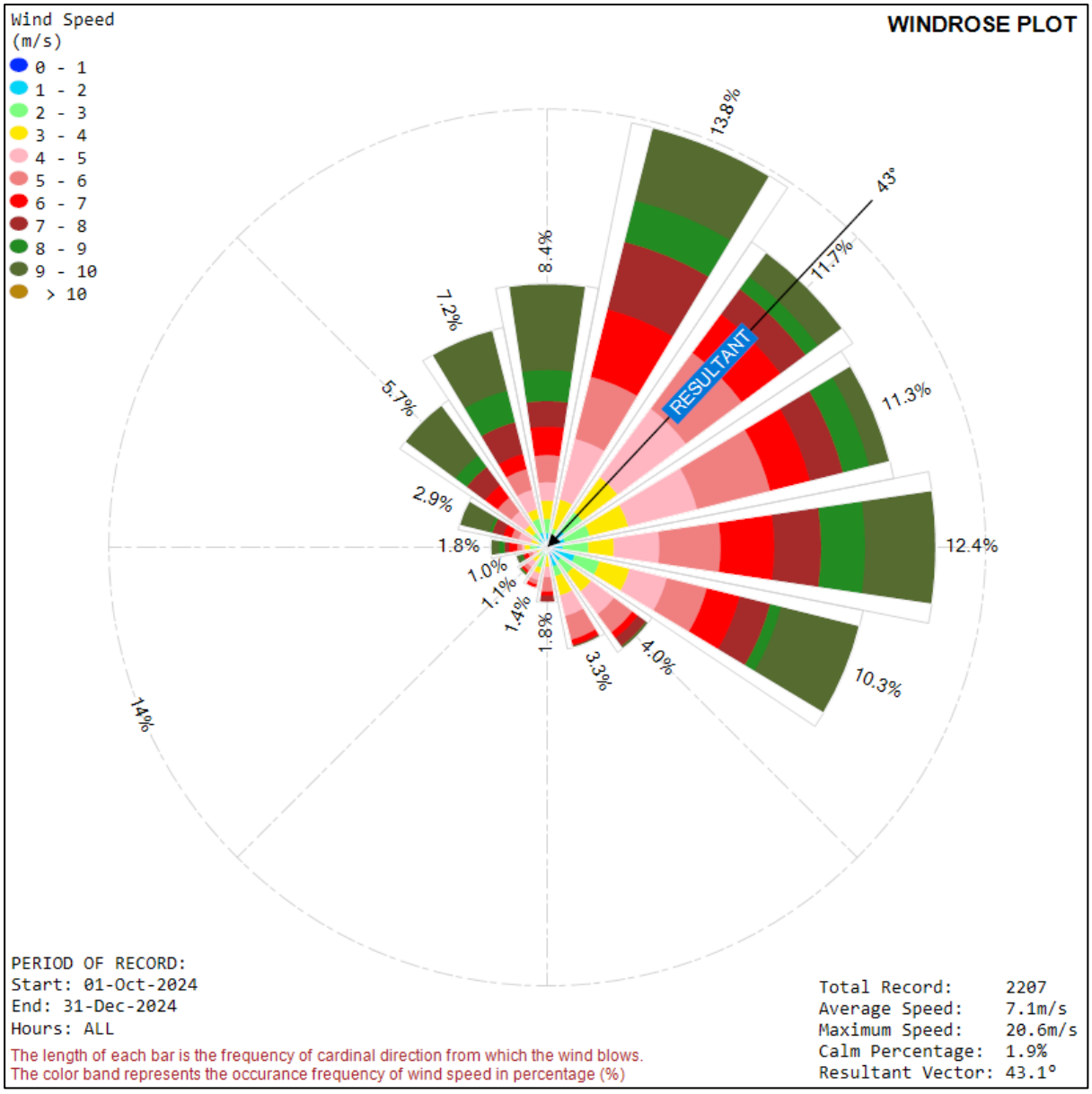


Figure 3-6: Wind rose diagram at Project Site (Oct to Dec, 2024)

Temperature, humidity, cloud cover and precipitation:

Hourly atmospheric temperature during the study period was recorded from a minimum of 14.3^{0}C to a maximum of 36.4^{0}C, with the average value of 25.3^{0}C. Hourly relative humidity was recorded from a minimum of 22% to a maximum of 100%, with the average value of 61%. Hourly cloud cover varied from a minimum of 0 to a maximum of 10 tenth of sky, with an average value of 5 tenth. A total of 65mm precopitation was observed during the season, with maximum 1 hour precipitation of 13.3 mm.

3.4 Ambient air quality

3.4.1 General Description

The proposed ASRS at HUL's Silvassa Detergents Factory is strategically located to optimize logistics and operations. It is just 0.25 km from NH-848A, ensuring quick access to major road networks, including the Golden Quadrilateral (NH-48) at 12.66 km. The Vapi Railway Station, 21 km northwest, and Surat Airport, 140 km away.

3.4.2 Monitoring Stations

The following criteria were taken into consideration during selection of the sampling stations:

- Human settlements within the study area
- Representing the area likely to be affected by the proposed project
- Safety, accessibility, and non-interference with general routine of the people
- Prevailing wind direction in the area

Based on the above considerations, nine sampling locations were selected for ambient air quality survey. Locations of the sampling stations are presented in Table 4-8, and presented on the study area map in Figure-3-7.

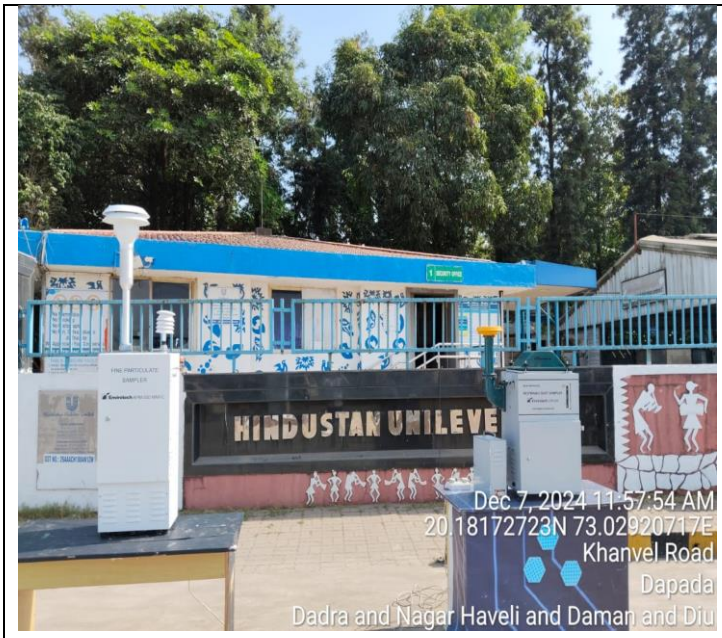
Table 3-7: Location of Ambient air Quality Survey Stations

Sl. No.	Loc. Code	Sampling station	Co-ordinates		Distance & direction
			Latitude	Longitude	
1	AQ1	Project Site (Near Main Gate)	20°10'58.59"N	73° 1'52.10"E	--
2	AQ2	Project Site (Near ETP Area)	20°10'50.27"N	73° 1'48.61"E	---
3	AQ3	Dadra	20°11'31.56"N	73° 2'12.55"E	1.00km in NW
4	AQ4	Near Satmaliya Deer park	20°10'39.72"N	73° 1'35.80"E	0.48km in SW
5	AQ5	Surangi	20° 9'44.98"N	73° 1'46.77"E	2.0 km in S
6	AQ6	Near Lion Safari Vasona Silvassa DNH	20°11'55.07"N	73° 2'35.43"E	1.97km in NW
7	AQ7	Kherdi	20° 6'16.14"N	73° 1'17.39"E	8.36km in S
8	AQ8	Dapada	20°11'9.87"N	73° 1'15.55"E	0.97 km in WNW
9	AQ9	Rakholi	20°14'4.94"N	73° 1'4.96"E	5.62km in NW

3.4.3 Sampling Period, Frequency and Parameters

The ambient air quality survey was conducted for one full season, covering the Winter (Post-monsoon) Season of 2024. The study was started on 1st October, 2024 and continued up to 31st December, 2024. Sampling was performed with the frequency of 2 days/week per location to determine 24-hourly average concentrations. The sampling was started between 7 to 9 AM in the morning and terminated after 24 hours on the next morning. The air pollution parameters covered under the survey are PM10, PM2.5, Sulphur dioxide (SO_2), Nitrogen dioxide (NO_2), and Carbon Monoxide (CO).

Figure 3-7: Map showing ambient air sampling locations



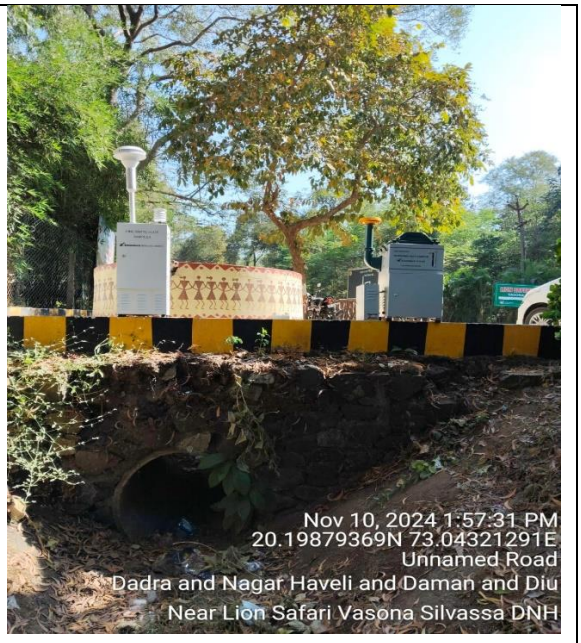


Figure 3-8: Photographs showing ambient air sampling

3.4.4 Sampling and Analytical Procedure

A brief summary of the sampling and analytical procedures followed during the survey is given in **Table 3-8** below.

Table 3-8: Methodology for Ambient Air quality Measurement

Sl. No.	Pollutant	Method of measurement	Ref. to Standard
1	Sulphur dioxide (SO_2)	Improved West and Gaeke	IS : 5182 (Part-2)
2	Nitrogen dioxide (NO_2)	Modified Jacob & Hochheiser	IS : 5182 (Part-6)
3	Particulate matter PM_{10}	Gravimetric	IS : 5182 (Part-23)
4	Particulate matter $PM_{2.5}$	Gravimetric	IS : 5182 (Part-23)
5	Carbon monoxide (CO)	NDIR Spectroscopy	IS : 5182 (Part-10)

3.4.5 Air Quality Standards

The National Ambient Air Quality Standards for the above-mentioned pollutants, notified vide NAQS Notification dated 18th November, 2009, are presented in **Table 3-9**.

Table 3-9: Ambient Air quality Standards

Sl. No.	Pollutant	Time weighted Average	Concentration in air	
			Industrial, residential, rural, and other areas	Ecologically sensitive area (notified by Central Govt.)
1.	Sulphur dioxide (SO_2), µg/m³	Annual*	50	20
		24 Hours**	80	80
2.	Nitrogen dioxide (NO_2), µg/m³	Annual*	40	30
		24 Hours**	80	80

Sl. No.	Pollutant	Time weighted Average	Concentration in air	
			Industrial, residential, rural, and other areas	Ecologically sensitive area (notified by Central Govt.)
3.	Particulate matter PM_{10}, µg/m^3	Annual*	60	60
		24 Hours**	100	100
4.	Particulate matter $PM_{2.5}$, µg/m^3	Annual*	40	40
		24 Hours**	60	60
5.	Carbon monoxide (CO), mg/m^3	8 Hours**	02	02
		1 Hour**	04	04

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

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

3.4.6 Monitoring Results

The Laboratory Test Reports of ambient air quality monitoring at the 9 sampling locations, as generated by the Test laboratory are enclosed as **Annexure.** The minimum, maximum, mean and 98th percentile concentration values of pollutants observed at Individual sampling locations have been presented through **Tables 3-10**.

Table 3-10: Summary of Ambient Air quality monitoring results

Pollutant	L.C., Monitoring Station	Maximum	Minimum	Mean	98th %ile
Particulate matter (PM10), µg/m3	AQ1, Project Site (Near Main Gate)	73	66	69.38	72.54
	AQ2, Project Site (Near ETP Area)	74	66	69.42	65
	AQ3, Dadra	68	58	65.00	68
	AQ4, Near Satmaliya Deer Park	55	46	51.29	55
	AQ5, Surangi	64	56	60.33	64
	AQ6, Near Lion Safari Vasona Silvassa	60	51	56.58	60
	AQ7, Kherdi	57	48	52.04	56.54
	AQ8, Dapada	58	48.45	53.84	57.54
	AQ9, Rakholi	60	51	54.29	59.54
Particulate matter (PM2.5), µg/m3	AQ1, Project Site (Near Main Gate)	45	41	43.04	45
	AQ2, Project Site (Near ETP Area)	41	35	38.29	35
	AQ3, Dadra	38	32	35.88	38
	AQ4, Near Satmaliya Deer Park	33	26	29.50	32.54
	AQ5, Surangi	36	30	32.63	35.54

	AQ6, Near Lion Safari Vasona Silvassa	35	26	30.88	35
	AQ7, Kherdi	34	25	31.08	34
	AQ8, Dapada	36	30	33.25	35.54
	AQ9, Rakholi	39	28	33.33	38.54
Sulphur Dioxide (SO2), µg/m3	AQ1, Project Site (Near Main Gate)	21	14	16.21	20.08
	AQ2, Project Site (Near ETP Area)	17	11	13.79	16.54
	AQ3, Dadra	15	9	11.88	15
	AQ4, Near Satmaliya Deer Park	12	8	10.08	12
	AQ5, Surangi	12	8	9.75	12
	AQ6, Near Lion Safari Vasona Silvassa	11	7	9.33	11
	AQ7, Kherdi	11	7	9.33	11
	AQ8, Dapada	16	7	10.63	14.62
	AQ9, Rakholi	15	8	10.29	14.54
Nitrogen dioxide (NO2), µg/m3	AQ1, Project Site (Near Main Gate)	29	20	24.08	29
	AQ2, Project Site (Near ETP Area)	25	18	21.92	24.54
	AQ3, Dadra	24	16	20.21	23.54
	AQ4, Near Satmaliya Deer Park	16	10	14.17	16
	AQ5, Surangi	20	12	16.46	20
	AQ6, Near Lion Safari Vasona Silvassa	20	11	15.83	19.08
	AQ7, Kherdi	20	10	15.38	20
	AQ8, Dapada	20	11	15.96	20
	AQ9, Rakholi	21	11	16.42	21
Carbon monoxide (CO), Mg/m3	AQ1, Project Site (Near Main Gate)	0.82	0.58	0.76	0.81
	AQ2, Project Site (Near ETP Area)	0.78	0.62	0.72	0.78
	AQ3, Dadra	0.77	0.64	0.72	0.77
	AQ4, Near Satmaliya Deer Park	0.58	0.42	0.51	0.58
	AQ5, Surangi	0.73	0.62	0.67	0.72
	AQ6, Near Lion Safari Vasona Silvassa	0.69	0.57	0.62	0.68
	AQ7, Kherdi	0.66	0.53	0.61	0.65
	AQ8, Dapada	0.68	0.57	0.63	0.68
	AQ9, Rakholi	0.65	0.52	0.60	0.65

3.4.7 Analysis and interpretation of data

Analysis and interpretation of ambient air quality data collected during the study period, including comparison with air quality standards is as follows.

Particulate matter (PM_{10}): Concentrations of PM_{10} were observed from the minimum of 48 µg/m3 to the maximum value of 74 µg/m3. The minimum concentrations observed at the 9 sampling stations were in the range 41 µg/m3 to 66 µg/m3. The maximum concentrations were observed in the range 55 to 74 µg/m3, and the average concentrations in the range 66 to 74 µg/m3. The highest values of minimum, maximum and mean concentrations were observed at project Site. As expected, the lower values are observed at Kherdi locations. All the observed values are below the ambient air quality standard (100 µg/m3) for Industrial, residential, rural and other areas. However, PM10 concentrations at the project site are approaching the limiting standard of 100 µg/m3 due to its proximity.

Particulate matter (PM2.5): Concentrations of PM2.5 were observed from the minimum of 25 µg/m3 to the maximum value of 45 µg/m3. The minimum concentrations observed at the 9 sampling stations were in the range 25 µg/m3 to 41 µg/m3. The maximum concentrations were observed in the range 33 to 45 µg/m3, and the average concentrations in the range 30 to 41 µg/m3. Here also, the highest values of minimum, maximum and mean concentrations were observed at the project site, and the lower values are observed at Kherdi locations. All the observed values are below the ambient air quality standard (60 µg/m3) for Industrial, residential, rural and other areas.

Sulphur dioxide (SO2): Concentrations of SO2 were observed from the minimum of 7 µg/m3 to the maximum value of 21 µg/m3. The minimum concentrations observed at the 9 sampling stations were in the range 7 µg/m3 to 14 µg/m3. The maximum concentrations were observed in the range 11 µg/m3 to 21 µg/m3, and the average concentrations in the range 11 to 17 µg/m3. Here also, the highest values of minimum, maximum and mean concentrations were observed at the project site, and the lower values are observed at Kherdi locations. All the observed values are well below the ambient air quality standard (50 µg/m3) for Industrial, residential, rural and other areas.

Nitrogen dioxide (NO2): Nitrogen dioxide concentrations in the study area were observed from the minimum of 10 µg/m^3 to the maximum value of 29 µg/m^3. The minimum concentrations observed at the 9 sampling stations were in the range 10 µg/m3 to 20 µg/m3, whereas the maximum concentrations were observed in the range 16 µg/m3 to 29 µg/m3, and the average concentrations in the range 15 µg/m3 to 24 µg/m3. Here also, the highest values of minimum, maximum and mean concentrations were observed at the project site, and the lower values are observed at Kherdi locations. The values observed at all the 9 locations are well within the ambient air quality standard (40 µg/m3) for Industrial, residential, rural and other areas.

Carbon monoxide (CO): Carbon monoxide concentrations in the study area were observed from the minimum of 0.42 mg/m3 to the maximum value of 0.82 mg/m3. The minimum concentrations observed at the 9 sampling stations were in the range 0.42 mg/m3 to 0.62 µg/m3, whereas the maximum concentrations were observed in the range 0.58 mg/m3 to 0.64 mg/m3, and the average concentrations in the range 0.51 mg/m3 to 0.61 mg/m3. The maximum observed values at all the 9 locations are well below the ambient air quality standard (2 mg/m3) for Industrial, residential, rural and other areas.

3.4.8 Conclusion

3.5 Water Quality

3.5.1 General

The water resources, both surface and ground water, play an important role in the day to day life as well as in development of an area. Accordingly, the water resources of the area have been studied to establish the baseline status of their quality in the study area. Assessment of baseline data on water environment includes:

- Identification of surface water sources
- Identification of ground water sources
- Collection of representative water samples for characterization
- Analyzing water samples for physico-chemical and biological parameters.

Ground water is the main source of water for domestic uses in the villages as well in urban areas of the study area. Therfore, characteristics of ground water have been compared with drinking water standards, i.e., IS 10500. The urban users receives water from the respective municipal sources through pipeline, whereas the villagers draw water from dugwells or bore wells.

Two perenniel rivers, Sakartond and Damanganga pass through the study area. Madhuban Reservoir also passes through the study area. Most of the villages have ponds. Surface water is used mostly for bathing, washing and fishery. Therfore, characteristics of surface water have been compared with Surface water standards, i.e., IS 2296.

3.5.2 Sampling locations

Selection of the sampling stations was based on drainage pattern in the area, location of residential and impact areas, and areas representative of the baseline status. Based on these considerations, 5 ground water and 3 surface water sources were identified for characterization. Details of the selected sampling locations, and their geographical coordinates are presented in Table 3-11. The location of these sampling stations on the study are map has been presented in Figure 3-9.

Table 3-11: Location of Ground & Surface Water Sampling Stations

Sl. No.	Location Code	Sampling locations	Co-ordinates	
			Latitude	Longitude
Ground water sampling locations				
1	GW1	Project site	20°11'2.21"N	73° 1'48.72"E
2	GW2	Dapada	20°11'16.88"N	73° 1'25.71"E
3	GW3	Pati	20°10'48.02"N	73° 2'52.79"E
4	GW4	Surangi	20° 9'19.87"N	73° 1'46.17"E
5	GW5	Amboli	20° 8'22.48"N	73° 1'42.58"E
Surface water sampling locations				
6	SW1	Sakartond River	20°11'5.23"N	73° 1'8.48"E
7	SW2	Daman ganga River	20°15'30.26"N	72°59'22.24"E

8	SW3	Madhuban reservoir	20°11'28.62"N	73° 3'47.20"E

Figure 3-9: Map showing Ground and surface water sampling locations

Figure 3-10: Photographs showing Ground and surface water sampling

3.5.3 Methodology

The sampling and examination/ analysis of water samples was performed by Virat Global Laboratory, Lucknow (a MoEF&CC recognized and NABL accredited teating laboratory). Water samples were collected by grab sampling from all the sampling locations and analyzed for relevant physical, chemical and bacteriological parameters. Collection and analysis of the samples was carried out as per established standard methods and procedures, prescribed relevant Parts of IS 3025 (Indian Standard Methods for samoling and Test for Water and Wastewater) and Standard Methods for the Examination of Water & Wastewater (American Water Works Association). The test methods followed for individual parameters are described in the Test report provided by the testing laboratory.

Analyses of the parameters like temperature; pH, dissolved oxygen and alkalinity were carried out at the sampling stations immediately after collection of samples with the help of Field Analysis Kits. For analysis of other parameters, the samples were preserved by addition of prescribed preservatives and brought to laboratory at Noida. The metallic constituents like arsenic, mercury, lead, cadmium, chromium, copper, zinc, selenium, iron and manganese were analyzed with Atomic Absorption Spectroscope.

3.5.4 Ground water characteristics

The test report for ground water samples, provided by the testing laboratory, is attached as **Annexure.** The summary and statistical analysis of important characteristics of ground water samples from the 6 locations within the study area, along with relevant Indian Standards for Drinking Water (IS:10500), are presented in **Table 3-12.**

Table 3-12: Summary of ground water test result

Sl. No.	Parameters	IS 10500 : 2012		Observed values			
		Desirable	Permissible	Minm.	Maxm.	Mean	Median
1	Colour, Hazen	5.0	15.0	<5	<5	<5	<5

2	pH at 25 ^{0}C	6.5 to 8.5		7.2	7.7	7.2	7.2
3	Turbidity, NTU	1.0	5.0	<1.0	<1.0	<1.0	<1.0
4	Conductivity at 25 ^{0}C, µmhos/cm	-	-	363	656	537	537
5	Total Dissolved Solids, mg/l	500.0	2000.0	182	388	287	287
6	Total Hardness as $CaCO_3$, mg/l	200.0	600.0	140	284	224	268
7	Calcium as Ca, mg/l	75.0	200.0	32.0	73.2	55.72	57.7
8	Magnesium as Mg, mg/l	30.0	100.0	13.1	34.0	20.7	21.4
9	Total Alkalinity as $CaCO_3$, mg/l	200	600.0	135	312	188	188
10	Chloride as Cl, mg/l	250.0	1000.0	25.9	96.0	49.12	33.0
11	Sulphate as SO_4, mg/l	200.0	400.0	20.4	36.7	30.0	30.0
12	Nitrate as NO_3, mg/l	45.0		6.7	9.5	8.6	8.2
13	Fluoride as F, mg/l	1.0	1.5	0.19	0.28	0.04	0.27
14	Iron as Fe, mg/l	1.0		0.19	0.24	0.21	0.21
15	Sodium as Na, mg/l	-	-	20.0	32.0	26.0	26.0
16	Potassium as K, mg/l	-	-	8.0	16.0	12.0	11.0
17	Boron as B, mg/l	0.5	1.0	<0.2	<0.2	<0.2	<0.2
18	Copper as Cu, mg/l	0.05	1.5	<0.01	<0.01	<0.01	<0.01
19	Zinc as Zn, mg/l	5.0	15.0	<0.001	<0.001	<0.001	<0.001
20	Chromium as Cr, mg/l	0.05		<0.05	<0.05	<0.05	<0.05
21	Arsenic as, mg/l	0.01		<0.01	<0.01	<0.01	<0.01
22	Cadmium as Cd, mg/l			<0.001	<0.001	<0.001	<0.001
23	Total Coliform, CFU/100 ml.	Shall not be detectable in 100 ml.		<2	<2	<2	<2
24	E. Coli, CFU/100 ml.			<2	<2	<2	<2

Salient features of characteristics of ground water samples collected from the study area are as follows.

a) The pH values were observed in the range 7.0 to 7.5 units, which are well within the desirable range of 6.5-8.5.

b) Total dissolved solids were observed in the range 182 to 388 mg/l. All the observed values are well within the desirable limit of 500 mg/l.

c) Total hardness values were observed in the range 140 to 290 mg/l. It exceed the desirable standard value of 200 mg/l in most of the samples, but is well within the permissible limit of 600 mg/l.

d) Total alkalinitiy values were observed in the range 135 to 315 mg/l. Alkalinity exceed the desirable standard value of 200 mg/l in all the samples, but is well within the permissible limit of 600 mg/l.

e) Calcium, as Ca, values were observed in the range 32.0 to 68.0 mg/l. Calcium contenets in all the samples well within the desirable limit of 75 mg/l.

f) Magnesium, as Mg, values were observed in the range 13.0 to 34.0 mg/l, and all the observed values are within the desirable value of 30 mg/l.

g) Chloride, sulpahate, nitrate, fluoride, iron and zinc concentrations in all samples are within the desirable limits for drinking water.

h) Boron, chromium, copper and arsenic were below detection limits.

i) Faecal and total coliform organisams were detected in the samples.

It is, therefore, concluded that ground water in the study area is potable in nature.

3.5.5 Surface water characteristics

The test report for surface water samples (including samples from 2 rivers), provided by the testing laboratory, is attached as **Annexure.**

Sakartond and Damanganga Rivers:

The salient features of surface water samples from the 2 rivers within the study area are presented in **Table 4-14**, and have been compared with the tolerance limits specified by Central Pollution Control Board and BIS IS 2296 for "Drinking water source after conventional treatment and disinfection".

Table 3-13: Salient features of River Water characteristics

Sl. No.	Parameters	Requirement (CPCB/ IS 2296)*	Observed values for	
			Sakartond River	Daman Ganga River
1	pH at 25 ^{0}C	6 to 9	7.53	7.63
2	Dissolved Oxygen, mg/l	4 mg/l or mor	150	109
3	BOD (3 days at 27^{0}C), mg/l	3 mg/l or less	7.2	7.3
4	COD, mg/l	-	12	16
5	Total Suspended Solids, mg/l	-	<5	<5
6	Total Dissolved Solids, mg/l	1500	150	109
7	Conductivity at 25 ^{0}C, µmhos/cm.	-	300	238
8	Turbidity, NTU	-	1.3	1.2
9	Sulphate as SO_4, mg/l	400	5.6	1.1
10	Dissolved Phosphate as P, mg/l	-	3.12	1.73
11	Ammonical Nitrogen as N, mg/l	-	3.5	3.7
12	Total Alkalinity as $CaCO_3$	-	132	68
13	Total Hardness as $CaCO_3$, mg/l	300	156	104
14	Calcium Hardness as $CaCO_3$, mg/l	-	35	21
15	Magnesium Hardness as $CaCO_3$, mg/l	-	16.50	12.60
16	Fluoride as F, mg/l	-	0.56	0.48
17	Chloride as Cl, mg/l	600	22	10
18	Total Coliform, MPN/100 ml.	5000 or less	31	23
19	Fecal Coliform, MPN/100 ml.	-	<2	<2

* *Drinking water source after conventional treatment and disinfection*

Salient features of river water samples collected from the study area are as follows:

a) The pH values in the samples were found 7.53 and 7.63 units, which are well within the desirable range of 6 to 9.

b) Dissolved oxygen in the two samples werer found as 109 mg/l and 150 mg/l, which are more than the minimum desired value of 4 mg/l.

c) Biochemical oxygen demand in the samples were found as 7.2 mg/l and 7.3 mg/l, which exceed the desired limit of 3 mg/l or less.

d) Total dissolved solids in both samples were found 109 & 150 mg/l, which are well within the desired limit of 1500 mg/l or less.

e) Sulphate levels in the samples sources were found 1.1 and 5.6 mg/l mg/l, which is well withion the desired limit of 400 mg/l.

f) Chlorides levels in both the samples were found 10-22 mg/l, which is well withion the desired limit of 600 mg/l.

g) Total coloform in the two samples were found as 23 and 31 MPN/100 ml, which is well within the desired limit of 5000 MPN/100 ml.

It is, therefore, concluded that water from the two rivers meet the criteria for "drinking water source with conventional treatment followed by disinfection', except the BOD levels which exceed the specified limit.

Other surface water bodies:

The salient features of surface water samples from the dam are presented in Table 4-15, and have been compared with the tolerance limits specified by Central Pollution Control Board and BIS IS 2296 (for Propagation of wildlife and fisheries, and for Irrigation, industrial cooling and conbtrolled waste dispoosal, whichever is more stringent)".

Table 3-14: Salient features of other water bodies

Sl. No.	Parameters	Tolerance limit	Madhuban Reservoir
1	pH	6.5 to 8.5	7.15
2	Conductivity, µmhos/cm	1000	368
3	Alkalinity as $CaCO_3$, mg/l	-	132
4	Total Dissolved Solids, mg/l	2100	268
5	Total Suspended Solids, mg/l	-	<5
6	Total Hardness as $CaCO_3$, mg/l	-	203
7	Calcium as $CaCO_3$, mg/l	-	74
8	Magnesium as $CaCO_3$, mg/l	-	32.40
9	Chloride as Cl, mg/l	600	68
10	Total Phosphorus, mg/l	-	1.84
11	Nitrate as NO_3, mg/l	-	8.7
12	Sulphate as SO_4, mg/l	1000	12.8
13	Fluoride as F, mg/l	-	0.65
14	Ammonical Nitrogen as N, mg/l	-	4.1
15	Sodium as Na, mg/l	-	36
16	Potassium as K, mg/l	-	18
17	Dissolved Oxygen, Min., mg/l	4 mg/l	7.2
20	BOD, mg/l	3 mg/l	12.7
21	COD, mg/l	-	36
22	Total Coliform, MPN/100ml,	5000	920
23	Fecal Coliform, MPN/100ml	-	540

Salient features of surface water samples from the one sources in the study area are as follows:

a) The pH values in the samples were found between 7.15 units, which are well within the desirable range of 6.5 to 8.5.

b) Biochemical oxygen demand in the samples were found between 12.7 mg/l, which exceed the desired limit of 3 mg/l or less.

c) Total dissolved solids in both samples were found between 36 mg/l, which are well within the desired limit of 2100 mg/l or less.

3.6 Noise level

3.6.1 Effects of Noise

Noise can also be defined as any sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoying. It has an adverse effect on human beings and their environment, including domestic animals, natural wildlife and ecological systems.

Environmental noise can have several effects varying from hearing loss to annoyance.
Sufficiently loud noise may

- cause hearing loss or health damage;
- interfere with work tasks, especially those involving concentration of mind;
- interfere with speech communication;
- affect inter-room privacy;
- interfere with sleep; and
- cause annoyance.

3.6.2 Ambient Noise Level Standards

The Ministry of Environment, Forests & Climate Change, Government of India, has notified the ambient air quality standards in respect of noise for different area categories vide gazette notification dated February 14, 2000 under the Environment Protection Act (1986). These standards are given in Table-3-15.

Table 3-15: Ambient Air Quality Standards in respect of Noise

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

Note:

1. *Day Time is reckoned between 6AM and 9PM*
2. *Night Time is reckoned between 9PM and 6AM.*
3. *Silence Zone is defined as area up to 100 metres around such premises as hospitals, educational institutions and courts. The silence zones are to be declared by the competent authority. Use of vehicular horns, loudspeakers and bursting of crackers shall be banned in these zones.*
4. *Mixed categories of areas may be declared as one of the four above mentioned categories by the competent authority.*

- *dB(A) Leq denotes the time weighted average of the level of sound in decibels on scale A which is related to human hearing.*
- *"A", in dB(A), denotes the frequency weighing in the measurement of noise and corresponds to frequency response characteristics of the human ear.*

3.6.3 Noise monitoring locations

The main noise generating source in the area of influence is activities within the industries located in the area, traffic on the roads, and ccommercial and urban activities in the urban areas. Based on these considerations, 9 noise monitoring locations were selected. Out of these, 1 is located in Industrial area, 2 in urban (Commercial) areas, 5 in residential areas, and 1 in sensitive area (primary school). The sampling locations are described in Table 3-16 and shown on the study area map in Figure 3-11.

Table 3-16: Location of Noise Monitoring Stations

Sl. No.	Loc. Code	Sampling station	Area category	Co-ordinates	
				Latitude	Longitude
1	NQ1	Project Site (Near Main Gate)	Industrial	20°10'58.59"N	73° 1'52.10"E
2	NQ2	Project Site (Near ETP Area)	Industrial	20°10'50.27"N	73° 1'48.61"E
3	NQ3	Dadra	Commercial	20°11'31.56"N	73° 2'12.55"E
4	NQ4	Near Satmaliya Deer park	Silence	20°10'39.72"N	73° 1'35.80"E
5	NQ5	Surangi	Residential	20° 9'44.98"N	73° 1'46.77"E
6	NQ6	Near Lion Safari Vasona Silvassa DNH	Silence	20°11'55.07"N	73° 2'35.43"E
7	NQ7	Kherdi	Residential	20° 6'16.14"N	73° 1'17.39"E
8	NQ8	Dapada	Commercial	20°11'9.87"N	73° 1'15.55"E
9	NQ9	Rakholi	Residential	20°14'4.94"N	73° 1'4.96"E

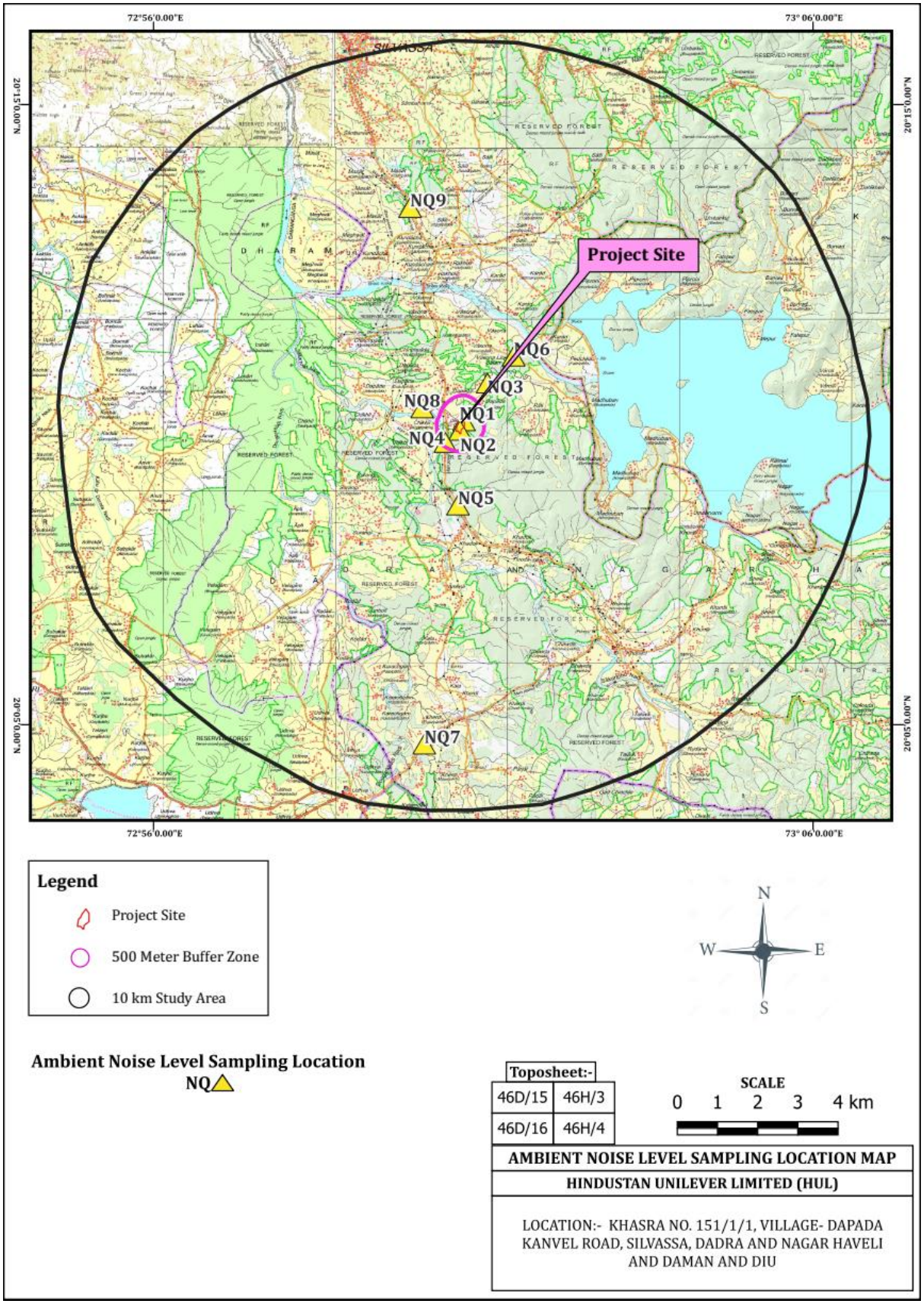


Figure 3-11: Map showing noise monitoring locations

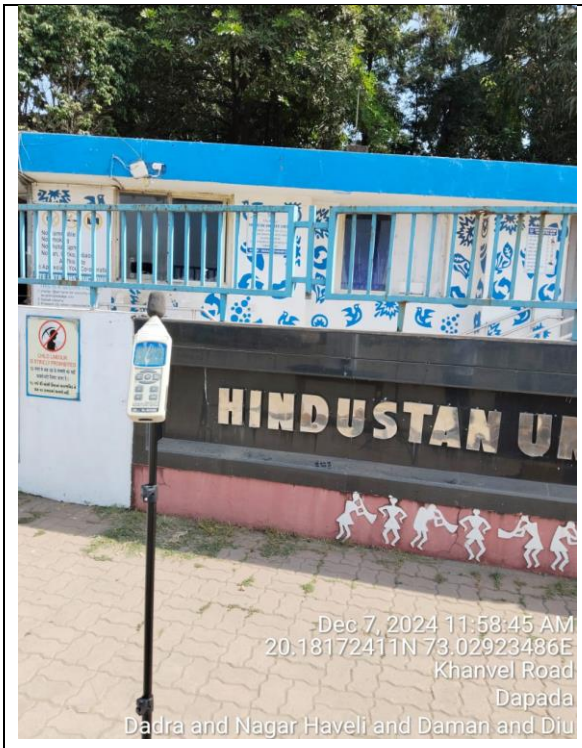


Figure 3-12: Photographs showing noise monitoring

3.6.4 Methodology

The noise level measurements were performed by M/s Virat Global Laboratory, a MoEF&CC recognized and NABL accredited Testing Laboratory. The intensity of sound energy in the environment is measured on a logarithmic scale and is expressed in a decibel (dB) scale. Noise levels were measured using an Integrating sound level Meter. It has an indicating mode of Lp and Leq. Keeping the mode in Lp for few minutes and setting the corresponding range and the weighting network in "A" weighting set the sound level meter was run for one hour time and Leq was measured at all locations. Day time Leq and night time Leq values were computed from these measured 1 hour Leq values. Noise level measurements were made continuously for one full day (24 hours) at each monoting location. The day noise levels represent the value during 6.00am to 10.00pm and night noise levels, during 10.00pm to 6.00am at all the six locations covered under the study.

3.6.5 Results and Discussion

The test report provided by the testing laboratory, M/s Virat Global Laboratory, is attached as **Annexure.** The day and night time L_{eq} values generated during the measurements are given in Table 3-17.

Table 3-17: Ambient Noise Levels within the study area

Sl. No.	Location	Area Category	Standards, dB (A)		Measured values, dB (A)	
			Day time	Night time	Day (Ld)	Night (Ln)
1	Project Site (Near Main Gate)	Industrial	75	70	59.5	51.3

2	Project Site (Near ETP Area)	Residential	55	45	64.3	55.4
3	Dadra	Residential	55	45	56.4	46.9
4	Near Satmaliya Deer park	Residential	55	45	42.6	40.3
5	Surangi	Sensitive	50	40	46.2	41.2
6	Near Lion Safari Vasona Silvassa	Commercial	65	55	42.2	39.4
7	Kherdi	Residential	55	45	45.3	41.6
8	Dapada	Commercial	65	50	48.7	42.9
9	Rakholi	Residential	55	45	44.6	40.3

At the monitoring stations located in Industrial areas, the day time noise levels are observed as 59.5 dB(A), whereas the night time noise level was 51.3 dB(A). Both the observed values are within the specified Ambient Air Quality Standards in respect of Noise.

At the 5 monitoring stations located in residential areas, the day time noise levels are observed in the range 42.6 to 64.3 dB(A), whereas the night time noise level is in the range 40.3 to 55.4 dB(A). All the observed values are within the specified limits for residential and rural areas.

At the 2 monitoring stations located in Urban (commercial) areas, the day time noise levels are observed in the range 42.2 to 48.7 dB(A), whereas the night time noise level is in the range 39.4 to 42.9 dB(A). All the observed values are within the specified limits for Commercial areas.

3.7 Ecology & Biodiversity

Biological environment includes both floral and faunal species and constitutes the biodiversity of the area. In order to maintain the natural ecosystem, a study on biological environment of the area is a basic requirement. Biodiversity can be defined as the sum of life and its processes including the variety of living plants, animals and others organisms. The biodiversity has social, economic and cultural implications. Since most of the project activities is carried out in remote areas, it is likely that the biodiversity of the area is significantly altered. Change environment scenario may impact on livelihood of dependent people and local biodiversity of the area. Primary as well as secondary data on flora and fauna in the study area are required to be collected either field study of the study site and /or concerned departments, publish literature, and consultation with local people and Forest Department. The main objective of the study of biodiversity is to access and identify (ecologically sensitive areas, critically endangered, endangered, threatened) with respect to flora and fauna of core and buffer zone within the study area. The study area also known as impact area has been defined as sum total of core and buffer area with a radius of ten kilometer.

3.7.1 General Ecological Setting

General: The Union Territory of Dadra and Nagar Haveli is situated on the western coast of India between states of Gujarat and Maharashtra. It lies between north latitudes 20° 02' and 20° 22' and east longitudes 72° 54' and 73° 14' and falls in Survey of India Toposheet no. 46D/15, 46D/16, 46H/3 and 46H/4. The Territory is surrounded on the west, north and east by Valsad district of Gujarat State and in the south and southeast by Thane and Nashik districts of Maharashtra State. The UT of D&NH is spread over an area of 491 sq. km. and comprises 72 villages and forms a single district and single taluka Union Territory. For revenue purpose all the villages have been divided

in to 11 Patelads namely Amboli, Dadra, Dapada, Dudhani, Khanvel, Kilavani, Mandoni, Naroli, Randha, Silvassa-I and Silvassa-II. The headquarters of UT of D&NH is located at Silvassa.

Climate & Soil: The climate of the Union Territory of Dadra and Nagar Haveli is characterised by an oppressive summer, dampness in the atmosphere nearly throughout the year, heavy southwest monsoon rainfall and a mild winter. The year can be divided in to four seasons. The cold season from December to February is followed by the summer season from March to May. The southwest monsoon season from June to September and the post monsoon season constitute the month of October and November. The average maximum temperature is recorded as 30.9°C whereas average minimum temperature is recorded as 19.6°C. The average wind speed recorded is 7.4 km/h. The rainfall in this area varies from 2050 mm to about 2500 mm and increases from east to west. It is minimum in the eastern parts around 2050 mm and about 2500 mm in the north western part.

The Union Territory of D & NH is mainly drained by Damanganga River and its tributaries (382.32 kms). The northern part (69.32 km) is drained by Kolak River and its tributaries. A small portion (37.26 km) of the Territory in the west is drained by the Kalunadi and its tributaries. The soils occurring on the Deccan plateau are generally black cotton soils. Within this broad categorisation, there are significant variations depending upon topography. Three major type of soil occurs in the UT i.e., lateritic soils, shallow black cotton soils deep black soils.

Sensitivity: There is one Wildlife Sanctuary in East direction, close to the boundary of plant. The major environment sensitive areas have been studied in 10 km radius of project site using Google earth images & survey of India topo map.

Forest Cover: The forest cover in Dadra and Nagar Haveli is 42.19% of the union territory's geographical area, according to the Forest Survey of India. This is based on satellite data from October 2017.

Seasonal Variation: The area represents to tropical zone of India. Climatic condition of the area represents three specific seasons viz; Rainy, Winter and Summer seasons. Seasonal variation of abiotic factors generally influences to ground vegetation and dependent fauna of the study area. However, secondary information from the local peoples envisaged that the ground species generally grow in area are consisting of variety of grasses and also reported in the forest working plan of regions.

3.7.2 Methodology for Terrestrial Ecology

General Methodology

Sampling locations for the ecology and biodiversity study was selected and the criteria that were used for site selection includes Conservation concern of species, Occurrence of restricted-range species, Size of the area and Species richness, contained unique and rare habitats, Included fragile and sensitive habitats, Important for ecological integrity and representative of all habitats.

The relevant information regarding forest types, floral and faunal diversity (Terrestrial and Aquatic) was collected from secondary sources like consultation with working plan of concern forest division and published literatures (BSI, ZSI), articles and reports etc. This secondary source was authenticated by the extensive site visit and field survey core zone and buffer zones (within 10 km radius of the study area).

Ecological sensitivity along with critical habitats (National Park, Wildlife Sanctuary, Ecological Sensitive Area, Migratory Corridor, habitat of endangered, vulnerable and rare species, etc.) in the project area has also been reviewed. Identification and classification of species recognized as critically endangered, endangered, threatened etc. has been carried out as per IUCN Red List and Scheduled Species as per WPA (1972).

Methodology for Terrestrial Ecology

Flora and floral diversity:

Qualitative & quantitative assessments of floral diversity from core & buffer zone were undertaken by adopting standard ecological methods (Smith, 1980; Mishra, 1968) as under:

1. Primary and secondary data was authenticated by field visits, interaction with local population and sample surveys.
2. Random sampling by adopting 0.1ha quadrate was carried out for the assessment of the tree's species (more than 20cm GBH). Species by enumeration was undertaken.
3. Enumeration of sapling and shrub species were made by laying out 5 plots of 10m x 10m each size in all direction by covering each 0.1 ha.
4. Quantitative and qualitative characteristics of floral diversity of the study area were analyzed by adopting following method.
5. Species characteristics like Cover, frequency, abundance & density were calculated using these formulas: -

A.	Density	Number of Individual Species in the area Sampled
B.	Frequency	Number of plots in which species A occurs X 100/ Total no. of plot sampled
C.	Abundance	Density of Species A X 100/Total density of all species recorded
D.	Relative Density	Density of Species A X 100 / Total Species of all species
E.	Relative Abundance	Abundance of Species A X 100/ Total Abundance of all species
F.	Relative Frequency	Frequency value of species A X 100/ Total frequency value of all species
G.	Important Value Index	R. Density + R. Abundance + R. Frequency
H.	Diversity Index	Shannon-Wiener Formula. H= 3.222(log10n – (1/n Sum ni log10ni) Where, **n** is total number of individuals in all species **ni** is the Total number of individual of species A. However, this equation is simplified by adopting the IVI values for calculation of diversity index (H) of the study site as under: **H = (IVI species A/300) X Total no. of Quadrats X F% of species A (IVI Species A/300)**

Fauna

1. Techniques like Species list methods, 'Pollard Walk' method, 'Point Sampling' along the fixed transects (Foot trails, Nests, Pug Marks, Droppings etc), Direct Contact methods

Count indices methods (Roadside and aerial count methods) and linear transect method was used for the survey of terrestrial fauna

2. A linear transect of 100m was applied for sampling of faunal species in the core zone. Transect was trekked for the sampling of faunal diversity through following methods for different categories:
   - For the sampling of butterflies, the standard 'Pollard Walk' method was employed and all species encountered were recorded.
   - For bird's/avifauna sampling, 'Point Sampling' along the fixed transects (Foot trails) was carried out.
3. All the species of birds were observed and identified with the help of field guide book and photographs. For the sampling of mammals, direct count on open width (20m) transect were used. In addition, information on recent sightings/records of mammals by the villagers/locals were also collected. For carnivores, indirect sampling was carried out and the mammals were identified by foot marks, faeces and other marks/sign created by them. In case of reptiles mainly lizards were sampled by direct count on open width transects.
4. The assessments of fauna were done by extensive field survey of the area. During survey, the presence of wildlife has been confirmed by direct field survey and by the oral information by local inhabitants and data procured from the concerned forest department.
5. Assessment of faunal species was also undertaken in the study area within 10 km radius from the boundary of the core zone.
6. According to Wildlife Protection Act 1972 and amended 2006 the species were categorized like Endangered species, Critically endangered, endangered, threatened, Endemic species, Migratory species and details of aquatic fauna, if any?
7. Effort was made to identify the migratory paths of wild animals considering the water sources, forest patches and fodder plants and grasslands in the study area and the direct and indirect signs of their presence.

3.7.3 Methodology for Aquatic Ecology

- Water bodies were surveyed for the presence of aquatic biodiversity & the extent of their coverage in the water bodies.
- Water samples were collected as well as preserved for aquatic floral analysis as per Standard Methods. Interactions with the local people were done to verify the aquatic flora and fauna species with their common names collected from water bodies.
- For microbiological groups (water of Surface and groundwater samples of hand pump) are analysed for studying aquatic biodiversity and biological water quality.
- The list of aquatic infesting the pond, canal and rivers was made.
- Phytoplankton are identified and enumerated by Lackey Drop Count Method whereas
- Zooplanktons are identified and enumerated by Sedgewick Rafter Method.
- The list of fish species were prepared by inquiry with the local fishermen and data on commercial fishery are obtained from local Fishery Department.
- Total Coliforms and faecal coliforms (E. coli) were analysed by Multiple Fermentation Tube Method or Membrane Filter Technique Method as per Standard Methods

3.7.4 Sampling Locations

The survey for ecology and biodiversity were conducted in the 10 Km radius in the study area and the surrounding area. It is observed that human settlements, lion safari park, are present within the study area of 10 Km radius. During assessment, several floral species were encountered within the 10 Km radius of the project site.

3.7.5 Terrestrial Flora

Core Zone

A survey was conducted to assess the floral diversity in the core zone. Gulmohar, Mango, Peepal, Banyan, Bamboo Etc. are the species found all over the plant area.

RET & Endemic Floral Species

There are no Rare or Endangered or Threatened (RET) and Endemic floral species identified within core zone of the project site as per IUCN category.

Table 3-18 Description of RET and Endemic Floral species, Core zone

SL. No.	Type of Flora Species	Core Zone
1.	Endangered species	None of the species found
2.	Endemic species	None of the species found
3.	Grass lands	No Grass land
4.	Natural vegetation/ Forest type	None

Buffer Zone

A survey was conducted to assess the floral diversity which includes forests, plantations, agriculture and horticultural crops and weeds in the study area.

Table 3-19 Flora Species found at Core Zone

Sr. No.	Family & Scientific name	Common name	IUCN Status
	Mimosaceae		
1	**Acacia Nilotica*	Bawal	LC
2	*Acacia Catechu*	Khair	LC
3	*Albizia Lebbeck*	Siris	LC
	Rubiaceae		
4	*Adina Cordifolia*	Hed/ Haldu	NA
5	**Mitragyna Parvifolia*	Kalam	NA
6	*Vangueria Spinosa*	Aloo	NA
	Malvaceae		
7	*Adansonia Digitata*	Rukhdo	NA

8	*Bombax Ceiba*	Samar/ Shimalo	LC
	Rutaceae		
9	*Aegle Marmelos*	Bel/ Bili	NT
	Simaroubaceae		
10	*Ailanthus Excels*	Arduso	NA
	Anacardiaceae		
11	*Lanne Coromandelica*	Mondal	NA
12	*Mangifera Indica*	Amba	DD
13	*Semecarpus Anacardium*	Biwalo, Bhilamo	LC
	Combretaceae		
15	*Anogeissus Latifolia*	Dhavado	NA
	Annonaceae		
16	*Annona Squamosal*	Sitaphal	NA
17	*Miliusa Tomentosa*	Umbh	NA
18	**Monoon Longifolium*	Asopalav	NA
	Moraceae		
19	**Ficus Benghalensis*	Vad	NA
20	*Ficus Racemosa*	Umber	LC
21	*Ficus Religiosa*	Pipal	LC
22	*Morus alba*	Shetur	LC
	Meliaceae		
23	**Azadirachta Indica*	Limbado	LC
24	*Melia Azadirachta*	Bakem(Limdo)	LC
25	*Melia Composite*	Nimbaro/ Limbaro	NA
	Caesalphinaceae		
26	*Cassia Fistula*	Bahwa garmalo	LC
27	**Tamarindus Indica*	Amli	LC
	Fabaceae		
28	*Pongamia Pinnata (Derris Indica)*	Karanj	LC

29	*Pithecellobium dulce*	Mithi Amli (Goras Amli)	LC
	Euphorbiaceae		
30	*Emblica Officinalis*	Awla	LC
	Flacouriaceae		
31	*Casearia Elliptica*	Kimiro	NA
	Boraginaceae		
32	*Cordia Dichotoma*	Bhokar, Gundi	LC
	Myrtaceae		
33	*Eucalyptus Hybrid*	Nilgiri	NA
	Verbenaceae		
34	**Tectona Grandis*	Sag	EN
	Bignoniaceae		
35	*Oroxylum Indicum*	Tetu	NA
	Apocynaceae		
36	*Holarrhena Antidysenterica*	Kuda/ Indrajav	LC
37	*Wrightia Tinctoria*	Kudi	LC
	Lythraceae		
38	*Lagerstoemia Lanceolata*	Nano-Bandaro	NA
39	*Largerstroemia Pariflora*	Bondaro	NA
	Rhamnaceae		
40	*Ziziphus Mauritiana*	Bor	LC
	Arecaceae		
41	*Cocos nucifera*	Nariyel	NA
	Malvaceae		
42	*Abutilon Indicum*	Khapat	NA
43	**Gossypium Herbaceum*	Kapas	DD
44	*Azanza Lampas*	Ranbhendi	NA
	Acanthaceae		
45	*Carvia Callosa*	Karvi	NA
	Asparagaceae		
46	*Agave Americana*	Ketki	LC
	Rosaceae		
47	**Rosa Damascena*	Rose	NA
	Apocynaceae		
48	*Calotropis Procera*	Akado	LC

49	*Carissa Conjesta*	Karmada	NA
50	*Nerium Indicum*	Karen	NA
51	*Hemidesmus Indicus*	Dhoodi	NA
	Rutaceae		
52	*Cirtus Species*	Limbu	NA
	Fabaceae		
53	*Prosopis Juliflora*	Vilayati Mendi	NA
54	*Flemingia Strobilifera*	Poptyo	NA
	Musaceae		
55	*Ensete Superbum*	Ranketi	NT
	Asteraceae		
56	*Tridex Procumberns*	Pardeshi Bhongaro	NA
57	*Vicoa Auriculata*	Sarvat	NA
	Streculiaceae		
58	*Helicteres Isora*	Antedi	NA
	Solanaceae		
59	*Datura Stramonium*	Dhaturo	NA
	Mallows		
60	*Hibiscus Rosa-Sinensis*	Jasud	NA
61	*Thespesia Lampas*	Paras Piplo	NA
	Verbenaceae		
62	*Lantana Camara*	Lantana	NA
63	*Vitex Negundo*	Nagodi	LC
	Lythraceae		
64	*Lawsonia Inermis*	Mendi	LC
	Rhamnaceae		
65	*Zizyphus Oenoplia*	Boydinovelo	NA
	Papaveraceae		
66	*Argemone Mexicana*	Darudi	NA
	Amaranthaceae		
67	*Achyranthes Aspera*	Anghedi	NA
	Acanthaceae		
68	*Adhatoda Vasica*	Ardusi	LC

69	*Asystasia Gangetica*	Serva	NA
	Fabaceae		
70	*Arachis Hypogea*	Mungfali F	NA
71	*Uraria Picta*	Liptyo	LC
	Pedaliceae		
72	*Pedalium Murex*	Ghakhru	NA
	Apocynaceae		
73	**Catharanthus Roseus*	Barmasi	NA
	Solanaceae		
74	**Capsicum Annum*	Marchi	NA
75	*Datura Metel*	Ganthovalo Dhaturo	NA
	Malvaceae		
76	*Hibiscus Lobatus*	Tali	NA
	Convolvulaceae		
77	*Ipomoea Aquaticaforsk*	Mali Ni Bhaji	NA
	Musaceae		
78	*Musa Paradisiacal*	Kela	NA
	Lamiaceae		
79	**Ocimum Sanctum*	Tulsi	NA
	Phyllanthaceae		
80	*Phyllanthus Fraternus*	Bhonya Amli	NA
Source: Primary survey and interaction with the local people.			
Note: * indicate that species are sighted during the primary survey.			

A list of floral species has been prepared based on site observations and discussion with local people & also available literature.

RET and Endemic Floral species

There are no Rare or Endangered or Threatened (RET) and endemic floral species identified within 10 km radius of the project site of buffer zone as per IUCN category. The floral species found in the study area are common and wide spread occurrence.

3.7.6 Terrestrial Fauna

Core Zone

The project site is situated on hilly area as well as encircled by Forest. The faunal species which were observed in the core zone of plant area .

Table 3.20- Faunal Species found at Core Zone

Sr. No	Scientific Name	English Name	Schedule of Wildlife Protection Act	Status as per IUCN Red Data List	Method
Mammals					
1	*Rattus norvegicus*	Field mouse	V	Least Concern	DS
2	*Funambulus palmarum*	Squirrel	IV	Least Concern	DS
3	*Lepus nigricollis*	Indian Hare	IV	Least Concern	DS
Birds					
1	*Eudynamys scolopacea*	Koel	IV	Least Concern	DS
2	*Passer domesticus*	House Sparrow	IV	Least Concern	DS
3	*Spilopelia chinensis*	Spotted dove	IV	Least Concern	DS
4	*Acridotheres tristis*	Common myna	IV	Least Concern	DS
5	*Egretta garzetta*	Little Egret	IV	Least Concern	DS
6	*Corvus splendens*	House crow	V	Least Concern	DS
Reptiles					
1	*Calotes versicolor*	Garden Lizard	III	Not assessed	DS
2	*Ptyas mucosus*	Rat snake	II	Least Concern	DS
DS = Direct Sighting					

The faunal composition in core zone is presented in Table 3-22.

Table 3-21- Faunal Composition of Core Zone

SL. No.	Animal Life Form	Number of Species in core zone
1	**Mammals**	03
2	**Birds**	06
4	**Reptiles**	02
Total		**11**

RET & Endemic Floral Species

There are no rare or endangered or threatened faunal species identified within 10 km radius of the project site of core zone as per IUCN category. The faunal species found in the study area are common and wide spread occurrence.

Table 3-22: Description of RET and Endemic Floral species, Core zone

S.No.	Type of Flora Species	Core Zone
1.	Endangered species	None
2.	Endemic species	None

3.	Migratory species	None
4.	Migratory Corridors & Flight Paths	None
5.	Breeding & Spawning grounds	None

Buffer Zone

During study period as per the discussion with local people, flora found in buffer zone are given below in Table 3-23:

Table 3-23: List of flora observed in the buffer zone

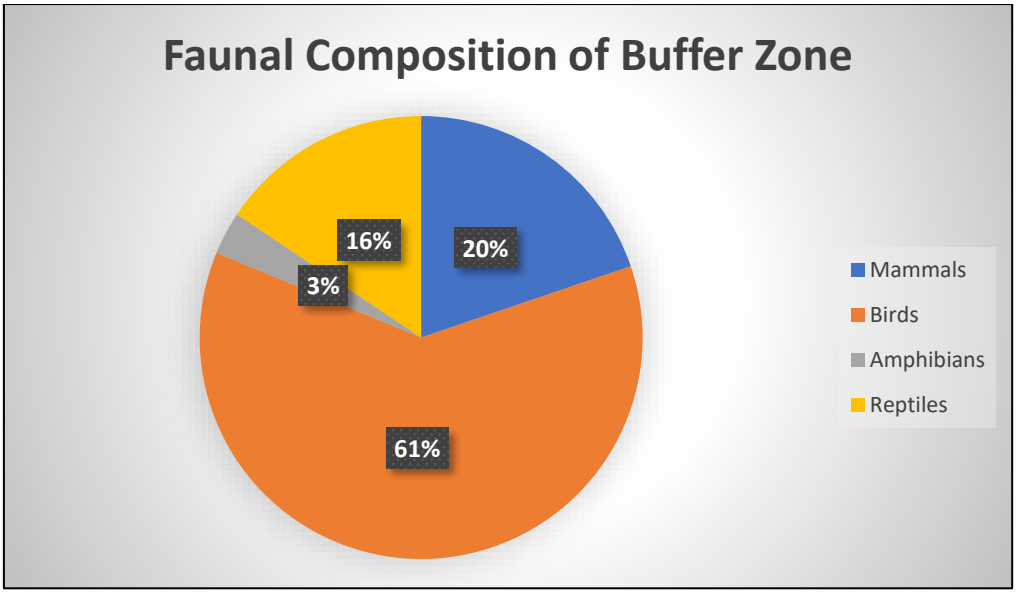
S.No.	Family & Scientific name	Vernacular Name	Schedule of W. P. A, 1972	IUCN Status
	Mammals			
1.	*Canis Aureus*	Golden or common jackal	Schedule I	LC
2.	*Herpestes Edwardsi*	Indian gray mongoose	Schedule I	LC
3.	*Lepus Nigricollis*	Indian hare	-	LC
4.	*Felis Chaus*	Jungle cat	Schedule I	LC
5.	*Funambulus Pennant*	Palm Squirrel	-	LC
6.	*Felis Rubiginosa*	Rusty spotted cat	Schedule I	NA
7.	*Macaca Mulatta*	Rhesus macaque	-	LC
8.	*Panthera pardus*	Panther	Schedule I	-
9.	*Parahyaena brunnea*	Hyena	-	-
10.	*Vulpes vulpes*	Fox	Schedule II	-
11.	*Tetracerus quadricornis*	Four Horned Antelope	Schedule I	VN
12.	*Canis aureus*	Jackal	Schedule II	-
13.	*Boselaphus tragocamelus*	Nilgai	Schedule III	-
14.	*Rusa unicolor*	Sambar Deer	Schedule III	-
15.	*Axis axis*	Chital Deer	Schedule III	-
16.	*Panthera leo*	Lion	Schedule I	-
	Birds			
1.	**Psittacula Cupatria*	Alexandrian Parakeet	Schedule II	NA
2.	*Prinia Socialis*	Ashy Wern- Warbler	-	LC
3.	*Haliastur Indus*	Brahminy Kite	Schedule II	LC
4.	*Elanus Caeruleus*	Black Winged Kite	-	LC
5.	**Columba Livia*	Blue Rock Pigeon	Schedule IV	NA
6.	**Psittacula*	Blossom Headed Parakeet	Schedule II	DD
7.	*Dicrurus Adsimilis*	Black Drongo Or King-Crow	Schedule II	LC
8.	**Pavo Cristatus*	Indian Peafowl	Schedule I	LC
9.	*Turdoides Caudatus*	Common Babbler	Schedule II	LC
10.	*Acridotheres Tristis*	Common Myna	Not Listed	LC

11.	*Bubulcus Ibis*	Cattle Egret	Schedule II	LC
12.	*Prinia socialis*	Ashy wern-warbler	-	LC
13.	*Gyps bengalensis*	White-rumped vulture	Schedule II	CR
14.	*Francolinus Pondecerianus*	Grey Francolin	Schedule II	LC
15.	*Upapa Epops*	Hoopoe	Schedule II	NA
16.	*Corvus Splendens*	House Crow	-	LC
17.	*Streptopelia Decaocto*	Eurasian Collared-Dove	Schedule II	LC
18.	*Corajas Benghalensis*	Indian Roller	Schedule II	LC
19.	*Corvus Macrorhynchos*	Jungle Crow	Schedule II	LC
20.	*Ceryl Rudis*	Pied Kingfisher	Schedule II	LC
21.	*Ardea Alba*	Great Egret	Schedule II	NA
22.	**Pycnonotus Cafer*	Red Vented Bulbul	Schedule II	LC
23.	*Streptopelia Chinensis*	Spotted Dove	Schedule II	NA
24.	*Motacilla Citreola*	Yellow Headed Wagtail	Schedule II	LC
Reptile				
1.	*Typhlina Brahmina*	Blind Snake/ Common Worm	Schedule II	NA
2.	*Lycodon Aulicus*	Common Wolf Snake	Schedule II	LC
3.	*Ptyas Mucosa*	Common Rat Snake	Schedule I	LC
4.	*Chamaeleon Zeylanicus*	Chameleon	Schedule I	NA
5.	*Mabuya Carinata*	Common Skink	Not listed	LC
6.	*Calotes Versicolor*	Common Garden Lizard	-	LC
7.	*Naja Naja*	Indian Cobra	Schedule I	LC
8.	*Varanus Bengalensis*	Indian Monitor	Schedule I	NT
9.	*Dendrelaphis Tristis*	Tree Snake	Schedule II	LC
	N.B: Source- Forest working plan and site visit			

The faunal composition in buffer zone is presented

Table 3-24 Faunal Composition of Buffer Zone

Sr. No.	Animal Life Form	Number of Species in buffer zone
1	Mammals	19
2	Birds	59
3	Amphibians	03
4	Reptiles	15
Total		**96**



RET and Endemic Floral species

There are no rare or endangered or threatened faunal species identified within 10 km radius of the project site of buffer zone as per IUCN category. The faunal species found in the study area are common and wide spread occurrence.

Table 3-25 Description of RET and Endemic floral species, Buffer zone

S. No.	Type of Faunal Species	Buffer Zone
1.	Endangered species	6
2.	Endemic species	None
3.	Migratory species	None
4.	Migratory Corridors & Flight Paths	None
5.	Breeding & Spawning grounds	None

3.7.7 Aquatic Flora

Core Zone

No water bodies present in the core; thus, no aquatic flora is found in core zone.

Buffer Zone

In the water bodies of the buffer zone some phytoplankton was observed which are illustrated below in the Table 3-26.

Table 3-26 Phytoplankton Species

Name of species	Name of Family
Cymbella sp., Bacillaria sps., Fragillaria sp, Cyclotella sps etc.,	Bacillariophyceae
Cosmarium sp., Closterium sp., Chlorella sp., Euastrum sp.,	Chlorophyceae

Mougeotia sp., Oocystis sp., Oedogonium sps., Scenedessmus sps.	
Oscillatoria Sp., Gloeocapsa sp., Lyngbya sp., Merismospedia sps., Nostoc sps., Oscillatoria sps., Spirulina sps., Cylindrospermum sp.	Cyanophyceae
Euglena viridis, Euglena acus, Euglenomorpha sp., Phacus curvicauda, Phacus orbicularius, Trachelomonas armata, Trachelomonas playfairii, Trachelomonas sp.	Euglenophyceae

3.7.8 Aquatic Fauna

Core Zone

No water bodies present in the core; thus, no aquatic fauna is found in core zone.

Buffer Zone

In the water bodies of the buffer zone some zooplanktons were observed, which are illustrated below in the Table 3-27

Table 3-18: Zooplankton Species

Name of Zooplankton Species	Name of Family
Asplanchana sp. Sinantherina semibullata	Rotifera
Cyclops sp., and nauplii larvae	Copepoda
Daphnia carinata, Simocephalus elizabethae, Moina dubia, Daphnia plexus sp.,	Cladocera

(Source: Site visit and interaction with Locals)

Fish Species

Among all the aquatic life in the study area the fish fauna occupies an important place. The fish fauna of the area includes:

Table 3-28 Fish species reported from the study area.

S. No.	Scientific name	Common Name	Family
1.	*Salmostoma sardinella*	Chela	Cyprinidae
2.	*Hypopthalmicthys molytrix*	Silver carp	Cyprinidae
3.	*Catla catla*	Catla	Cyprinidae
4.	*Cirrhinus mrigala*	Mrigal	Cyprinidae
5.	*Cyprinus carpio*	American rui	Cyprinidae
6.	*Labeo rohita*	Rohu	Cyprinidae
7.	*Labeo bata*	Bata	Cyprinidae
8.	*Osteobrama cotio cotio*	Chanda	Cyprinidae
9.	*Heteropneustes fossilis*	Singi	Heteropneustidae
10.	*Channa striatus*	Shol	Channidae
11.	*Channa punctatus*	Lata	Channidae
12.	*Lates calcarifera*	Bhetki	Latidae
13.	*Oriochromis mossambica*	Tilapia	Cichlidae

14.	*Glossogobius giuris*	Beley	Gobiidae
15.	*Anabas testudineus*	Koi	Anabantidae
16.	*Mastacembelus armatus Lacepede*	Pakal	Mastacembelidae

(Source: Site visit and interaction with Locals)

3.7.9 Conclusion

- It is concluded that, there is no major threat on floral and faunal species.
- The present environment status of study area is good enough for the project activity.
- No breeding and hibernating sites is present in core and buffer zone.
- No species of RET/ Endangered and Endemic species as per the schedule of the WPA, 1972 category were recorded during field survey of the study area.

However, adoption of adequate mitigation measures will protect the surrounding environment.

3.8 Socio-Economic Environment

3.8.1 Objective

This report presents the Socio-Economic Impact Assessment (SIA), as part of the EIA for the proposed Project. The socio-economic baseline focuses on demographic patterns of socio-economic conditions and livelihood profile and infrastructure facilities in the study area. Based on the data that is collected in this section, the socio-economic impact assessment will envisage and evaluate any potential impacts of the proposed project on the local community, livelihoods and other social systems. The main objectives of the study are as follows:

- To establish the socio-economic profile of settlements within a radius of 10 km around the proposed project location.
- To determine the perception of the population about the proposed project.
- To determine the status of amenities and infrastructure in the study area.
- To establish baseline data for identification of the impacts of the proposed project on the socioeconomic factors, including amenities and infrastructure
- To facilitate formulation of mitigation measures for the adverse impacts, if any, and to ensure sustainability of positive impacts.

3.8.2 Methodology

The socio-economic baseline for the project has been developed using a combination of **secondary data** and **primary data collection methods**. This two-pronged approach ensures a comprehensive understanding of the existing socio-economic conditions in the study area, forming the foundation for impact assessment and mitigation planning.

- The secondary data source adopted for the study mainly includes review of published secondary existing, reliable, and relevant socio-economic data from established sources. Key sources of secondary data include District Handbook (District Census Statistical Handbooks - 2011 and Primary Census Abstract of Census-2011), and other govt related govt office and web sources of available secondary sources of information as well as select primary consultations in the vicinity of the project area with respect to population, density, household size, sex ratio, literacy rate and occupational structure for 10 km radius study area.

- To complement and enhance the understanding derived from secondary data, extensive primary data collection was conducted. The primary method provided real-time socio-economic insights specific to the communities that will be affected by the mining project. The primary data have been collected from participants from various communities through Individual Questionnaire Surveys and Focused Group Discussions (FGD). This will measure the impacts of the proposed project in various aspects, awareness of the project and community perceptions about the proposed project and other related information.

3.8.3 District Profile

Dadra Nagar Haveli & Daman and Diu

The Dadra & Nagar Haveli is located on the western side of the foothills of Western Ghats and has undulating terrain 41.63% of the total geographical area is covered with forests and thus offers it a look of woodland. The major river Daman Ganga and its tributaries criss-cross the Dadra Nagar Haveli and drain into the Arabian Sea at Daman. The district has a population of 3,43,709 as per the 2011 census.

The major tribes are Varlies, Kokana, Dhodia and Dublas. The tribal have their distinct culture of their own consisting of curious rituals and colourful folk-lore. No occasion in tribal life is complete, be it a marriage or harvest without a folk dance.

As stated earlier, the study area is located within Dadra Nagar Haveli & Daman and Diu. There are 3 sub-districts, viz., Dadra and Nagar Haveli, Daman and Diu. There are 4 towns and 1377 villages in the district.

Thane District of Maharashtra

Thane is the northern most District of the Konkan division. It is sandwiched between Sahyadri ranges in the east and Arabian Sea on the west. Thane District lies between 18º 42' North and 20º 20'North latitudes and 72º 45' East and 73º 45' East longitudes. The district has a coastal length of about 112 kms. The north-south length of the district in 140 kms and east-west it is about 101 kms It is surrounded in the north by the Union territories of Dadra and Nagar haveli and the State of Gujarat,

Nashik and Ahmadnagar District lie to its east, Pune District to its south-east, Raigarh and Mumbai (Suburban) Districts lie to its south and the Arabian Sea to its west.

The district has an area of 9,558.0 sq kms and a population of 1,10,60,148 persons as per 2011 Census. While the area of the district accounts for 3.11 percent of the total area of the State, the

District population constitutes 9.84 percent of the total population of the State. The density of population is 1,157 persons per sq. km Among the 35 Districts of the State, the District ranks 16th in terms of area, 1st in terms of population and 3rd in terms of density.

Valsad District of Gujarat

The Valsad district is situated in the South Gujarat. It lies between the parallels of north latitude of 20o 10’ and 20o 45’ and the east longitude of 72o48' and 73o43' at an elevation of 12 meters above mean sea level. The length from north to south of this territory is about 72.4

km and from east to west about 80.3 km. It is surrounded by Navsari district in north, Nasik and Thane districts of Maharashtra in east and Arabian sea in the south and west, whereas, The Dangs district is located in north-east direction. The area covered by the district is 3,008 sq.km i.e. it covers 1.53% of total geographical area of Gujarat. The rank of the district is 21st by area among the districts of the State, but the density of the district is only 567 persons per sq. km compare to 308 the density of the Gujarat.

The sub-district wise distribution of villages in the different districts are presented in table 3-29, and also shown in figure 3-13:

Table 3-29: Distribution of villages in the Sub-district

S. No.	District	Sub-district	No. of Village
1	Gujarat	Valsad	98
		Dharampur	107
		Pardi	77
		Kaprada	128
		Umbergaon	49
2	Dadra & Nagar Haveli, Daman & Diu	Dadra & Nagar Haveli	70
		Diu	4
		Daman	21

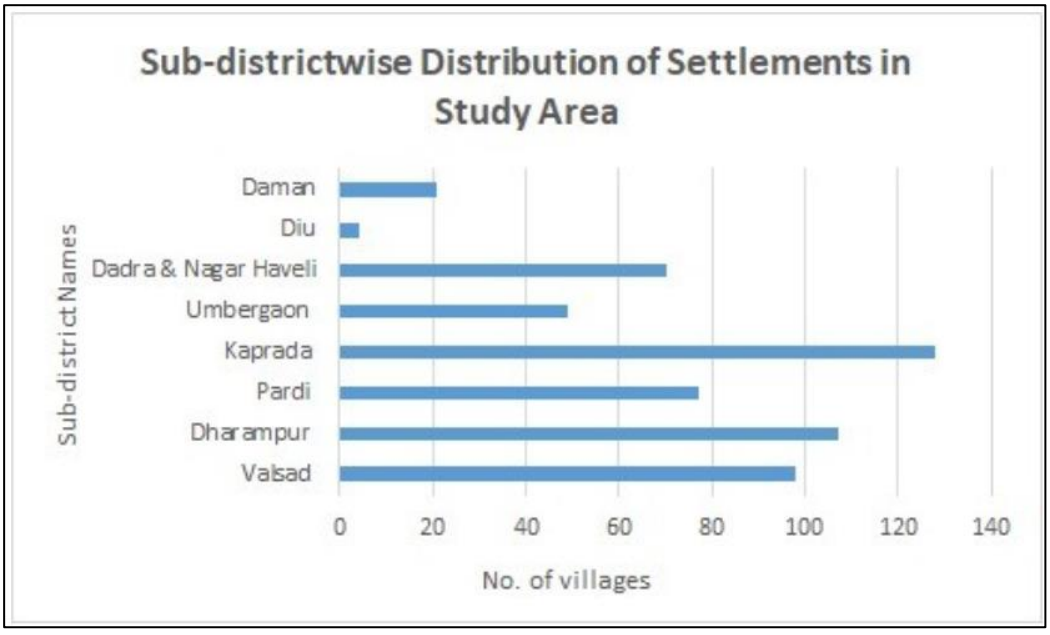


Figure 3-13: Sub-district wise distribution of settlements in study area

District Highlights

The Portuguese occupied Dadra and Nagar Haveli between 1783 and 1785 and ruled it till its liberation in 1954. About 170 years of Portuguese rule was brought to an end on 2nd August 1954 by the volunteers of Goa parties acting in close cooperation with the local inhabitants. After its liberation, the administration of the territory was carried on by an Administrator with an Advisor to advise him on all administrative matters and soon steps were taken to associate the local people in the administration by the creation of Varistha Panchayat and Group Panchayat.

On 12th June 1961, the Varistha Panchayat unanimously passed a resolution for integration with the Indian Union. On 11.08.1961, the territory became nationally united by the Dadra and Nagar Haveli Act 1961 passed by the Parliament. Consequently, the free Dadra & Nagar Haveli Administration was succeeded by a formal statutory Administration headed by an Administrator. Dadra and Nagar Haveli comprising of 72 villages and one town and 5 Census Town from a single district and single taluka as Union Territory. The union territory was merged with the neighboring union territory of Daman and Diu to form the new union territory of Dadra and Nagar Haveli and Daman and Diu on January 26, 2020. The territory of Dadra and Nagar Haveli then became one of the three districts of the new union territory, as the Dadra and Nagar Haveli District.

The Dadra & Nagar Haveli is located on the western side of the foothills of Western Ghats and has undulating terrain 41.63% of the total geographical area is covered with forests and thus offers it a look of woodland. The major river Daman Ganga and its tributaries criss-cross the Dadra Nagar Haveli and drain into the Arabian Sea at Daman.

According to the 2011 census Dadra Nagar Haveli has a population of 343,709. It has a population density of 700 inhabitants per square kilometre. The district has a sex ratio of 774 females for every 1,000 males, and a literacy rate of 76.2%. This area of 491 sq. kms is the homeland of more than one lakh people of various tribes. It has seen many rulers, ranging from the mighty Marathas to the fiery Portuguese. Yet, the essence of tribal life, its richness and variety, its art, myth, song and folklore, have all remained unchanged. The major tribes are Varlies, Kokana, Dhodia and Dublas. The tribals have their distinct culture of their own consisting of curious rituals and colourful folk-lore. No occasion in tribal life is complete, be it a marriage or harvest without a folk dance. The major dances are Tarpa, Dhol, Bhavada and Gherria. The performers of these foot-tapping dances are equally good in other arts and art forms and are almost independent for most of their daily requirements.

3.8.5 Demographical Profile of the study area

As described earlier, no town or urban area is located within the study area. The village wise demographic profile of the 45 villages located within the study area is described in **Annexure-XI-XII.** A brief description of the same is provided in the following text:

Density of Population

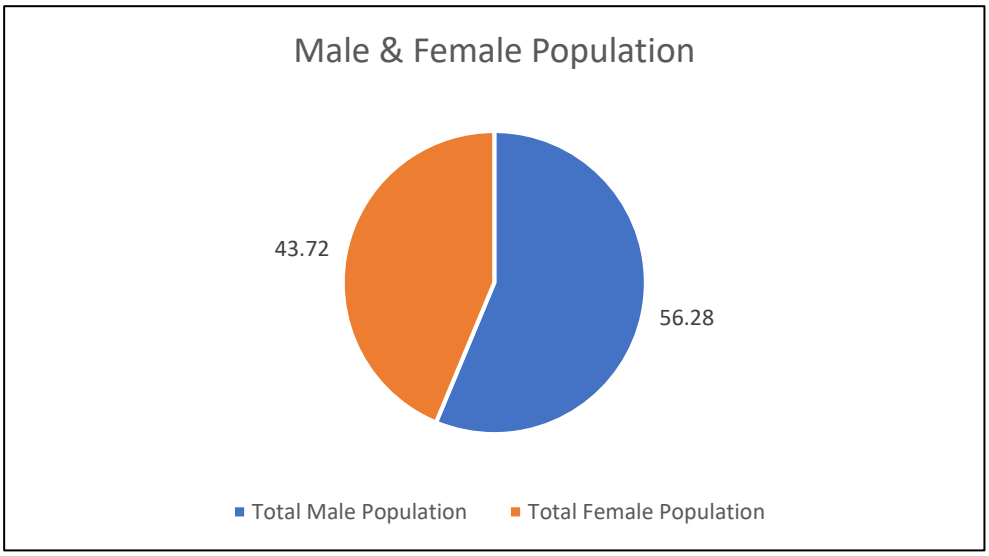
Density of population is a key demographical term. It refers to number of people per square kilometre. The overall density of population in the study area has been worked out to 748.52 persons per Square Kilometre.

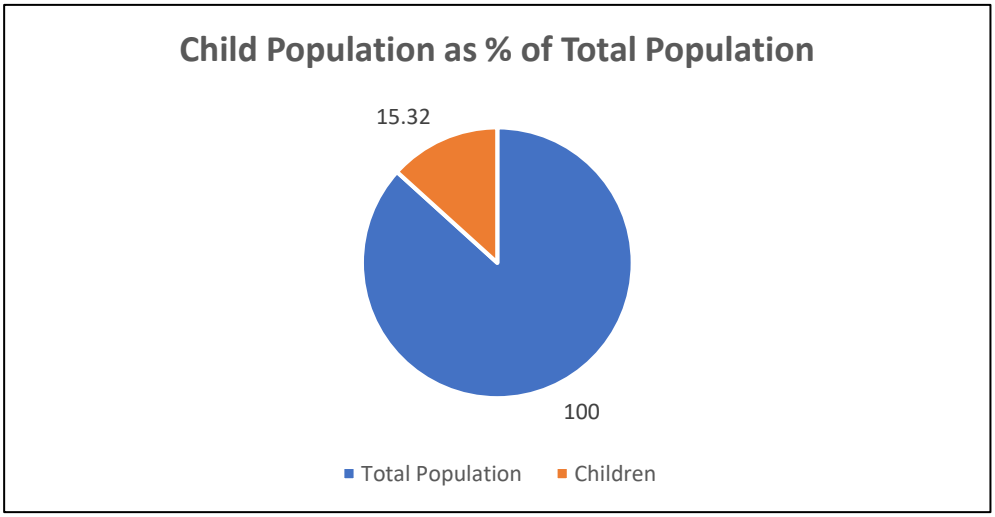
Households and Family Size

There are 54,647 households in the study area. The average family size in the study area has been worked out to 4.4 persons.

Population

According to the Population Census 2011, the total population in the study area is 2,44,753 persons including 34,497 children, i.e., between 0-6 years of age. Children constitutes 15.32 percent of total population. The study area has a total population comprising 1,37,751 males and 1,07,002 females, representing 56.28% males and 43.72% females. The sex ratio, is 777 females per thousand males.

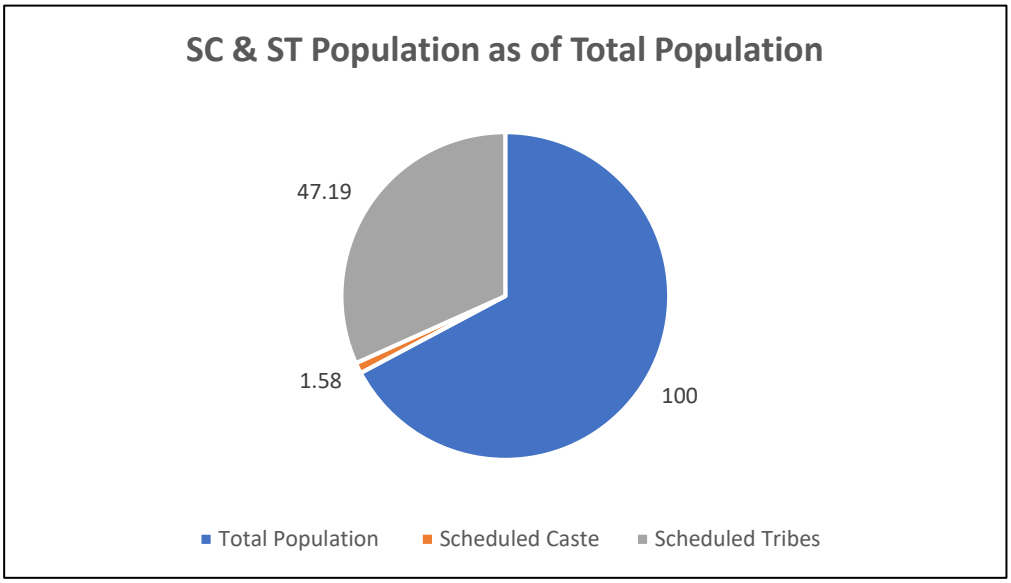




Socio-Economically Backward People (Schedule Caste and Schedule Tribe)

In the study area, the total number of persons belonging to Scheduled Caste community is 3,857, which is 1.58 percent of total population. Of the total Schedule Caste population 53.56 percent are male and the remaining 46.44 percent are female.

In the study area the total number of persons belonging to Scheduled Tribe community is 1,15,508 which is 47.19 percent of total population of the study area. Of the total Schedule Tribe population 49.56 percent are male and the remaining 50.4 percent are female.



Literates and Literacy Rate

The total number of literate persons in the study area has been worked out to 1,57,747, which is 76.1 percent of the total population. Of the total number of literate persons 63.57 percent are male and the remaining 36.43 percent are female. The overall literacy rate in the study area has been worked out to 64.45 percent.

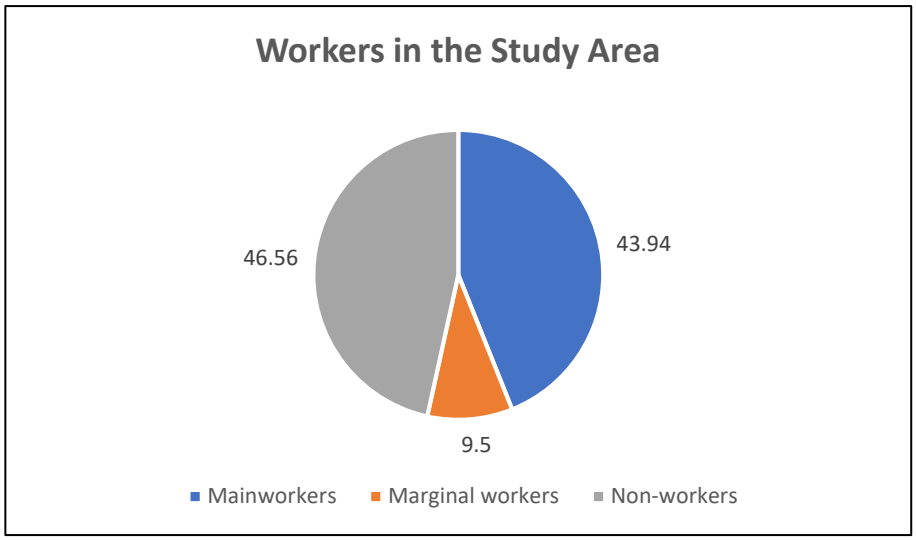
Workers

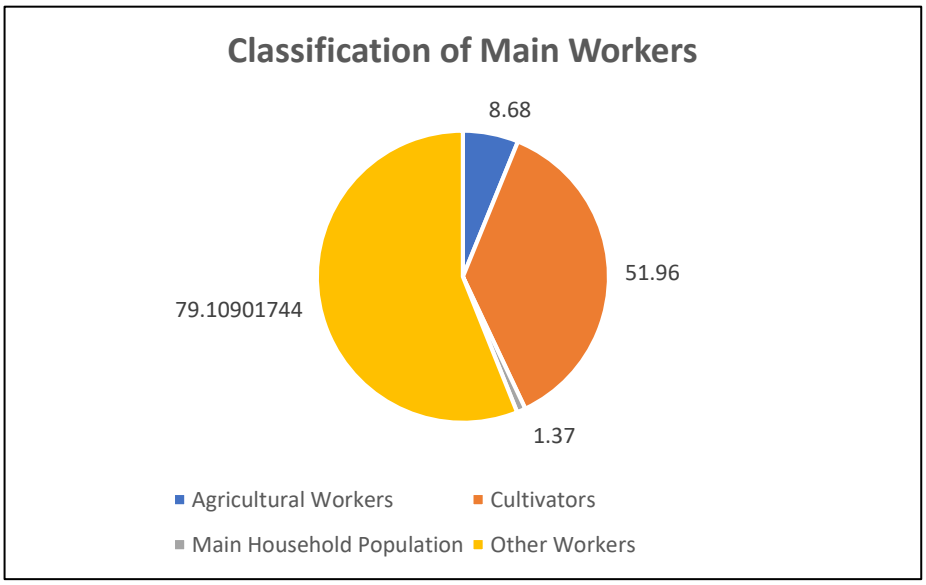
The total number of workers in the study area has been worked out to 1,10,767 which is 53.44 percent of total population. Of total number of workers 76.56 percent are male the remaining 23.44 percent are female.

Classification of workers into Main and Marginal reveals that the main workers constitute 43.94 percent of total work force, while marginal workers constitute only 9.5 percent of the same.

Further analysis of data reveals male dominancy in Main Work force is 74.4 percent and Female dominancy in Marginal Work force 60.3 percent. Thus, participation of women as Main workers is only 15.47 percent.

Further classification of main workers in the study area has revealed that 8.68 percent of the main workers are agricultural workers, 51.96 percent are Cultivators, 1.37 percent are household industrial workers, and the remaining 79.1 percent are 'Other Workers'. The total agricultural workers 31.7 percent are Cultivators.





3.8.6 Availability of Social Amenities & Infrastructure in the Study Area

Various facilities available to the people in the study area are discussed below:

Education Facilities

Table below provides details of educational institutions located in the study area:

Name of Village	Pre-primary School	Primary School	Middle School	Secondary School	Senior Secondary School
Athola	5	5	-	-	-
Kharadpada	2	4	-	1	
Athal	2	4	-		
Falandi	2	3	-		
Saily	11	7	-		
Karad	4	2	-	-	-
Vasona	4	6	-	-	-
Chinchpada	3	3	-	-	-

Luhari	4	6	-	-	-
Dapada	5	6	-	2	-
Pati	2	2	-	-	-
Khadoli	4	2	-	-	-
Surangi	5	6	-	1	-
Apti	1	2	-	-	-
Velugam	6	8	-	-	-
Bindrabin	1	2	-	-	-
Tinoda	1	1	-	-	-
Khanvel	4	8	-	2	1
Umbervarni	2	2	-	-	-
Goratpada	1	1	-	-	-
Medha	1	2	-	-	-
Shelti	5	6	-	-	-
Chauda	1	1	-	-	-
Kala	1	2	-	-	-
Karachgam	3	2	-	-	-
Kherdi	4	5	-	-	-
Dolara	1	2	-	-	-
Parzai	1	3	-	-	-
Talavali	1	1	-	-	-
Silvassa (M CI)	31	0	5	5	-
Samarvarni (CT)	6	0	2	2	-
Rakholi (CT)	1	0	1	1	-
Bormal	3	2	1	-	-
Anwir	5	5	1	-	-
Sutrakar	9	8	4	1	1
Gandhinagar	3	2	2	1	-
Kodad	3	2	1	-	-
Udhawa	5	4	2	1	-
Burvad	-	2	-	-	-
Fatepur	-	1	-	-	-
Piproni	-	2	-	-	-
Madhuban	-	2	-	-	-
Raymal	-	1	-	-	-
Nagar	-	2	-	-	-
Varoli Jungle	-	1	-	-	-
TOTAL	**153**	**138**	**19**	**17**	**2**

Data Source: *Population Census 2011*

There are 329 Schools in the study area, which includes pre-primary, primary, middle, secondary and senior Secondary School.
In the rural area there is no scope for higher studies. For Higher studies one has to go to Katni and Kymore where there are a few colleges.

Hospitals

There are 21 Public Health Sub Centre (PHS), 11 Maternity and Child Welfare Centre (MCW), 1 Veterinary Hospital (VH), 5 Medical Practitioner with MBBS Degree, 14 Traditional practitioner and faith healer and 89 Medical shops in the study area.

Primary Study

Road Connectivity

- The project site is at a distance of approx. 12 km from Silvassa.
- The nearest Railway Station is at Vapi, at a distance of approx. 21 km in the northwest direction.
- The nearest commercial airport is at Surat, at a distance of approx. 140 km from the factory

Community Perception

The primary data collection was subsequently undertaken during process to understand the intended and unintended consequences in the study area. It was done two different methods, namely, Individual questionnaire Survey and Focused Group Discussion. The Individual assessment was done by using standard questionnaire in nonprobability sampling method. This survey focusing on household composition, education levels, general health status, livelihood strategies, employment, this survey also focused on various dimensions of economic, social & cultural, health & wellbeing, economical, personal & psychological and heath & public infrastructure aspects to assess that significant impact differences about this proposed project. Apart from this, expert is done focused group discussion on community by included various demographical aspect to know the collective opinions of the proposed project.

This study was carried on population living in the 10 villages. The hamlets covered within 10 KM of core and buffer areas. The primary survey was conducted on data of 44 participants and FGD from 2 different groups, among the local communities of the study area villages.

Impacts of Study Area and Major Findings

The data is process to bring out the positive as well as negative impacts due to this proposed project as we discussed.

Economic Impact

This dimension is related to direct and indirect economic impacts due to proposed project. It was observed from the primary participants that people and communities might be benefited in and around the proposed area. It can be said from direct benefits like, employment and infrastructure developments. Manpower will be required during the mining activities. In this connection, they need to be recruited in various departments on skilled, semi-skilled and unskilled. It was also noticed that there are many qualified people have mining operation and related skills. In this

connection, these local people might be recruited as like; technicians, quality control departments, service providers, supervisors in this project.

Availability of Drinking Water

In the rural area treated tap water is available in 41 villages. All the 45 villages in the study area are provided with hand pumps. While uncovered/covered wells are found in 45 villages. Only 31 villages in the study area are provided with Tube Wells/Bore wells. Canal/ River water is used in 29 villages. In only 1 village Tank/pond water is used by the villagers for domestic uses.

Drainage System

One of the major challenges faced in the study area is lack of an effective drainage system. Inadequate drainage leads to waterlogging and blocking roads thus, disrupting daily life and mobility. Stagnant water becomes a breeding ground for mosquitoes and other insects, significantly increasing the risk of diseases such as malaria, dengue, and other vector-borne illnesses. Furthermore, in regions with poor drainage and sanitation infrastructure, rainwater runoff often carries waste, including human feces, contaminating water sources and worsening health hazards. Therefore, implementing a proper drainage system is crucial for maintaining public health, ensuring hygiene, and preventing the spread of diseases.

In the villages, there is open drainage system. The drain water is discharged directly in water bodies or to sever in all the villages.

Power Supply

In the study area, power supply is available for domestic consumption, industrial uses, commercial uses, street lighting and other uses.

Chapter 4. Anticipated Environmental Impacts & Mitigation Measures

4.1 Introduction

4.1.1 General

Any developmental activity in its wake will bring about some impacts associated with its origin, which can be broadly classified as reversible, irreversible, long and short-term impacts. In this chapter, an endeavor has been made to identify various Environmental Impacts associated with the plant operation and other associated activities. The potential impacts from the proposed project and the impacts from the existing operations on the environment are identified based on the nature of the various activities associated during project implementation and operation. The environment impact assessment is based on the credible worst case emissions, waste generation and other environmental aspects, and has taken the baseline Environmental status in the study area into consideration.

Several scientific techniques and methodologies are available to predict impacts of developmental activities on physical, ecological and socio-economic environments. Wherever feasible, mathematical models have been used to quantitiavely describe the cause-effect relationships between sources of pollution and different components of environment. In case, mathematical models are not available, predictions have been made through available scientific knowledge and judgments. The anticipated impacts have been superimposed over the baseline status of environmental quality to predict the post project scenario of environmental conditions. The anticipated impacts have been utilized to formulate the environmental management plan to minimize the adverse impacts and to improve the ecology, bio-diversity and socio-economic profile.

4.1.2 Objective

The existing detergent factory is located adjacent to the Dadra and Nagar Haveli Wildlife Sanctuary, and part of the factory is located within eco-sensitive zone of the sanctuary. Samaliya Deer Park, part of the Sanctuary, is located to adjacent to the factory boundary in the southern direction. The Lion Safari, also part of the Sanctuary, is located in the NE direction at a distance of 1.6 km from the factory. Therefore, the objectives of impact assessment are as follows:-

- ✓ To assess the impact of existing operations as well as the proposed ASR System on Wildlife Sanctuary, and to formulate measures for mitigation of adverse impacts, if any;
- ✓ To assess the imact of the existing and the proposed facilites on the different environmental aspects within the study area;
- ✓ To ensure compliance with regulations
- ✓ To consider impacts within the constraints of the area's carrying capacity.
- ✓ To formulate and implement mitigation measures during design, construction and operation phases of the proposed project.

4.1.3 Potential impacts

The following parameters are of significance in the Environmental Impact Assessment of the existing and the proposed project, and have been discussed in detail.

1. **Land environment**

a. Impact on land use
b. Impact on soil quality

2. **Water environment**
   a. Impact on surface water quality
   b. Impact on ground water quality
   c. Impact on hydrological regime
3. **Air environment**
   a. Impacts on ambient air quality during construction phase
   b. Impacts on ambient air quality during operation phase
4. **Noise environment**
   a. Impact on ambient noise, with special reference to the adjacent Wildlife Sanctuary
5. **Socio-Economics**
   a. Impact on demographic profile
   b. Impacts on employment
   c. Impacts on infrastructure & social life
   d. Impact on transportation & traffic
6. **Biological environment**
   a. Impact on terrestrial flora & fauna
   b. Impact on aquatic life
   c. Impact on the Wildlife Sanctusry

4.2 Impacts on Land Environment

4.2.1 General sources of impact

In general, one or more of the following activities impart adverse impacts on the land environment:

- Handling of solid raw materials, where from fugitive solids may deteriorate the soil characteristics;
- Handling and disposal of solid wastes, which may deteriorate soil characteristics and change the physical features, drainage, etc;
- Disposal of liquid wastes on land, thereby deteriorating soil quality;
- Disposal of miscellaneous used/damaged materials and garbage may have negative impact on aesthetic value.

4.2.2 Identification of impact sources

An analysis of the project proposal for the above-mentioned causes of impact is as follows:

- The plot of land is Industrial land and is already covered by the existing plant and associated facilities. Thus, the proposed project will not result into change of land use.
- All the raw materials, solid and liquid, are transported in Tank lorries or in Closed drums. Material from the yank lorries is unloaded and transferred to the storage silos and tanks either pneumatically or through pumping. As unloading and transferr is fully closed circuit, impact on land environment during transport and handling of raw materials is not foreseen.
- Solid wastes, hazardous and non-hazardous, are collected, segregated and stored in their designated rooms and disposed through approved recyclers or TSDF facilities, as applicable.

Thus, sold wastes from the existing and proposed facilities have no impact on the soil characteristics, ambient air quality, surface water or vegetation.

- The existing plants are operated on zero effluent basis. Trade effluents and sanitary wastewater are treated in the ETP and the treated water is utilized quantitatively for gardening and plantation. No wastewater will be generated from the proposed ASR System. Thus, impact on land environment due to discharge of untreated water is not foreseen.
- As the proposed project is for automation of the existing storage and retrieval facilities within the existing factory premises, cutting or filling operations for land development are not involved, The site does not require landfill material.
- No natural drain passes through the identified plot of land.

4.2.3 Impact assessment

The impacts of the proposed facilities during construction and operation stage are as follows:

- As the plot of land is Industrial land, occupied by the existing plant, change of designated land use is not involved.
- As cut and fill operations are not proposed, associated soil erosion is not foreseen.
- The proposed project does not involve diversion of existing drains. The existing storm water drains will be maintained. Thus, impact on drainage pattern is ruled out.
- During construction phase some construction waste will be generated. However, it will be disposed through sale as scrap, and will have no impact on the land environment.
- Raw materials and the finished product will be transported by road in covered truck. Thus, their spillage and subsequent adverse impact on soil quality, is not foreseen.
- Raw materials and finished product are stored in closed silos, tanks and packed drums. Therefore, adverse impact on soil quality due to surface run-offs or wind erosion is not foreseen.
- The project proposal does not involve disposal of toxic wastes (liquid or solid wastes) on land.

It is, therefore, concluded that the existing operations and the proposed ASR System will have no adverse impact on land environment, neither during construction nor during operation phase. Provision of green cover on the barren land will have positive impact on the land environment.

4.3 Impact on water environment

4.3.1 Construction phase impacts

Fresh water requirement during the construction phase has been estimated as 3 KLD including 1 KLD domestic water requirements. The water requirement for construction phase will be met from ground water and pond, which will be drawn through the existing bore well and stored in existing overhead tank. The ground water is potable in nature and does not require pre-treatment. The existing toilets, wash rooms and rest rooms will be utilized by the construction workers. The domestic wastewater / sewage generated during construction phase will be treated in existing septic tanks and disposed in soak pits. As the project site is secured by existing boundary walls, all impacts shall be limited to within the project site. As per CGWB report (Ground Water Brochure), the Stage of ground water development is in under safe category for ground water exploitation. Therefore, extraction of ground water will not impact the ground water regime.

4.3.2 Operation phase impacts

Water consumption: Total fresh water requirement for the project, during operation phase, has been estimated as approx. 80 KLD, (extracted 40 KLD from Pond & 40 KLD from Borewell). Approximately 17 KLD is required for Domestic Purposes, 43 KLD for Industrial Purposes & 20 KLD for Manufacturing Purposes during normal operation.

Ground Water Resources: Approx. 50% of fresh water demand for the facilities is met from ground water through bore-wells within premises. The main source of the ground water recharge in the district is rainfall. Apart from this, the return flow from ground water irrigation, seepage from canal, ponds, tanks and direct infiltration from river beds during stream flow are the other secondary sources of recharge. As per CPCB sources, the stage of ground water development in Dadra and Nagar Haveli has been estimated as 15.25%, and has been categorized as 'Safe". Moreover, the detergent factory has constructed 7 ground water harvesting structures of adequate capacity to compensate for the ground water extraction. Therefore, no adverse impact on ground water resources is foreseen.

Surface water quality: The proposed project will be operated on zero effluent discharge concept and no wastewater will be discharged. Trade effluents, together with Sewage from toilets, washrooms, and other domestic sources, are treated in the ETP and the treated water is utilized quantitatively for gardening and plantation within premises. Surface run-off from the premises is drained through storm water drain and joins a natural drain located to the west of the factory. Therefore, the existing as well as the project have no impact on surface water quality.

Ground water quality: Trade and domestic effluents are treated in the ETP, the treated water passed through Sand filter followed by Activated Carbon Filters. Waste water from different sources is transferred to the ETP through pipes. The treated water is collected in a tank and pumped for gardening and plantation as per requirement. Therefore, adverse impact on ground water quality is not foreseen.

4.3.3 Mitigation measures

The following mitigation measures have been implemented for water conservation and pollution control:

- Rain water harvesting systems have been installed for conservation of ground water resources.
- Water collection pits have been constructed along the storm water drain, and the water collected in the pits is filtered and utilized for industrial use.
- Treated wastewater from the ETP is utilized quantitatively for gardening, plantation and construction.
- Wastewater from industrial operation, sewage and domestic wastewater is transferred to the ETP through pipelines to eliminate ground water contamination.

4.4 Impacts on Air Environment

4.4.1 Construction Phase Impacts

As the proposed ASR System will be implemented within existing plot of land, land preparation and associated cut and fill operations are not involved. The construction will involve limited civil

construction. The construction activities will involve fabrication of sheds over civil foundations and erection of machines and equipment. Civil construction and erection activities will lead to generation of limited quantity of fugitive dust. As no earth work is required, generation of fugitive dust will be almost nil. However, use of construction equipment as well as movement of vehicles for transporting construction material to the site as well as operation of equipment within the site will lead to generation of particulate matter, SO_2, NOx, CO and HC. Installation of equipment and mechanical fabrications will also lead to generation of gaseous pollutants. However, the construction activities will be limited within the project area, and for a limited period. It is, therefore, concluded that the construction phase impact on air quality will be short-lived, reversible, and restricted within vicinity of the project area.

The mitigation measures proposed during construction phase are as follows:

- Water spray on un-paved roads and surfaces,
- Routine preventive maintenance of construction equipment,
- Use of PUC certified vehicles for transport of construction materials and plant equipment,
- Storage of construction material under cover,
- Construction activities, including receipt of material, to be done during day time only.

4.4.2 Operation phase Impacts

No process emission is envisaged from the proposed ASR System.

Manufacturing of detergent powder and bars is done by blending amd mixing of different components at different stages of manufaturing. As chemical reactions or combustion are not involved in the manufacturing, there are no process emissions. Further, all operations – from unloading of raw materials to the packing of finished produsts – are performed under closed vessels and tranfer devices, there is no emission fugitive emission from thr operations. The sources of emission are limited to the Boiler and the DG sets. Details of the stacks and the measured values of emissions from these sources are described in Table 4-1.

Table 4-1: Details of stacks and emissions

S.N.	Particulars	Boiler-1	DG Set 1	DG Set 2	DG Set 3
	Capacity	1.5 TPH	750 KW	750 KW	750 KW
	Fuel used	Broquettes	HSD	HSD	HSD
2.	Exhaust gas temperature, ^{0}C	128	181	187	176
3.	Stack height, m	31.5	12	12	12
4.	Stack Diameter, m	0.6	0.2	0.2	0.2
5.	Velocity	9.79	13.46	13.88	14.04
6.	Measured concentrations of				
	Particulate matter, mg/Nm3	41	27	25	37
	Sulphur dioxide, mg/Nm3	11.93	15.68	13.41	13.14
	Oxides of nitrigen, mg/Nm3	8.49	7.40	7.14	7.77
	Carbon moxide, mg/Nm3	89.31	100.76	112.21	105.34

A comparative statement of emissions from the proposed sources against the specified emission standards (EP Rules) is as follows.

- Flue gas from the Boiler is discharged through stacks of 31.5 m height, i.e., more 30m height, as required for small boilers.
- Flue gases from the 3 DG sets (750 KVA) are discharged through vents of 12 m heights, i.e., 7m above the roof of the nearest shed against the required height of 5.5 meters.

The, concentrations of air pollutants in the flue gas streams are well below the limits specified by The Pollution Control Committee for SO2 (150 mg/NM3), SO2 (40 mg/Nm3) and Nox (25 mg/Nm3). Therefore, with respect to compliance with the specified limits, the air emissions from the operations have, practically, no impact on the ambient air quality.

4.4.3 Dispersion modeling of stack emissions

Dispersion Modelling Software:

For atmospheric dispersion modelling study, United States Environmental Protection Agency (USEPA) approved and MoEF & CC recommended regulatory air quality model, AERMOD View Software, was applied to predict ground level incremental concentrations (GLCs) of concerned critical pollutants due to point source emissions. The AMS/EPA Regulatory Model (AERMOD) is the state-of-the-science, steady-state Gaussian air dispersion model based on planetary boundary layer theory. AERMOD fully incorporates the PRIME building downwash algorithms, advanced depositional parameters, local terrain and urban heat island effects, and advanced meteorological turbulence calculations. The model is used extensively to assess pollution concentration and deposition from a wide variety of sources in locations all over the world.

The assumptions made in the computations are as follows:

- The model for stacks uses the steady state Gaussian plume equation for a continuous elevated source.
- The wind power law is used to adjust the observed wind speed, from a reference measurement height of 3 m, to the stack or release height.
- The plume rise is estimated by Briggs formulae.
- Buoyancy Induced Dispersion is used to describe the increase in plume dispersion during the preliminary phase
- Stack tip down wash is not considered
- Processing of Calm conditions has been considered.
- It is assumed that the pollutants do not undergo any physicochemical transformation and that there is not pollutant removal by dry deposition or washout by rain.
- Polar coordinate system has been used for computations, and
- The model computations have been done for 10 km distance on grids of 500 m.

Meteorological inputs:

The hourly average meteorological data were collected within the Plant premises continuously during the study period, i.e., one full post monsoon season from 1st October to 31st December, 2024, using a microprocessor based automatic weather monitoring system. The site-specific hourly met data like wind direction, wind speed, ambient temperature, stability classes, solar radiation, etc. have been used as input met data for the dispersion modeling.

Source strength:

Emissions of particulate matter from the stack attached to Boiler and DG Set have been considered for dispersion modelling. Although the measured concentrations of particulate matter, Sulphur

Dioxide, Oxide of Nitrogen and Carbon Monoxide in the exhaust gases are much lower, the norms specified Daman, Diu and Dadra Nagar Haveli Pollution Control Committee in the CTO for the plants have been used as inputs for dispersion modelling (Ref.: Guidelines for Conducting Air Quality Modelling; Probes/70/1997-98; Central Pollution Control Board). Further, PM10 has been assumed to constitute 100% of particulate matter emission and PM2.5 has been considered as 60% of PM10.

The source related inputs used for atmospheric dispersion modelling is provided in Table **4-2**.

Table 4-2: Source related inputs for dispersion modelling

Emission details for dispersion modelling - HUL Dapada				
Particulars	**Stack attached to**			
	Boiler	**DG Set 1**	**DG Set 2**	**DG Set 3**
Stack height, m	31.5	12	12	12
Stack ID, m	0.6	0.2	0.2	0.2
Stack cross-section area, m2	0.283	0.031	0.031	0.031
Flue gas temp, 0C	128	181	187	176
Efflux velocity. m/s	9.79	13.46	13.88	14.04
Volumetric flow, m3/S	2.77	0.42	0.44	0.44
Volumetric flow, Nm3/s	2.06	0.28	0.28	0.29
Volumetric flow, Nm3/hr.	7408	1000	1017	1054
Measured conc., mg/Nm3				
Particulate matter (PM)	150	100	100	100
Sulphur dioxide (SO2)	50	50	50	50
Oxides of Nitrogen (Nox)	25	25	25	25
Carbon monoxide (CO)	70.99	92.74	100.76	107.63
Pollutant emission rate, g/s				
Particulate matter, PM10	0.309	0.028	0.028	0.029
Particulate matter, PM2.5	0.185	0.017	0.017	0.018
Sulphur dioxide (SO2)	0.309	0.028	0.028	0.029
Oxides of Nitrogen (Nox)	0.051	0.007	0.007	0.007
Carbon monoxide (CO)	0.146	0.026	0.028	0.032

Modelling Outputs:

The dispersion modelling was performed to estimate the hourly average incremental PM10, PM2.5, SO2, Nox, and CO concentrations at 729 receptor points (729 locations x 92 days x 24 hours), comprising 720 polar receptor points (at intervals of 10 degrees and 500m) and the 9 air quality monitoring locations. The modelling output file provides seasonal average incremental concentrations at the 729 receptor points as well as 24-hour average incremental concentrations for 92 days at the 729 receptor points. In the present report, the results of of modelling is presented hereunder in the following manner:

a) The first 10 highest seasonal average incremental concentrations of PM10, PM2.5, SO2, Nox, and CO, with the location of the receptor points realizing these incremental values, are described in tabular form (Table 4-3).

b) Out of the highest 24-hour average incremental concentrations observed at the 720 polar receptor points, the first 10 highest (high 1st high) 24-hour average incremental concentrations of PM10, PM2.5, SO2, Nox, and CO with date and location of occurrence are described in tabular form Table 4-4).
c) Isopleths of Seasonal average incremental concentrations of PM10, PM2.5, SO2, Nox, and CO at the 720 polar receptor points (Figure 4-2 to 4-6).
d) Isopleths of the highest 24-hour average concentrations PM10, PM2.5, SO2, Nox, and CO predicted at the 720 polar receptor points (Figure 4-7 to 4-11).
e) The highest (1st high) 24-hour average incremental values computed for the 9 AQ monitoring locations, superimposed over the highest observed 24-hour average observed values at these stations (Table 4-5).

Seasonal average incremental concentrations of PM10, PM2.5, SO2, Nox, and CO are presented in Figure 4-2 to Figure 4-6 respectively. It can be observed that the seasonal average values of PM10, PM2.5, SO2, Nox, and CO remain practically unchanged.

Table 4-3: First 10 High Seasonal average incremental concentrations, µg/m3

S.N.	Rank	PM10	PM2.5	SO2	NOx	CO	Location w.r.t. Plant	
							Distance, m	Direction, ^{0}
1.	1st	0.569	0.459	0.755	0.175	0.758	200.49	181.13
2.	2nd	0.532	0.343	0.569	0.112	0.441	500.41	199.98
3.	3rd	0.522	0.339	0.522	0.111	0.433	500.36	209.97
4.	4th	0.491	0.324	0.491	0.108	0.432	500.18	239.95
5.	5th	0.484	0.317	0.484	0.108	0.426	500.10	249.95
6.	6th	0.476	0.312	0.476	0.103	0.421	500.31	219.96
7.	7th	0.466	0.308	0.466	0.103	0.414	500.25	229.96
8.	8th	0.449	0.295	0.449	0.098	0.391	499.87	80.05
9.	9th	0.448	0.293	0.448	0.097	0.386	499.94	269.95
10.	10th	0.446	0.292	0.446	0.096	0.371	500.02	259.95

The modelling output also provides 1st high 24-hour average concentrations at the 441 grid receptor points as well at the 9 monitoring locations for baseline data generation. The first ten highest 24-hour concentrations along with the location and date of occurrence of these concentrations is presented in Table 4-4.

Table 4-4: Highest (1st high) 24-hour average incremental concentrations, µg/m3

Rank	PM10	PM2.5	SO2	NOx	CO	Date of occurrence	Location w.r.t. Plant	
							Distance, m	Direction, ^{0}
1st	3.044	1.813	4.389	0.678	2.607	12/29/24	239.48	183.32
2nd	1.922	1.189	2.437	0.384	1.302	12/29/24	500.05	189.98
3rd	1.519	0.930	2.149	0.326	1.197	12/30/24	500.00	209.98
4th	1.487	0.879	2.070	0.306	1.174	12/19/24	499.84	60.00
5th	1.415	0.850	2.059	0.301	1.099	12/29/24	500.08	179.98
6th	1.377	0.847	1.975	0.296	1.090	12/31/24	499.97	219.98
7th	1.360	0.847	1.931	0.295	1.076	10/08/24	500.02	199.98
8th	1.351	0.845	1.785	0.279	1.001	11/5/24	499.86	269.99

9th	1.345	0.833	1.779	0.275	0.967	12/30/24	499.89	249.99
10th	1.306	0.811	1.758	0.263	0.934	11/6/2024	499.85	80.01

Based on the modelling result under observed meteorological condition, the highest 24 hours average incremental Ground Level Concentrations (GLC) of PM10, PM2.5, SO2, Nox, and CO.are estimated to be 3.04 µg/m^3 ,1.813 µg/m^3, 4.389 µg/m^3 , 0.678 µg/m^3 ,2.607 µg/m^3 respectively. These high concentrations occurred at approx. 500.08 m from the plant center in the Northern direction for the meteorological conditions prevailing on December 29, 2024.

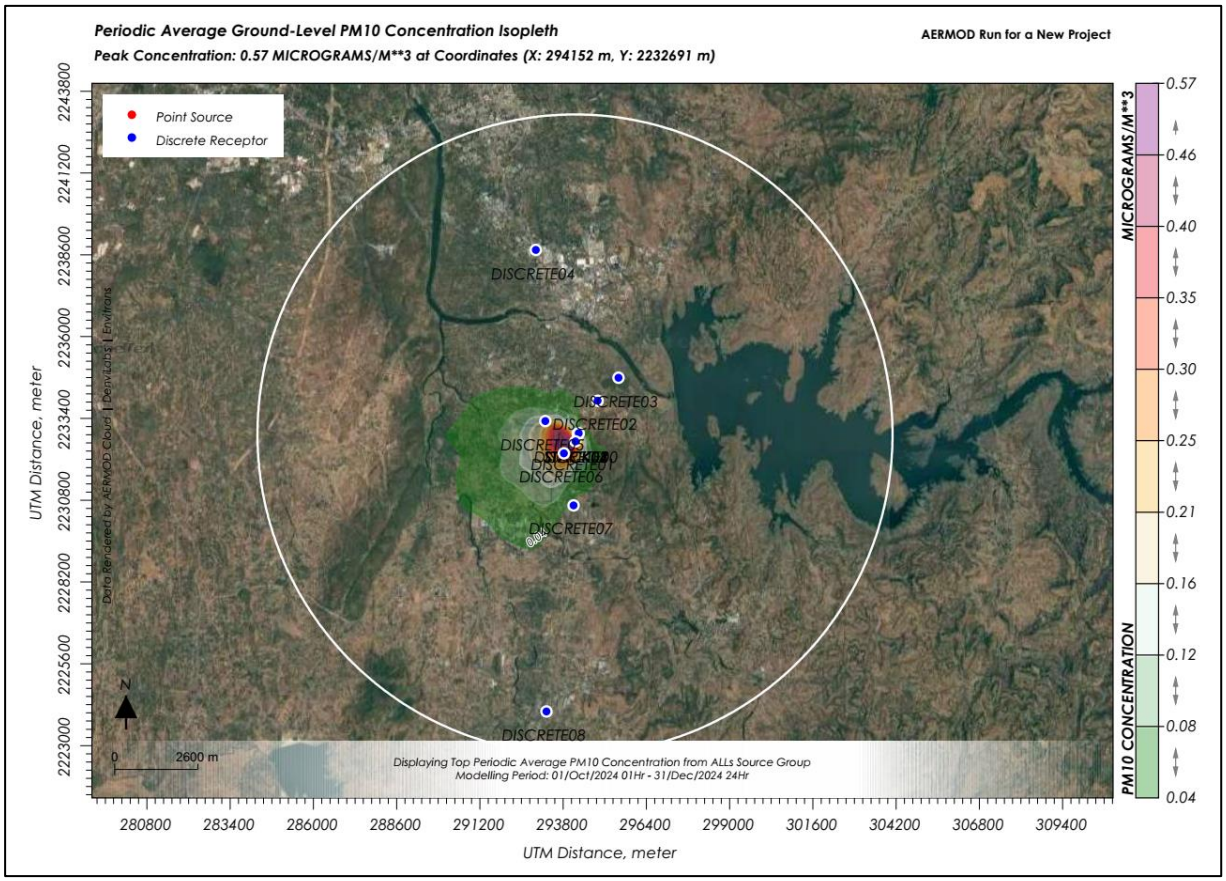


Figure 4-1: Isopleths of Seasonal average incremental PM10 conc. (µg/m3)

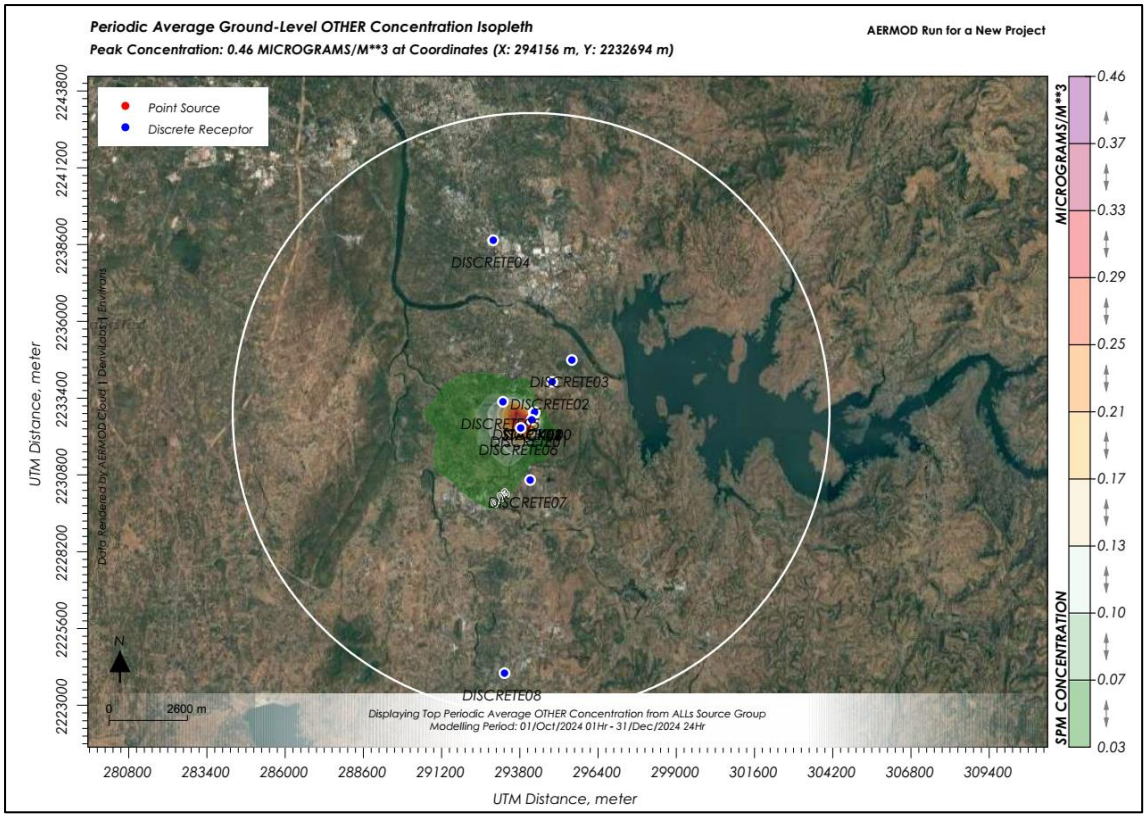


Figure 4-2: Isopleths of Seasonal average incremental PM2.5 conc. (µg/m3)

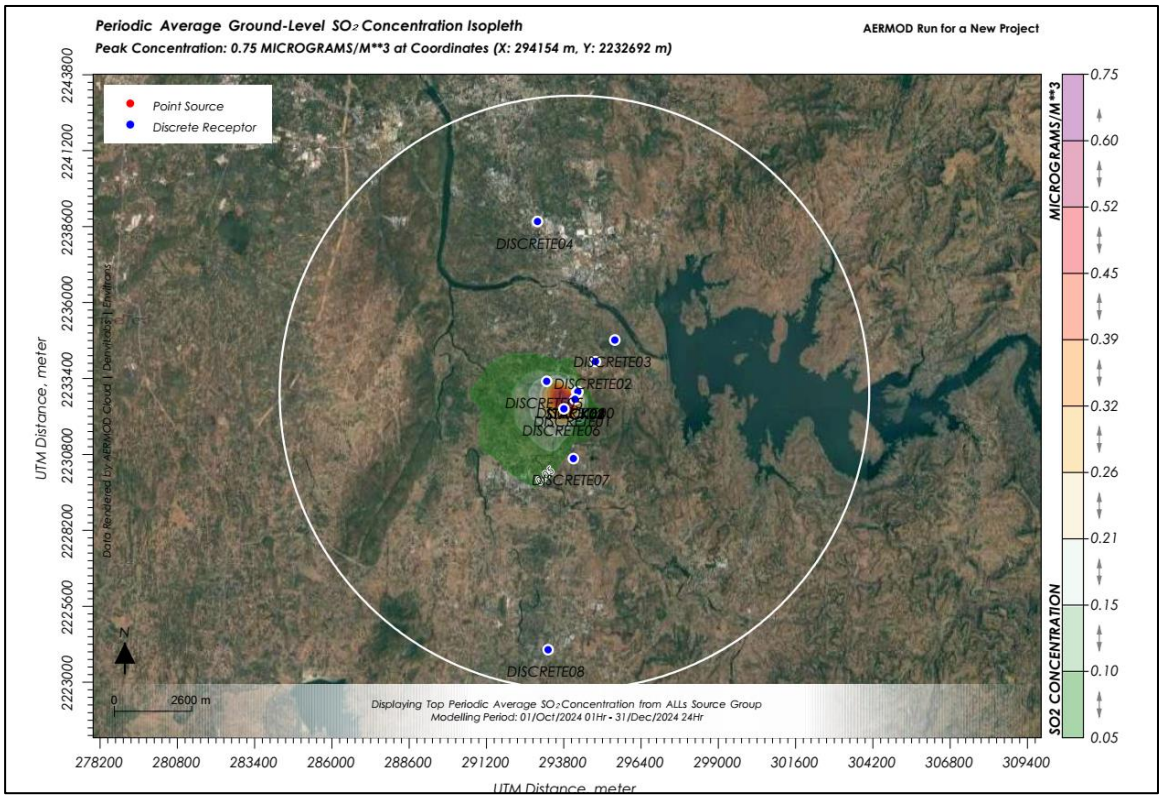


Figure 4-3: Isopleths of Seasonal avg incremental SO2 conc. (µg/m3)

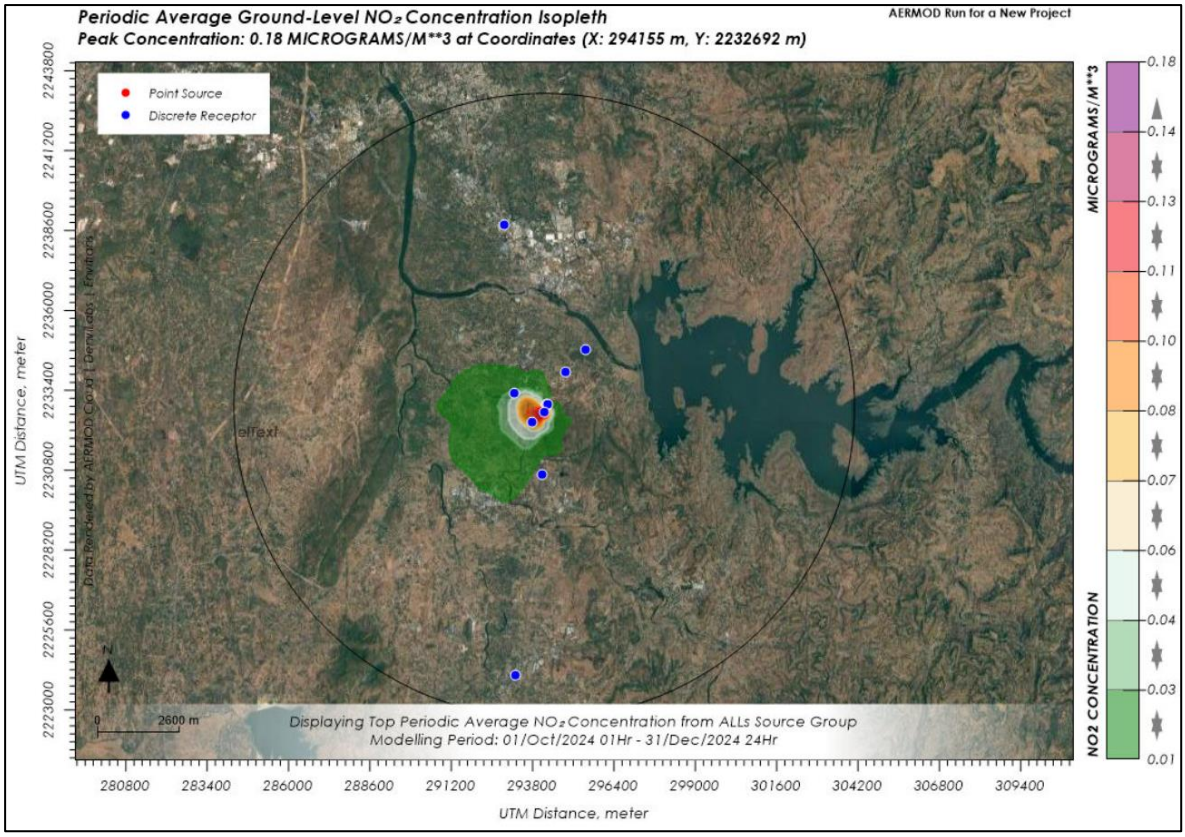


Figure 4-4: Isopleths of Seasonal avg incremental NOx conc. (µg/m3)

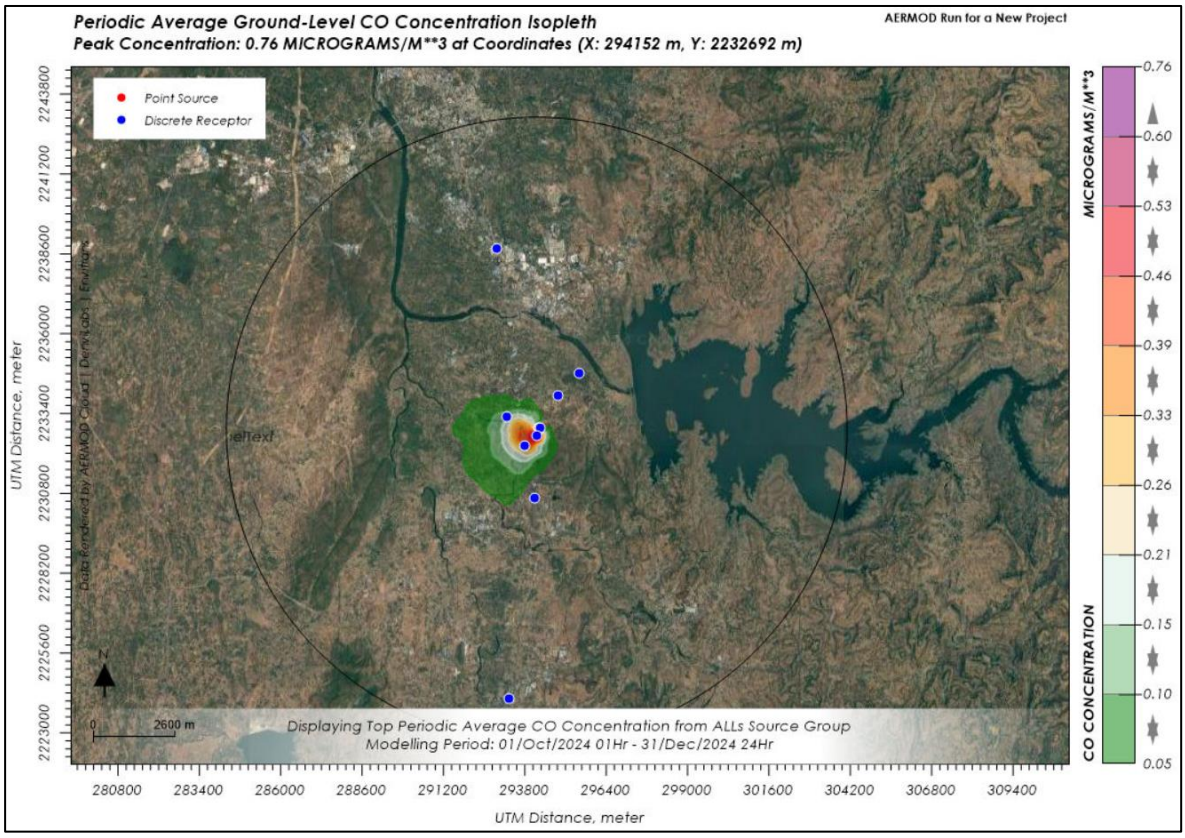


Figure 4-5: Isopleths of Seasonal average incremental CO conc. (mg/m3)

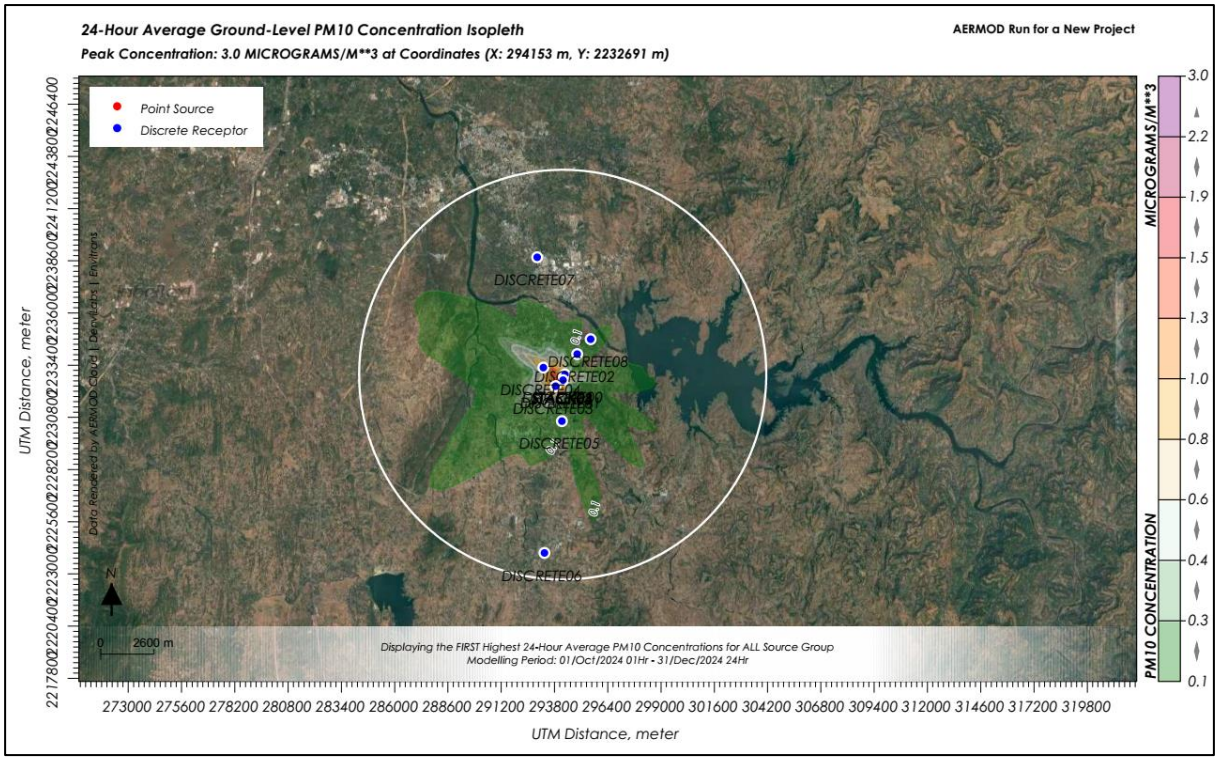


Figure 4-6: Isopleths of High 1st High 24-hour avg incremental PM10 conc. (µg/m3)

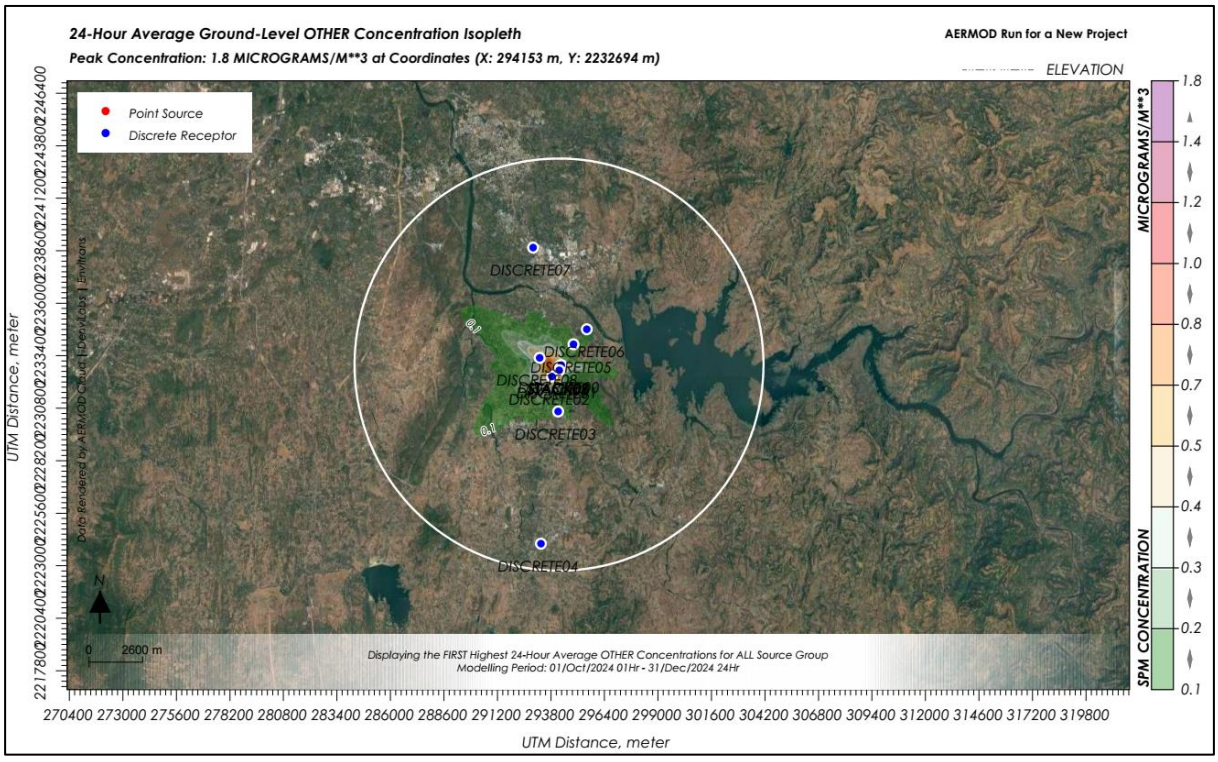


Figure 4-7: Isopleths of High 1st High 24-hour avg incremental PM2.5 conc. (µg/m3)

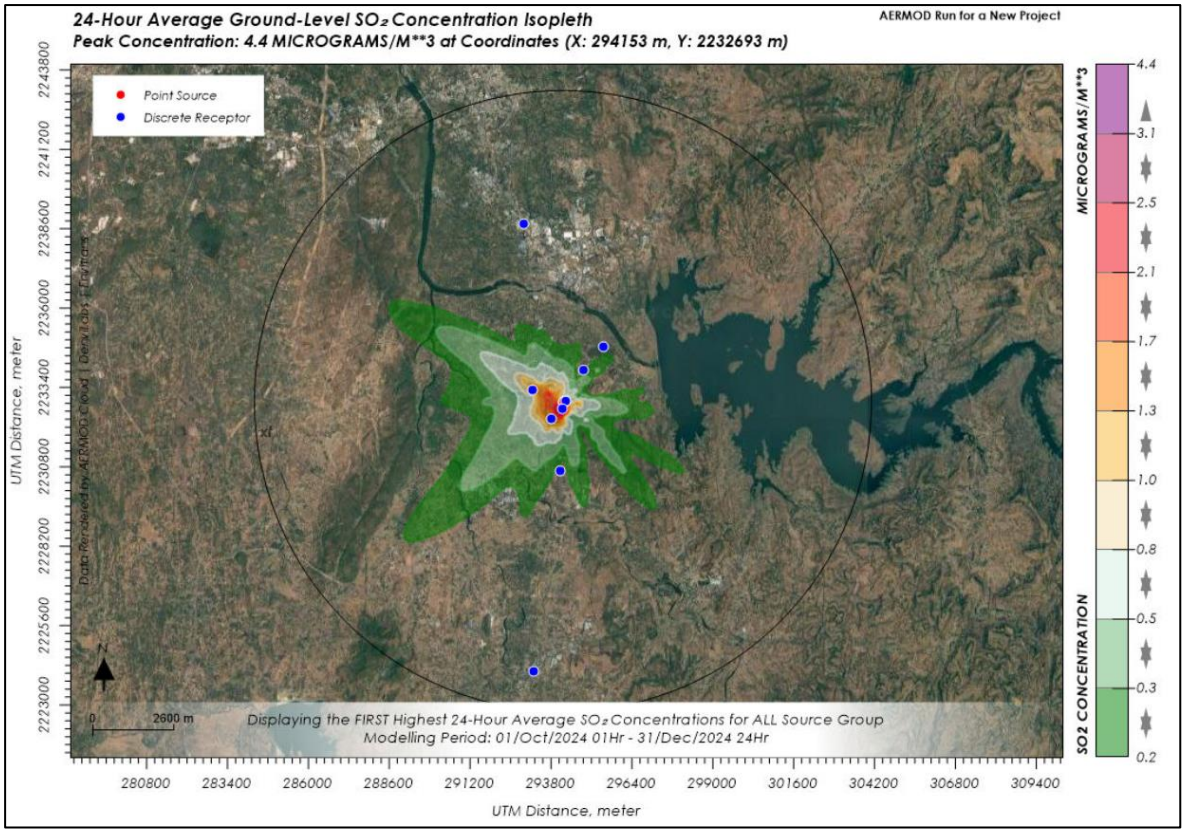


Figure 4-8: Isopleths of High 1st High 24-hour avg incremental SO2 conc. (µg/m3)

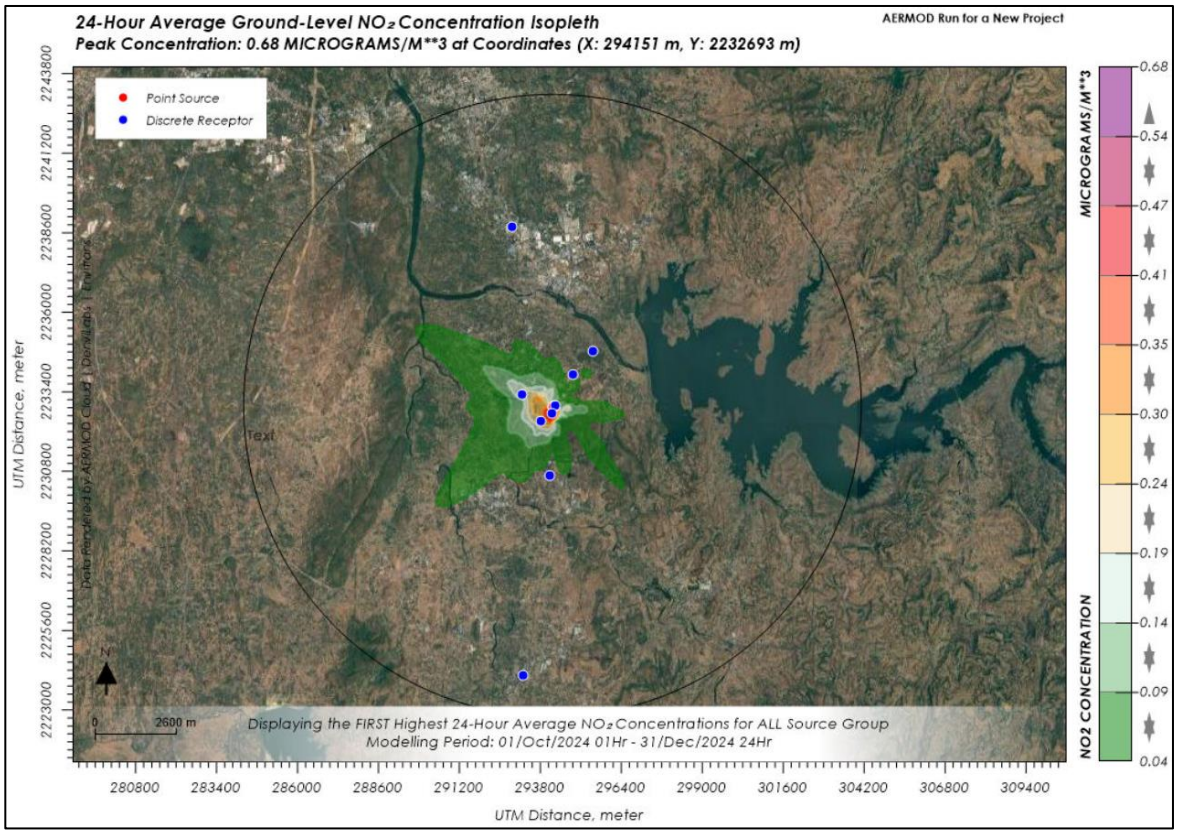


Figure 4-9: Isopleths of High 1st High 24-hour avg incremental Nox conc. (µg/m3)

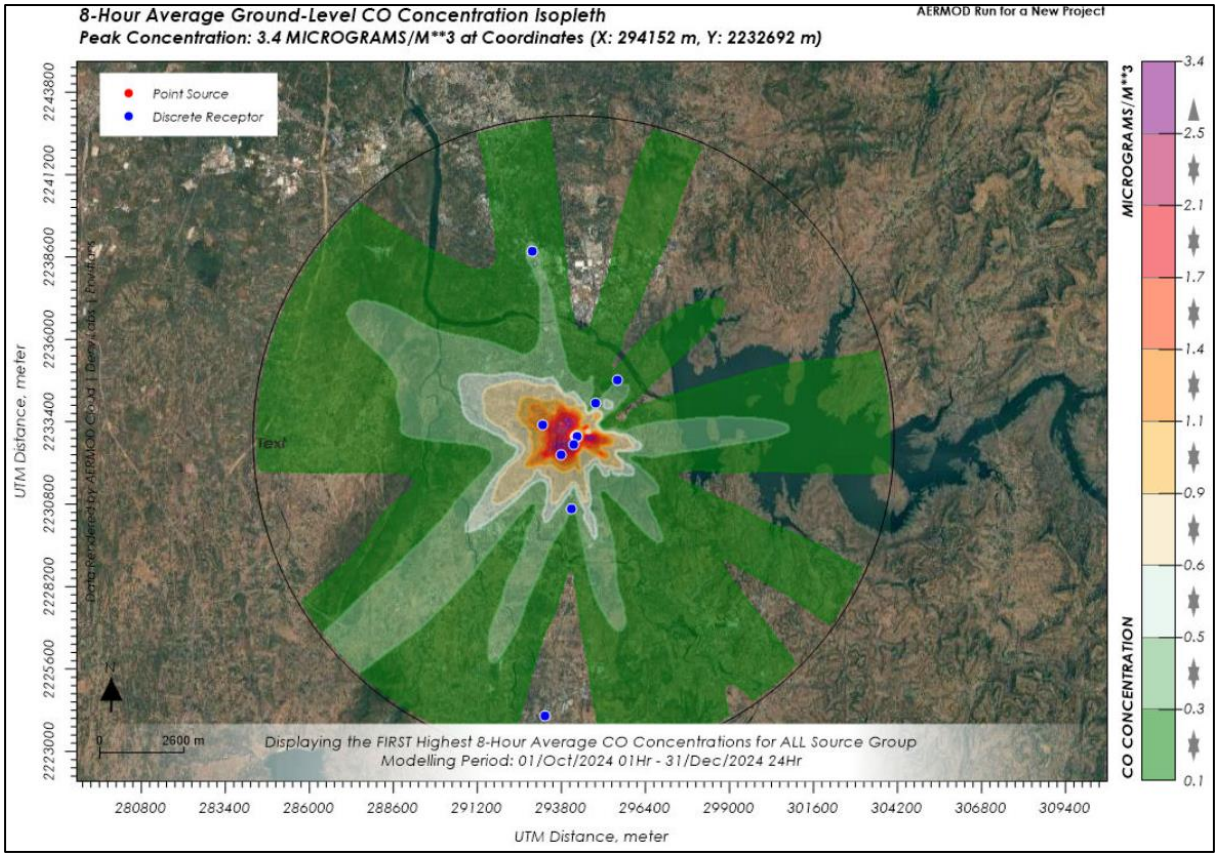


Figure 4-10: Isopleths of High 1st High 24-hour avg. incremental CO conc. (µg/m3)

It can be observed from the above isopleths that the seasonal average incremental concentrations of the 5 pollutants is below 1 µg/m3, and it is concluded that operation of the detergent factory has no impact on the ambient air quality. The 24-hour average concentrations of the pollutants are also insignificant.

The highest values of incremental 24-hours GLC of PM10, PM2.5, SO2, Nox, and CO, predicted at the 9 discrete receptor locations, viz., the air quality monitoring locations, have been superimposed over the highest measured baseline concentrations of these pollutants, and are presented in the **Table 4-5 to Table 4-7** to visualize the operational phase air quality of the study area.

Table 4-5: Predicted Concentrations of pollutants at AQM Stations

Loc No.	AQ Monitoring Station	PM10, µg/m3			PM2.5, µg/m3		
		Baseline	Increment	Predicted	Baseline	Increment	Predicted
AQ1	Near Main Gate	73	3.0	76.00	45	3.0	48.0
AQ2	Near ETP Area	74	2.2	76.20	41	2.2	43.20
AQ3	Dadra	68	1.9	69.90	38	1.9	39.90
AQ4	Deer park gate	55	1.5	56.5	33	1.5	34.50

AQ5	Surangi	64	1.3	65.3	36	1.3	37.3
AQ6	Lion Safari gate	60	1.0	61.0	35	1.0	36.0
AQ7	Kherdi	57	0.8	57.80	34	0.8	34.80
AQ8	Dapada	58	0.6	58.60	36	0.6	36.60
AQ9	Rakholi	60	0.4	60.40	39	0.4	39.40

Table 4-6: Predicted Concentrations of pollutants at AQM Stations

Loc No.	AQ Monitoring Station	SO2, µg/m3			NO2, µg/m3		
		Baseline	Increment	Predicted	Baseline	Increment	Predicted
AQ1	Project Site (Near Main Gate)	21	4.4	25.4	29	0.68	29.68
AQ2	Project Site (Near ETP Area)	17	3.1	20.1	25	0.54	25.54
AQ3	Dadra	15	2.5	17.5	24	0.47	24.47
AQ4	Near Satmaliya Deer park	12	2.1	14.1	16	0.41	16.41
AQ5	Surangi	12	1.7	13.7	20	0.35	20.35
AQ6	Near Lion Safari Vasona Silvassa	11	1.3	12.3	20	0.30	20.3
AQ7	Kherdi	11	1.0	12	20	0.24	20.24
AQ8	Dapada	16	0.8	16.8	20	0.19	20.19
AQ9	Rakholi	15	0.5	15.5	21	0.14	21.14

Table 4-7: Predicted Concentrations of pollutants at AQM Stations

Loc No.	AQ Monitoring Station	CO, Mg/m3		
		Baseline	Increment	Predicted
AQ1	Project Site (Near Main Gate)	0.82	4.2	5.02
AQ2	Project Site (Near ETP Area)	0.78	3.0	3.78
AQ3	Dadra	0.77	2.4	3.17
AQ4	Near Satmaliya Deer park	0.58	2.0	2.58
AQ5	Surangi	0.73	1.6	2.33

AQ6	Near Lion Safari Vasona Silvassa	0.69	1.3	1.99
AQ7	Kherdi	0.66	1.0	1.66
AQ8	Dapada	0.68	0.7	1.38
AQ9	Rakholi	0.65	0.4	1.05

Modelling results demonstrate that the incremental ground level concentrations of modeled pollutants due to plant operation are insignificant, and the resultant concentrations remain . The resultant concentration of PM10, PM2.5, SO2, Nox, and CO shall remain well within the NAAQS.

It is, therefore, concluded that the ambient air quality will remain practically unchanged and well within the ambient air quality standards, and operation of the proposed project will not have significant impact on the ambient air quality.

4.4.4 Mitigation measures

The following mitigation measures have been implemented to minimize the air emissions:

- The boilers and the DG sets have been provided with stacks of adequate height for better dispersion of flue gases.
- The raw materials are transported to the site in closed containers (Tank lorries and drums).
- The solid raw materials are transported to the site in powder form in Tank lorries, unloaded pneumatically and stored in silos.
- Bulk liquid raw materials like LABSA are transported in Tank lorries, unloaded through pumping and stored in closed tanks with secondary containment.
- Other liquid raw materials are brough in drums and stored in enclosed areas with secondary containment.
- Transfer of materials during different stages of manufacturing are done in closed circuit to eliminate fugitive emissions into atmosphere.

4.5 Impact on Noise Environment

4.5.1 General description

Sound propagation from a source to a receiver depends upon the properties of the atmosphere and the presence of any object or barrier in the transmission path. The sound pressure level generated by a noise source decreases with increasing distance mainly due to wave divergence. There is an additional decrease, called excess attenuation, in sound pressure level, with distance from the source due to atmospheric effects or interference with objects in the transmission path.

For a sound source of strength Lw, located above a flat rigid surface, the radiation pattern is approximately hemispherical, and the sound pressure level, Lp, at a distance r from the source is expressed by

Lp = Lw - 20 log r - Ae - 8 ------ (1)

Often, the sound power of a source is not known, but the sound pressure level Lp1 at a distance r1 from the source is known. The sound pressure level Lp2 at a distance r2 from the source can then be calculated from the equation:

$$Lp2 = Lp1 - 20 \log r2/r1 - Ae1,2 \quad \text{--------} \quad (2)$$

Where Ae1, 2 is the excess attenuation along the path r2-r1 between observers 1 and 2. In environmental noise assessment, Eqn (2) is of more general use since the sound power of a source is seldom known.

In environmental noise problems, generally more than one noise sources are encountered, and the total noise at an observer's location due to all the sources is to be evaluated. Since the sound pressure level is logarithmic, decibel values are not additive. To determine the resultant dB level, it is necessary to convert decibel values to sound pressures, add these pressures, and then reconvert the resultant ratio to the decibel value

4.5.2 Construction Phase Impacts

The major noise generating sources during the construction phase are vehicle traffic, and construction equipment like, concrete mixers, cranes, generators, pumps, compressors, vibrators etc. The operation of these equipment will generate noise ranging between 85–90 dB (A), when measured at 3 m distance from these equipment.

The construction activities will be limited to day hours only to the extent possible. The day time ambient noise level recorded during field studies at industrial was 59.5 dB(A).

4.5.3 Operation Phase Impacts

Sources of Noise:

In general, any industrial complex consists of several sources of noise in clusters or stand-alone mode. This clusters/stand-alone source may be housed in buildings of different dimensions made of different materials or installed in open or under sheds. The material of construction implies different attenuation co-efficient. The main sources of noise generation in the proposed DG set. Typical values of sound power levels, in dB, of different noise sources in the proposed facilities, **without incorporation of noise control measures**, are estimated as follows:

DG Set : 90 to 95

Prediction of Impacts:

The ASRS will be located within the covered and walled Production shed. Further, the DG Set has been provided with sound attenuated and weather protective cover. Therefore, For prediction of noise level in the area surrounding the plants, the source level noise of 90 dB at 3 m distance from the shed, has been considered. The distances of the nearest habitation is 700 m from the plants. For noise attenuation by the green belt, the minimum width of the green belt in the Western direction is considered as 10 m. In view of these considerations, the resultant noise level at these locations is estimated as follows:

Existing noise level	: 59.5 dB(A)
Predicted incremental noise	: 45.6 dB(A)
Predicted noise level (day time)	: 59.5 dB(A)

It is, therefore, concluded that the existing noise level in the area will remain practically unchanged. Thus, no impact on the noise level is foreseen.

4.5.4 Mitigation measures

In view of the noise potential of the proposed facilities, adequate measures have been incorporated for control of noise and vibration from the different equipment. The control of noise within the plants is through the provision of silencers, hoods, and acoustic walls to the noise generating equipment. For mitigation of noise, a proper green belt development plan has been formulated, which would further attenuate noise to bring the level down within acceptable levels. Further, the guarantee clause required to be fulfilled by the vendors of equipment regarding noise generation is as follows:

- Nearby equipment: 75 dB at 1m from equipment under normal operation
- Working Environment: Below 75 dB.
- At the boundary wall: Below 65 dB.

The control rooms have been provided with acoustic glass walls to protect the workers from higher noise level. As the operational staff remain within the control rooms for most of the time, they are exposed to the higher noise levels for very short duration. During the visits to the areas of higher noise levels, the operational and maintenance personnel use earplugs as a safety measure.

4.6 Impact on Flora & Fauna

4.6.1 Impact during the construction phase

The project site is presently under industrial use, occupied by the existing Plant. Almost 25% of the land has been covered by plantation and green belt. These trees will not be cleared during the construction of ASRS. As the proposed expansion will be done over the areas presently occupied by the existing plant. The industry boundary is surrounded by forest in eastern and southern side, due to construction and operation of ASRS. There will be no impact on the flora and fauna of the surrounding area.

4.6.2 Impact during the operation phase

During the operation of the proposed project no effluent will be discharged. Emission from the Stack is negligible which will not have any major impact on the flora & fauna. As adequate control measures have been provided in plant design for control of process and fugitive dust. The abiotic factors will remain practically, unaffected, Therefore, adverse impact on flora and fauna will be insignificant. Further, it is proposed to increase the plantation area from 25% to 33% of the land under premises, which would impart significant positive impact on flora and fauna.

4.6.3 Impact on Wildlife Sanctuary

Operation of the detergent factory has no impact on the abiotic factors which could adversely impact the wildlife sanctuary. The operations have practically no impact on the ambient air quality. The factory is being operated with zero liquid discharge.

The slope within the factory area is towards west. As a result, surface run-off from the factory flows towards west and joins the natural drain flowing in the northern direction to join

Damanganga River. As the wild life sanctuary is located towards east and south, it is not affected by surface run-off from the factory.

Noise level at the eastern boundary walls is within noise level standards for residential areas. Further, noise barriers of 1.5 m have been erected over and above the eastern boundary walls.

It is therefore concluded that operation of the detergent factory has no adverse impact on the Wildlife Sanctuary.

4.6.4 Mitigation measures

1). It has been ensured that all the pollution control/ environment management systems are commissioned as a part of main plant equipment, before the commencement of the operation of the project;

2). For Ecological improvement and attenuation of air pollutants (PM,) in source receptor pathway and in order to improve the vegetation cover, it is suggested to increase green belt area from 25 % to 33% mainly in surrounding of the project area.

3). Emissions from point sources are discharged into the atmosphere at adequate heights to facilitate maximum dispersion of the gases.

4) The factory is being operated with zero liquid discharge.

5) Noise barriers have been erected on the eastern boundary walls, at least 1.5m height above the boundary walls.

4.7 Socio-economic impacts

4.7.1 Demography

The project will provide direct and indirect employment. Direct employment will be in the form of skilled, semi-skilled and un-skilled work force required for operation of the facilities. The skilled manpower will be permanent employees of the project, and semi-skilled and un-skilled work force will be drawn from local population on contract basis. Major part of the semi-skilled manpower and most of the unskilled manpower will be drawn from local population. As the project is located in agriculture based area, adequate numbers of unskilled work force is available in the area. The employees of the company will stay in the nearby villages and commute to the site. Therefore, any impact on demographic profile of the area through influx of job seekers is ruled out.

4.7.2 Economy

The proposed facilities will have positive impact on national and local economy. Establishment and operation of the proposed project will contribute significantly to the revenue of the state and central governments in the form of different types of taxes on inputs, outputs and fuel, income tax of employees, service tax, etc.

The proposed project will impart significant positive impact on the economy of the area. Establishment of the proposed industrial unit will impart significant impact on economy, employment potential and social structure of the area.

Chapter 5. Analysis of Alternatives

5.1 Alternative locations

The project proposal is for construction and operation of Automated Storage and Retrieval System (ASRS) in the Silvassa Detergents Factory Unit of the Hindustan Unilever Limited located at Survey No:151/1/1, Village: Dapada, Kanvel Road, Silvassa (Dadra and Nagar Haveli and Daman and Diu). As the expansion is to be implemented within existing facilities, analysis of alternative sites is not applicable.

5.2 Alternative technologies

5.2.1 Backup Power Systems (e.g., UPS, Generators) Continuity

Backup power systems are essential for ensuring that Automated Storage and Retrieval Systems (ASRS) can continue functioning seamlessly during unexpected power failures. A Uninterruptible Power Supply (UPS) provides immediate power during brief outages, allowing the system to continue operations temporarily while the backup generator kicks in. Generators serve as a more long-term solution for extended power disruptions. By incorporating these backup power solutions, companies can significantly reduce the risk of operational downtime, prevent data loss, and avoid disruptions in inventory handling and order fulfillment. Additionally, backup power systems ensure that ASRS equipment, including robotics, conveyors, and automated lifts, can safely shut down or continue working without causing system damage. This proactive approach also reduces the likelihood of expensive repairs and improves overall operational reliability.

5.2.2 Performance Evaluation and System Optimization

Regular system evaluation is crucial for ensuring that the ASRS continues to perform optimally as inventory volumes and types evolve. Periodic performance audits allows to monitor throughput, identify issues, and uncover inefficiencies in storage and retrieval processes. By adjusting algorithms related to item placement, retrieval patterns, and storage configuration, ASRS can be fine-tuned to maximize efficiency. For example, implementing machine learning techniques can help improve predictive algorithms that optimize storage density and retrieval speed. As inventory changes, algorithms can be adapted to prioritize high-demand items, reducing retrieval times. These adjustments ensure that the ASRS remains responsive to shifting business needs, maximizing throughput and reducing operational costs. Continuously improving system algorithms helps businesses stay competitive by enhancing both speed and accuracy.

5.2.3 Employee Safety Training

Employee safety is paramount when working with complex automated systems like ASRS. Employees need to be thoroughly trained in how to safely interact with these systems. This includes understanding system operations, knowing how to perform tasks around automated robots or conveyors, and being aware of potential hazards. Training should cover emergency procedures in the event of system malfunctions, such as how to safely halt the system, deactivate automated machinery, or evacuate the area if necessary. Additionally, training should include how to perform manual overrides and interact with emergency stop buttons or safety sensors. Routine refresher courses and safety drills ensure that employees are always prepared for unexpected situations, reducing the risk of accidents. By fostering a strong safety culture and providing

proper training, businesses can significantly minimize the risk of human error and improve overall workplace safety.

5.2.4 Protection from Cyber Threats

As ASRS systems become more integrated with the broader digital ecosystem, they become vulnerable to cybersecurity threats. To protect the integrity of the system, it is essential to implement strong cybersecurity protocols. This includes using encryption to safeguard sensitive data during transmission and storage, ensuring that unauthorized users cannot intercept or alter critical operational data. Secure access control mechanisms should be put in place, ensuring that only authorized personnel can access the system or make modifications. Additionally, regular vulnerability assessments help identify potential security weaknesses, allowing for timely patches or updates to prevent cyberattacks. Robust cybersecurity protocols safeguard the ASRS from external threats and ensure data integrity, helping protect both the physical assets and intellectual property of the business.

5.2.5 Regular Data Backup and Security

Data loss is one of the most significant risks when using an ASRS. To mitigate this, all critical operational and inventory data must be regularly backed up and securely stored in multiple locations. This includes information such as stock levels, inventory movement, transaction logs, and system configurations. Utilizing both cloud-based and on-site backups ensures that data is protected from local disasters, such as hardware failure or fires, as well as from cyber threats like ransomware. Having secure backups allows the system to be quickly restored in the event of data corruption or loss, ensuring minimal disruption to operations. Regular backup schedules and secure storage practices not only safeguard against data loss but also help businesses comply with data protection regulations and maintain business continuity.

5.2.6 Conclusion

Automated Storage and Retrieval Systems (ASRS) require a comprehensive approach to risk management. By incorporating backup power systems like UPS and generators. Regular performance evaluations and algorithm adjustments, while employee training on safety procedures and system malfunctions mitigates human-related risks. Strong cybersecurity protocols protect the system from external threats, and regular data backups safeguard against data loss, ensuring business continuity.

Chapter 6. Environment Monitoring Programme

6.1 General

Regular monitoring of environmental parameters is of immense importance to assess the status of environment during project operation. Monitoring results confirm that commitments are being met with. This takes the form of direct measurement and recording of quantitative information, such as quantity and concentrations of discharges, emissions and wastes, for measurement against corporate or statutory standards, consent limits or targets. It also consists of monitoring of the physical, biological and social environment in the surrounding area. Monitoring may also include socioeconomic interaction, through local activities or even assessment of complaints.

The preventive approach by management requires monitoring of process inputs, for example, type and method used, resource consumption, equipment and pollution control performance etc. The key aims of monitoring are, first to ensure that results/ conditions are as per prediction during the planning stage and where they are or not, to pinpoint the cause and implement action to remedy the situation. A second objective is 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. Monitoring is also be required to meet compliance with statutory and corporate requirements. Finally, monitoring results provide the basis for auditing. An environmental monitoring plan provides a delivery mechanism to address the adverse environmental impacts of a project during its execution, to enhance project benefits, and to introduce standards of good practice to be adopted.

With the knowledge of baseline conditions, the monitoring programme will serve as an indicator of any deterioration in environmental conditions due to operation of the project, to enable taking up suitable mitigatory steps in time to safeguard the environment. Monitoring is also important to evaluate the efficiency of control measures. Thus, the objectives of monitoring are to:-

- Verify effectiveness of planning decisions;
- Evaluate effectiveness of operational procedures;
- Confirm statutory and corporate compliance;
- Identify unexpected changes; and
- Energy and resources conservation

6.2 Environmental monitoring objectives

An environmental monitoring plan is important as it provides useful information and helps to:

- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures.
- Define the responsibilities of the project proponents, contractors and environmental monitors and provides means of effective communication of environmental issues among them.
- Define monitoring mechanism and identify monitoring parameters.
- Evaluate the performance and effectiveness of mitigation measures proposed in the Environment Management Plan (EMP) and suggest improvements in management plan, if required.

- Evaluate Evaluate specific consumptions of electric power and other inputs to ensure their conservation.

From the monitoring point of view, the important parameters are water quality, ambient air quality, soil characteristics, noise level, flora & fauna, and human health. The proposed monitoring details are outlined in Sections 6.4.

6.3 Organizational setup

Success of any environmental management program depends upon the efficiency of the organizational set up responsible for implementation of the program. Considering the importance of monitoring results in the implementation of the environmental management program, an Environment, Health & Safety (EHS) Cell has been established to ensure safe and environment friendly operation of the project. The Cell is headed by Manager (EHS), who is supprted by Dy. Manager (EHS) and other supporting staff.

6.4 Monitoring Schedule and Parameters

6.4.1 Environmental Monitoring

The proposed schedule, frequency and parameters for different environmental components are presented in Table 6-1.

Table 6-1: Proposed monitoring schedule

Sl. No	Description of parameters	Schedule and duration of monitoring
1.	**Air Environment**	
a.	Ambient air quality monitoring for PM_{10}, $PM_{2.5}$, SO_2, and NO_2 at the following four locations: • Factory Gate • Upwind direction at 1 km • Downwind direction at 1 km • Dapada Village	24-hour average samples, once in 6 months
b.	Stack emission monitoring (Manual): • Boiler stack for particulate matter (PM) • 3 DG set vent for PM, SO2, NOx and CO	Once in 6 months
c.	Work zone air quality monitoring for PM: • Automated Storage and Retrieval System Unit area	Once in 6 months
2.	**Water Environment**	
a.	Ground water samples from 3 locations for all parameters specified under (IS 10500:2012)	Once in 6 months
3.	**Noise Environment**	

Sl. No	Description of parameters	Schedule and duration of monitoring
a.	Ambient noise monitoring at 3 locations, including Factory gate, to determine day-time and night-time noise levels.	Once in 6 months
b.	Work-room noise level at Automated Storage and Retrieval System Unit area	Once in 6 months
5.	**Ecology & bio-diversity**	
a.	Inventory of survival and growth rate of trees planted under plantation and green belt development	Once per year
b.	Inventory of endangered/vulnerable flora and fauna species, if any, with respect to their population within 2 km of the project site	Once in 3 years
6.	**Socio-economics**	
a.	Socio-economic condition of local, population, health survey and traffic status	Once in 3 years
b.	Monitoring of status of schemes under by the Company under 'Corporate Social Responsibility'	Once in a year.
7.	**Resources Conservation**	
a.	Electric power consumption by individual machines and operations	Once in 6 month

6.4.2 Occupational health

The health of the employees who will be working in the unit will be monitored through general periodical check up and also for respiratory ailments. The health monitoring programme shall include monitoring of

a) Body weight : Once in a year
b) Blood pressure : Once in a year
c) Blood sugar : Once in a year
d) Blood haemoglobin : Once in a year
e) Chest X-ray : Once in a year
f) Eye test : Once in 3 years
g) Audiometry : Once in 3 years

6.4.3 Laboratory facilities

The project proposal does not include establishment of environment monitoring laboratory. The proposed monitoring will be get done through NABL accredited and MoEF&CC recognized external environmental laboratories.

Chapter 7. Additional Studies

7.1 Public Hearing

Automated Storage and Retrieval System (ASRS) does not require a public hearing because the area in which it is located has already obtained Environmental Clearance (EC) at the time of its establishment. During the initial process for the establishment of Silvassa Detergents Factory, Hindustan Unilever Limited, a public hearing was conducted to assess the potential environmental impact of various industrial activities in the zone. The clearance granted at that time considered the cumulative effects of all future developments within the area.

Since the industrial area was designated with proper environmental assessments and public consultation, any subsequent projects, do not need to undergo a new public hearing. This is because the environmental concerns were addressed during the original clearance process, which included a public hearing and comprehensive evaluation of potential impacts such as air and water pollution, waste management, and overall environmental sustainability.

7.2 Risk Analysis

7.2.1 Mechanical Failures:

Mechanical breakdowns in components like conveyors and robotic arms can halt operations and damage goods. Regular preventive maintenance, predictive monitoring, and backup systems can help detect issues early, reduce downtime, and maintain operational continuity.

7.2.2 System Software Failures:

Software glitches can cause errors in inventory management and system malfunctions. Mitigation involves using redundant software systems, real-time monitoring, regular updates, and disaster recovery plans to minimize downtime and restore functionality quickly.

7.2.3 Human Error:

Mistakes in system programming, maintenance, or operation can disrupt ASRS. Comprehensive training, clear operational protocols, and automated error-detection systems are necessary to reduce human error and improve safety and efficiency in daily operations.

7.2.4 Fire Hazards:

Electrical equipment, machinery, and flammable materials create fire risks in ASRS environments. Fire suppression systems, regular inspections of electrical components, safe wiring practices, and adherence to fire safety codes help minimize the chances of fire and ensure quick responses if one occurs.

7.2.5 Power Failures:

Power outages can disrupt ASRS operations and cause system shutdowns. Installing Uninterruptible Power Supply (UPS) systems, backup generators, and ensuring critical systems have battery power can help maintain operations and prevent data loss during power failures.

7.2.6 Environmental Risks:

Poor ventilation, excessive heat, or water damage can affect ASRS operations. Proper cooling systems, air quality monitoring, waterproofing, and temperature regulation are essential to prevent environmental risks and protect both the equipment and the warehouse environment.

7.2.7 Cybersecurity Risks:

ASRS systems are vulnerable to cyberattacks that could disrupt operations or steal data. Strong cybersecurity protocols, encryption, firewalls, secure access controls, regular software updates, and staff training are essential to prevent cyber threats and ensure system integrity and security.

Chapter 8. Project Benefits

8.1 Benefits of Automated Storage and Retrieval System

The implementation of an Automated Storage and Retrieval System (ASRS) at Hindustan Unilever Limited (HUL) Silvassa offers numerous advantages that contribute to operational efficiency, cost savings, and enhanced safety. ASRS, being an advanced technology, is particularly beneficial for high-volume manufacturing facilities like HUL, which handles significant production, storage, and distribution operations.

Optimized Space Utilization

One of the primary benefits of ASRS is its ability to maximize storage space. By using vertical and compact storage systems, ASRS ensures efficient utilization of the available floor area. ASRS eliminates the need for wide aisles and manually accessible shelving, enabling high-density storage.

Increased Productivity

ASRS significantly enhances productivity by reducing the time spent on locating, retrieving, and transporting goods. The system is designed to automate repetitive tasks such as picking and placing items, ensuring faster and more accurate operations. For a large-scale facility like HUL Silvassa, this translates into quicker order fulfillment, efficient material handling, and reduced downtime.

Enhanced Inventory Accuracy

Maintaining accurate inventory records is crucial for effective supply chain management. ASRS provides real-time visibility into inventory levels, reducing the chances of errors associated with manual tracking. By automating inventory control, HUL Silvassa can achieve better stock accuracy, minimize instances of overstocking or stockouts, and ensure timely replenishment of raw materials. This level of precision is essential for meeting production deadlines and optimizing resource allocation.

Cost Efficiency

ASRS helps reduce operational costs in several ways. Firstly, it minimizes labour costs by automating tasks that would otherwise require a significant workforce. Secondly, it reduces material wastage and product damage, which are common in manual handling processes. The long-term savings from reduced labour dependency and lower inventory shrinkage make ASRS a cost-effective solution. Additionally, the system's ability to operate around the clock ensures high throughput with minimal energy consumption.

Improved Workplace Safety

The automated nature of ASRS reduces the need for human intervention in potentially hazardous tasks, such as lifting heavy loads or accessing materials stored at height. By minimizing the risk of workplace injuries, It will create a safer working environment for its employees. Moreover, the precise handling of goods by ASRS reduces the likelihood of accidents caused by human error.

8.2 Demand supply gap

India’s detergent and soap bar market continued its upward trajectory, driven by a variety of key factors. The rise in hygiene awareness, increasing disposable incomes, and the expanding middle

class have all contributed significantly to the demand for detergents and soap bars across urban and rural markets.

The Indian detergent and soap industry benefits from a local supply of key raw materials such as surfactants, oils, and fragrances. The availability of these raw materials in the domestic market reduces dependency on imports, ensuring cost-effective production and aiding the sector's growth. Additionally, the established supply chains and increasing retail penetration across India have made these products more accessible to consumers, further fueling demand. Over the past decade, India has seen a consistent increase in domestic consumption of detergents and soap bars, largely driven by population growth, rising urbanization, and increasing disposable incomes. As India continues its economic growth, both the urban and rural markets present a significant potential for future demand.

In order to meet the increasing demand for detergents and soap bars, it is essential to scale up manufacturing capabilities. Expanding existing plants and establishing new production facilities will be key to ensuring that demand is met efficiently. Investments in automation and advanced manufacturing technologies will enable companies to produce higher quantities of products while maintaining cost-efficiency and product quality. The future growth of the detergent and soap bar industry in India is promising, driven by both consumer demand and government initiatives. To capitalize on this potential, the industry must continue to expand its production capacity, innovate in product offerings, and streamline supply chain operations.

8.3 Employment generation

The project will generate direct employment opportunities. Direct employment will be in the form of skilled and semi-skilled work force required for day to day operation of the facilities. The project will also provide indirect employment generation in service sectors.

8.4 Benefits from CSR schemes

The CSR activities aims at strengthening the bond between the project authorities and the local population in the vicinity of project area. In line with the generic CSR policy, M/s Hindustan Unilever Limited will carry our community welfare activities in the following areas:

- Community development
- Education
- Health & medical care
- Drainage and sanitation
- Roads & Infrastructure
- Drinking water supply

8.5 Benefits to Government Revenue

Construction and operation of the proposed expansion project will contribute significantly to the revenue of the state and central governments in the form of different types of taxes like GST on inputs, outputs and fuel, income tax of employees, etc.

8.6 Conclusion

The residents of nearby villages will benefit from direct and indirect employment opportunities. Also, the CSR activities conducted by the company will help in improving the quality of life of the nearby villages. Apart from the above, the management will also undertake various pollution

control measures to restrict the pollution within the specified limit so that the local population is not affected.

Chapter 9. Environment Management Plan

9.1 Environment Management System

9.1.1 General

Environment Management System is a tool used by an organization for managing the impacts of its activities on the environment. Organizations of all kinds are increasingly concerned with achieving and demonstrating sound environmental performance by controlling the impacts of their activities, products, and services on the environment, consistent with their environmental policy and objectives. Hindustan Unilever Limited has established, implemented and maintains an Environmental Management System in the Silvassa detergent factory to foster environmental protection, and sustainable development.

9.1.2 Environmental Policy

The Detergents Factory has established, implemented and maintains an environmental policy that includes a commitment to the protection of the environment, including prevention of pollution, sustainable resource use, climate change mitigation and adaptation, and protection of biodiversity and ecosystems; includes its commitment to fulfil its compliance obligations; and includes a commitment to continual improvement of the environmental management system to enhance environmental performance. The environmental policy shall be communicated within the organization and shall be available to interested parties.

9.1.3 Impact Identification

The Detergents Factory has determined the environmental aspects of its activities and products that it can control and influence, and their associated environmental impacts, considering a life cycle perspective. The environmental aspects and their impacts have been identified and documented in Chapter 4 of the EIA report. While performing the aspect impact analysis, abnormal conditions and reasonably foreseeable emergency situations have also been considered.

9.1.4 Roles and responsibilities

The detergent factory has established an Environmental, Health & Safety (EHS) Cell, headed by Manager (EHS) and supported by Deputy Manager (EHS), and other supporting staff and infrastructural facilities. The Factory Manager is accountable for implementation and maintenance of the environmental management system within the organization, and communicates the performance of the system, including any non-compliances/ non-conformances, to the Board of Directors of the Company.

The responsibility of environmental management and occupational health & safety of the employees lies with the EHS Cell. The cell also acts as a nodal agency for various groups at the project site and the Factory Manager, and also liaisons with external agencies like Pollution Control Committee and other relevant statutory agencies. The main functions of the Cell may be summarized as follows.

- Maintenance and monitoring of the preventive and mitigative measures
- Environmental Monitoring
- Occupational health & safety aspects of employees
- Green belt development & maintenance

- Analysis and maintain records of environmental data
- Compliance with consents, guidelines and statutory requirements
- Coordination with statutory bodies and functional groups.
- Interaction for evolving new objectives and targets for continual improvement
- Environmental appraisal (internal) and EMS audit.

9.2 Air Quality Management

9.2.1 Construction phase management

Environmental impacts during the construction phase can be attributed to dust generation from site preparation activities, vehicular emissions during transportation of construction material, emissions from construction equipment and mobilization of workforce. The potential for environmental pollution during construction phase is insignificant and short lived. However, the plan for management of air quality during construction phase is as follows.

- During construction phase, water will be sprinkled in the vulnerable areas to suppress the dust generated during excavation, leveling and other operations.
- Construction equipment and transport vehicles will be maintained properly to minimize source emissions and spillage. Regular maintenance schedule will be adopted.
- Construction material shall be, to the extent practicable, transported in covered trucks.
- Contractors and transporters shall be bound to ensure that vehicles used for transportation are certified for "Pollution Under Control."

9.2.2 Operational phase management

Details of proposed measures for control of air emissions are described in Chapter 4 of the report. A summary of these control measures as well the mitigation measures for control of air pollution are as follows.

- Closed circuit unloading of raw materials;
- Closed circuit mixing, blending and transfer of materials up to their packing;
- Stacks of adequate height for discharge of flue gases from the boiler and the DG Sets; and
- Use of "PUC" certified vehicles for transport of finished products.

9.3 Noise level management

9.3.1 Construction Phase

During the construction phase, noise generated by the construction equipment will be confined within the project area. However, the on-site workers employed by the contractors as well as the employees of the company will be the exposed to enhanced noise levels. Following mitigation measures shall be adopted.

- Proper maintenance and greasing of construction equipment and machinery to minimize noise and vibration.
- Construction workers near the noise generating machines shall be provided with noise protection devices like ear-plugs etc.
- No workers shall be allowed to be exposed to more than 90 dBA in an 8-hourly shift and under no circumstance the noise level from any equipment shall be more than 115 dBA.
- Noise prone activities shall be restricted to the extent possible during day time in order to

have minimum impact on the surrounding area.

9.3.2 Operation Phase

The entire production activities are performed within closed sheds. For mitigation of noise, a proper green belt development program has been implemented, which further attenuates noise to bring its level down within acceptable levels.

A noise barrier has been provided over the eastern boundary of the factory, approx. 1.5m above the boundary wall, to further attenuate noise level in the Wildlife Sanctuay located to the east of the factory.

The control rooms have provided with acoustic glass walls to protect the operational staff from noise level. During the visits to the areas of higher noise levels, the operational and maintenance personnel will use earplugs as a safety measure.

Moving parts of equipment are properly maintained and lubricated to minimize the generation of noise.

9.4 Water Quality Management

9.4.1 Construction phase management

Fresh water requirement during the construction phase has been estimated as 3 KLD including 1 KLD domestic water requirements. The water requirement for construction phase will be met from ground water and pond. The ground water is potable in nature and does not require pre-treatment. The existing toilets, wash rooms and rest rooms will be utilized by the construction workers. The domestic wastewater / sewage generated during construction phase will be treated in existing ETP and utilized for gardening and construction.

9.4.2 Operation phase management

Industrial waste water as well as domestic wastewater and sewage are transferred to the ETP through pipelines and collected in underground tanks. In the ETP, the waste water is subjected to primary, secondary and tertiary treatment, and the treated water is utilized quantitatively for gardening, plantation and construction within premises. The factory operates with zero liquid discharge.

9.5 Water Consumption

Total fresh water requirement for the project, during operation phase, is approx. 80 KLD. Approx. 40 KLD is drawn from ground water through bore wells and the balance 40 KLD from the Water Reservoir (Pond) and rain water harvesting tanks. The factory has constructed 7 Rain Water Harvesting Ponds for recharge of ground water. Surface water from the natural drains along the western boundary walls is also diverted to the RW Harvesting tanks.

9.6 Solid & Hazardous waste management

9.6.1 Solid wastes

No solid waste shall be generated for disposal from the proposed ASR System.

Packing materials, containers and other non-hazardous wastes are segregated, stored in a dedicated store and disposed as scrap.

Domestic wastes are segregated and collected as biodegradable and non-biodegradable wastes. The biodegradable wastes shall be composted within premises and the resulting compost shall be utilized as fertilizer for green belt and plantation. The non-biodegradable waste shall be disposed through approved recyclers.

9.6.2 Hazardous wastes

No hazardous waste will be generated from the proposed ASR System.

Process waste like Sodal, Labsa, Acusol, Silicate, etc., generated from the existing plant operations, are considered as hazardous wastes, and are stored and disposed as per Hazardous Wastes Rule, 2016. Approximately 30 TPA of process wastes generated from the operations are stored in Hazardous wastes room and disposed through approved TSDF facilities.

The company operates with Consolidated Consent (under water and Air Acts) and Authorization (Under HW Rules, 2016). The hazardous wastes listed in the authorization include Process wastes, residues and sludges (category 21.1, Schedule I), and Contaminated cotton rags or other cleaning materials (Category 33.2, Schedule I).

9.7 Rainwater harvesting

The detergent factory has constructed 7 Nos. of rai water harvesting structures, all of which are functional. Rai water and surface water run-offs from the storm water drain are filtered and discharged into the harvesting pits. The capacity of the system is adequate to compensate for the 40 KLD water drawn from the ground water regime.

9.8 Green belt development

9.8.1 Proposed Plantation

Available area within the premises has been covered by plantation.

9.9 Occupational Health & Safety

9.9.1 Organizational Setup

The EHS Cell has displayed posters to highlight the safety measures to be followed in different areas. Training courses are organized regularly to educate the workers about the importance and procedures of safety measures. Posters indicating the list of toxic substances, their tolerance limits, effects, and first-aid measures have also be displayed in various plants and sections. Fire hydrants has been provided in all the sections and areas of the plants. Protective boots, aprons, garments, gloves, earplugs, etc. are made available, in sufficient numbers, in all sections of the plant.

A First Aid Post has been located within the factory for attending the cases of minor injuries. The first-aid-post shall be manned by a qualified doctor, Pharmacists and dressers for attending to minor injuries and health problems of the employees. Proper medical and hospitalization facilities are made available through referral clinics and hospitals at Silvassa.

All employees shall be subjected to regular health check-up. The schedule for health monitoring has been defined in **Chapter 5**.

9.9.2 Potential Hazards

People at work during construction/operation phase can encounter various environmental stresses. These stresses can be categorized into the following four basic classes

Chemical	: Exposure to fumes, dusts, vapours, liquid etc.
Physical	: Noise, vibration, heat, light, ionizing radiation etc.
Biological	: Insects, mites, yeast, bacteria, viruses, etc.
Ergonomic	: Man-machine interaction.

9.9.3 Hazard Control

After assessment of nature and quantum of occupational hazards arising from physical, environmental and ergonomic causes, the next step shall be to control such hazards. Occupational hazards in operational stage are controlled by :

- Taking due care in design, layout, procurement of machines, equipment, spare parts.
- Adopting safe working procedure for operation and maintenance and use of proper tools.
- Maintaining safe and comfortable working environment and good housekeeping.
- Ensuring safety awareness among employees by imparting regular training and other safety incentive programmes.
- Avoidance of human errors by proper supervision.
- Personal protection i.e. use of proper safety appliances.

Hazards during construction phase are also controlled in the same manner, e.g.,

- Adopting safe working practices for excavation, construction of buildings, foundation of equipment etc.
- Erection of machinery using cranes, forklifts of proper capacity using experienced crane operators under supervision of qualified and experienced supervisors. The authorities of the project want to get this job done by experienced consultants and contractors of proven capability.
- Maintaining safe working environment and proper housekeeping.
- Ensuring safety awareness amongst workmen.
- Proper supervision of jobs by experienced engineers and supervisors for avoidance of human errors.
- Use of proper personal protective equipment for different jobs e.g.
  - ⇒ Hand shields and eye goggles for welding.
  - ⇒ Safety belts for jobs at height.
  - ⇒ Use of helmets, safety shoes, etc.
- Adherence to statutory rules and regulations regarding workers' safety, electricity connections, etc.
- Adoption of safety work permit and authorization for various types of work e.g., hot work, cold work, excavation, use of electricity, radiography permit etc. to avoid any unsafe act.

9.9.4 Training and Communication

Basic occupational training program and specialty courses are provided, as needed, to ensure that workers are oriented to the specific hazards of individual work assignments. Training is generally be provided to management, supervisors, workers, and occasional visitors to areas of risks and hazards.

Additionally, the following specific trainings and communications are provided.

- OHS orientation training is provided to all employees to ensure they are apprised of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate.
- A visitor orientation and control program has been established to ensure visitors do not enter hazard areas unescorted.
- It is ensured that workers and contractors, prior to commencement of new assignments, have received adequate training and information about potential work hazards and protective measures. The training should adequately cover the following:
  - Knowledge of materials, equipment, and tools
  - Known hazards in the operations and how they are controlled
  - Potential risks associated with their activities
  - Wearing and use of protective equipment and clothing
- Workers with rescue and first-aid duties have been provided with dedicated training so as not to inadvertently aggravate exposures and health hazards to themselves or their coworkers.

Hazardous areas, installations, materials, safety measures, and emergency exits, etc. have been marked appropriately. The signages are in accordance with international standards and easily understood by workers, visitors and the general public as appropriate.

9.9.5 Safety & Fire Fighting

Organization & Functions

A suitable Safety and Fire-fighting Cell, under Manager (Fire & Safety), has been established within the proposed project since the very beginning of the construction phase, for taking suitable measures for implementation and observation of safe procedures for prevention and control of accidents and disasters. Main functions of the department are as follows:

- Inspection of different sections of the plant and imparting advice regarding unsafe practices
- Procurement and maintenance of personal protection and fire-fighting equipment
- Organizing safety motivation programs through competitions on safety and housekeeping and through posters, cartoons, boards and pamphlets
- Organizing safety and fire-fighting training programs to cover all employees, including contractors' workforce
- Implementation of Safety Work Permit system
- Organizing safety auditing through third parties
- Investigation of causes of accidents and recommending preventive/remedial measures
- Maintaining safety and accident statistics
- Actions for compliance with statutory safety and fire-fighting requirements

- Conducting work zone environmental surveys.

9.9.6 Codes and Standards

The fire protection system has been designed in accordance with the requirements of the National Fire Protection Association. The national codes and standards have been applied to materials, fabrication, and testing of the equipment. Within all installations, the threading on all hose and hose equipment conform to a single plant standard. Standards for all similar items, i.e., hydrant wrenches, hose type, etc., also are uniform.

9.9.7 Fire Fighting Facilities

A comprehensive fire protection system covering all risk areas of the plant has been provided. The fire protection system consists of the following:

- Fire water Tank
- Fire water pumps.
- Hydrant system.
- Spray system.
- Sprinkler system.
- Foam system.
- Fire alarm system.
- CO2 system.
- Portable and mobile fire extinguishers.

All the systems have been designed in such a way to make the system complete and acceptable to Tariff Advisory Committee for Insurance Companies of India and enable the project proponent to obtain maximum rebate on insurance premium available.

9.9.8 OH&S Monitoring

Conformity to the following requirements have been ensured during construction and operation of the project.

- All employees are examined once in a year as a part of their annual Health Checkups.
- During the examination they are counseled on communicable & non-communicable disease control, balanced diet, healthy heart & first aid.
- If any deviation is noticed in their medical records, specialist advice is sought & necessary treatment is given.
- An annual medical surveillance plan of such employees is maintained, and they are followed up with necessary lifestyle modification measures, if required.
- In addition, we are also carrying out identification of various factors adversely affecting working environment and impacting the health of workers for necessary corrective action.

Chapter 10. Summary and Conclusion

10.1 Summary

Summary of the EIA report as per Appendix IIIA of the EIA Notification, 2006, has been covered under the following Section.

- Introduction
- Process description
- Description of the Environment
- Anticipated Environmental Impacts & Mitigation Measures
- Analysis of Alternatives (Technology & Site)
- Environmental Monitoring Program
- Project Benefits
- Environment Management Plan

Salient features of the project are as follows:

Table 10-1: Salient features of the proposed project

S. No.	Items	Details
xv.	Project Name	Implementation of ASRS Project at Silvassa Detergents Factory of the Hindustan Unilever Limited
xvi.	Location	Khasra No, 807/4, 811, Village Sarora, Tehsil Tilda, Distt. Raipur, Chhattisgarh
xvii.	Type of Project	Construction and operation of automated handling system (storage and retrieval) of finished products
xviii.	Total Plot area	6.88 hectares
xix.	Existing capacity	**Unit 1:** Synthetic detergent, 180,000 TPA **Unit 2:** Detergent bar: 75,000 TPA Detergent powder: 75,000 TPA
xx.	Proposed capacity	Automated Storage and Retrieval System (ASRS) storage capacity of 7392 Pallets.
xxi.	Raw materials	**Unit 1:** Synthetic detergent, 180,000 TPA **Unit 2:** Detergent bar: 75,000 TPA Detergent powder: 75,000 TPA
xxii.	Nature of the Project	The proposed project is for creation and operation of automatic storage and retrieval facilities for the packed product bars and powders. The entire operation will be controlled from a centrally located control room.
xxiii.	Air pollution control facilities	The Proposed ASRS does not involve process or fugitive emissions. Adequate air pollution control facilities have been provided in the existing operations.
xxiv.	Effluent Management Facilities	The Proposed ASRS does not involve generation of wastewater. Process wastewater generated from the

S. No.	Items	Details
		existing plants is treated in the ETP, and the treated water is utilized quantitatively for plantation. The plants are being operated on zero effluent discharge basis.
xxv.	Sewage management facility	Treated in the ETP, and the treated water is utilized quantitatively for plantation.
xxvi.	Solid waste management facility	Bio-degradable wastes from the existing facilities are segregated and composted, and the compost together with sludge from the STP is utilized for green belt and plantation within premises. Non-biodegradable and non-hazardous wastes are disposed stored within covered and enclosed shed and disposed as scrap.
xxvii.	Hazardous waste management facility	The Proposed ASR System does not involve generation of wastewater. Used batteries, used oil and other hazardous wastes generated in the existing plants are disposed through approved TDSF as per applicable rules.
xviii.	Green belt	Approx unutilized area in the premises shall be covered under green belt and plantation.

10.2 Introduction

The Environmental Impact Assessment (EIA) report for Hindustan Unilever Limited's (HUL) Automated Storage and Retrieval System (ASRS) at the Silvassa Detergents Factory examines environmental, social, and economic impacts. The project aims to optimize storage, handling, and dispatch of detergent products through automation without altering production capacity or product range. Located near a Wildlife Sanctuary, the study focuses on minimizing ecological risks and ensuring compliance with environmental laws such as the Water (1974), Air (1981), and Environment Protection (1986) Acts. The ASRS will handle 7,392 pallets with a standard 1200m x 1200m size, utilizing centralized digital control to improve efficiency.

The EIA assesses potential environmental impacts, including air and water pollution, noise emissions, and biodiversity threats in the eco-sensitive zone. Proposed mitigation measures include dust suppression systems, wastewater treatment, noise barriers, and controlled material handling to prevent ecosystem disturbances. A long-term environmental monitoring plan will ensure regulatory compliance. Economically, the project enhances logistics, supply chain management, and regional employment opportunities. The factory, a key contributor to Silvassa's industrial sector, will benefit from streamlined operations, reduced manual handling, and improved safety measures. With risk assessments, disaster management strategies, and sustainability practices.

10.3 Process Description

The Automated Storage and Retrieval System (ASRS) project at Hindustan Unilever Limited's (HUL) Silvassa Detergents Factory is a significant step towards modernizing its warehousing operations. The project aims to enhance efficiency, reduce manual labor, and optimize storage capacity. The ASRS will be integrated within the existing facility, featuring automated storage

racks, conveyors, robotic arms, and a centralized control system to streamline material handling and inventory management.

Located in Village Dapada, Silvassa, the factory spans 6.88 hectares and currently has a production capacity of 180,000 TPA for synthetic detergents, 75,000 TPA for detergent bars, and 75,000 TPA for detergent powder. The ASRS will add a storage capacity of 7,392 pallets, facilitating better space utilization and increasing throughput. One of the key drivers for implementing ASRS is the rising demand for detergents, driven by population growth, urbanization, and increasing hygiene awareness. The system will ensure faster and more accurate order fulfilment, reducing delays and operational inefficiencies. It will also help lower labour costs, improve workplace safety, and enable real-time inventory tracking. Environmentally, the project aligns with HUL's sustainability goals. The ASRS will not produce emissions, wastewater, or hazardous waste. Existing wastewater treatment facilities ensure zero effluent discharge, with treated water reused for landscaping. Solid and hazardous waste management systems are in place, ensuring responsible disposal.

The factory is well-connected by road to NH-848A and SH-73, with the nearest railway station at Vapi (21 km) and Surat Airport (140 km). The site is near the Dadra and Nagar Haveli Wildlife Sanctuary, but no adverse environmental impact is anticipated due to the non-polluting nature of the ASRS. With an estimated capital investment of ₹295 crores, the project is expected to improve supply chain resilience, enhance operational efficiency, and support HUL's long-term growth strategy. While no additional direct workforce is required, the project will create indirect employment opportunities in logistics and support sectors.

10.4 Description of the Environment

At the Silvassa Detergents Factory assesses environmental conditions within a 10 km radius. Conducted from October to December 2024, the study examined land use, soil quality, hydrology, climate, air and water quality, noise levels, ecology & biodiversity, and socio-economic aspects. The study area spans 333.78 sq. km, primarily consisting of agricultural land (41.07%) and forests (37.58%), along with settlements, water bodies, and wasteland. The project site, designated for industrial use, features clay-based, fertile soil, making it suitable for afforestation. The region's topography includes flat plains and hilly terrain, with the Damanganga River serving as the main drainage system. Groundwater resources are categorized as safe, with an annual recharge of 59.37 MCM. Silvassa has a tropical climate with high humidity, heavy monsoon rainfall (1,243.4 mm annually), and temperatures ranging from 11.5°C to 41.3°C. The dominant wind direction is northeast to southwest. Air quality monitoring at nine locations showed that PM10 levels were nearing the permissible limit (max 74 $\mu g/m^3$), while PM2.5, SO_2, NO_2, and CO levels remained within National Ambient Air Quality Standards (NAAQS). Noise levels at industrial and residential areas were within permissible limits.

Ecology and biodiversity studies identified the presence of diverse flora and fauna, including protected species within the Dadra and Nagar Haveli Wildlife Sanctuary. While the project site has limited vegetation, care must be taken to minimize disruptions to local wildlife. The socio-economic study revealed that the region has a mix of industrial and agricultural employment, with a significant labor force engaged in nearby industries. The ASRS project is expected to boost local employment and economic activity while requiring measures to minimize its environmental footprint.

10.5 Anticipated Environmental Impacts & Mitigation Measures

Silvassa Detergents Factory evaluates potential environmental impacts and mitigation measures. The study assesses land use, water, air, noise, biodiversity, and socio-economic aspects, considering the factory's proximity to the Dadra and Nagar Haveli Wildlife Sanctuary. The project, focused on automation within an existing industrial site, is not expected to cause significant adverse effects on land or water quality. The factory follows a zero-liquid discharge policy, ensuring treated wastewater is reused. No significant change in land use is anticipated, as raw materials are stored and transported in enclosed systems, preventing soil contamination.

Air quality assessments using AERMOD dispersion modeling confirm minimal impact on ambient air quality. Emission sources, mainly the boiler and DG sets, comply with Pollution Control Committee standards. The highest predicted 24-hour incremental ground-level concentrations (GLCs) of PM10, PM2.5, SO_2, NOx, and CO remain well within National Ambient Air Quality Standards (NAAQS). Seasonal averages indicate pollutant dispersion remains localized within 500 meters. Noise assessments show that factory operations do not exceed permissible limits. Noise barriers and acoustic enclosures help mitigate impacts, ensuring compliance with regulations. The project does not threaten local flora and fauna, and green cover will be increased from 25% to 33% to enhance ecological balance. The socio-economic assessment highlights positive impacts, including direct and indirect employment opportunities and contributions to the local and national economy. Since the workforce will be drawn largely from local communities, demographic changes are not expected. Overall, the report concludes that the ASRS Project will have no significant environmental impact if mitigation measures are effectively implemented. The project aligns with regulatory requirements, ensuring sustainable operations while minimizing ecological and environmental risks.

10.6 Analysis of Alternatives (Technology & Site)

Analysis of alternative technologies, including backup power systems, performance optimization, and cybersecurity. Employee safety training, data protection, and risk management strategies ensure operational efficiency. Regular evaluations and monitoring safeguard system integrity, reducing downtime, enhancing reliability, and ensuring business continuity.

10.7 Environmental Monitoring Program

Silvassa Detergents Factory will do monitoring of air, water, noise, soil, biodiversity, and human health to ensure compliance with statutory and corporate standards. The program aims to detect environmental changes, evaluate mitigation measures, and ensure resource conservation. Monitoring includes ambient air quality, groundwater sampling, noise levels, and biodiversity assessments. Occupational health checkups for employees are also scheduled. An EHS Cell oversees implementation, while NABL-accredited laboratories conduct environmental testing. The plan ensures early detection of issues, effective management, and sustainable project execution.

10.8 Project Benefit

The system optimizes space utilization, increases productivity, enhances inventory accuracy, and reduces operational costs while improving workplace safety. The report also discusses the growing demand for detergents in India, emphasizing the need for increased production capacity. The project will generate employment, both directly and indirectly, and contribute to government revenue through taxes. Additionally, HUL's CSR initiatives will support community development, education, healthcare, sanitation, and infrastructure, benefiting the local population while ensuring sustainable and efficient operations.

10.9 Environmental Management Plan

The Environmental Management Plan (EMP) for the ASRS Project at Silvassa Detergents Factory by Hindustan Unilever Limited is a comprehensive framework ensuring sustainable operations while minimizing environmental impacts. The Environmental Management System (EMS) integrates pollution control, resource conservation, biodiversity protection, and compliance with legal obligations. A dedicated Environmental, Health & Safety (EHS) Cell oversees environmental performance, ensuring mitigation measures are implemented effectively. Air quality management includes dust suppression, covered transport, and emission control during construction, while operational measures involve closed-circuit material handling, tall stacks for flue gas dispersion, and PUC-certified vehicles. Noise pollution is managed through regulated construction activities, proper equipment maintenance, protective gear for workers, and operational noise barriers like a green belt and an acoustic wall near the wildlife sanctuary. The factory follows a zero-liquid discharge policy, treating industrial and domestic wastewater through primary, secondary, and tertiary processes in an Effluent Treatment Plant (ETP). Treated water is reused for gardening and plantation. Rainwater harvesting structures, including seven recharge ponds and surface runoff collection, further support water sustainability.

Waste management follows strict segregation, with biodegradable waste composted for green belt maintenance and non-biodegradable waste sent to recyclers. Hazardous waste, including process residues, is stored safely and disposed of per Hazardous Waste Rules, 2016. Occupational health and safety (OHS) measures ensure a safe working environment through hazard identification, protective equipment, fire-fighting systems, regular medical checkups, and worker training. Safety and emergency response systems, including firefighting facilities and statutory compliance, are reinforced with awareness programs, supervision, and audits. The EMP integrates air, water, waste, and OHS measures to ensure compliance, sustainability, and environmental stewardship, making the factory an environmentally responsible industrial facility.

10.10 Conclusion

The Environmental Impact Assessment (EIA) for Hindustan Unilever Limited's (HUL) Automated Storage and Retrieval System (ASRS) at the Silvassa Detergents Factory confirms that the project will modernize warehousing operations without altering production capacity or causing significant environmental impact. By integrating automation, the ASRS will optimize storage, handling, and dispatch processes, improving efficiency and workplace safety while reducing manual labor. The study demonstrates that the project is environmentally sustainable, as it does not produce emissions, wastewater, or hazardous waste. The factory follows a strict zero-liquid discharge policy, ensuring treated water is reused for landscaping. Air dispersion modeling confirms that emissions from the facility remain well within National Ambient Air Quality Standards (NAAQS), and noise levels comply with regulatory limits. Biodiversity conservation measures, including increasing green cover from 25% to 33%, will help maintain ecological balance, particularly given the factory's proximity to the Dadra and Nagar Haveli Wildlife Sanctuary. Mitigation strategies such as dust suppression, controlled material handling, and noise barriers will further minimize any potential impact.

From a socio-economic perspective, the ₹295 crore investment in the ASRS project will strengthen HUL's supply chain and logistics efficiency, reducing delays and improving inventory accuracy. While no additional direct workforce is required, the project will generate indirect employment opportunities in logistics and support services. HUL's corporate social responsibility

(CSR) initiatives will continue benefiting the local community through education, healthcare, and infrastructure development.

In conclusion, the ASRS project aligns with HUL's sustainability goals and regulatory compliance. With effective environmental management and monitoring, the project will enhance operational efficiency while ensuring minimal ecological impact, contributing to the long-term industrial growth and economic development of the Silvassa region.

Chapter 11. Disclosure of Consultants Engaged

11.1 Consultant Organization

Aseries Envirotek India Pvt. Ltd. (AEIPL), is an Environmental Consultancy Organization, accredited by National Accreditation Board for Education and Training (Quality Council of India) as a **Category-A** EIA Consultant Organization under the QCI-NABET Scheme for Accreditation for preparing EIA_EMP report. AEIPL has been accredited, vide Accreditation Certificate No. NABET/EIA/2225/RA 0275, valid up to November 09, 2025 (**Annexure),** for the following Sectors:

- Mining of minerals including opencast / underground mining (cat. A),
- River Valley projects (Cat. B),
- Thermal power plants (Cat. A),
- Cement Plants (Cat. A),
- Chemical fertilizers (Cat. A),
- Oil & gas transportation pipeline (crude and refinery/ petrochemical products), passing through national parks/ sanctuaries/coral reefs / ecologically sensitive areas including LNG terminal (Cat. A),
- Building and construction projects (Cat. B),
- Townships and Area development projects (Cat. B), and
- Electrical and Electronic including component industry (Cat. A)

AEIPL aims to provide best solutions related to Environment Impact Assessment (EIA), Environment Management Plan (EMP) and E-waste Management Services. AEIPL has a team of qualified and highly experienced team of in-house and empaneled experts, supported by a team of young, qualified, and experienced personnel, working in-house in conjunction with various experts across the globe. AEIPL adopts a multidisciplinary approach bringing in place with full complement of core skills & knowledge to develop optimum solutions of complex issues in built and natural environments.

AEIPL was established on 14th November 2017 as a private limited company under the Companies Act, 2013, having its registered office at Khasra No. 973 (Part), Sainik Vihar Phase-II, Near CRPF Camp Gate No. 2, Bijnaur, Sarojini Nagar, Lucknow (UP)-226008 and corporate office address is B-32, 2nd Floor, Sector-6, Noida, Gautam Buddha Nagar (UP) -201301. AEIPL is an ISO 9001:2015 certified Environmental Consultant Organization.

AEIPL is a leading consultancy company offering specialized strategic services all over India in the areas of Environmental (EIA & EMP), Social Impact Assessments, E-Waste Management Services. We have a robust technological background consisting of environmental scientists, environmental engineers, hydro-geologists, geologists, sociologists, and biologist.

11.2 Disclosure of consultants

11.2.1 Declaration by Experts contributing to the EIA

I, hereby, certify that I was a part of the EIA team in the following capacity that developed the EIA Report for Implementation of ASRS Project at Silvassa Detergents Factory, Hindustan Unilever Limited, Survey No.151/1/1 Village: Dapada, Khanvel Road, Silvassa Daman and Diu, Dadra Nagar Haveli.

Name: Shashi Bhushan Sinha.

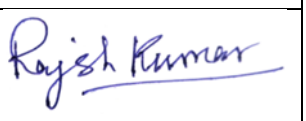
Signature and Date: 

Period of involvement: October 2024 to till date

Contact information: Mobile – 9810899563: E-mail – sinhasb@gmail.com

Team Member: Amar Singh Yadav

Functional area experts:

S.N.	Functional areas	Name of the expert(s)	Involvement (Period & tasks**)	Signature & date
1	AP	Shashi Bhushan Sinha	October to December, 2024 Selection of sampling locations; Review and analysis of AQ data; Identification and assessment of impact; Formulation of mitigation measures.	
2	WP	Shashi Bhushan Sinha	October to December, 2024 Selection of sampling locations; Review and analysis of test reports; Identification and assessment of impact; Formulation of mitigation measures.	
		FAA: Rahul Singh Kushwaha	October to December, 2024 Assisted the FAE during review & analysis of test reports, identification & assessment of impact and formulation of mitigation measures.	
3	SHW	Shashi Bhushan Sinha	October to December, 2024 Identification and assessment of impact; Formulation of mitigation measures.	
		TM: Dr. Rajesh Kumar Srivastava	October to December, 2024 Assisted the FAE during Identification and assessment of	

			impact; Formulation of mitigation measures.	
4	SE	Amar Singh Yadav	October to December, 2024 Collection of baseline data from secondary sources and through field visits and group discussion; impact assessment, preparation of CER scheme, mitigation measures, etc.	
		Preetika Chopra	October to December, 2024 Assisted the FAE during collection of baseline data from secondary sources and through field visits and group discussion; impact assessment, preparation of CER scheme, mitigation measures, etc.	
5	EB	Dr. Rajendra Kumar Pandey	October to December, 2024 Collection of baseline data from secondary sources and through field observations and interviews; impact assessment, green belt and plantation, mitigation measures, etc.	
		FAA: Rahul Singh Kushwaha	October to December, 2024 Assisted the FAE during collection of baseline data from secondary sources; impact assessment, green belt and plantation, mitigation measures, etc.	
6	HG	Omprakash Yadav	October to December, 2024 Collection of baseline data from secondary sources; baseline status report, impact assessment, etc.	
7	GEO	Omprakash Yadav	October to December, 2024 Collection of baseline data from secondary sources; baseline status report, impact assessment, etc.	
8	SC	Garima Srivastava	October to December, 2024 Collection of baseline data from secondary sources; baseline status report, impact assessment, etc.	

9	AQ	Shashi Bhushan Sinha	October to December, 2024 Review and analysis of Met data; Study of control measures, identification of emission sources and assessment of impact; Formulation of mitigation measures.	
10	NV	Dr. Vivek Kumar Tiwari	October to December, 2024 Selection of sampling locations; Review and analysis of test reports; Identification and assessment of impact; Formulation of mitigation measures.	
11	LU	Satpal S Raghuvanshi	October to December, 2024 Collection of baseline data from secondary sources; baseline status report, impact assessment, etc.	
12	RH	Anil L choumal	October to December, 2024 Study of project details, hazard identification, risk analysis, ERDMP, safety & OH&S measures, etc.	
		TM: Dr. Vivek Kumar Tiwari	October to December, 2024 Assisting the FAE in hazard identification, risk analysis, ERDMP, safety & OH&S measures, etc.	

11.2.2 Declaration by the Head of the ACO

I, Amar Singh Yadav, hereby, confirm that the above-mentioned experts prepared the EIA of EIA Report for Implementation of ASRS Project ATA Silvassa Detergents Factory, Hindustan Unilever Limited, Survey No.151/1/1 Village: Dapada, Khanvel Road, Silvassa Daman and Diu and Dadra and Nagar Haveli. I also confirm that the consultant organization shall be fully accountable for any mis-leading information mentioned in this statement.

Signature: 

Name: Amar Singh Yadav

Designation: Founder & CEO

Name of the ACO: Aseries Envirotek India Pvt. Ltd.

NABET Certificate No. & Issue Date: NABET/EIA/2225/RA 0275 dated 20-0202023

Annexure-I

CONSENT TO OPERATE (I)

Pollution Control Committee
Daman & Diu and Dadra Nagar Haveli
1 st Floor, Udyog Bhavan, Bhenslore, Nani Daman

CATEGORY – ORANGE

Consolidated Consent and Authorization - Renewal
{Under the provision/ Rules of below mentioned Environmental Acts}

Consent & Authorization No. PCC/DDD/O-1563/WA/AA/DP/00-01/907742/
Date : 20/08/2022

In exercise of the powers delegated to the Pollution Control Committee, Daman, Diu and Dadra & Nagar Haveli by the Central Pollution Control Board vide notification No.B-12015/7/92 published in the gazette of India No.746 dated 26/11/1992 and administration order No.45/1(1)/92-F&E/4700 dated 8/2/1993, the consent is hereby granted under Section 25, Sub section (1) & (2) of Water (Prevention & Control of Pollution) Amended Act, 1988 and under Section 21 of Air (Prevention & Control of Pollution) Act, 1981 and Authorization in Form 2 under Rule 6.(2) of the Hazardous and Other Wastes (Management and Transboundary) Rules, 2016 framed under the Environment (Protection) Act, 1986 (if any) and orders made there under to manufacture below mentioned products at the below mentioned address subjected to the following terms and conditions.

Consent is granted to:
M/s.M/S HINDUSTAN UNILEVER LIMITED
151/1/1, DAPADA VILLAGE, KHANVEL ROAD, SILVASSA

1. The Consent to **Renewal** is granted for a period upto 30/06/2026 .

2. The Consent is valid for the manufacture of following items:

Sr. No.	Product	Maximum Production Quantity
1	Synthetic Detergent (No Other Items)	180000 TPA

3. Installation Specific Conditions:

3.1The unit shall obtain NOC from CGWA for groundwater withdrawal.

3.2 The unit shall manufacture products through formulation only.

3.3 The unit shall dispose hazardous waste through authorized recyclers/ re-processors/TSDF

3.4 The unit shall submit duly signed and certified Environmental Audit report in prescribed format to PCC, DNH & DD.

4. Conditions under the Water Act:

4.1 The daily water consumption and wastewater generation is as under :-

Sr. No.	Purpose	Consumption(Killo litter/day)
1	Domestic	21.16
2	Mfg. Process	11.83

Sr. No.	Generation	Waste Water Generation Quantity
1	Domestic	17.62
2	Mfg. Process	9.84

4.2 Trade Effluent: If any the quality of the treated effluent as per PCC norms mentioned below.

(1)	**pH**	**Between**	**6.5-9.0**
(2)	Suspended Solids	Not to exceed	100 mg/L.
(3)	BOD, 3 days, 27°C	Not to exceed	30 mg/L.
(4)	C.O.D.	Not to exceed	250 mg/L.
(5)	Oil & Grease	Not to exceed	10 mg/L.

4.3 Trade Effluent Disposal Outlet Conditions: Industry shall not discharge treated effluent outside factory premises. The treated effluent shall be reused/recycled within the factory premises.

4.4 The unit shall operate the Effluent treatment plant efficiently to treat the generated tread effluent from manufacturing process to meet the PCC Standard.

4.5 The unit shall submit monthly readings of energy meter and flow meter (both inlet & outlet) of the ETP to the PCC DD & DNH.

4.6 Sewage Treatment - Domestic effluent shall be disposed off through septic tank/soak pit system to conform to the following standards:

BOD (5 days at 200 C)	less than 20 mg/l
Suspended solids	less than 30 mg/l
Residual Chlorine	minimum 0.5 mg/l

5. Conditions under Air Act:

5.1 The following shall be used as standards for emission causing installations:

Sr. No.	Stack Attached to	Capacity	Fuel to be used	Quantity	Stack height in Meter

1	DG Set	750 KVA	Diesel	50 liters/hour	12
2	DG Set	750 KVA	Diesel	50 liters/hour	12
3	DG Set	750 KVA	Diesel	50 liters/hour	12
4	Boiler	850 Kg/Hr	Diesel	50 liters/hour	31.5
5	Boiler	850 Kg/Hr	Diesel	50 liters/hour	31.5
6	Boiler	1500 Kg/Hr	Other Agro based briqued	6 m3/day	31.5

5.2 The flue gas emission through stack/vent attached to Boiler/Furnace/Heater/D.G Set/reactors/process/vessels etc, shall conform to the following standards:

Parameter	Permissible Limit
Particulate Matter	150 mg/NM3
SO2	40 mg/NM3
NOx	25mg/N M3

5.3 The concentration of the following parameters in the ambient air within the premises of the industry shall not exceed the limits specified hereunder:

Parameter	**Permissible Limit**
Particulate Matter (size less than 10um) or PM10 ug/m3	100 (24 hours average)
Particulate Matter (size less than2.5um) or PM2.5 ug/m3	60 (24 hours average)
Oxides of Nitrogen (NO2) ug/m3	80 (24 hours average)
Oxides of Sulphur (SO2) ug/m3	80 (24 hours average)

5.4 The applicant shall provide ports in the chimney/stack and facilities such as ladder, platform etc. as per requirements for monitoring the air emissions and the same shall be open for inspection and use by the committees staff. The chimney/stacks attached to various source of emission shall be designated by number such as S-1, S-2 etc and these shall be painted/ displayed to facilitate identification.

5.5 There shall be no emission other than the permitted installation and the quarterly stack monitoring report from recognized laboratory shall be submitted along with the renewal application.

5.6 The above consented DG Set is permitted for standby arrangement only and not as a captive power generation unit.

5.7 Adequate mufflers shall be provided to the installations, so that the ambient noise level shall not exceed the limits prescribed below;

Day time	6 a.m. to 9 p.m.	75 dB(A) Leq.
Night time	9 p.m. to 6 a.m.	70 dB(A) Leq.

6. Authorization for Handling Hazardous and Other Wastes

M/s. M/S HINDUSTAN UNILEVER LIMITED is hereby granted an authorization to operate a facility for handling following hazardous wastes for generation, collection, storage and transport/ recycling/ preprocessing of the hazardous or other wastes or both on the premises situated at 151/1/1, DAPADA VILLAGE, KHANVEL ROAD, SILVASSA.

S.No.	Category of Hazardous Waste as per the schedules I, II and III of these rules	Authorized mode of disposal or recycling or utilization or co – processing, etc.	Quantity
1	21.1 Process wastes, residues and sludges, Schedule I	Common Incineration - TSDF	6.268 T/Annum
2	33.2 Contaminated cotton rags or other cleaning materials, Schedule I	Common Incineration - TSDF	1.272 T/Annum

Conditions of Authorization

6.1 The authorized person shall comply with the provisions of the Environment (Protection) Act, 1986, and H&OW (M&TBM) Rules, 2016 and amendments made there under. In case of failure to comply with any of the rules, the authorization and consent order issued under the Water Act, 1974 and the Air Act, 1981 shall be revoked without any notice.

6.2 The person authorized shall not rent, lend, sell, transfer, or otherwise transport the hazardous and other wastes except what is permitted through this authorization.

6.3 The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;

6.4 The applicant shall manage Hazardous and other wastes in an environmentally sound manner so as not to cause damage to any surrounding environment.

6.5 Packaging, labeling, and transport of hazardous wastes shall be in accordance with the provisions of the rules made under the Motor Vehicles Act, 1988 and other guidelines issued from time to time.

6.6 The Hazardous waste containers shall be provided with a general label as given in Form 8 of H&OW (M&TBM) Rules, 2016 and other amendments thereof.

6.7 The applicant shall provide the transporter (of hazardous wastes) with seven copies of the manifest (FORM 10) as per the colour codes. The transporter shall give a copy of the manifest signed and dated to the applicant and retail the remaining copies to be used as prescribed in sub-rule (2), (3), (4), (5) and (6) of Rule

19.

6.8 Import and Export of hazardous wastes for dumping and disposal is not permitted for the UT's of Daman & Diu and Dadra Nagar Haveli.

6.9 This authorization is not valid for importing Hazardous Wastes.

6.10 The applicant is not permitted to export Hazardous Wastes without the prior permission of Government of India.

6.11 The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty"

6.12 It is the duty of the authorized person to take prior permission of the Pollution Control Committee DD & DNH to close down the facility.

6.13 The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.

6.14 The record of consumption and fate of the imported hazardous and other wastes shall be maintained.

6.15 The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.

6.16 The importer/exporter shall bear the cost of import or export and mitigation of damages if any.

6.17 Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time are liable to this authorization.

6.18 Annual return shall be filed by June 30th for the period ensuring 31st March of the year.

6.19 The applicant is permitted to sell the hazardous wastes or material only to those who obtained authorization from the State Pollution Control Boards or Pollution Control Committees in the respective states to use the said material as raw material. The documents in this regard shall be submitted to the Pollution Control Committee before selling the material.

6.20 The applicant shall maintain records of collection, reception, treatment, transport, storage, and disposal of Hazardous Wastes in FORM 3 of H&OW (M&TBM) Rules, 2016 amendments thereof.

6.21 The applicant shall inform the Pollution Control Committees in case of an accident at the facility or on the disposal site or during transportation of Hazardous Wastes in FORM 11 of H&OW (M&TBM) Rules, 2016 and amendments thereof.

6.22 The movement of hazardous wastes from or to the country shall be considered illegal (i) if it is without prior permission of the Central Government; or (ii) if the permission has been obtained through falsification, mis-representation or fraud; or (iii) if it does not conform to the shipping details provided in the document.

6.23 The applicant shall be liable (i) for damage caused to the environment resulting due to improper handling and disposal of hazardous and other wastes, (ii) to reinstate or restore damaged caused to the environment resulting due to the environment & (iii) to pay a fine as levied by Pollution Control Committee DD & DNH for any violation of the provisions under H&OW (M&TBM) Rules, 2016 and amendments thereof.

6.24 The applicant shall become the member of the CHWTSDF within thirty days from the date of the issue and submit the copy of the same to the PCC, DD & DNH, if fail to comply the same the authorization shall be revoked.

6.26 The industry shall dispose their waste to CHWTSDF facility only.

7. GENERAL CONDITIONS: -

7.1 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to the Pollution Control Committee.

7.2 If at any time, it is observed that effluent fails to confirm to the limits prescribed or any unauthorized change in personnel, equipment or working conditions, as mentioned in the application then, the CC & A will be withdrawn prohibiting the industry to manufacture either existing or new products.

7.3 The applicant shall submit separate application for obtaining Renewal of CC & A under the Water Act, 1974, the Air Act, 1981 and H&OW (M&TBM) Rules, 2016 before 30 days of expiry of validity period of this CC & A.

7.4 The industry shall comply with Water (Prevention and Control of Pollution) Cess Act, 1977, and submit monthly Cess returns as contemplated in the Act, in the prescribed form.

7.5 The applicant shall comply with the notified standards under Environment (Protection) Act, 1986.

7.6 This consent is further subject to green up the surrounding area inside and outside the unit/factory.

7.7 In case of change process/installation, which is likely to have discharge/an emission a separate application shall be made.

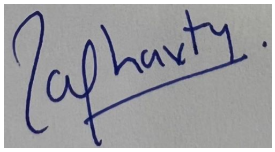
7.8 In case of failure to comply with any of the consent & authorization conditions, the CC & A order issue to you stands automatically revoked without any notice on this behalf.

7.9 The authorization or its renewal shall be produced during inspection at the request of an officer authorized by the Pollution Control Committee DD & DNH.

7.10 On the expiry of every 2 years, the unit/entrepreneur has to submit authenticate certificate to the PCC informing that there is no change in products/ process/ production capacity/ H&OW generation/ any other installation etc.

7.11 The unit shall submit Environmental Statement Form - V by the 30th day of September every year, duly certified in prescribed format to the PCC, DNH_DD.

7.12 The unit shall submit yearly Environment Audit Report duly certified to the PCC, DNH_DD.



23/08/2022

Member Secretary
Pollution Control Committee
Daman, Diu and Dadra & Nagar Haveli
Daman

Annexure-II

CONSENT TO OPERATE (II)

Pollution Control Committee
Daman & Diu and Dadra Nagar Haveli
1 st Floor, Udyog Bhavan, Bhenslore, Nani Daman

CATEGORY – ORANGE

Consolidated Consent and Authorization - Renewal
{Under the provision/ Rules of below mentioned Environmental Acts}

Consent & Authorization No. PCC/DDD/O-2308/WA/AA/DP/08-09/909149/
Date : 02/08/2022

In exercise of the powers delegated to the Pollution Control Committee, Daman, Diu and Dadra & Nagar Haveli by the Central Pollution Control Board vide notification No.B-12015/7/92 published in the gazette of India No.746 dated 26/11/1992 and administration order No.45/1(1)/92-F&E/4700 dated 8/2/1993, the consent is hereby granted under Section 25, Sub section (1) & (2) of Water (Prevention & Control of Pollution) Amended Act, 1988 and under Section 21 of Air (Prevention & Control of Pollution) Act, 1981 and Authorization in Form 2 under Rule 6.(2) of the Hazardous and Other Wastes (Management and Transboundary) Rules, 2016 framed under the Environment (Protection) Act, 1986 (if any) and orders made there under to manufacture below mentioned products at the below mentioned address subjected to the following terms and conditions.

Consent is granted to:
M/s.M/S HINDUSTAN UNILEVER LIMITED
151/1/1, DAPADA VILLAGE, KHANVEL ROAD, SILVASSA

1. The Consent to **Renewal** is granted for a period upto 30/06/2026 .

2. The Consent is valid for the manufacture of following items:

Sr. No.	Product	Maximum Production Quantity
1	Detergent Bar Plant	75000 MT/Year
2	Powder Plant	75000 MT/Year

3. Installation Specific Conditions:

3.1The unit shall submit Environmental Audit Report duly certified in prescribed format.

3.2 The unit shall submit NOC from Central Ground Water Authority (CGWA) for using ground water.

3.3 The unit shall manufacture product through formulation only.

3.4 The treated effluent shall be used entirely within the process only.

4. Conditions under the Water Act:

4.1 The daily water consumption and wastewater generation is as under :-

Sr. No.	Purpose	Consumption(Killo litter/day)
1	Domestic	21.16
2	Mfg. Process	11.83

Sr. No.	Generation	Waste Water Generation Quantity
1	Domestic	17.62
2	Mfg. Process	9.84

4.2 Trade Effluent: If any the quality of the treated effluent as per PCC norms mentioned below.

(1)	**pH**	**Between**	**6.5-9.0**
(2)	Suspended Solids	Not to exceed	100 mg/L.
(3)	BOD, 3 days, 27°C	Not to exceed	30 mg/L.
(4)	C.O.D.	Not to exceed	250 mg/L.
(5)	Oil & Grease	Not to exceed	10 mg/L.

4.3 Trade Effluent Disposal Outlet Conditions: Industry shall not discharge treated effluent outside factory premises. The treated effluent shall be reused/recycled within the factory premises.

4.4 The unit shall operate the Effluent treatment plant efficiently to treat the generated tread effluent from manufacturing process to meet the PCC Standard.

4.5 The unit shall submit monthly readings of energy meter and flow meter (both inlet & outlet) of the ETP to the PCC DD & DNH.

4.6 Sewage Treatment - Domestic effluent shall be disposed off through septic tank/soak pit system to conform to the following standards:

BOD (5 days at 200 C)	less than 20 mg/l
Suspended solids	less than 30 mg/l
Residual Chlorine	minimum 0.5 mg/l

5. Conditions under Air Act:

5.1 The following shall be used as standards for emission causing installations:

Sr. No.	Stack Attached to	Capacity	Fuel to be used	Quantity	Stack height in Meter

5.2 The flue gas emission through stack/vent attached to Boiler/Furnace/Heater/D.G Set/reactors/process/vessels etc, shall conform to the following standards:

Parameter	Permissible Limit
Particulate Matter	150 mg/NM3
SO2	40 mg/NM3
NOx	25mg/N M3

5.3 The concentration of the following parameters in the ambient air within the premises of the industry shall not exceed the limits specified hereunder:

Parameter	**Permissible Limit**
Particulate Matter (size less than 10um) or PM10 ug/m3	100 (24 hours average)
Particulate Matter (size less than2.5um) or PM2.5 ug/m3	60 (24 hours average)
Oxides of Nitrogen (NO2) ug/m3	80 (24 hours average)
Oxides of Sulphur (SO2) ug/m3	80 (24 hours average)

5.4 The applicant shall provide ports in the chimney/stack and facilities such as ladder, platform etc. as per requirements for monitoring the air emissions and the same shall be open for inspection and use by the committees staff. The chimney/stacks attached to various source of emission shall be designated by number such as S-1, S-2 etc and these shall be painted/ displayed to facilitate identification.

5.5 There shall be no emission other than the permitted installation and the quarterly stack monitoring report from recognized laboratory shall be submitted along with the renewal application.

5.6 The above consented DG Set is permitted for standby arrangement only and not as a captive power generation unit.

5.7 Adequate mufflers shall be provided to the installations, so that the ambient noise level shall not exceed the limits prescribed below;

Day time	6 a.m. to 9 p.m.	75 dB(A) Leq.
Night time	9 p.m. to 6 a.m.	70 dB(A) Leq.

6. Authorization for Handling Hazardous and Other Wastes

M/s. M/S HINDUSTAN UNILEVER LIMITED is hereby granted an authorization to operate a facility for handling following hazardous wastes for generation, collection, storage and transport/ recycling/ preprocessing of the hazardous or other wastes or both on the premises situated at 151/1/1, DAPADA

VILLAGE, KHANVEL ROAD, SILVASSA.

S.No.	Category of Hazardous Waste as per the schedules I, II and III of these rules	Authorized mode of disposal or recycling or utilization or co – processing, etc.	Quantity
1	21.1 Process wastes, residues and sludges, Schedule I	Common Incineration - TSDF	4.178 T/Annum
2	33.2 Contaminated cotton rags or other cleaning materials, Schedule I	Common Incineration - TSDF	0.848 T/Annum

Conditions of Authorization

6.1 The authorized person shall comply with the provisions of the Environment (Protection) Act, 1986, and H&OW (M&TBM) Rules, 2016 and amendments made there under. In case of failure to comply with any of the rules, the authorization and consent order issued under the Water Act, 1974 and the Air Act, 1981 shall be revoked without any notice.

6.2 The person authorized shall not rent, lend, sell, transfer, or otherwise transport the hazardous and other wastes except what is permitted through this authorization.

6.3 The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;

6.4 The applicant shall manage Hazardous and other wastes in an environmentally sound manner so as not to cause damage to any surrounding environment.

6.5 Packaging, labeling, and transport of hazardous wastes shall be in accordance with the provisions of the rules made under the Motor Vehicles Act, 1988 and other guidelines issued from time to time.

6.6 The Hazardous waste containers shall be provided with a general label as given in Form 8 of H&OW (M&TBM) Rules, 2016 and other amendments thereof.

6.7 The applicant shall provide the transporter (of hazardous wastes) with seven copies of the manifest (FORM 10) as per the colour codes. The transporter shall give a copy of the manifest signed and dated to the applicant and retail the remaining copies to be used as prescribed in sub-rule (2), (3), (4), (5) and (6) of Rule 19.

6.8 Import and Export of hazardous wastes for dumping and disposal is not permitted for the UT’s of Daman & Diu and Dadra Nagar Haveli.

6.9 This authorization is not valid for importing Hazardous Wastes.

6.10 The applicant is not permitted to export Hazardous Wastes without the prior permission of Government of India.

6.11 The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on “Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty”

6.12 It is the duty of the authorized person to take prior permission of the Pollution Control Committee DD & DNH to close down the facility.

6.13 The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.

6.14 The record of consumption and fate of the imported hazardous and other wastes shall be maintained.

6.15 The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.

6.16 The importer/exporter shall bear the cost of import or export and mitigation of damages if any.

6.17 Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time are liable to this authorization.

6.18 Annual return shall be filed by June 30th for the period ensuring 31st March of the year.

6.19 The applicant is permitted to sell the hazardous wastes or material only to those who obtained authorization from the State Pollution Control Boards or Pollution Control Committees in the respective states to use the said material as raw material. The documents in this regard shall be submitted to the Pollution Control Committee before selling the material.

6.20 The applicant shall maintain records of collection, reception, treatment, transport, storage, and disposal of Hazardous Wastes in FORM 3 of H&OW (M&TBM) Rules, 2016 amendments thereof.

6.21 The applicant shall inform the Pollution Control Committees in case of an accident at the facility or on the disposal site or during transportation of Hazardous Wastes in FORM 11 of H&OW (M&TBM) Rules, 2016 and amendments thereof.

6.22 The movement of hazardous wastes from or to the country shall be considered illegal (i) if it is without prior permission of the Central Government; or (ii) if the permission has been obtained through falsification, mis-representation or fraud; or (iii) if it does not conform to the shipping details provided in the document.

6.23 The applicant shall be liable (i) for damage caused to the environment resulting due to improper handling and disposal of hazardous and other wastes, (ii) to reinstate or restore damaged caused to the

environment resulting due to the environment & (iii) to pay a fine as levied by Pollution Control Committee DD & DNH for any violation of the provisions under H&OW (M&TBM) Rules, 2016 and amendments thereof.

6.24 The applicant shall become the member of the CHWTSDF within thirty days from the date of the issue and submit the copy of the same to the PCC, DD & DNH, if fail to comply the same the authorization shall be revoked.

6.26 The industry shall dispose their waste to CHWTSDF facility only.

7. GENERAL CONDITIONS: -

7.1 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to the Pollution Control Committee.

7.2 If at any time, it is observed that effluent fails to confirm to the limits prescribed or any unauthorized change in personnel, equipment or working conditions, as mentioned in the application then, the CC & A will be withdrawn prohibiting the industry to manufacture either existing or new products.

7.3 The applicant shall submit separate application for obtaining Renewal of CC & A under the Water Act, 1974, the Air Act, 1981 and H&OW (M&TBM) Rules, 2016 before 30 days of expiry of validity period of this CC & A.

7.4 The industry shall comply with Water (Prevention and Control of Pollution) Cess Act, 1977, and submit monthly Cess returns as contemplated in the Act, in the prescribed form.

7.5 The applicant shall comply with the notified standards under Environment (Protection) Act, 1986.

7.6 This consent is further subject to green up the surrounding area inside and outside the unit/factory.

7.7 In case of change process/installation, which is likely to have discharge/an emission a separate application shall be made.

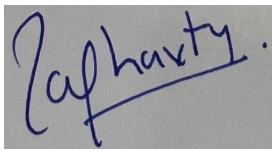
7.8 In case of failure to comply with any of the consent & authorization conditions, the CC & A order issue to you stands automatically revoked without any notice on this behalf.

7.9 The authorization or its renewal shall be produced during inspection at the request of an officer authorized by the Pollution Control Committee DD & DNH.

7.10 On the expiry of every 2 years, the unit/entrepreneur has to submit authenticate certificate to the PCC informing that there is no change in products/ process/ production capacity/ H&OW generation/ any other installation etc.

7.11 The unit shall submit Environmental Statement Form - V by the 30th day of September every year, duly certified in prescribed format to the PCC, DNH_DD.

7.12 The unit shall submit yearly Environment Audit Report duly certified to the PCC, DNH_DD.



02/08/2022

Member Secretary
Pollution Control Committee
Daman, Diu and Dadra & Nagar Haveli
Daman

Annexure - III

AMBIENT AIR TEST QUALITY REPORT

(Oct-Dec 2024)

TEST REPORT CODE: VGL/A/24/12/31/001-009 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (AMBIENT AIR)

Issued To : **ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**

Name and Address of Customer : **M/s HINDUSTAN UNILEVER LIMITED**
SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230

Sampling Location : **AQ1- PROJECT SITE (NEAR MAIN GATE)**
Sampling Done by : ASHISH KUMAR & VIRENDRA KUMAR YADAV
Packing Condition : SEALED
Environmental Condition (At Lab) : **Temp.(°C)** 24.6 **& RH (%)** 57
Method of Sampling : IS:5182
Sample Receiving Date : 31.12.2024
Sample Processing Date : 01.01.2025 TO 06.01.2025
Equipment Used : RESPIRABLE DUST SAMPLER (PM 10)
: FINE PARTICULATE SAMPLER (PM 2.5)

TEST RESULTS

DATES	PM_{10} (µg/m3)	$PM_{2.5}$ (µg/m3)	SO_2 (µg/m3)	NO_2 (µg/m3)	CO (mg/m3)
02.10.2024	71	44	18	22	0.65
06.10.2024	67	41	16	24	0.75
09.10.2024	68	42	21	29	0.82
12.10.2024	67	41	17	28	0.58
16.10.2024	67	42	16	24	0.76
19.10.2024	70	44	15	21	0.75
23.10.2024	72	45	17	20	0.72
26.10.2024	66	41	19	22	0.80
02.11.2024	69	42	14	25	0.75
06.11.2024	70	44	16	24	0.81
09.11.2024	71	43	15	20	0.75
12.11.2024	73	45	17	26	0.79
16.11.2024	71	44	14	24	0.78
19.11.2024	68	42	16	25	0.79
23.11.2024	68	43	14	20	0.80
26.11.2024	67	41	15	21	0.80
02.12.2024	69	43	16	23	0.81
06.12.2024	70	44	17	28	0.79
09.12.2024	67	41	18	24	0.81
12.12.2024	72	45	14	21	0.80
16.12.2024	69	43	15	29	0.76
19.12.2024	70	44	16	25	0.74
23.12.2024	72	45	15	26	0.80
26.12.2024	71	44	18	27	0.74
Max	**73**	**45**	**21.00**	**29.00**	**0.82**
Min	**66.00**	**41.00**	**14.00**	**20.00**	**0.58**
Avg	**69.38**	**43.04**	**16.21**	**24.08**	**0.76**
98 percentile	**72.54**	**45.00**	**20.08**	**29.00**	**0.82**

Note: -

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2. The sample will be destroyed after 15 days from the date of issue of test certificate unless otherwise specified.
3. Any discrepancy in test result should be reported within 15 Days.
4. The above results are related to the tested sample only.
5. BDL: Below detection limit.

Reviewed By
Mr. Ashok Kumar
Technical Manager

Authorized Signatory
VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory
D. K. Yadav
Lab In-charge

CORPORATE OFFICE : B - 32 2nd Floor, Sec - 6, Noida, Gautam Buddha Nagar (UP) - 201301
TESTING FACILITY : KH.NO. 973 Part, Bijnaur, Sarojini Nagar, Lucknow (UP) - 226008
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+91-9990366186
0522-7118739
Viratgloballab@gmail.com
info@viratlab.com
www.viratlab.com

TEST REPORT CODE: VGL/A/24/12/31/010-018 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (AMBIENT AIR)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**AQ2- PROJECT SITE (NEAR ETP AREA)**
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Packing Condition	:	SEALED
Environmental Condition (At Lab)	:	**Temp.(°C)** 24.6 **& RH (%)** 57
Method of Sampling	:	IS:5182
Sample Receiving Date	:	31.12.2024
Sample Processing Date	:	01.01.2025 TO 06.01.2025
Equipment Used	:	RESPIRABLE DUST SAMPLER (PM 10)
	:	FINE PARTICULATE SAMPLER (PM 2.5)

TEST RESULTS

DATES	PM_{10} (µg/m3)	$PM_{2.5}$ (µg/m3)	SO_2 (µg/m3)	NO_2 (µg/m3)	CO (mg/m3)
02.10.2024	70	35	14	25	0.67
06.10.2024	68	39	15	21	0.74
09.10.2024	67	35	11	21	0.76
12.10.2024	70	40	16	19	0.68
16.10.2024	69	38	13	22	0.74
19.10.2024	69	36	12	23	0.75
23.10.2024	66	40	15	22	0.78
26.10.2024	68	38	12	20	0.68
02.11.2024	73	36	13	24	0.74
06.11.2024	71	40	14	23	0.77
09.11.2024	72	39	13	21	0.68
12.11.2024	66	37	12	19	0.75
16.11.2024	70	39	14	18	0.76
19.11.2024	70	40	13	22	0.78
23.11.2024	68	39	14	24	0.64
26.11.2024	67	38	16	22	0.69
02.12.2024	68	40	13	21	0.71
06.12.2024	71	38	15	23	0.73
09.12.2024	70	39	11	22	0.76
12.12.2024	74	37	13	24	0.71
16.12.2024	70	41	16	22	0.75
19.12.2024	68	37	15	20	0.68
23.12.2024	70	40	17	24	0.67
26.12.2024	71	38	14	24	0.62
Max	**74.00**	**41.00**	**17.00**	**25.00**	**0.78**
Min	**66.00**	**35.00**	**11.00**	**18.00**	**0.62**
Avg	**69.42**	**38.29**	**13.79**	**21.92**	**0.72**
98 percentile	**65.00**	**35.00**	**16.54**	**24.54**	**0.78**

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4. The above results are related to the tested sample only.
5. BDL: Below detection limit.

Reviewed By

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) Authorised Signatory

D. K. Yadav
Lab In-charge

CORPORATE OFFICE : B - 32 2nd Floor, Sec - 6, Noida, Gautam Buddha Nagar (UP) - 201301
TESTING FACILITY : KH.NO. 973 Part, Bijnaur, Sarojini Nagar, Lucknow (UP) - 226008
+91-9415135012 +91-9990366186 0522-7118739
Viratgloballab@gmail.com info@viratlab.com www.viratlab.com

TEST REPORT CODE: VGL/A/24/12/31/019-027 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (AMBIENT AIR)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**AQ3- DADRA**
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Packing Condition	:	SEALED
Environmental Condition (At Lab)	:	**Temp. (°C)** 24.6 **& RH (%)** 57
Method of Sampling	:	IS:5182
Sample Receiving Date	:	31.12.2024
Sample Processing Date	:	01.01.2025TO 06.01.2025
Equipment Used	:	RESPIRABLE DUST SAMPLER (PM 10)
	:	FINE PARTICULATE SAMPLER (PM 2.5)

TEST RESULTS

DATES	PM_{10} (µg/m3)	$PM_{2.5}$ (µg/m3)	SO_2 (µg/m3)	NO_2 (µg/m3)	CO (mg/m3)
02.10.2024	65	36	15	23	0.76
06.10.2024	64	37	12	20	0.72
09.10.2024	63	38	9	22	0.75
12.10.2024	67	32	11	19	0.76
16.10.2024	68	34	12	16	0.77
19.10.2024	63	35	14	18	0.69
23.10.2024	62	34	14	21	0.70
26.10.2024	63	36	12	22	0.68
02.11.2024	64	38	12	18	0.66
06.11.2024	58	35	11	22	0.71
09.11.2024	64	37	9	20	0.75
12.11.2024	67	32	10	18	0.65
16.11.2024	68	38	10	22	0.64
19.11.2024	64	34	12	20	0.74
23.11.2024	65	36	10	19	0.68
26.11.2024	68	38	11	16	0.74
02.12.2024	67	35	13	20	0.75
06.12.2024	64	38	11	23	0.74
09.12.2024	66	37	15	18	0.77
12.12.2024	65	38	10	23	0.72
16.12.2024	68	36	15	20	0.69
19.12.2024	67	35	10	24	0.66
23.12.2024	66	34	15	21	0.74
26.12.2024	64	38	12	20	0.77
Max	**68.00**	**38.00**	**15.00**	**24.00**	**0.77**
Min	**58.00**	**32.00**	**9.00**	**16.00**	**0.64**
Avg	**65.00**	**35.88**	**11.88**	**20.21**	**0.72**
98 percentile	**68.00**	**38.00**	**15.00**	**23.54**	**0.77**

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4. The above results are related to the tested sample only.
5. BDL: Below detection limit.

Reviewed By:

Mr. Ashish Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)

D. K. Yadav Authorised Signatory
Lab In-charge

TEST REPORT CODE: VGL/A/24/12/31/028-036 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (AMBIENT AIR)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**AQ4- NEAR SATMALIYA DEER PARK**
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Packing Condition	:	SEALED
Environmental Condition (At Lab)	:	**Temp. (°C)** 24.6 **& RH (%)** 57
Method of Sampling	:	IS:5182
Sample Receiving Date	:	31.12.2024
Sample Processing Date	:	01.01.2025TO 06.01.2025
Equipment Used	:	RESPIRABLE DUST SAMPLER (PM 10)
	:	FINE PARTICULATE SAMPLER (PM 2.5)

TEST RESULTS

DATES	PM_{10} (µg/m3)	$PM_{2.5}$ (µg/m3)	SO_2 (µg/m3)	NO_2 (µg/m3)	CO (mg/m3)
03.10.2024	51	30	10	15	0.48
07.10.2024	52	31	9	16	0.46
10.10.2024	48	28	12	14	0.58
13.10.2024	50	29	11	15	0.42
17.10.2024	52	30	10	13	0.52
20.10.2024	53	31	8	15	0.54
24.10.2024	50	32	9	12	0.53
27.10.2024	55	30	10	13	0.58
03.11.2024	52	28	11	15	0.54
07.11.2024	50	27	10	16	0.55
10.11.2024	55	29	8	14	0.57
13.11.2024	49	26	12	13	0.52
17.11.2024	48	30	10	15	0.48
20.11.2024	46	31	8	10	0.49
24.11.2024	52	32	12	14	0.43
27.11.2024	53	30	12	15	0.48
03.12.2024	54	27	10	11	0.52
07.12.2024	55	26	9	12	0.43
10.12.2024	54	33	11	14	0.55
13.12.2024	50	30	10	15	0.52
17.12.2024	49	30	11	16	0.51
20.12.2024	52	31	10	15	0.53
24.12.2024	53	28	9	16	0.54
27.12.2024	48	29	10	16	0.52
Max	**55.00**	**33.00**	**12.00**	**16.00**	**0.58**
Min	**46.00**	**26.00**	**8.00**	**10.00**	**0.42**
Avg	**51.29**	**29.50**	**10.08**	**14.17**	**0.51**
98 percentile	**55.00**	**32.54**	**12.00**	**16.00**	**0.58**

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4. The above results are related to the tested sample only.
5. BDL: Below detection limit.

Reviewed by:

Dr. Ashish Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/A/24/12/31/037-045 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (AMBIENT AIR)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**AQ5- SURANGI**
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Packing Condition	:	SEALED
Environmental Condition (At Lab)	:	**Temp. (°C)** 24.6 **& RH (%)** 57
Method of Sampling	:	IS:5182
Sample Receiving Date	:	31.12.2024
Sample Processing Date	:	01.01.2025TO 06.01.2025
Equipment Used	:	RESPIRABLE DUST SAMPLER (PM 10)
	:	FINE PARTICULATE SAMPLER (PM 2.5)

TEST RESULTS

DATES	PM_{10} (µg/m3)	$PM_{2.5}$ (µg/m3)	SO_2 (µg/m3)	NO_2 (µg/m3)	CO (mg/m3)
03.10.2024	61	32	8	13	0.72
07.10.2024	60	33	9	19	0.68
10.10.2024	62	34	11	16	0.66
13.10.2024	59	35	8	19	0.70
17.10.2024	60	36	10	20	0.73
20.10.2024	62	32	12	12	0.70
24.10.2024	58	30	8	15	0.64
27.10.2024	60	31	9	19	0.62
03.11.2024	56	32	8	16	0.66
07.11.2024	60	33	11	16	0.67
10.11.2024	64	34	10	20	0.69
13.11.2024	63	30	9	15	0.62
17.11.2024	60	35	10	12	0.63
20.11.2024	58	34	12	18	0.68
24.11.2024	61	32	10	20	0.72
27.11.2024	59	31	9	14	0.7
03.12.2024	60	35	8	15	0.64
07.12.2024	61	35	9	17	0.68
10.12.2024	64	32	10	13	0.66
13.12.2024	61	30	11	16	0.66
17.12.2024	58	31	9	19	0.64
20.12.2024	60	32	12	20	0.67
24.12.2024	62	30	10	13	0.62
27.12.2024	59	34	11	18	0.67
Max	**64.00**	**36.00**	**12.00**	**20.00**	**0.73**
Min	**56.00**	**30.00**	**8.00**	**12.00**	**0.62**
Avg	**60.33**	**32.63**	**9.75**	**16.46**	**0.67**
98 percentile	**64.00**	**35.54**	**12.00**	**20.00**	**0.73**

Note: -

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2. The sample will be destroyed after 15 days from the date of issue of test certificate unless otherwise specified.
3. Any discrepancy in test result should be reported within 15 Days.
4. The above results are related to the tested sample only.
5. BDL: Below detection limit.

Reviewed By
Dr. Ashok Kumar
Technical Manager

Authorized Signatory
VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory
D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/A/24/12/31/046-054 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (AMBIENT AIR)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**AQ6- NEAR LION SAFARI VASONA SILVASSA DNH**
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Packing Condition	:	SEALED
Environmental Condition (At Lab)	:	**Temp. (°C)** 24.6 **& RH (%)** 57
Method of Sampling	:	IS:5182
Sample Receiving Date	:	31.12.2024
Sample Processing Date	:	01.01.2025TO 06.01.2025
Equipment Used	:	RESPIRABLE DUST SAMPLER (PM 10)
	:	FINE PARTICULATE SAMPLER (PM 2.5)

TEST RESULTS

DATES	PM_{10} (µg/m3)	$PM_{2.5}$ (µg/m3)	SO_2 (µg/m3)	NO_2 (µg/m3)	CO (mg/m3)
03.10.2024	55	28	11	18	0.62
07.10.2024	59	30	8	17	0.65
10.10.2024	60	31	10	15	0.59
13.10.2024	51	35	7	20	0.62
17.10.2024	59	30	9	15	0.58
20.10.2024	54	26	11	16	0.61
24.10.2024	60	31	10	11	0.62
27.10.2024	51	33	8	18	0.66
03.11.2024	59	30	11	15	0.62
07.11.2024	55	26	8	16	0.58
10.11.2024	58	28	9	11	0.64
13.11.2024	60	32	10	18	0.61
17.11.2024	53	30	9	12	0.59
20.11.2024	58	32	10	16	0.64
24.11.2024	55	28	8	15	0.64
27.11.2024	54	32	11	17	0.68
03.12.2024	60	30	7	12	0.63
07.12.2024	51	31	10	18	0.58
10.12.2024	59	32	8	15	0.69
13.12.2024	52	33	9	18	0.62
17.12.2024	60	31	11	15	0.57
20.12.2024	57	35	8	18	0.67
24.12.2024	60	33	11	18	0.59
27.12.2024	58	34	10	16	0.66
Max	**60.00**	**35.00**	**11.00**	**20.00**	**0.69**
Min	**51.00**	**26.00**	**7.00**	**11.00**	**0.57**
Avg	**56.58**	**30.88**	**9.33**	**15.83**	**0.62**
98 percentile	**60.00**	**35.00**	**11.00**	**19.08**	**0.69**

Note: -

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4. The above results are related to the tested sample only.
5. BDL: Below detection limit.

Reviewed by:

Ashish Kumar
Technical Manager

Authorized Signatory
VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/A/24/12/31/055-063 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (AMBIENT AIR)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**AQ7- KHERDI**
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Packing Condition	:	SEALED
Environmental Condition (At Lab)	:	**Temp. (°C)** 24.6 **& RH (%)** 57
Method of Sampling	:	IS:5182
Sample Receiving Date	:	31.12.2024
Sample Processing Date	:	01.01.2025TO 06.01.2025
Equipment Used	:	RESPIRABLE DUST SAMPLER (PM 10)
	:	FINE PARTICULATE SAMPLER (PM 2.5)

TEST RESULTS

DATES	PM_{10} (µg/m3)	$PM_{2.5}$ (µg/m3)	SO_2 (µg/m3)	NO_2 (µg/m3)	CO (mg/m3)
04.10.2024	56	29	11	12	0.64
08.10.2024	54	32	8	16	0.61
11.10.2024	52	31	10	17	0.58
14.10.2024	50	33	10	18	0.64
18.10.2024	48	34	8	15	0.56
21.10.2024	52	31	7	16	0.65
25.10.2024	53	33	10	18	0.62
28.10.2024	50	32	8	15	0.65
04.11.2024	48	28	10	10	0.58
08.11.2024	56	31	9	16	0.62
11.11.2024	52	32	10	20	0.64
14.11.2024	51	30	9	20	0.66
18.11.2024	56	29	11	16	0.63
21.11.2024	54	33	10	17	0.62
25.11.2024	52	33	7	10	0.55
28.11.2024	48	32	10	15	0.64
04.12.2024	53	32	10	17	0.63
08.12.2024	49	30	9	15	0.55
11.12.2024	48	25	10	11	0.58
14.12.2024	51	28	11	18	0.65
18.12.2024	54	33	8	15	0.53
21.12.2024	53	31	11	14	0.59
25.12.2024	57	30	9	18	0.57
28.12.2024	52	34	8	10	0.61
Max	**57.00**	**34.00**	**11.00**	**20.00**	**0.66**
Min	**48.00**	**25.00**	**7.00**	**10.00**	**0.53**
Avg	**52.04**	**31.08**	**9.33**	**15.38**	**0.61**
98 percentile	**56.54**	**34.00**	**11.00**	**20.00**	**0.66**

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4. The above results are related to the tested sample only.
5. BDL: Below detection limit.

Review By:
Dr. Ashok Kumar
Technical Manager

Authorised Signatory
VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) Authorised Signatory
D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/A/24/12/31/064-072 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (AMBIENT AIR)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**AQ8- DAPADA**
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Packing Condition	:	SEALED
Environmental Condition (At Lab)	:	**Temp. (°C)** 24.6 **& RH (%)** 57
Method of Sampling	:	IS:5182
Sample Receiving Date	:	31.12.2024
Sample Processing Date	:	01.01.2025TO 06.01.2025
Equipment Used	:	RESPIRABLE DUST SAMPLER (PM 10)
	:	FINE PARTICULATE SAMPLER (PM 2.5)

TEST RESULTS

DATES	PM_{10} (µg/m3)	$PM_{2.5}$ (µg/m3)	SO_2 (µg/m3)	NO_2 (µg/m3)	CO (mg/m3)
04.10.2024	52	32	11	18	0.62
08.10.2024	56	35	10	16	0.65
11.10.2024	57	36	10	15	0.59
14.10.2024	48	30	13	20	0.62
18.10.2024	56	35	12	15	0.58
21.10.2024	51	32	11	16	0.61
25.10.2024	57	35	10	11	0.62
28.10.2024	48	30	16	19	0.66
04.11.2024	56	35	11	15	0.62
08.11.2024	52	32	8	16	0.58
11.11.2024	55	34	10	11	0.64
14.11.2024	57	35	12	18	0.61
18.11.2024	50	31	9	12	0.59
21.11.2024	55	34	10	16	0.64
25.11.2024	52	32	12	15	0.63
28.11.2024	51	32	11	17	0.68
04.12.2024	57	35	9	13	0.63
08.12.2024	48	31	10	18	0.64
11.12.2024	58	35	7	15	0.68
14.12.2024	49	31	10	18	0.62
18.12.2024	57	32	11	15	0.57
21.12.2024	54	35	9	18	0.67
25.12.2024	57	35	11	20	0.60
28.12.2024	55	34	12	16	0.66
Max	**58.00**	**36.00**	**16.00**	**20.00**	**0.68**
Min	**48.45**	**30.00**	**7.00**	**11.00**	**0.57**
Avg	**53.84**	**33.25**	**10.63**	**15.96**	**0.63**
98 percentile	**57.54**	**35.54**	**14.62**	**20.00**	**0.68**

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4. The above results are related to the tested sample only.
5. BDL: Below detection limit.

Reviewed by:
Dr. Ashok Kumar
Technical Manager

Authorized Signatory
VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
D. K. Yadav
Lab In-charge

CORPORATE OFFICE : B - 32 2nd Floor, Sec - 6, Noida, Gautam Buddha Nagar (UP) - 201301
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TEST REPORT CODE: VGL/A/24/12/31/073-081 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (AMBIENT AIR)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**AQ9- RAKHOLI**
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Packing Condition	:	SEALED
Environmental Condition (At Lab)	:	**Temp.(°C)** 24.6 **& RH (%)** 57
Method of Sampling	:	IS:5182
Sample Receiving Date	:	31.12.2024
Sample Processing Date	:	01.01.2025TO 06.01.2025
Equipment Used	:	RESPIRABLE DUST SAMPLER (PM 10)
	:	FINE PARTICULATE SAMPLER (PM 2.5)

TEST RESULTS

DATES	PM_{10} (µg/m3)	$PM_{2.5}$ (µg/m3)	SO_2 (µg/m3)	NO_2 (µg/m3)	CO (mg/m3)
04.10.2024	57	29	11	12	0.64
08.10.2024	51	32	10	17	0.61
11.10.2024	56	36	10	17	0.58
14.10.2024	51	38	10	19	0.64
18.10.2024	52	34	8	15	0.56
21.10.2024	53	32	11	16	0.62
25.10.2024	54	33	10	18	0.62
28.10.2024	59	32	9	19	0.65
04.11.2024	54	36	10	15	0.58
08.11.2024	56	37	9	16	0.62
11.11.2024	52	32	10	15	0.64
14.11.2024	59	34	15	21	0.59
18.11.2024	56	36	11	16	0.63
21.11.2024	54	39	10	21	0.62
25.11.2024	52	36	14	20	0.57
28.11.2024	60	32	10	16	0.64
04.12.2024	53	32	10	17	0.63
08.12.2024	51	30	11	15	0.55
11.12.2024	55	34	10	13	0.52
14.12.2024	53	28	11	18	0.65
18.12.2024	54	33	9	15	0.53
21.12.2024	53	31	11	14	0.59
25.12.2024	56	30	9	18	0.57
28.12.2024	52	34	8	11	0.61
Max	**60.00**	**39.00**	**15.00**	**21.00**	**0.65**
Min	**51.00**	**28.00**	**8.00**	**11.00**	**0.52**
Avg	**54.29**	**33.33**	**10.29**	**16.42**	**0.60**
98 percentiles	**59.54**	**38.54**	**14.54**	**21.00**	**0.65**

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Reviewed By
Dr. Ashok Kumar
Technical Manager

Authorized Signatory
VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.)
D. K. Yadav
Authorised Signatory
Lab In-charge

Annexure-IV

AMBIENT NOISE TEST REPORT
OCT 2024-DEC 2024

TEST REPORT CODE: VGL/N/24/10/14/001 TEST REPORT ISSUE DATE: 21.10.2024

TEST REPORT (AMBEINT NOISE)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**PROJECT SITE (NEAR MAIN GATE)**
Date & Duration of Sampling	:	07.10.2024 & 24 Hrs.
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Method of Sampling	:	IS:9989
Sample Receiving Date	:	14.10.2024
Sample processing Date	:	15.10.2024

AMBIENT NOISE RESULT

Sl. No.	Day Time		Night Time	
	Time	Leq Value in dB(A)	Time	Leq Value in dB(A)
1.	6:00 AM TO 10:00 PM	59.5	10.00 PM TO 6:00 AM	51.3

NOISE (AMBIENT STANDARDS AS PER CPCB)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

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3. Any discrepancy in test result should be reported within 15 Days.

The above results are related to the tested sample only.

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) Lucknow

Reviewed By:

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory
Authorised Signatory

Dr. Ashok Kumar
Technical Manager

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/N/24/10/14/002 TEST REPORT ISSUE DATE: 21.10.2024

TEST REPORT (AMBEINT NOISE)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**PROJECT SITE (NEAR ETP AREA)**
Date & Duration of Sampling	:	07.10.2024 & 24 Hrs.
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Method of Sampling	:	IS:9989
Sample Receiving Date	:	14.10.2024
Sample processing Date	:	15.10.2024

AMBIENT NOISE RESULT

Sl. No.	Day Time		Night Time	
	Time	Leq Value in dB(A)	Time	Leq Value in dB(A)
1.	6:00 AM TO 10:00 PM	64.3	10.00 PM TO 6:00 AM	55.4

NOISE (AMBIENT STANDARDS AS PER CPCB)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

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3. Any discrepancy in test result should be reported within 15 Days.

The above results are related to the tested sample only.

Reviewed By:

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

Dr. Ashok Kumar
Technical Manager

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/N/24/10/14/003 TEST REPORT ISSUE DATE: 21.10.2024

TEST REPORT (AMBEINT NOISE)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**DADRA**
Date & Duration of Sampling	:	08.10.2024 & 24 Hrs.
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Method of Sampling	:	IS:9989
Sample Receiving Date	:	14.10.2024
Sample processing Date	:	15.10.2024

AMBIENT NOISE RESULT

Sl. No.	Day Time		Night Time	
	Time	Leq Value in dB(A)	Time	Leq Value in dB(A)
1.	6:00 AM TO 10:00 PM	56.4	10.00 PM TO 6:00 AM	46.9

NOISE (AMBIENT STANDARDS AS PER CPCB)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

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3. Any discrepancy in test result should be reported within 15 Days.
4. The above results are related to the tested sample only.

Review By:

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) Authorised Signatory

Dr. Ashok Kumar
Technical Manager

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/N/24/10/14/004 TEST REPORT ISSUE DATE: 21.10.2024

TEST REPORT (AMBEINT NOISE)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**NEAR SATMALIYA DEER PARK**
Date & Duration of Sampling	:	08.10.2024 & 24 Hrs.
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Method of Sampling	:	IS:9989
Sample Receiving Date	:	14.10.2024
Sample processing Date	:	15.10.2024

AMBIENT NOISE RESULT

Sl. No.	Day Time		Night Time	
	Time	Leq Value in dB(A)	Time	Leq Value in dB(A)
1.	6:00 AM TO 10:00 PM	42.6	10.00 PM TO 6:00 AM	40.3

NOISE (AMBIENT STANDARDS AS PER CPCB)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

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2. The sample will be destroyed after 15 days from the date of issue of test certificate unless otherwise specified.
3. Any discrepancy in test result should be reported within 15 Days.
4. The above results are related to the tested sample only.

Reviewed By:

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/N/24/10/14/005 TEST REPORT ISSUE DATE: 21.10.2024

TEST REPORT (AMBEINT NOISE)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**SURANGI**
Date & Duration of Sampling	:	09.10.2024 & 24 Hrs.
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Method of Sampling	:	IS:9989
Sample Receiving Date	:	14.10.2024
Sample processing Date	:	15.10.2024

AMBIENT NOISE RESULT

Sl. No.	Day Time		Night Time	
	Time	Leq Value in dB(A)	Time	Leq Value in dB(A)
1.	6:00 AM TO 10:00 PM	46.2	10.00 PM TO 6:00 AM	41.2

NOISE (AMBIENT STANDARDS AS PER CPCB)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

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VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) LUCKNOW

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) Authorised Signatory

Reviewed By: **Authorized Signatory**

Dr. Ashok Kumar
Technical Manager

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/N/24/10/14/006 TEST REPORT ISSUE DATE: 21.10.2024

TEST REPORT (AMBEINT NOISE)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**NEAR LION SAFARI VASONA SILVASSA DNH**
Date & Duration of Sampling	:	09.10.2024 & 24 Hrs.
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Method of Sampling	:	IS:9989
Sample Receiving Date	:	14.10.2024
Sample processing Date	:	15.10.2024

AMBIENT NOISE RESULT

Sl. No.	Day Time		Night Time	
	Time	Leq Value in dB(A)	Time	Leq Value in dB(A)
1.	6:00 AM TO 10:00 PM	42.2	10.00 PM TO 6:00 AM	39.4

NOISE (AMBIENT STANDARDS AS PER CPCB)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

Note:

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3. Any discrepancy in test result should be reported within 15 Days.
4. The above results are related to the tested sample only.

Reviewed By:

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory
Authorised Signatory

Dr. Ashok Kumar
Technical Manager

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/N/24/10/14/007 TEST REPORT ISSUE DATE: 21.10.2024

TEST REPORT (AMBEINT NOISE)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**KHERDI**
Date & Duration of Sampling	:	10.10.2024 & 24 Hrs.
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Method of Sampling	:	IS:9989
Sample Receiving Date	:	14.10.2024
Sample processing Date	:	15.10.2024

AMBIENT NOISE RESULT

Sl. No.	Day Time		Night Time	
	Time	Leq Value in dB(A)	Time	Leq Value in dB(A)
1.	6:00 AM TO 10:00 PM	45.3	10.00 PM TO 6:00 AM	41.6

NOISE (AMBIENT STANDARDS AS PER CPCB)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

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Reviewed By:

Dr. Ashok Kumar
Technical Manager

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorized Signatory
Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/N/24/10/14/008 TEST REPORT ISSUE DATE: 21.10.2024

TEST REPORT (AMBEINT NOISE)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**DAPADA**
Date & Duration of Sampling	:	10.10.2024 & 24 Hrs.
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Method of Sampling	:	IS:9989
Sample Receiving Date	:	14.10.2024
Sample processing Date	:	15.10.2024

AMBIENT NOISE RESULT

Sl. No.	Day Time		Night Time	
	Time	Leq Value in dB(A)	Time	Leq Value in dB(A)
1.	6:00 AM TO 10:00 PM	48.7	10.00 PM TO 6:00 AM	42.9

NOISE (AMBIENT STANDARDS AS PER CPCB)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

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Reviewed By:

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory
Authorised Signatory

Dr. Ashok Kumar
Technical Manager

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/N/24/10/14/009 TEST REPORT ISSUE DATE: 21.10.2024

TEST REPORT (AMBEINT NOISE)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Sampling Location	:	**RAKHOLI**
Date & Duration of Sampling	:	11.10.2024 & 24 Hrs.
Sampling Done by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Method of Sampling	:	IS:9989
Sample Receiving Date	:	14.10.2024
Sample processing Date	:	15.10.2024

AMBIENT NOISE RESULT

Sl. No.	Day Time		Night Time	
	Time	Leq Value in dB(A)	Time	Leq Value in dB(A)
1.	6:00 AM TO 10:00 PM	41.8	10.00 PM TO 6:00 AM	38.7

NOISE (AMBIENT STANDARDS AS PER CPCB)

Area Code	Category of Area	Limit in dB (A) Leq	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55
C	Residential Area	55	45
D	Silence Zone	50	40

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Reviewed By:

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory
Authorised Signatory

Dr. Ashok Kumar
Technical Manager

D. K. Yadav
Lab In-charge

Annexure-V

SOIL QUALITY TEST REPORT
OCT 2024-DEC 2024

TEST REPORT CODE: VGL/S/24/12/31/001 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**PROJECT SITE**
Sample Description	:	SOIL
Date & Time of Sampling	:	18.12.2024 05:30 PM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	001
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
1.	pH	-	8.85	IS 2720 (Part-26)
2.	Electrical Conductivity	µS/cm	283	IS 14767
3.	Water Content	%	16.1	IS 2720(Part-2)
4.	Water Holding Capacity	%	45.43	VGL/SOP/SOIL/02
5.	Specific Gravity	-	1.99	IS:2720 (Part-3) Sec-01
6.	Porosity	%	21	VGL/SOP/SOIL/14
7.	Bulk Density	g/cc	1.23	VGL/SOP/SOIL/03
8.	Sodium	mg/kg	64	IS 9497:1980
9.	Potassium	mg/kg	94	IS 9497:1980
10.	Calcium	me/100g	39.7	VGL/SOP/SOIL/08
11.	Magnesium	me/100g	4.9	VGL/SOP/SOIL/08
12.	Cadmium	mg/kg	<0.001	VGL/SOP/SOIL/10
13.	Copper	mg/kg	<0.1	VGL/SOP/SOIL/10
14.	Lead	mg/kg	<0.1	VGL/SOP/SOIL/10
15.	Manganese	mg/kg	3.24	VGL/SOP/SOIL/10

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Review By: **Authorized Signatory**

Dr. Ashok Kumar
Technical Manager

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/S/24/12/31/001 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
16.	Zinc	mg/kg	1.23	VGL/SOP/SOIL/10
17.	Boron	mg/kg	0.57	VGL/SOP/SOIL/09
18.	Cation Exchange Capacity	Me/100 gm	12.84	IS 2720 (Part-24)
19.	Organic carbon	%	0.72	VGL/SOP/SOIL/06
20.	Nitrogen	mg/kg	122.3	VGL/SOP/SOIL/07
21.	Phosphorous	mg/kg	7.2	VGL/SOP/SOIL/04
22.	Texture	-	Sandy clay	-
23.	Sand	%	46	VGL/SOP/SOIL/01
24.	Silt	%	18	VGL/SOP/SOIL/01
25.	Clay	%	36	VGL/SOP/SOIL/01
26.	SAR	-	4.71	VGL/SOP/SOIL/15
27.	**Pesticides**			
i	2,4-D Iso-Octyl Ester	mg/100gm	ND	VGL/SOP/SOIL/20
ii	Captan	mg/100gm	ND	VGL/SOP/SOIL/20
iii	Diazinon	mg/100gm	ND	VGL/SOP/SOIL/20
Iv	Fenamiphos	mg/100gm	ND	VGL/SOP/SOIL/20
v	Fenpropimorph	mg/100gm	ND	VGL/SOP/SOIL/20
vi	Glyphosate	mg/100gm	ND	VGL/SOP/SOIL/20
vii	Imazaquin	mg/100gm	ND	VGL/SOP/SOIL/20
viii	Metsulphuron Methyl	mg/100gm	ND	VGL/SOP/SOIL/20
ix	Methidathion	mg/100gm	ND	VGL/SOP/SOIL/20
x	Simazine	mg/100gm	ND	VGL/SOP/SOIL/20

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Review By

Dr. Ashok Kumar
Technical Manager

Authorized Signatory
VIRAT GLOBAL LAB
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D. Authorised Signatory
Lab In-charge

CORPORATE OFFICE : B - 32 2nd Floor, Sec - 6, Noida, Gautam Buddha Nagar (UP) - 201301
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Viratgloballab@gmail.com
info@viratlab.com
www.viratlab.com

TEST REPORT CODE: VGL/S/24/12/31/002 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**DAPADA**
Sample Description	:	SOIL
Date & Time of Sampling	:	20.12.2024 02:10 PM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	002
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
1.	pH	-	7.72	IS 2720 (Part-26)
2.	Electrical Conductivity	µS/cm	163	IS 14767
3.	Water Content	%	15.6	IS 2720(Part-2)
4.	Water Holding Capacity	%	36.82	VGL/SOP/SOIL/02
5.	Specific Gravity	-	2.36	IS:2720 (Part-3) Sec-01
6.	Porosity	%	19	VGL/SOP/SOIL/14
7.	Bulk Density	g/cc	1.26	VGL/SOP/SOIL/03
8.	Sodium	mg/kg	75	IS 9497:1980
9.	Potassium	mg/kg	96	IS 9497:1980
10.	Calcium	me/100g	22.3	VGL/SOP/SOIL/08
11.	Magnesium	me/100g	9.3	VGL/SOP/SOIL/08
12.	Cadmium	mg/kg	<0.001	VGL/SOP/SOIL/10
13.	Copper	mg/kg	<0.1	VGL/SOP/SOIL/10
14.	Lead	mg/kg	<0.1	VGL/SOP/SOIL/10
15.	Manganese	mg/kg	2.16	VGL/SOP/SOIL/10

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Review By:

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/S/24/12/31/002 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
16.	Zinc	mg/kg	0.56	VGL/SOP/SOIL/10
17.	Boron	mg/kg	0.48	VGL/SOP/SOIL/09
18.	Cation Exchange Capacity	Me/100 gm	13.2	IS 2720 (Part-24)
19.	Organic carbon	%	0.86	VGL/SOP/SOIL/06
20.	Nitrogen	mg/kg	136.5	VGL/SOP/SOIL/07
21.	Phosphorous	mg/kg	11.2	VGL/SOP/SOIL/04
22.	Texture	-	Clay	-
23.	Sand	%	25	VGL/SOP/SOIL/01
24.	Silt	%	30	VGL/SOP/SOIL/01
25.	Clay	%	45	VGL/SOP/SOIL/01
26.	SAR	-	6.67	VGL/SOP/SOIL/15

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Review By:

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

J. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/S/24/12/31/003 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**SURANGI**
Sample Description	:	SOIL
Date & Time of Sampling	:	21.12.2024 02:10 PM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(ºC) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	003
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
1.	pH	-	7.89	IS 2720 (Part-26)
2.	Electrical Conductivity	µS/cm	126	IS 14767
3.	Water Content	%	18.3	IS 2720(Part-2)
4.	Water Holding Capacity	%	41.5	VGL/SOP/SOIL/02
5.	Specific Gravity	-	2.77	IS:2720 (Part-3) Sec-01
6.	Porosity	%	23	VGL/SOP/SOIL/14
7.	Bulk Density	g/cc	1.37	VGL/SOP/SOIL/03
8.	Sodium	mg/kg	78.0	IS 9497:1980
9.	Potassium	mg/kg	107	IS 9497:1980
10.	Calcium	me/100g	19.6	VGL/SOP/SOIL/08
11.	Magnesium	me/100g	8.1	VGL/SOP/SOIL/08
12.	Cadmium	mg/kg	<0.001	VGL/SOP/SOIL/10
13.	Copper	mg/kg	<0.1	VGL/SOP/SOIL/10
14.	Lead	mg/kg	<0.1	VGL/SOP/SOIL/10
15.	Manganese	mg/kg	1.24	VGL/SOP/SOIL/10

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Review By:

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
D. K. Yadav
Lab In-charge
Authorised Signatory

TEST REPORT CODE: VGL/S/24/12/31/003 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
16.	Zinc	mg/kg	1.02	VGL/SOP/SOIL/10
17.	Boron	mg/kg	0.42	VGL/SOP/SOIL/09
18.	Cation Exchange Capacity	Me/100 gm	11.72	IS 2720 (Part-24)
19.	Organic carbon	%	0.79	VGL/SOP/SOIL/06
20.	Nitrogen	mg/kg	138.4	VGL/SOP/SOIL/07
21.	Phosphorous	mg/kg	7.2	VGL/SOP/SOIL/04
22.	Texture	-	Clay	-
23.	Sand	%	30	VGL/SOP/SOIL/01
24.	Silt	%	24	VGL/SOP/SOIL/01
25.	Clay	%	46	VGL/SOP/SOIL/01
26.	SAR	-	7.41	VGL/SOP/SOIL/15

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Review By:

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/S/24/12/31/004 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**NEAR LION SAFARI VASONA SILVASSA DNH**
Sample Description	:	SOIL
Date & Time of Sampling	:	24.12.2024 03:30 PM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(ºC) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	004
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
1.	pH	-	8.29	IS 2720 (Part-26)
2.	Electrical Conductivity	µS/cm	89.4	IS 14767
3.	Water Content	%	12.7	IS 2720(Part-2)
4.	Water Holding Capacity	%	46.76	VGL/SOP/SOIL/02
5.	Specific Gravity	-	2.61	IS:2720 (Part-3) Sec-01
6.	Porosity	%	24	VGL/SOP/SOIL/14
7.	Bulk Density	g/cc	1.27	VGL/SOP/SOIL/03
8.	Sodium	mg/kg	62	IS 9497:1980
9.	Potassium	mg/kg	103	IS 9497:1980
10.	Calcium	me/100g	18.5	VGL/SOP/SOIL/08
11.	Magnesium	me/100g	9.5	VGL/SOP/SOIL/08
12.	Cadmium	mg/kg	<0.001	VGL/SOP/SOIL/10
13.	Copper	mg/kg	<0.1	VGL/SOP/SOIL/10
14.	Lead	mg/kg	<0.1	VGL/SOP/SOIL/10
15.	Manganese	mg/kg	1.64	VGL/SOP/SOIL/10

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Review By:

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
D. K. Yadav
Lab In-charge
Authorised Signatory

TEST REPORT CODE: VGL/S/24/12/31/004 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
16.	Zinc	mg/kg	1.24	VGL/SOP/SOIL/10
17.	Boron	mg/kg	0.65	VGL/SOP/SOIL/09
18.	Cation Exchange Capacity	Me/100 gm	12.46	IS 2720 (Part-24)
19.	Organic carbon	%	1.05	VGL/SOP/SOIL/06
20.	Nitrogen	mg/kg	132.5	VGL/SOP/SOIL/07
21.	Phosphorous	mg/kg	5.3	VGL/SOP/SOIL/04
22.	Texture	-	Clay	-
23.	Sand	%	20	VGL/SOP/SOIL/01
24.	Silt	%	20	VGL/SOP/SOIL/01
25.	Clay	%	60	VGL/SOP/SOIL/01
26.	SAR	-	5.86	VGL/SOP/SOIL/15

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Reviewed By:

Dr. Ashish Kumar
Technical Manager

Authorised Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/S/24/12/31/005 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**CHINCHPADA (AGRICULTURAL LAND)**
Sample Description	:	SOIL
Date & Time of Sampling	:	26.12.2024 01:40 PM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	005
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
1.	pH	-	7.76	IS 2720 (Part-26)
2.	Electrical Conductivity	µS/cm	160.3	IS 14767
3.	Water Content	%	19.3	IS 2720(Part-2)
4.	Water Holding Capacity	%	39.1	VGL/SOP/SOIL/02
5.	Specific Gravity	-	2.45	IS:2720 (Part-3) Sec-01
6.	Porosity	%	25	VGL/SOP/SOIL/14
7.	Bulk Density	g/cc	1.26	VGL/SOP/SOIL/03
8.	Sodium	mg/kg	78	IS 9497:1980
9.	Potassium	mg/kg	98	IS 9497:1980
10.	Calcium	me/100g	18.3	VGL/SOP/SOIL/08
11.	Magnesium	me/100g	9.3	VGL/SOP/SOIL/08
12.	Cadmium	mg/kg	<0.001	VGL/SOP/SOIL/10
13.	Copper	mg/kg	<0.1	VGL/SOP/SOIL/10
14.	Lead	mg/kg	<0.1	VGL/SOP/SOIL/10
15.	Manganese	mg/kg	1.21	VGL/SOP/SOIL/10

Note:
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2. The sample will be destroyed after 15days from the date of issue of test certificate unless otherwise specified.
3. Any discrepancy in test result should be reported within 15Days.
4. The above results are related to the tested sample only.

Review By:

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/S/24/12/31/005 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
16.	Zinc	mg/kg	0.64	VGL/SOP/SOIL/10
17.	Boron	mg/kg	0.42	VGL/SOP/SOIL/09
18.	Cation Exchange Capacity	Me/100 gm	12.9	IS 2720 (Part-24)
19.	Organic carbon	%	0.9	VGL/SOP/SOIL/06
20.	Nitrogen	mg/kg	145.3	VGL/SOP/SOIL/07
21.	Phosphorous	mg/kg	12.8	VGL/SOP/SOIL/04
22.	Texture	-	Clay loam	-
23.	Sand	%	34	VGL/SOP/SOIL/01
24.	Silt	%	30	VGL/SOP/SOIL/01
25.	Clay	%	36	VGL/SOP/SOIL/01
26.	SAR	-	7.42	VGL/SOP/SOIL/15

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4. The above results are related to the tested sample only.

Review By:

Ing. Ashish Kumar
Technical Manager

Authorized Signatory
VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorized Signatory

D. K. [illegible]
Lab In-charge

TEST REPORT CODE: VGL/S/24/12/31/006 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**BINDRABIN**
Sample Description	:	SOIL
Date & Time of Sampling	:	27.12.2024 02:50 PM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	006
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
1.	pH	-	8.18	IS 2720 (Part-26)
2.	Electrical Conductivity	µS/cm	77.6	IS 14767
3.	Water Content	%	20.9	IS 2720(Part-2)
4.	Water Holding Capacity	%	22.7	VGL/SOP/SOIL/02
5.	Specific Gravity	-	2.74	IS:2720 (Part-3) Sec-01
6.	Porosity	%	17	VGL/SOP/SOIL/14
7.	Bulk Density	g/cc	1.29	VGL/SOP/SOIL/03
8.	Sodium	mg/kg	81	IS 9497:1980
9.	Potassium	mg/kg	106	IS 9497:1980
10.	Calcium	me/100g	18.6	VGL/SOP/SOIL/08
11.	Magnesium	me/100g	7.6	VGL/SOP/SOIL/08
12.	Cadmium	mg/kg	<0.001	VGL/SOP/SOIL/10
13.	Copper	mg/kg	<0.1	VGL/SOP/SOIL/10
14.	Lead	mg/kg	<0.1	VGL/SOP/SOIL/10
15.	Manganese	mg/kg	1.26	VGL/SOP/SOIL/10

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7. Any discrepancy in test result should be reported within 15Days.
8. The above results are related to the tested sample only.

Reviewed by

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/S/24/12/31/006 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (SOIL)

TEST RESULTS

SI. NO.	TESTS	UNIT	RESULTS	TEST METHOD
16.	Zinc	mg/kg	0.46	VGL/SOP/SOIL/10
17.	Boron	mg/kg	0.32	VGL/SOP/SOIL/09
18.	Cation Exchange Capacity	Me/100 gm	14.3	IS 2720 (Part-24)
19.	Organic carbon	%	0.54	VGL/SOP/SOIL/06
20.	Nitrogen	mg/kg	112.3	VGL/SOP/SOIL/07
21.	Phosphorous	mg/kg	10.3	VGL/SOP/SOIL/04
22.	Texture	-	Clay	-
23.	Sand	%	40	VGL/SOP/SOIL/01
24.	Silt	%	16	VGL/SOP/SOIL/01
25.	Clay	%	44	VGL/SOP/SOIL/01
26.	SAR	-	7.91	VGL/SOP/SOIL/15

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8. The above results are related to the tested sample only.

Review By:

Dr. [illegible] Kumar
Technical Manager

Authorized Signatory
VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorized Signatory
Dr. [illegible]
Lab In-charge

Annexure-VI

GROUNDWATER QUALITY TEST REPORT OCT 2024-DEC 2024

TEST REPORT CODE: VGL/W/24/12/31/001 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)
PART – A (CHEMICAL)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**PROJECT SITE**
Sample Description	:	GROUND WATER
Date & Time of Sampling	:	16.12.2024 10:50 AM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6& RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	001
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025
Method of Sampling	:	APHA 1060B & 9060A

TEST RESULTS

Sr. No.	Parameters	Test Method	Result	Unit	Limit as per IS 10500:1991 (Reaff:2012)	
					Desirable	Permissible
1.	Colour	APHA 2120-B	<5	Hazen	5	15
2.	Odour	APHA 2150-B	Agreeable	-	Agreeable	Agreeable
3.	Taste	APHA 2160-B	Agreeable	-	Agreeable	Agreeable
4.	Turbidity	APHA 2130-A+B	<1.0	NTU	1	5
5.	Temperature	APHA 2550-A+B	20.10	°C	Not Specified	Not Specified
6.	pH	APHA 4500H+A+B	7.49	-	6.5-8.5	No relaxation
7.	Conductivity	APHA 2110-A+B	597	µmhos/cm	-	-
8.	Alkalinity	APHA 2320-A+ B	135	mg/L	200	600
9.	Total Dissolved Solids	APHA2540-C	388	mg/L	500	2000
10.	Total Hardness	APHA 2340 A+C	222	mg/L	200	600
11.	Calcium	APHA 3500 Ca- A+B	67.2	mg/L	75	200
12.	Magnesium	APHA 3500 Mg A+B	13.1	mg/L	30	100

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4. The above Results are related to the tested sample only.

Review By:

Dr. Ashish Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/001 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)
PART – A (CHEMICAL)

TEST RESULTS

13.	Chloride	APHA 4500 Cl A+B	96.0	mg/L	250	1000
14.	Phosphate	APHA 4500-SO42- E	0.76	mg/L	-	-
15.	Nitrate	APHA 4500-NO3- B	9.4	mg/L	45.0	-
16.	Sulfate	APHA 4500-PD	32.4	mg/L	200	400
17.	Fluoride	APHA 4500-C	0.21	mg/L	1.0	1.5
18.	Zinc	APHA 3111 A+B	<0.001	mg/L	5	15
19.	Boron	APHA 4500 B A+C	<0.02	mg/L	0.5	1.0
20.	Arsenic	APHA 3114 B	<0.01	mg/L	0.01	0.05
21.	Lead	APHA 3111 A+B	<0.001	mg/L	0.01	No relaxation
22.	Iron	APHA 3500 Fe B	0.21	mg/L	0.3	No relaxation
23.	Nickel	APHA 3111 A+B	<0.01	mg/L	0.02	No relaxation
24.	Copper	APHA 3111 A+B	<0.01	mg/L	0.05	1.5
25.	Total Chromium	APHA 3111 A+B	<0.05	mg/L	0.05	No relaxation
26.	Cadmium	APHA 3111 A+B	<0.001	mg/L	0.003	No relaxation
27.	Sodium	APHA 3500 Na, A+B	28	mg/L	-	-
28.	Potassium	APHA 3500 K, A+B	13	mg/L	-	-
29.	Total Coliform Count	APHA 9221 B	<2	MPN/100 ML	Shall not be detectable in any 100 ml sample	
30.	Faecal coliform	APHA 9221 E	<2	MPN/100 ML		

Note:

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3. Any discrepancy in test result should be reported within 15Days.
4. The above Results are related to the tested sample only.

Review By:

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/002 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)
PART – A (CHEMICAL)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**DAPADA**
Sample Description	:	GROUND WATER
Date & Time of Sampling	:	18.12.2024 11:30 AM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(ºC) 24.6& RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	002
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025
Method of Sampling	:	APHA 1060B & 9060A

TEST RESULTS

Sr. No.	Parameters	Test Method	Result	Unit	Limit as per IS 10500:1991 (Reaff:2012)	
					Desirable	Permissible
1.	Colour	APHA 2120-B	<5	Hazen	5	15
2.	Odour	APHA 2150-B	Agreeable	-	Agreeable	Agreeable
3.	Taste	APHA 2160-B	Agreeable	-	Agreeable	Agreeable
4.	Turbidity	APHA 2130-A+B	<1.0	NTU	1	5
5.	Temperature	APHA 2550-A+B	19.60	ºC	Not Specified	Not Specified
6.	pH	APHA 4500H+A+B	7.09	-	6.5-8.5	No relaxation
7.	Conductivity	APHA 2110-A+B	656	µmhos/cm	-	-
8.	Alkalinity	APHA 2320-A+ B	208	mg/L	200	600
9.	Total Dissolved Solids	APHA2540-C	327	mg/L	500	2000
10.	Total Hardness	APHA 2340 A+C	268	mg/L	200	600
11.	Calcium	APHA 3500 Ca- A+B	73.7	mg/L	75	200
12.	Magnesium	APHA 3500 Mg A+B	20.4	mg/L	30	100

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4. The above Results are related to the tested sample only.

Reviewed By:
Dr. Ashok Kumar
Technical Manager

Authorised Signatory:
VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory
D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/002 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)
PART – A (CHEMICAL)

TEST RESULTS

13.	Chloride	APHA 4500 Cl A+B	25.9	mg/L	250	1000
14.	Phosphate	APHA 4500-SO42- E	0.99	mg/L	-	-
15.	Nitrate	APHA 4500-NO3- B	6.7	mg/L	45.0	-
16.	Sulfate	APHA 4500-PD	26.2	mg/L	200	400
17.	Fluoride	APHA 4500-C	0.28	mg/L	1.0	1.5
18.	Zinc	APHA 3111 A+B	<0.001	mg/L	5	15
19.	Boron	APHA 4500 B A+C	<0.02	mg/L	0.5	1.0
20.	Arsenic	APHA 3114 B	<0.01	mg/L	0.01	0.05
21.	Lead	APHA 3111 A+B	<0.001	mg/L	0.01	No relaxation
22.	Iron	APHA 3500 Fe B	0.22	mg/L	0.3	No relaxation
23.	Nickel	APHA 3111 A+B	<0.01	mg/L	0.02	No relaxation
24.	Copper	APHA 3111 A+B	<0.01	mg/L	0.05	1.5
25.	Total Chromium	APHA 3111 A+B	<0.05	mg/L	0.05	No relaxation
26.	Cadmium	APHA 3111 A+B	<0.001	mg/L	0.003	No relaxation
27.	Sodium	APHA 3500 Na, A+B	32	mg/L	-	-
28.	Potassium	APHA 3500 K, A+B	16	mg/L	-	-
29.	Total Coliform Count	APHA 9221 B	<2	MPN/100 ML	Shall not be detectable in any 100 ml sample	
30.	Faecal coliform	APHA 9221 E	<2	MPN/100 ML		

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Reviewed By
Dr. Ashok Kumar
Technical Manager

Authorized Signatory
VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory
D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/003 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)
PART – A (CHEMICAL)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**PATI**
Sample Description	:	GROUND WATER
Date & Time of Sampling	:	20.12.2024 02:50 PM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6& RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	003
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025
Method of Sampling	:	APHA 1060B & 9060A

TEST RESULTS

Sr. No.	Parameters	Test Method	Result	Unit	Limit as per IS 10500:1991 (Reaff:2012)	
					Desirable	Permissible
1.	Colour	APHA 2120-B	<5	Hazen	5	15
2.	Odour	APHA 2150-B	Agreeable	-	Agreeable	Agreeable
3.	Taste	APHA 2160-B	Agreeable	-	Agreeable	Agreeable
4.	Turbidity	APHA 2130-A+B	<1.0	NTU	1	5
5.	Temperature	APHA 2550-A+B	21.00	°C	Not Specified	Not Specified
6.	pH	APHA 4500H+A+B	7.35	-	6.5-8.5	No relaxation
7.	Conductivity	APHA 2110-A+B	363	µmhos/cm	-	-
8.	Alkalinity	APHA 2320-A+ B	312	mg/L	200	600
9.	Total Dissolved Solids	APHA2540-C	182	mg/L	500	2000
10.	Total Hardness	APHA 2340 A+C	140	mg/L	200	600
11.	Calcium	APHA 3500 Ca- A+B	32.0	mg/L	75	200
12.	Magnesium	APHA 3500 Mg A+B	14.6	mg/L	30	100

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3. Any discrepancy in test result should be reported within 15Days.
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Reviewed By:
Dr. Ashish Kumar
Technical Manager

Authorized Signatory
VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory
D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/003 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)
PART – A (CHEMICAL)

TEST RESULTS

13.	Chloride	APHA 4500 Cl A+B	33.9	mg/L	250	1000
14.	Phosphate	APHA 4500-SO42- E	1.58	mg/L	-	-
15.	Nitrate	APHA 4500-NO3- B	9.5	mg/L	45.0	-
16.	Sulfate	APHA 4500-PD	20.4	mg/L	200	400
17.	Fluoride	APHA 4500-C	0.25	mg/L	1.0	1.5
18.	Zinc	APHA 3111 A+B	<0.001	mg/L	5	15
19.	Boron	APHA 4500 B A+C	<0.02	mg/L	0.5	1.0
20.	Arsenic	APHA 3114 B	<0.01	mg/L	0.01	0.05
21.	Lead	APHA 3111 A+B	<0.001	mg/L	0.01	No relaxation
22.	Iron	APHA 3500 Fe B	0.19	mg/L	0.3	No relaxation
23.	Nickel	APHA 3111 A+B	<0.01	mg/L	0.02	No relaxation
24.	Copper	APHA 3111 A+B	<0.01	mg/L	0.05	1.5
25.	Total Chromium	APHA 3111 A+B	<0.05	mg/L	0.05	No relaxation
26.	Cadmium	APHA 3111 A+B	<0.001	mg/L	0.003	No relaxation
27.	Sodium	APHA 3500 Na, A+B	24	mg/L	-	-
28.	Potassium	APHA 3500 K, A+B	11	mg/L	-	-
29.	Total Coliform Count	APHA 9221 B	<2	MPN/100 ML	Shall not be detectable in any 100 ml sample	
30.	Faecal coliform	APHA 9221 E	<2	MPN/100 ML		

Note:

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3. Any discrepancy in test result should be reported within 15Days.
4. The above Results are related to the tested sample only.

Reviewed By:

Dr. A[illegible]mar
Technical Manager

Authorised Signatory

D. K. Yadav
Lab In-charge

CORPORATE OFFICE : B - 32 2nd Floor, Sec - 6, Noida, Gautam Buddha Nagar (UP) - 201301
TESTING FACILITY : KH.NO. 973 Part, Bijnaur, Sarojini Nagar, Lucknow (UP) - 226008
+91-9415135012 +91-9990366186 0522-7118739
Viratgloballab@gmail.com info@viratlab.com www.viratlab.com

TEST REPORT CODE: VGL/W/24/12/31/004 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)
PART – A (CHEMICAL)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**SURANGI**
Sample Description	:	GROUND WATER
Date & Time of Sampling	:	22.12.2024 01:10 PM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6& RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	004
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025
Method of Sampling	:	APHA 1060B & 9060A

TEST RESULTS

Sr. No.	Parameters	Test Method	Result	Unit	Limit as per IS 10500:1991 (Reaff:2012)	
					Desirable	Permissible
1.	Colour	APHA 2120-B	<5	Hazen	5	15
2.	Odour	APHA 2150-B	Agreeable	-	Agreeable	Agreeable
3.	Taste	APHA 2160-B	Agreeable	-	Agreeable	Agreeable
4.	Turbidity	APHA 2130-A+B	<1.0	NTU	1	5
5.	Temperature	APHA 2550-A+B	19.80	°C	Not Specified	Not Specified
6.	pH	APHA 4500H+A+B	7.23	-	6.5-8.5	No relaxation
7.	Conductivity	APHA 2110-A+B	566	µmhos/cm	-	-
8.	Alkalinity	APHA 2320-A+ B	140	mg/L	200	600
9.	Total Dissolved Solids	APHA2540-C	283	mg/L	500	2000
10.	Total Hardness	APHA 2340 A+C	284	mg/L	200	600
11.	Calcium	APHA 3500 Ca- A+B	57.7	mg/L	75	200
12.	Magnesium	APHA 3500 Mg A+B	34.0	mg/L	30	100

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4. The above Results are related to the tested sample only.

Review By:

Dr. Ashish Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/004 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)
PART – A (CHEMICAL)

TEST RESULTS

13.	Chloride	APHA 4500 Cl A+B	25.9	mg/L	250	1000
14.	Phosphate	APHA 4500-SO42- E	2.86	mg/L	-	-
15.	Nitrate	APHA 4500-NO3- B	8.2	mg/L	45.0	-
16.	Sulfate	APHA 4500-PD	36.7	mg/L	200	400
17.	Fluoride	APHA 4500-C	0.19	mg/L	1.0	1.5
18.	Zinc	APHA 3111 A+B	<0.001	mg/L	5	15
19.	Boron	APHA 4500 B A+C	<0.02	mg/L	0.5	1.0
20.	Arsenic	APHA 3114 B	<0.01	mg/L	0.01	0.05
21.	Lead	APHA 3111 A+B	<0.001	mg/L	0.01	No relaxation
22.	Iron	APHA 3500 Fe B	0.24	mg/L	0.3	No relaxation
23.	Nickel	APHA 3111 A+B	<0.01	mg/L	0.02	No relaxation
24.	Copper	APHA 3111 A+B	<0.01	mg/L	0.05	1.5
25.	Total Chromium	APHA 3111 A+B	<0.05	mg/L	0.05	No relaxation
26.	Cadmium	APHA 3111 A+B	<0.001	mg/L	0.003	No relaxation
27.	Sodium	APHA 3500 Na, A+B	20	mg/L	-	-
28.	Potassium	APHA 3500 K, A+B	8	mg/L	-	-
29.	Total Coliform Count	APHA 9221 B	<2	MPN/100 ML	Shall not be detectable in any 100 ml sample	
30.	Faecal coliform	APHA 9221 E	<2	MPN/100 ML		

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4. The above Results are related to the tested sample only.

Reviewed By:

Dr. [illegible]
Technical Manager

Authorised Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/005 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)
PART – A (CHEMICAL)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**AMBOLI**
Sample Description	:	GROUND WATER
Date & Time of Sampling	:	25.12.2024 11:20 AM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	005
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025
Method of Sampling	:	APHA 1060B & 9060A

TEST RESULTS

Sr. No.	Parameters	Test Method	Result	Unit	Limit as per IS 10500:1991 (Reaff:2012)	
					Desirable	Permissible
1.	Colour	APHA 2120-B	<5	Hazen	5	15
2.	Odour	APHA 2150-B	Agreeable	-	Agreeable	Agreeable
3.	Taste	APHA 2160-B	Agreeable	-	Agreeable	Agreeable
4.	Turbidity	APHA 2130-A+B	<1.0	NTU	1	5
5.	Temperature	APHA 2550-A+B	20.20	°C	Not Specified	Not Specified
6.	pH	APHA 4500H+A+B	7.26	-	6.5-8.5	No relaxation
7.	Conductivity	APHA 2110-A+B	507	µmhos/cm	-	-
8.	Alkalinity	APHA 2320-A+ B	148	mg/L	200	600
9.	Total Dissolved Solids	APHA2540-C	257	mg/L	500	2000
10.	Total Hardness	APHA 2340 A+C	208	mg/L	200	600
11.	Calcium	APHA 3500 Ca- A+B	48.0	mg/L	75	200
12.	Magnesium	APHA 3500 Mg A+B	21.4	mg/L	30	100

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4. The above Results are related to the tested sample only.

Reviewed By
VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) LUCKNOW
Dr. Ashok Kumar
Technical Manager

Authorized Signatory
VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory
D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/005 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)
PART – A (CHEMICAL)

TEST RESULTS

13.	Chloride	APHA 4500 Cl A+B	63.9	mg/L	250	1000
14.	Phosphate	APHA 4500-SO42- E	0.40	mg/L	-	-
15.	Nitrate	APHA 4500-NO3- B	9.3	mg/L	45.0	-
16.	Sulfate	APHA 4500-PD	34.3	mg/L	200	400
17.	Fluoride	APHA 4500-C	0.20	mg/L	1.0	1.5
18.	Zinc	APHA 3111 A+B	<0.001	mg/L	5	15
19.	Boron	APHA 4500 B A+C	<0.02	mg/L	0.5	1.0
20.	Arsenic	APHA 3114 B	<0.01	mg/L	0.01	0.05
21.	Lead	APHA 3111 A+B	<0.001	mg/L	0.01	No relaxation
22.	Iron	APHA 3500 Fe B	0.23	mg/L	0.3	No relaxation
23.	Nickel	APHA 3111 A+B	<0.01	mg/L	0.02	No relaxation
24.	Copper	APHA 3111 A+B	<0.01	mg/L	0.05	1.5
25.	Total Chromium	APHA 3111 A+B	<0.05	mg/L	0.05	No relaxation
26.	Cadmium	APHA 3111 A+B	<0.001	mg/L	0.003	No relaxation
27.	Sodium	APHA 3500 Na, A+B	26	mg/L	-	-
28.	Potassium	APHA 3500 K, A+B	12	mg/L	-	-
29.	Total Coliform Count	APHA 9221 B	<2	MPN/100 ML	Shall not be detectable in any 100 ml sample	
30.	Faecal coliform	APHA 9221 E	<2	MPN/100 ML		

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Review By:

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

Annexure-VII

SURFACEWATER QUALITY TEST REPORT OCT 2024- DEC 2024

TEST REPORT CODE: VGL/W/24/12/31/006 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**SAKARTOND RIVER**
Sample Description	:	SURFACE WATER
Date & Time of Sampling	:	27.12.2024 11:30 AM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	006
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025
Method of Sampling	:	APHA 1060B & 9060A

TEST RESULTS

Sl. No.	Parameter	Units of Measurements	Results
1	Colour	Hazen Units	<5
2	Odour	-	Agreeable
3	Taste	-	Not Done
4	pH	-	7.53
5	Temperature	°C	20.7
6	Turbidity	NTU	1.3
7	Conductivity	µmhos/cm	300
8	Alkalinity as $CaCO_3$	mg/l	132
9	Total Dissolved Solids	mg/l	150
10	Total Suspended Solids	mg/l	<5
11	Total Hardness as $CaCO_3$	mg/l	156
12	Calcium as $CaCO_3$	mg/l	35
13	Magnesium as $CaCO_3$	mg/l	16.50
14	Chloride as Cl	mg/l	22
15	Total Phosphorus	mg/l	3.12
16	Nitrate as NO_3	mg/l	8.5
17	Sulphate as SO_4	mg/l	5.6
18	Fluoride as F	mg/l	0.56

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Reviewed by:

Dr. Ashok Kumar
Technical Manager

Authorised Signatory:

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/006 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)

TEST RESULTS

19	Ammonical Nitrogen	mg/l	3.5
20	Arsenic as As	mg/l	<0.01
21	Lead as Pb	mg/l	<0.01
22	Zinc as Zn, Max	mg/l	0.22
23	Iron	mg/l	0.38
24	Nickel	mg/l	<0.5
25	Copper	mg/l	<0.001
26	Chromium	mg/l	<0.001
27	Cadmium	mg/l	<0.001
28	Sodium as Na	mg/l	32
29	Potassium as K	mg/l	10
30	Dissolved Oxygen	mg/l	5.3
31	BOD	mg/l	7.2
32	COD	mg/l	12
33	Total Coliform	MPN/100ml	31
34	Faecal Coliform	MPN/100ml	<2

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Reviewed By:

Dr. [illegible]hok Kumar
Technical Manager

Authorised Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/007 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**DAMAN GANGA RIVER**
Sample Description	:	SURFACE WATER
Date & Time of Sampling	:	27.12.2024 12:20 PM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	007
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025
Method of Sampling	:	APHA 1060B & 9060A

TEST RESULTS

Sl. No.	Parameter	Units of Measurements	Results
1	Colour	Hazen Units	<5
2	Odour	-	Agreeable
3	Taste	-	Not Done
4	pH	-	7.63
5	Temperature	°C	20.8
6	Turbidity	NTU	1.2
7	Conductivity	µmhos/cm	238
8	Alkalinity as $CaCO_3$	mg/l	68
9	Total Dissolved Solids	mg/l	109
10	Total Suspended Solids	mg/l	<5
11	Total Hardness as $CaCO_3$	mg/l	104
12	Calcium as $CaCO_3$	mg/l	21
13	Magnesium as $CaCO_3$	mg/l	12.60
14	Chloride as Cl	mg/l	10
15	Total Phosphorus	mg/l	1.73
16	Nitrate as NO_3	mg/l	8.3
17	Sulphate as SO_4	mg/l	1.1
18	Fluoride as F	mg/l	0.48

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4. The above Results are related to the tested sample only.

Review By:

Dr. [illegible] Kumar
Technical Manager

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

Authorized Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/007 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)

TEST RESULTS

19	Ammonical Nitrogen	mg/l	3.7
20	Arsenic as As	mg/l	<0.01
21	Lead as Pb	mg/l	<0.01
22	Zinc as Zn, Max	mg/l	0.23
23	Iron	mg/l	0.28
24	Nickel	mg/l	<0.5
25	Copper	mg/l	<0.001
26	Chromium	mg/l	<0.001
27	Cadmium	mg/l	<0.001
28	Sodium as Na	mg/l	28
29	Potassium as K	mg/l	12
30	Dissolved Oxygen	mg/l	5.9
31	BOD	mg/l	7.3
32	COD	mg/l	16
33	Total Coliform	MPN/100ml	23
34	Faecal Coliform	MPN/100ml	<2

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Review By:

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

Dr. Ashwani Kumar
Technical Manager

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/008 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**MADHUBAN RESERVOIR**
Sample Description	:	SURFACE WATER
Date & Time of Sampling	:	27.12.2024 03:30 PM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	008
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025
Method of Sampling	:	APHA 1060B & 9060A

TEST RESULTS

Sl. No.	Parameter	Units of Measurements	Results
1	Colour	Hazen Units	<5
2	Odour	-	Agreeable
3	Taste	-	Not Done
4	pH	-	7.15
5	Temperature	°C	22.1
6	Turbidity	NTU	1.5
7	Conductivity	µmhos/cm	368
8	Alkalinity as $CaCO_3$	mg/l	132
9	Total Dissolved Solids	mg/l	268
10	Total Suspended Solids	mg/l	<5
11	Total Hardness as $CaCO_3$	mg/l	203
12	Calcium as $CaCO_3$	mg/l	74
13	Magnesium as $CaCO_3$	mg/l	32.40
14	Chloride as Cl	mg/l	68
15	Total Phosphorus	mg/l	1.84
16	Nitrate as NO_3	mg/l	8.7
17	Sulphate as SO_4	mg/l	12.8
18	Fluoride as F	mg/l	0.65

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Reviewed by:

Dr. A[illegible]
Technical Manager

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) Authorised Signatory

Authorized Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/W/24/12/31/008 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)

TEST RESULTS

19	Ammonical Nitrogen	mg/l	4.1
20	Arsenic as As	mg/l	<0.01
21	Lead as Pb	mg/l	<0.01
22	Zinc as Zn, Max	mg/l	0.42
23	Iron	mg/l	0.22
24	Nickel	mg/l	<0.5
25	Copper	mg/l	<0.001
26	Chromium	mg/l	<0.001
27	Cadmium	mg/l	<0.001
28	Sodium as Na	mg/l	36
29	Potassium as K	mg/l	18
30	Dissolved Oxygen	mg/l	7.2
31	BOD	mg/l	12.7
32	COD	mg/l	36
33	Total Coliform	MPN/100ml	920
34	Faecal Coliform	MPN/100ml	540.0

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Review By:

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) LUCKNOW

Dr. Ashish Kumar
Technical Manager

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

D. K. Yadav
Lab In-charge

Annexure-VIII

WASTEWATER QUALITY TEST REPORT OCT 2024-DEC 2024

TEST REPORT CODE: VGL/WW/24/12/31/001 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**STP INLET**
Sample Description	:	WASTE WATER
Date & Time of Sampling	:	28.12.2024 11:50 AM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	001
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025
Method of Sampling	:	APHA 1060B & 9060A

TEST RESULTS

Sl. No.	Parameter	Test Method	Results	Unit
1	Colour	APHA 24th Edn. 2120-B	<5	Hazen Units
2	Odour	APHA 24th Edn. 2150 B	Agreeable	-
3	Taste	APHA 24th Edn.2160 B	Not Done	-
4	pH	APHA 24th Edn. 4500 H+B	7.81	-
5	Temperature	APHA 24th Edn 2550 B	22.1	°C
6	Turbidity	APHA 24th Edn 2130 B	1.8	NTU
7	Conductivity	APHA 24th Edn. 2110, A+B	1814	µmhos/cm
8	Alkalinity as $CaCO_3$	APHA 24th Edn. 2320 A+B	432	mg/l
9	Total Dissolved Solids	APHA 24th Edn. 2540C	907	mg/l
10	Total Suspended Solids	APHA 24th Edn 2540D	36	mg/l
11	Total Hardness as $CaCO_3$	APHA 24th Edn. 2340-C	304	mg/l
12	Calcium as $CaCO_3$	APHA 24th Edn. 2340 C	60	mg/l
13	Magnesium as $CaCO_3$	APHA 24th Edn. 3500	36.90	mg/l
14	Chloride as Cl	APHA 24th Edn. 4500-Cl B	278	mg/l
15	Total Phosphorus	APHA 24th Edn 4500 P D	5.40	mg/l
16	Nitrate as NO_3	APHA 24th Edn 4500 NO3 B	9.9	mg/l
17	Sulphate as SO_4	APHA 24th Edn. 4500- SO4E	56.1	mg/l
18	Fluoride as F	APHA 24th Edn. 4500 FC & D	0.95	mg/l

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Review By:

Dr. Ashok Kumar
Technical Manager

Authorised Signatory:

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) Authorised Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/WW/24/12/31/001 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)

TEST RESULTS

19	Ammonical Nitrogen	APHA 24th Edn 4500 NH3 F	4.2	mg/l
20	Arsenic as As	APHA 24th Edn. 3114 B	<0.01	mg/l
21	Lead as Pb	APHA 24th Edn. 3111 A+B	<0.01	mg/l
22	Zinc as Zn, Max	APHA 24th Edn. 3111-A+ B	0.16	mg/l
23	Iron	APHA 24th Edn. 3500 Fe B	0.23	mg/l
24	Nickel	APHA 24th Edn 3111 B	<0.5	mg/l
25	Copper	APHA 24th Edn. 3111-A+ B	<0.001	mg/l
26	Chromium	APHA 24th Edn 3500 B	<0.001	mg/l
27	Cadmium	APHA 24th Edn 3111 B	<0.001	mg/l
28	Sodium as Na	APHA 24th Edn. 3500 B	36	mg/l
29	Potassium as K	APHA 24th Edn 3500 B	16	mg/l
30	Dissolved Oxygen	IS 3025 (Part -38)	5.4	mg/l
31	BOD	IS 3025 (Part -44)	106.0	mg/l
32	COD	APHA 24th Ed. 5220 A+ C	432	mg/l
33	Total Coliform	APHA 24th Edn 9221 B	160000	MPN/100ml
34	Faecal Coliform	APHA 24th Edn 9221 E	9200.0	MPN/100ml

Note:

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3. Any discrepancy in test result should be reported within 15Days.
4. The above Results are related to the tested sample only.

Review By:

Dr. Ashok Kumar
Technical Manager

Authorized Signatory

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)

D. K. Yadav
Lab In-charge

Authorised Signatory

TEST REPORT CODE: VGL/WW/24/12/31/002 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)

Issued To	:	**ASERIES ENVIROTEK INDIA PVT LTD, LUCKNOW**
Name and Address of Customer	:	**M/s HINDUSTAN UNILEVER LIMITED** SURVEY NO.151/1/1 VILLAGE DAPADA KHANVEL ROAD SILVASSA, SILVASSA, 26- 360 230
Location of Sample	:	**STP OUTLET**
Sample Description	:	WASTE WATER
Date & Time of Sampling	:	28.12.2024 12:40 PM
Sample Collected by	:	ASHISH KUMAR & VIRENDRA KUMAR YADAV
Environmental Condition (At Lab)	:	Temp.(°C) 24.6 & RH (%) 57
Sample Packing	:	SEALED
Sample Id No.	:	002
Laboratory Sample Receiving Date	:	31.12.2024
Duration of Sample Analysis	:	01.01.2025 TO 06.01.2025
Method of Sampling	:	APHA 1060B & 9060A

TEST RESULTS

Sl. No.	Parameter	Test Method	Results	Unit	SPECIFICATION / LIMIT (AS PER CPCB)
1	Colour	APHA 24th Edn. 2120-B	<5	Hazen Units	-
2	Odour	APHA 24th Edn. 2150 B	Agreeable	-	-
3	Taste	APHA 24th Edn.2160 B	Not Done	-	-
4	pH	APHA 24th Edn. 4500 H+B	6.57	-	5.5-9.0
5	Temperature	APHA 24th Edn 2550 B	23.4	°C	-
6	Turbidity	APHA 24th Edn 2130 B	1.1	NTU	-
7	Conductivity	APHA 24th Edn. 2110, A+B	1515	µmhos/cm	-
8	Alkalinity as $CaCO_3$	APHA 24th Edn. 2320 A+B	52	mg/l	-
9	Total Dissolved Solids	APHA 24th Edn. 2540C	754	mg/l	-
10	Total Suspended Solids	APHA 24th Edn 2540D	16	mg/l	-
11	Total Hardness as $CaCO_3$	APHA 24th Edn. 2340-C	260	mg/l	-
12	Calcium as $CaCO_3$	APHA 24th Edn. 2340 C	56	mg/l	-
13	Magnesium as $CaCO_3$	APHA 24th Edn. 3500	27.20	mg/l	-
14	Chloride as Cl	APHA 24th Edn. 4500-Cl B	263	mg/l	1000
15	Total Phosphorus	APHA 24th Edn 4500 P D	4.35	mg/l	-
16	Nitrate as NO_3	APHA 24th Edn 4500 NO3 B	6.7	mg/l	-
17	Sulphate as SO_4	APHA 24th Edn. 4500- SO4E	31.8	mg/l	-
18	Fluoride as F	APHA 24th Edn. 4500 FC & D	0.36	mg/l	2.0

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4. The above Results are related to the tested sample only.

Review By:

D. [illegible] Kumar
Technical Manager

VIRAT GLOBAL LAB
(A Division of Aseries Envirotek India Pvt. Ltd.)
Authorised Signatory

Authorized Signatory

D. K. Yadav
Lab In-charge

TEST REPORT CODE: VGL/WW/24/12/31/002 TEST REPORT ISSUE DATE: 06.01.2025

TEST REPORT (WATER)

TEST RESULTS

19	Ammonical Nitrogen	APHA 24th Edn 4500 NH3 F	1.6	mg/l	-
20	Arsenic as As	APHA 24th Edn. 3114 B	<0.01	mg/l	0.2
21	Lead as Pb	APHA 24th Edn. 3111 A+B	<0.01	mg/l	0.1
22	Zinc as Zn, Max	APHA 24th Edn. 3111-A+ B	0.12	mg/l	5.0
23	Iron	APHA 24th Edn. 3500 Fe B	0.15	mg/l	3.0
24	Nickel	APHA 24th Edn 3111 B	<0.5	mg/l	-
25	Copper	APHA 24th Edn. 3111-A+ B	<0.001	mg/l	2.0
26	Chromium	APHA 24th Edn 3500 B	<0.001	mg/l	-
27	Cadmium	APHA 24th Edn 3111 B	<0.001	mg/l	2.0
28	Sodium as Na	APHA 24th Edn. 3500 B	23	mg/l	-
29	Potassium as K	APHA 24th Edn 3500 B	10	mg/l	-
30	Dissolved Oxygen	IS 3025 (Part -38)	6.1	mg/l	4.0
31	BOD	IS 3025 (Part -44)	7.4	mg/l	10.0
32	COD	APHA 24th Ed. 5220 A+ C	96	mg/l	50.0
33	Total Coliform	APHA 24th Edn 9221 B	430	MPN/100ml	-
34	Faecal Coliform	APHA 24th Edn 9221 E	5.6	MPN/100ml	-

Note:

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3. Any discrepancy in test result should be reported within 15Days.
4. The above Results are related to the tested sample only.

Reviewed by:

Dr. Ashok Kumar
Technical Manager

Authorised Signatory:

VIRAT GLOBAL LAB (A Division of Aseries Envirotek India Pvt. Ltd.) Authorised Signatory

D. K. Yadav
Lab In-charge

Annexure-IX

Demographic Profile of the Study Area

ANNEXURE XI– Demographic Profile of the Study Area

	Name	No_HH	TOT_P	P_06	P_SC	M_SC	F_SC	P_ST	M_ST	F_ST	P_LIT	M_LIT	F_LIT	P_ILL	M_ILL	F_ILL
Dadra Nagar Haveli & Daman and Diu	Athola	1018	4668	627	53	30	23	3807	1883	1924	3020	1869	1151	1648	611	1037
	Kharadpada	752	3691	442	24	10	14	2570	1300	1270	2325	1475	850	1366	569	797
	Athal	966	3965	558	32	27	5	2641	1304	1337	2639	1719	920	1326	565	761
	Falandi	392	1878	252	3	1	2	1536	747	789	1073	733	340	805	340	465
	Saily	3801	15655	1695	100	88	12	6515	3256	3259	11085	8717	2368	4570	2083	2487
	Karad	1476	5860	840	112	61	51	2044	1040	1004	4319	2943	1376	1541	657	884
	Vasona	878	4707	730	3	3	0	3667	1837	1830	2639	1838	801	2068	871	1197
	Chinchpada	434	2510	429	1	1	0	2485	1225	1260	1235	739	496	1275	502	773
	Luhari	484	2918	602	1	0	1	2871	1402	1469	1154	739	415	1764	685	1079
	Dapada	1115	5713	929	62	47	15	4988	2432	2556	2892	1853	1039	2821	1116	1705
	Pati	334	1943	367	0	0	0	1933	919	1014	1016	600	416	927	329	598
	Khadoli	661	3140	489	60	36	24	2355	1157	1198	1713	1077	636	1427	593	834
	Surangi	949	5016	847	1	1	0	3893	1892	2001	2653	1838	815	2363	925	1438
	Apti	284	1655	251	0	0	0	1640	791	849	786	475	311	869	325	544
	Velugam	801	4612	894	0	0	0	4444	2224	2220	2043	1259	784	2569	1096	1473
	Bindrabin	222	1184	224	0	0	0	1165	561	604	491	296	195	693	273	420
	Tinoda	130	748	127	0	0	0	740	358	382	318	207	111	430	155	275
	Khanvel	1612	7965	1191	36	17	19	4624	2267	2357	5127	2943	2184	2838	1145	1693

	Umbervarni	173	1053	166	0	0	0	1010	499	511	429	252	177	624	270	354
	Goratpada	60	316	43	0	0	0	306	146	160	143	92	51	173	61	112
	Medha	83	467	66	0	0	0	467	242	225	155	101	54	312	141	171
	Shelti	669	3999	762	0	0	0	3975	1963	2012	1423	856	567	2576	1121	1455
	Chauda	240	1118	185	0	0	0	957	442	515	607	371	236	511	191	320
	Kala	243	1341	204	0	0	0	1248	618	630	678	435	243	663	266	397
	Karachgam	482	2517	431	1	1	0	2327	1125	1202	1132	706	426	1385	537	848
	Kherdi	725	3637	509	57	28	29	3182	1554	1628	1917	1209	708	1720	677	1043
	Dolara	190	1296	285	0	0	0	1290	639	651	437	282	155	859	361	498
	Parzai	297	1717	305	0	0	0	1681	851	830	757	485	272	960	386	574
	Talavali	181	922	139	1	1	0	921	465	456	443	273	170	479	193	286
	Silvassa (M CI)	24105	98265	14230	2377	1239	1138	12989	6481	6508	76481	45825	30656	21784	10157	11627
	Samarvarni (CT)	3345	12553	1806	90	56	34	2801	1417	1384	9359	6403	2956	3194	1432	1762
	Rakholi (CT)	2295	8339	1023	84	60	24	1458	810	648	6234	4865	1369	2105	1010	1095
Maharashtra	Bormal	310	1661	308	0	0	0	1568	757	811	754	427	327	907	373	534
	Anwir	585	3604	843	0	0	0	3583	1794	1789	1283	820	463	2321	981	1340
	Sutrakar	1541	8795	1619	87	41	46	8633	4254	4379	3913	2376	1537	4882	1957	2925
	Gandhinagar	494	2590	430	0	0	0	2558	1258	1300	1216	751	465	1374	526	848
	Kodad	357	1819	292	417	199	218	1396	666	730	813	485	328	1006	384	622
	Udhawa	604	3026	458	255	119	136	1379	676	703	1837	1066	771	1189	481	708

Gujarat	Burvad	296	1713	413	0	0	0	1713	864	849	149	111	38	1564	753	811
	Fatepur	235	1328	321	0	0	0	1328	708	620	157	136	21	1171	572	599
	Piproni	162	950	272	0	0	0	950	470	480	131	100	31	819	370	449
	Madhuban	76	479	88	0	0	0	473	234	239	148	93	55	331	146	185
	Raymal	119	719	182	0	0	0	696	346	350	115	78	37	604	280	324
	Nagar	151	797	174	0	0	0	797	403	394	335	209	126	462	194	268
	Varoli Jungle	320	1904	449	0	0	0	1904	964	940	173	147	26	1731	817	914

Annexure-X

Occuptional Pattern of the Study Area

Annexure XII - Occupational Pattern of the Study Area

Name of Villages	TOT_	MAIN WORKERS					MARGINAL WORKERS			NON_
	WORK_P	WORK_P	_CL_P	_AL_P	_HH_P	_OT_P	WORK_P	_HH_P	_OT_P	WORK_P
Athola	2361	1536	293	167	4	1072	825	2	247	2307
Kharadpada	1608	1308	207	161	26	914	300	7	111	2083
Athal	2375	1771	353	203	262	953	604	60	341	1590
Falandi	780	677	145	23	5	504	103	7	56	1098
Saily	9206	8087	800	85	37	7165	1119	7	883	6449
Karad	3108	2814	113	29	41	2631	294	14	71	2752
Vasona	2397	1625	347	48	6	1224	772	16	339	2310
Chinchpada	1291	575	102	8	27	438	716	12	86	1219
Luhari	1028	728	195	51	1	481	300	8	182	1890
Dapada	2741	2163	637	161	162	1203	578	13	48	2972
Pati	875	405	76	74	7	248	470	85	99	1068
Khadoli	1071	946	262	21	3	660	125	0	68	2068
Surangi	2103	1878	642	8	12	1216	225	1	85	2913
Apti	640	397	102	2	0	293	243	0	9	1015
Velugam	2110	1594	632	486	11	465	516	5	112	2502
Bindrabin	623	238	197	13	1	27	385	2	18	561

Tinoda	395	110	99	4	3	4	285	0	13	353
Khanvel	2958	2702	976	63	91	1572	256	4	88	507
Umbervarni	243	240	207	0	0	33	3	0	1	810
Goratpada	183	68	20	12	0	36	115	0	23	133
Medha	270	108	60	16	0	32	162	0	12	197
Shelti	1848	1111	391	388	8	324	737	1	165	2151
Chauda	593	362	119	4	1	238	231	0	19	525
Kala	563	426	150	3	0	273	137	0	5	778
Karachgam	1133	917	357	18	2	540	216	2	99	1384
Kherdi	1823	1227	578	145	3	501	596	3	62	1814
Dolara	547	251	227	3	3	18	296	32	91	749
Parzai	694	419	139	67	8	205	275	9	18	1023
Talavali	521	513	422	1	11	79	8	0	0	401
Silvassa (M CI)	40277	37332	661	219	331	36121	2945	119	2386	57988
Samarvarni (CT)	6702	6182	200	43	34	5905	520	7	344	5851
Rakholi (CT)	5029	4688	101	11	18	4558	341	6	315	3310
Bormal	741	348	211	87	1	49	393	1	5	920
Anwir	1663	905	161	346	8	390	758	4	161	1941
Sutrakar	3329	1838	817	517	28	476	1491	95	219	5466

Gandhinagar	1284	1061	619	255	6	181	223	0	76	1306
Kodad	1032	471	380	37	5	49	561	0	46	787
Udhawa	1073	1010	280	87	75	568	63	15	10	1953
Burvad	801	364	332	23	3	6	437	0	16	912
Fatepur	506	295	159	115	0	21	211	2	17	822
Piproni	440	364	267	10	4	83	76	3	10	510
Madhuban	137	113	93	0	1	19	24	0	1	342
Raymal	398	166	4	37	0	125	232	0	3	321
Nagar	270	266	144	70	0	52	4	0	0	527
Varoli Jungle	997	469	215	161	2	91	528	99	36	907

Annexure-XI

NABL & NABET CERTIFICATE

National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

VIRAT GLOBAL LAB (A DIVISION OF ASERIES ENVIROTEK INDIA PRIVATE LIMITED)

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

KH NO. 973 (PART), BIJNAUR, SAROJINI NAGAR, LUCKNOW, UTTAR PRADESH, INDIA

in the field of

TESTING

Certificate Number: TC-14455

Issue Date: 09/09/2024 **Valid Until:** 08/09/2026

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of thislaboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Entity: ASERIES ENVIROTEK INDIA PRIVATE LIMITED

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

QUALITY COUNCIL® OF INDIA
Creating an Ecosystem for Quality

National Accreditation Board for Education and Training

Certificate of Accreditation

Aseries Envirotek India Pvt Ltd, Lucknow

Khasra No. 973 (Part), Sainik Vihar Phase-II, Near CRPF Camp Gate No. 2, Bijnaur, Sarojini Nagar, Lucknow-226008

*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	River Valley projects	3	1(c)	B
3	Thermal power plants	4	1 (d)	A
4	Cement plants	9	3 (b)	A
5	Chemical fertilizers	16	5 (a)	A
6	Oil & gas transportation pipeline (crude and refinery/ petrochemical products), passing through national parks/ sanctuaries/coral reefs /ecologically sensitive areas including LNG terminal	27	6 (a)	A
7	Building and construction projects	38	8(a)	B
8	Townships and Area development projects	39	8(b)	B
9	Electrical and Electronics including component industry	40 (iii)	--	A

Note: Names of approved EIA Coordinators and Functional Area Experts are mentioned in RAAC minutes dated Jan 17, 2023 and 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/23/2682 dated Feb 20, 2023. The accreditation needs to be renewed before the expiry date by Aseries Envirotek India Pvt Ltd, Lucknow following due process of assessment.

Sr. Director, NABET
Dated: Feb 20, 2023

Certificate No.
NABET/EIA/2225/RA 0275

Valid up to
November 09, 2025

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

National Accreditation Board for Education and Training

Ref. No. QCI/NABET/ENV/ACO/24/3457 **December 18, 2024**

To,
Aseries Envirotek India Pvt Ltd
Kh no. 973 Part, Near CRPF Camp Gate No. 2
Bijnaur, Sarojini Nagar
Lucknow-226008, Uttar Pradesh

Sub: Accreditation of EIA Consultant Organizations under NABET Scheme

Ref.: Your SA application dated 18 May 2024 subsequent correspondence on subject and office assessment scheduled on 12-13-14 August 2024 through video conference mode.

Dear Sir/Madam,

QCI-NABET is hereby pleased to accredit **Aseries Envirotek India Pvt Ltd, as a Category-A** organization for the sectors as mentioned in the Certificate of Accreditation

The validity of accreditation is subject to continued compliance to the Scheme and the terms & conditions mentioned in Annexure I to IV.

NABET looks forward to your association and continued support.

With best regards,

(A K Jha)
Sr. Director, NABET

Annexure-II

Ref. No.: QCI/NABET/ENV/ACO/24/3457
Date- December 18, 2024
Name of organization: Aseries Envirotek India Pvt Ltd, Lucknow

Accreditation under NABET Scheme for EIA Consultant Organization

Sectors approved for EIA Coordinators (ECs):

Assessed as per SA norms – for ECs approved earlier:

Sl. No.	Name	Earlier approval status (in RA3/subsequently)		Approval status (after SA)		Remarks
		Sectors approved	Cat.	Sectors approved	Cat.	
In-house						
	Rajendra Kumar Pandey	1	B	CA	A	Opencast only Upgraded to Cat. A
	Amar Singh Yadav	1	B	CA	A	Opencast only Upgraded to Cat. A
	Shashi Bhushan Sinha	1	A	CA	A	None
		4	A	CA	A	
		9	A	CA	A	
		16	A	CA	A	
		27	A	CA	A	
	Dinesh Kumar Yadav,	1	B	CA	B	Opencast only With observation to maintain Field log book. Candidate must keep documentary evidence of his field visits (including geotagged photographs) undertaken for projects in field logbooks for future assessments also maintain records pertaining to his contributions in preparation of EIA/EMPs report.
Empanelled-None						

Assessed as per IA norms – for Approved ECs and Fresh ECs proposed:

Sl. No.	Name	Sectors			Cat.	Remarks
		Applied	Recommended	Approved		
In-house						
1.	**Rajendra Kumar Pandey**	3	Yes	Yes	B	None
2.	**Amar Singh Yadav**	40(iii)	Yes	Yes	A	None
3.	**Vivek Kumar Tiwari**	1	Yes	Yes	B	Opencast only
		38	Yes	Yes	B	None
		39	Yes	Yes	B	
4.	**Garima Srivastava**	1	Yes	B	Yes	Opencast only
5.	**Omprakash Yadav**	1	Yes	B	Yes	Opencast only
Empanelled- None						

<u>Functional Areas (FA) approved for Functional Area Experts (FAEs):</u>

Assessed as per SA norms – for FAEs approved earlier:

Sl. No.	Name	Earlier approval status (in RA3 /subsequently)		Approval status (after SA)		Remarks
		FAs approved	Cat.	FAs approved	Cat.	
In-house						
1.	**Rajendra Kumar Pandey**	EB	A	CA	A	
		SC	B	CA	B	With observation to identify project specific impacts and mitigation measures
2.	**Amar Singh Yadav**	SE	A	CA	A	None
3.	**Vivek Kumar Tiwari**	NV	B	CA	B	None
		SHW	B	CA	B	
4.	**Shashi Bhushan Sinha**	AP	A	CA	A	None
		AQ	A	CA	A	
		WP	A	CA	A	
		SHW	A	CA	A	SW and HW only
5.	**Dinesh Kumar Yadav**	AP	B	CA	B	None
		N	B	CA	B	
6.	**Omprakash Yadav**	Geo	Yes	Yes	B	None

Sl. No.	Name	Earlier approval status (in RA3 /subsequently)		Approval status (after SA)		Remarks
		FAs approved	Cat.	FAs approved	Cat.	
		HG	Yes	Yes	B	
7.	**Garima Srivastava**	SC	B	CA	B	None
		WP	B	CA	B	
Empanelled						
8.	**S V Prashant**	AQ	B	CWA	B	With alert to upgrade his knowledge in working of AQ. Also the candidate must keep documentary evidence of his field visits (including geotagged photographs) undertaken for projects in field logbooks for future assessments also maintain records pertaining to his contributions in preparation of EIA/EMPs report
		RH	B	CA	B	With observation that he must keep documentary evidence of his field visits (including geotagged photographs) undertaken for projects in field logbooks for future assessments also maintain records pertaining to his contributions in preparation of EIA/EMPs report
9.	**Satpal Singh Raghuvanshi**	Geo	A	CA	A	None
		HG	B	CA	B	
		LU	B	CWA	B	With alert for lack of knowledge in the functional area. Also, the candidate must keep documentary evidence of his field visits (including geotagged photographs) undertaken for projects in field logbooks for future assessments also

Sl. No.	Name	Earlier approval status (in RA3 /subsequently)		Approval status (after SA)		Remarks
		FAs approved	Cat.	FAs approved	Cat.	
						maintain records pertaining to his contributions in preparation of EIA/EMPs report
10.	**Anil L Choumal**	NV	B	CA	A	Upgraded to Cat. A
		RH	A	CA	A	None

Assessed as per IA norms – for new functional areas of approved FAEs and fresh FAEs proposed:

Sl. No.	Name	Functional Area			Cat.	Remarks
		Applied	Recommended	Approved		
In-house						
1.	**Vivek Kumar Tiwari**	EB	No	No	-	Not recommended due to lack of EIA related experience in the applied FA.
		RH	Yes	Yes	B	None
2.	**Dinesh Kumar Yadav**	EB	No	No	-	Not recommended due to inadequate experience in the applied FA.
		NV	No	No	-	Not recommended as candidate as no experience in Vibration. To be continued for Noise only.
3.	**Garima Srivastava**	AQ	No	No	-	Candidature withdrawn as FAE **Accepted as TM**
		EB	No	No	-	Candidature withdrawn
4.	**Omprakash Yadav**	LU	No	No	-	No recommended due to inadequate experience in the applied FA. **Accepted to continue as TM**.
5.	**Raj Mani**	WP	No	No	-	No recommended due to inadequate experience in the applied FA
		RH	No	No	-	

Sl. No.	Name	Functional Area			Cat.	Remarks
		Applied	Recommended	Approved		
						Accepted to continue as TM
6.	**Sayeed Ahmad**	WP	No	No	-	No recommended due to inadequate experience in the applied FA **Accepted to continue as TM**
7.	**Nishu Kanaujiya**	WP	Yes	Yes	B	None
		SC	Yes	Yes	B	
8.	**Syed Salman Abbas**	WP	Yes	Yes	B	None
Empanelled- None						

Functional Area Associates (FAAs)-

a. FAAs proposed:

S. No.	Name	FA Applied	Approved	FAE/Mentor	Remarks
In-house					
1	**Preetika Chopra**	SE	Yes	Amar Singh Yadav	None
2.	**Rahul Singh Kushwaha**	WP	Yes	Shashi Bhushan Sinha	None
		EB	Yes	Rajendra Kumar Pandey	

Team Members (TM):

a. As EC:

Sl.No.	Name	FA Applied	Accepted	Approved EC (to work under)	Remarks
In-house					
1	**Vivek Kumar Tiwari**	9	Yes	Shashi Bhushan Sinha	None
		16	Yes	Shashi Bhushan Sinha	
2	**Garima Srivastava**	9	No	-	None
		27	Yes	Shashi Bhushan Sinha	Candidature withdrawn
3	**Amar Singh Yadav**	9	Yes	Shashi Bhushan Sinha	None
		27	Yes	Shashi Bhushan Sinha	

b. As FAE:

Sl.No.	Name	FA Applied	Accepted	Approved FAE (to work under)	Remarks
In-house					
1	**Indresh Singh**	RH	Yes	S V Prashant	None
		AQ	Yes	S V Prashant	

2	**Mohd Nafees**	NV	Yes	Vivek Kumar Tiwari	None
		AP	Yes	Dinesh Kumar Yadav	
3.	**Ravikant Mishra**	EB	Yes	Rajendra Kumar Pandey	None
		SC	Yes	Rajendra Kumar Pandey	
4	**Meena Chourasiya**	Geo	Yes	Om Prakash Yadav	None
		HG	Yes		

(A K Jha)
Sr. Director, NABET